NAVFAC ATLANTIC

WORK ORDER NO. 1667770

CONTRACT NO. N40085-18-D-8728

Specifications

Final Design Submittal

P-1102 Weapons Magazine and Ordnance Operations Facility

At the

Naval Submarine Base New London
Groton, CT

Volume 1 (01 11 00 - 07 27 19.01)

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Date: 08/14/2025

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Naval Facilities Engineering Command

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Issue for Bid & Construction

PREPARED BY:
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LIST OF DRAWINGS
02/11, CHG 1: 08/14

PART 1 GENERAL

1.1 SUMMARY

This section lists the drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings, Maps and Specifications."

1.2 CONTRACT DRAWINGS

Contract drawings are as follows:

OPERATIONS BUILDING			
SHEET NO.		NAVFAC DWG. NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12893951	GENERAL COVER SHEET
2	G-002	12893952	GENERAL LIST OF SHEETS
3	G-101	12893953	GENERAL BUILDING CODE ANALYSIS
4	G-102	12893954	GENERAL FLOOR PLAN - LIFE SAFETY
5	G-103	12893955	CODE COMPLIANCE SITE PLAN - AREA A
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7	S-002	12893957	DESIGN CRITERIA & LOADS
8	S-003	12893958	MATERIAL NOTES
9	S-101	12893959	FOUNDATION & GROUND FLOOR PLAN
10	S-102	12893960	ROOF FRAMING PLANS
11	S-201	12893961	BUILDING ELEVATIONS
12	S-202	12893962	BUILDING ELEVATIONS
13	S-401	12893963	DUMPSTER ENCLOSURE
14	S-501	12893964	TYPICAL FOUNDATION & CONCRETE DETAILS
15	S-502	12893965	TYPICAL SLAB-ON-GROUND DETAILS
16	S-503	12893966	TYPICAL CONCRETE WALL DETAILS
17	S-504	12893967	TYPICAL STEEL DETAILS
18	S-505	12893968	TYPICAL JOIST DETAILS

19	S-510	12893969	SECTIONS & DETAILS
20	S-601	12893970	SCHEDULES
21	S-901	12893971	3D ISOMETRIC VIEWS
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26	A-102	12893976	ARCHITECTURAL REFLECTED CEILING PLAN
27	A-103	12893977	ARCHITECTURAL ROOF PLAN
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60	P-104	12894010	PLUMBING RADON MITIGATION FLOOR PLAN
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81	M-804	12894031	MECHANICAL CONTROL DIAGRAMS & SEQUENCES
82	M-805	12894032	MECHANICAL CONTROL POINTS SCHEDULE
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93	EL101	12894043	ELECTRICAL LIGHTING PLAN
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107	T-201	12894057	TELECOMMUNICATIONS RACK ELEVATIONS
108	T-202	12894058	TELECOMMUNICATIONS ELEVATIONS
109	T-401	12894059	TELECOMMUNICATIONS ENLARGED PLANS

110	T-501	12894060	TELECOMMUNICATIONS DETAILS
111	T-502	12894061	TELECOMMUNICATIONS DETAILS
112	T-503	12894062	TELECOMMUNICATIONS DETAILS
113	T-504	12894063	TELECOMMUNICATIONS DETAILS
114	T-505	12894064	TELECOMMUNICATIONS DETAILS
115	T-506	12894065	TELECOMMUNICATIONS DETAILS
116	T-507	12894066	TELECOMMUNICATIONS DETAILS
117	T-508	12894067	TELECOMMUNICATIONS DETAILS
118	T-509	12894068	TELECOMMUNICATIONS DETAILS
119	T-510	12894069	TELECOMMUNICATIONS DETAILS
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121	T-602	12894071	TELECOMMUNICATIONS SCHEDULES
122	T-603	12894072	ONE LINE OSP RISER DIAGRAM
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125	TA101	12894075	AUDIO VISUAL FLOOR PLAN
126	TA201	12894076	AUDIO VISUAL ELEVATIONS
127	TA202	12894077	AUDIO VISUAL ELEVATIONS
128	TA401	12894078	AUDIO VISUAL ENLARGED PLANS
129	TA402	12894079	AUDIO VISUAL ENLARGED PLANS
130	TA501	12894080	AUDIO VISUAL DETAILS
131	TA502	12894081	AUDIO VISUAL DETAILS
132	TA601	12894082	AUDIO VISUAL DIAGRAMS
133	TA602	12894083	AUDIO VISUAL DIAGRAMS
SECURITY			
134	TY001	12894084	SECURITY SYMBOLS, LEGEND, ABBREVIATIONS, AND NOTES
135	TY101	12894085	SECURITY FLOOR PLAN
136	TY501	12894086	SECURITY DETAILS
137	TY502	12894087	SECURITY DETAILS
138	TY503	12894088	SECURITY DETAILS
139	TY504	12894324	SECURITY DETAILS

140	TY601	12894323	SECURITY SCHEMATIC DESIGN

SENTRY BUILDING			
SHEET NO.		NAVFAC DWG. NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12894089	GENERAL COVER SHEET
2	G-002	12894090	GENERAL LIST OF SHEETS
STRUCTURAL			
3	S-001	12894091	GENERAL NOTES, ABBREVIATIONS & LEGEND
4	S-002	12894092	DESIGN CRITERIA & LOADS
5	S-003	12894093	MATERIAL NOTES
6	S-101	12894094	FLOOR & ROOF PLANS
7	S-201	12894095	BUILDING ELEVATIONS
8	S-501	12894096	TYPICAL FOUNDATION & CONCRETE DETAILS
9	S-502	12894097	TYPICAL SLAB-ON-GROUND DETAILS
10	S-503	12894098	TYPICAL CONCRETE WALL DETAILS
11	S-504	12894099	TYPICAL STEEL DETAILS
12	S-510	12894100	SECTIONS & DETAILS
13	S-601	12894101	SCHEDULES
14	S-901	12894102	3D ISOMETRIC VIEWS
ARCHITECTURAL			
15	A-001	12894103	ARCHITECTURAL NOTES AND SYMBOLS
16	A-002	12894104	ARCHITECTURAL ACCESSIBILITY STANDARDS & MOUNTING HEIGHTS

17	A-101	12894105	ARCHITECTURAL FLOOR PLANS
18	A-201	12894106	ARCHITECTURAL EXTERIOR ELEVATIONS
19	A-301	12894107	ARCHITECTURAL BUILDING SECTIONS
20	A-302	12894108	ARCHITECTURAL WALL SECTIONS
21	A-501	12894109	ARCHITECTURAL EXTERIOR DETAILS
22	A-502	12894110	ARCHITECTURAL EXTERIOR DETAILS
23	A-503	12894111	OPENING DETAILS
24	A-601	12894112	ARCHITECTURAL SCHEDULES
25	A-602	12894113	ARCHITECTURAL PARTITION TYPES
INTERIORS			
26	I-101	12894114	FF&E PLAN & SCHEDULE
27	I-102	12894115	INTERIOR FINISH PLAN & ROOM FINISH SCHEDULE
28	I-103	12894116	SIGNAGE PLAN & SCHEDULE
29	I-401	12894117	INTERIOR ENLARGED PLANS & ELEVATIONS
30	I-501	12894118	INTERIOR DETAILS
PLUMBING			
31	P-001	12894119	PLUMBING LEGEND AND GENERAL NOTES
32	P-101	12894120	PLUMBING FLOOR PLANS
33	P-501	12894121	PLUMBING DETAILS
34	P-601	12894122	PLUMBING SCHEDULES
35	P-901	12894123	PLUMBING RISER DIAGRAMS
MECHANICAL			
36	M-001	12894124	MECHANICAL LEGEND, ABBREVIATIONS AND NOTES
37	M-101	12894125	MECHANICAL FLOOR PLAN - DUCTWORK
38	MP101	12894126	MECHANICAL FLOOR PLAN - PIPING
39	M-501	12894127	MECHANICAL DETAILS
40	M-601	12894128	MECHANICAL SCHEDULES

41	M-800	12894129	CONTROLS LEGEND
42	M-801	12894130	CONTROLS DIAGRAMS & SEQUENCES
ELECTRICAL			
43	E-001	12894131	ELECTRICAL GENERAL NOTES
44	E-002	12894132	ELECTRICAL ABBREVIATIONS
45	E-003	12894133	ELECTRICAL SYMBOLS
46	E-004	12894134	ELECTRICAL SYMBOLS
47	EG101	12894135	ELECTRICAL GROUNDING AND LIGHTNING PROTECTION PLAN
48	EL101	12894136	ELECTRICAL LIGHTING PLAN
49	EP101	12894137	ELECTRICAL POWER AND EQUIPMENT POWER PLAN
50	E-501	12894138	ELECTRICAL DETAILS
51	E-502	12894139	ELECTRICAL DETAILS
52	E-601	12894140	ELECTRICAL POWER SINGLE LINE DIAGRAM
53	E-701	12894141	LIGHTING FIXTURE AND CONTROLS SCHEDULES
54	E-702	12894142	ELECTRICAL PANEL SCHEDULES
55	E-703	12894143	ELECTRICAL FEEDER SCHEDULE
TELECOMMUNICATIONS			
56	T-001	12894144	TELECOMMUNICATIONS SYMBOLS, LEGEND, ABBREVIATIONS, AND NOTES
57	T-101	12894145	TELECOMMUNICATIONS FLOOR PLAN
58	T-401	12894146	TELECOMMUNICATIONS ENLARGED PLANS
59	T-501	12894147	TELECOMMUNICATIONS DETAILS
60	T-502	12894148	TELECOMMUNICATIONS DETAILS
61	T-503	12894149	TELECOMMUNICATIONS DETAILS
SECURITY			
62	TY001	12894325	SECURITY SYMBOLS, LEGEND, ABBREVIATIONS, AND NOTES
63	TY101	12894150	SECURITY FLOOR PLAN
64	TY501	12894151	SECURITY DETAILS

65	TY502	12894152	SECURITY DETAILS

BOX C LIST OF SHEETS			
SHEET NO.		NAVFAC DWG NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12894153	COVER SHEET
2	G-002	12894154	SHEET INDEX
STRUCTURAL			
3	S-001	12894155	GENERAL NOTES
4	S-002S	12894156	GENERAL NOTES
5	S-010S	12894157	OVERALL PLAN - SITE ADAPTED
6	S-011S	12894158	EPDM COVER LAYOUT - SITE ADAPTED
7	S-101AS	12894159	BOXC-001 FOUNDATION & GROUND FLOOR PLAN - SITE ADAPTED
8	S-101BS	12894160	BOXC-002 FOUNDATION & GROUND FLOOR PLAN - SITE ADAPTED
9	S-102AS	12894162	BOXC-001 ROOF PLAN AND FRONT ELEVATION - SITE ADAPTED
10	S-102BS	12894163	BOXC-002 ROOF PLAN AND FRONT ELEVATION - SITE ADAPTED
11	S-103S	12894164	CRANE RUNWAY PLAN - SITE ADAPTED
12	S-301S	12894165	SECTIONS AND DETAILS - SITE ADAPTED
13	S-302S	12894166	SECTIONS AND DETAILS - SITE ADAPTED
14	S-303AS	12894167	RETAINING WALL DETAILS - SITE ADAPTED
15	S-303BS	12894168	RETAINING WALL DETAILS - SITE ADAPTED
16	S-304	12894169	PARTIAL ELEVATION
17	S-305	12894170	PARTIAL PLAN AND ELEVATION
18	S-501	12894171	RETAINING WALL DETAILS
19	S-502S	12894172	SECTIONS AND DETAILS - SITE ADAPTED
20	S-503	12894173	SECTIONS AND DETAILS

21	S-504	12894174	SECTIONS AND DETAILS
22	S-505	12894175	DOOR SECTIONS AND DETAILS
23	S-506	12894176	DOOR MONORAIL SUPPORT BRACKETS AND DETAILS
24	S-507	12894177	TRENCH SECTIONS AND DETAILS
25	S-508	12894178	DOOR DETAILS AND SECTIONS
26	S-509	12894179	DOOR DETAILS AND SECTIONS
27	S-510	12894180	VENTILATOR DETAILS
28	S-511	12894181	INTAKE VENTILATOR DETAILS
29	S-512	12894182	DOOR INTERIOR LOCK MECHANISM DETAILS
30	S-513	12894183	OPTIONAL HIGH SECURITY HASP - ILD DETAILS
31	S-514	12894184	TRENCH COVER DETAILS
32	S-520S	12894186	EPDM COVER DETAILS - SITE ADAPTED
33	S-521S	12894187	EPDM COVER SECTIONS - SITE ADAPTED
			ELECTRICAL
34	E-001S	12894188	LEGENDS, ABBREVIATIONS AND GENERAL NOTES-SITE ADAPTED
35	E-101S	12894189	LIGHTING PLAN- SITE ADAPTED
36	E-102S	12894190	POWER PLANS- SITE ADAPTED
37	E-103S	12894191	GROUNDING PLAN- SITE ADAPTED
38	E-501S	12894192	DETAILS- SITE ADAPTED
39	E-502S	12894193	DETAILS- SITE ADAPTED
40	E-601S	12894194	POWER RISER DIAGRAM AND PANELBOARD SCHEDULE-SITE ADAPTED
41	E-701S	12894195	LIGHTING DETAILS- SITE ADAPTED
42	E-801S	12894196	HEAT TRACE PLAN- SITE ADAPTED
43	E-802S	12894197	HEAT TRACE DETAILS- SITE ADAPTED
			SECURITY
44	TY001AS	12894326	SECURITY LEGEND, NOTES & ABBREVIATIONS
45	TY101AS	12894327	SECURITY FLOOR PLAN - SITE ADAPTED

46	TY501	12894328	SECURITY DETAILS
47	TY601	12894329	SECURITY DETAILS - SITE ADAPTED

BOX D LIST OF SHEETS			
SHEET NO.		NAVFAC DWG NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12894198	COVER SHEET
2	G-002	12894199	SHEET INDEX
STRUCTURAL			
3	S-001	12894200	GENERAL NOTES
4	S-002S	12894201	GENERAL NOTES
5	S-010S	12894202	OVERALL PLAN - SITE ADAPTED
6	S-011S	12894203	EPDM COVER LAYOUT - SITE ADAPTED
7	S-101S	12894204	FLOOR PLAN - SITE ADAPTED
8	S-102S	12894205	SLAB PLAN AND FRONT ELEVATION - SITE ADAPTED
9	S-103AS	12894206	RETAINING WALL PLAN AND ELEVATION - SITE ADAPTED
10	S-103BS	12894207	RETAINING WALL PLAN AND ELEVATION - SITE ADAPTED
11	S-104S	12894208	ROOF PLAN - SITE ADAPTED
12	S-105S	12894209	CRANE RUNWAY PLAN - SITE ADAPTED
13	S-301S	12894210	SECTIONS AND DETAILS - SITE ADAPTED
14	S-302S	12894211	SECTIONS - SITE ADAPTED
15	S-303	12894212	HEADWALL/DOOR ELEVATION
16	S-304	12894213	EXTERIOR HEADWALL PLAN AND ELEVATION
17	S-305	12894214	PLAN SECTIONS, CANOPY, RAIL SUPPORTS, TRENCH COVERS
18	S-501	12894215	RETAINING WALL DETAILS
19	S-502	12894216	SECTIONS AND DETAILS

20	S-503	12894217	HEAD WALL SECTIONS
21	S-504	12894218	HEAD WALL SECTIONS
22	S-505	12894219	HEAD WALL DETAILS
23	S-506	12894220	VENTILATOR DETAILS, SECTIONS AND ELEVATIONS
24	S-507	12894221	AIR INTAKE SECTIONS AND DETAILS
25	S-508	12894222	SLIDING DOOR SECTION DETAILS AND ELEVATION
26	S-509	12894223	CANOPY DETAILS
27	S-510	12894224	RAIL SUPPORT BEAM - DETAILS
28	S-511	12894225	TRENCH COVER DETAILS
29	S-512	12894226	DOOR ROLLER GUIDES AND SHOCK ABSORBER DETAILS
30	S-513	12894227	ALTERNATE HIGH SECURITY HASP - ILD DETAILS
31	S-514	12894228	INTERIOR DOOR LOCK DETAILS
32	S-520S	12894229	EPDM COVER DETAILS - SITE ADAPTED
33	S-521S	12894230	EPDM COVER DETAILS - SITE ADAPTED
34	S-601	12894231	ELEVATION - SLIDING DOOR OPERATOR
35	S-602	12894232	SLIDING DOOR DETAILS
36	S-603	12894233	SLIDING DOOR DETAILS
			ELECTRICAL
37	E-001S	12894234	LEGENDS, ABBREVIATIONS AND GENERAL NOTES-SITE ADAPTED
38	E-101S	12894235	LIGHTING PLAN- SITE ADAPTED
39	E-102S	12894236	POWER PLANS - SITE ADAPTED
40	E-103S	12894237	GROUNDING PLAN - SITE ADAPTED
41	E-501S	12894238	DETAILS-SITE ADAPTED
42	E-502S	12894239	DETAILS-SITE ADAPTED
43	E-601S	12894240	POWER RISER DIAGRAM AND PANELBOARD SCHEDULE - SITE ADAPTED
44	E-701S	12894241	LIGHTING DETAILS- SITE ADAPTED
45	E-801S	12894242	HEAT TRACE PLAN - SITE ADAPTED

46	E-802S	12894243	HEAT TRACE DETAILS- SITE ADAPTED
SECURITY			
47	TY001BS	12894330	SECURITY LEGEND, SYMBOLS & ABBREVIATIONS
48	TY101BS	12894331	SECURITY FLOOR PLAN - SITE ADAPTED
49	TY501	12894332	SECURITY DETAILS
50	TY601	12894333	SECURITY SCHEMATIC DESIGN

CLWS LIST OF SHEETS			
SHEET NO.		NAVFAC DWG NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12894244	COVER SHEET
2	G-002	12894245	SHEET INDEX
STRUCTURAL			
3	S-001	12894246	GENERAL NOTES - 1
4	S-002	12894247	GENERAL NOTES - 2
5	S-003	12894248	STANDARD DETAILS
6	S-004S	12894249	GENERAL NOTES -3
7	S-010S	12894250	OVERALL PLAN - SITE ADPATED
8	S-011S	12894251	EPDM COVER LAYOUT - SITE ADAPTED
9	S-101	12894252	FOUNDATION/ FLOOR PLAN
10	S-102	12894253	BRIDGE CRANE AND CANOPY FRAMING PLAN
11	S-103	12894254	ROOF FRAMING PLAN
12	S-104	12894255	FOUNDATION DRAINAGE PLAN
13	S-201AS	12894256	CLWS-001 BUILDING ELEVATIONS - 1 - SITE ADAPTED
14	S-201BS	12894257	CLWS-002/003/004/005 BUILDING ELEVATIONS - 1 - SITE ADAPTED
15	S-201CS	12894258	CLWS-006 BUILDING ELEVATIONS - 1 - SITE ADAPTED

16	S-202	12894259	BUILDING ELEVATIONS - 2
17	S-203	12894260	RETAINING WALL ELEVATIONS
18	S-204	12894261	FRONT WALL PARTIAL ELEVATIONS
19	S-205	12894262	FRONT WALL PARTIAL ELEVATION AND DETAILS
20	S-206	12894263	BUILDING ELEVATIONS - 3
21	S-301S	12894264	BUILDING SECTIONS
22	S-302	12894265	WALL SECTIONS - 1
23	S-303S	12894266	WALL SECTIONS - 2
24	S-304S	12894267	WALL SECTIONS - 3
25	S-401	12894268	ENLARGED TRENCH PLAN
26	S-402	12894269	ENLARGED CANOPY FRAMING PLAN
27	S-403	12894270	ENLARGED PLAN VIEW RETAINING WALL
28	S-404S	12894271	ENLARGED PLAN VIEW RETAINING WALL-SITE ADAPTED
29	S-501	12894272	DOOR GUIDE AND CANOPY DETAILS
30	S-502	12894273	PILASTER AND BOUNDARY ELEMENTS REINF DETAILS
31	S-503	12894274	DOOR , TRENCH AND COVER DETAILS
32	S-504	12894275	DOOR STOP, PLOW AND TRENCH COVER ROLLER DETAILS
33	S-505	12894276	SECURITY PILASTER DETAILS
34	S-520S	12894277	EPDM COVER DETAILS - SITE ADAPTED
35	S-521S	12894278	EPDM COVER DETAILS - SITE ADAPTED
36	S-701	12894279	DOOR ELEVATION, NOTES AND SCHEDULES
37	S-702	12894280	DOOR ELEVATION AND DETAILS
38	S-703	12894281	DOOR DETAILS
39	S-704	12894282	AIR INTAKE SECTIONS AND DETAILS
40	S-705	12894283	VENTILATOR DETAILS, SECTIONS AND ELEVATIONS
41	S-706	12894284	DRAINIAGE ISOMETRIC & PENETRATION DETAILS
MECHANICAL			

42	M-001S	12894285	MECHANICAL LEGEND AND GENERAL NOTES
43	M-101S	12894286	MECHANICAL DUCTWORK PLAN - TYPICAL
44	M-301S	12894287	MECHANICAL SECTIONS - TYPICAL
45	M-401S	12894288	MECHANICAL ENLARGED PLANS - TYPICAL
46	M-501S	12894289	MECHANICAL DETAILS
47	M-601S	12894290	MECHANICAL SCHEDULES
48	M-801S	12894291	MECHANICAL CONTROLS LEGEND
49	M-802S	12894292	MECHANICAL CONTROLS DIAGRAMS AND SEQUENCES
50	M-803S	12894293	MECHANICAL CONTROLS DIAGRAMS AND SEQUENCES
51	M-804S	12894294	MECHANICAL CONTROLS DIAGRAMS AND SEQUENCES
52	M-805S	12894295	MECHANICAL CONTROLS POINTS SCHEDULE
53	M-806S	12894296	MECHANICAL CONTROLS POINTS SCHEDULE
ELECTRICAL			
54	E-001S	12894297	ELECTRICAL SYMBOLS & LEGEND - SITE ADAPTED
55	E-101A	12894298	ELECTRICAL FLOOR PLAN A
56	E-101BS	12894299	ELECTRICAL FLOOR PLAN B - SITE ADAPTED
57	E-102A	12894300	ELECTRICAL GROUNDING PLAN A
58	E-102BS	12894301	ELECTRICAL GROUNDING PLAN B - SITE ADAPTED
59	E-103S	12894302	ELECTRICAL LIGHTNING ZONE PROTECTION ELEVATION - SITE ADAPTED
60	E-104S	12894303	ELECTRICAL LIGHTNING ZONE PROTECTION ELEVATION - SITE ADAPTED
61	E-501S	12894304	ELECTRICAL DETAILS - SITE ADAPTED
62	E-502	12894305	ELECTRICAL DETAILS
63	E-503S	12894306	ELECTRICAL DETAILS - SITE ADAPTED
64	E-504S	12894307	ELECTRICAL DETAILS - SITE ADAPTED
65	E-505S	12894308	ELECTRICAL DETAILS - SITE ADAPTED
66	E-506	12894309	ELECTRICAL DETAILS
67	E-601S	12894310	ELECTRICAL ONE-LINE - SITE ADAPTED

68	E-602S	12894311	ELECTRICAL SCHEDULES - SITE ADAPTED
69	E-801S	12894312	ELECTRICAL HEAT TRACE PLAN
70	E-802S	12894313	ELECTRICAL HEAT TRACE DETAILS
TELECOMUNICATIONS			
71	T-101AS	12894334	TELECOMMUNICATION FLOOR PLAN A - SITE ADAPTED
72	T-101BS	12894335	TELECOMMUNICATION FLOOR PLAN B - SITE ADAPTED
73	T-501	12894336	TELECOMMUNICTION DETAILS
74	T-601S	12894337	TELECOMMUNICATION AND SECURITY RISER DIAGRAM - SITE ADAPTED
SECURITY			
75	TY001A	12894338	SECURITY LEGEND, NOTES & ABBREVIATIONS
76	TY101AS	12894339	SECURITY FLOOR PLAN A - SITE ADAPTED
77	TY101BS	12894340	SECURITY FLOOR PLAN B - SITE ADAPTED
78	TY501	12894341	SECURITY DETAILS
79	TY502	12894342	SECURITY DETAILS

MAGAZINE A-113 MODIFICATIONS LIST OF SHEETS			
SHEET NO.		NAVFAC DWG NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12894318	COVER SHEET
2	G-002	12894319	SHEET INDEX
STRUCTURAL			
3	S-001	12894320	GENERAL NOTES
4	S-101	12894321	FOUNDATION & GROUND FLOOR PLAN
5	S-501	12894322	MASONRY DETAILS
ELECTRICAL			
6	E-001	12894343	ELECTRICAL GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS

7	E-101	12894344	ELECTRICAL LIGHTING PLAN
8	E-102	12894345	ELECTRICAL POWER PLAN
9	E-501	12894346	ELECTRICAL LIGHTING DETAILS
SECURITY			
10	TY001	12894347	SECURITY LEGEND, NOTES & ABBREVIATIONS
11	TY101	12894348	SECURITY FLOOR PLAN
12	TY501	12894349	SECURITY DETAILS
13	TY502	12894350	SECURITY DETAILS
14	TY601	12894351	SECURITY DIAGRAMS

SITE LIST OF SHEETS			
SHEET NO.		NAVFAC DWG NO.	SHEET TITLE
NO.	SHEET		
GENERAL			
1	G-001	12893807	COVER SHEET
2	G-002	12893808	SHEET INDEX
3	GC-101	12893809	PHASE 1 CONSTRUCTION PHASING PLAN
4	GC-102	12893810	PHASE 2 CONSTRUCTION PHASING PLAN
5	GC-103	12893811	PHASE 3 CONSTRUCTION PHASING PLAN
HAZARDOUS MATERIAL			
6	HD-101	12893812	TYPICAL MAGAZINE STORAGE BUILDING A94-A111
7	HD-102	12893813	FIRST FLOOR BUILDING 393
8	HD-103	12893814	FIRST FLOOR PLAN BUILDING 524
9	HD-104	12893815	SECOND FLOOR PLAN BUILDING 524
10	H-101	12893816	LAND USE CONTROL PLAN HAZMAT
11	H-102	12893817	LAND USE CONTROL PLAN HAZMAT
GEOTECHNICAL			
12	B-101	12893818	GROUND IMPROVEMENTS PLAN
13	B-102	12893819	TOP OF BEDROCK ELEVATION
14	B-501	12893820	ROCK FALL PROTECTION MESH DETAILS
15	BB101	12893821	BORING LOCATION PLAN
16	BB301	12893822	BORING LOGS

17	BB302	12893823	BORING LOGS
18	BB303	12893824	BORING LOGS
19	BB304	12893825	BORING LOGS
20	BB305	12893826	BORING LOGS
21	BB306	12893827	BORING LOGS
22	BB307	12893828	BORING LOGS
23	BB308	12893829	BORING LOGS
			CIVIL
24	V-100	12893830	EXISTING CONDITIONS PLAN - OVERALL CIVIL
25	V-101	12893831	EXISTING CONDITIONS PLAN - AREA A CIVIL
26	V-102	12893832	EXISTING CONDITIONS PLAN - AREA B CIVIL
27	V-103	12893833	EXISTING CONDITIONS PLAN - AREA C CIVIL
28	C-001	12893834	GENERAL NOTES & LEGEND CIVIL
29	C-002	12893835	VICINITY MAP & HAUL ROUTE CIVIL
30	C-003	12893836	OVERALL SITE KEY MAP CIVIL
31	C-004	12893837	EROSION & SEDIMENT CONTROL - GENERAL NOTES CIVIL
32	C-100	12893838	INITIAL EROSION AND SEDIMENT CONTROL PLAN - OVERALL CIVIL
33	C-101	12893839	INITIAL EROSION AND SEDIMENT CONTROL PLAN - AREA A CIVIL
34	C-102	12893840	INITIAL EROSION AND SEDIMENT CONTROL PLAN - AREA B CIVIL
35	C-103	12893841	INITIAL EROSION AND SEDIMENT CONTROL PLAN - AREA C CIVIL
36	C-104	12893842	INITIAL EROSION AND SEDIMENT CONTROL PLAN - AREA D CIVIL
37	C-105	12893843	INITIAL EROSION AND SEDIMENT CONTROL PLAN - AREA E CIVIL
38	C-110	12893844	FINAL EROSION AND SEDIMENT CONTROL PLAN - OVERALL CIVIL
39	C-111	12893845	FINAL EROSION AND SEDIMENT CONTROL PLAN - AREA A CIVIL
40	C-112	12893846	FINAL EROSION AND SEDIMENT CONTROL PLAN - AREA B CIVIL
41	C-113	12893847	FINAL EROSION AND SEDIMENT CONTROL PLAN - AREA C CIVIL
42	C-114	12893848	FINAL EROSION AND SEDIMENT CONTROL PLAN - AREA D CIVIL
43	C-115	12893849	FINAL EROSION AND SEDIMENT CONTROL PLAN - AREA E CIVIL
44	C-501	12893850	EROSION AND SEDIMENT CONTROL DETAILS CIVIL
45	C-502	12893851	EROSION AND SEDIMENT CONTROL DETAILS CIVIL
46	C-503	12893852	EROSION AND SEDIMENT CONTROL DETAILS CIVIL
47	CD100	12893853	DEMOLITION PLAN - OVERALL CIVIL
48	CD101	12893854	DEMOLITION PLAN - AREA A CIVIL
49	CD102	12893855	DEMOLITION PLAN - AREA B CIVIL

50	CD103	12893856	DEMOLITION PLAN - AREA C CIVIL
51	CD901	12893857	DEMOLITION PHOTOS - OPS BUILDING CIVIL
52	CD902	12893858	DEMOLITION PHOTOS - OPS BUILDING CIVIL
53	CD903	12893859	DEMOLITION PHOTOS - OPS BUILDING CIVIL
54	CD904	12893860	DEMOLITION PHOTOS - SENTRY BUILDING CIVIL
55	CD905	12893861	DEMOLITION PHOTOS - SENTRY BUILDING CIVIL
56	CD906	12893862	DEMOLITION PHOTOS - MAGAZINES CIVIL
57	CD907	12893863	DEMOLITION PHOTOS - MAGAZINES CIVIL
58	CD908	12893864	DEMOLITION PHOTOS - MAGAZINES CIVIL
59	CD909	12893865	DEMOLITION PHOTOS - MAGAZINES CIVIL
60	CD910	12893866	DEMOLITION PHOTOS - MAGAZINES CIVIL
61	CS100	12893867	SITE LAYOUT PLAN - OVERALL CIVIL
62	CS101	12893868	SITE LAYOUT PLAN - AREA A CIVIL
63	CS102	12893869	SITE LAYOUT PLAN - AREA B CIVIL
64	CS103	12893870	SITE LAYOUT PLAN - AREA C CIVIL
65	CS501	12893871	SITE & PAVING DETAILS CIVIL
66	CS502	12893872	SITE & PAVING DETAILS CIVIL
67	CS503	12893873	SITE & PAVING DETAILS CIVIL
68	CS504	12893874	SITE & PAVING DETAILS CIVIL
69	CG100	12893875	GRADING AND DRAINAGE PLAN - OVERALL CIVIL
70	CG101	12893876	GRADING AND DRAINAGE PLAN - AREA A CIVIL
71	CG102	12893877	GRADING AND DRAINAGE PLAN - AREA B CIVIL
72	CG103	12893878	GRADING AND DRAINAGE PLAN - AREA C CIVIL
73	CG201	12893879	STORMWATER PROFILES CIVIL
74	CG202	12893880	STORMWATER PROFILES CIVIL
75	CG203	12893881	STORMWATER PROFILES CIVIL
76	CG210	12893882	ROADWAY PROFILE CIVIL
77	CG301	12893883	SITE SECTIONS CIVIL
78	CG302	12893884	SITE SECTIONS CIVIL
79	CG303	12893885	SITE SECTIONS CIVIL
80	CG304	12893886	SITE SECTIONS CIVIL
81	CG305	12893887	SITE SECTIONS CIVIL
82	CG401	12893888	ENLARGED GRADING PLANS & SECTIONS CIVIL
83	CG402	12893889	ENLARGED GRADING PLANS & SECTIONS CIVIL

84	CG403	12893890	ENLARGED GRADING PLANS & SECTIONS CIVIL
85	CG501	12893891	GRADING & DRAINAGE DETAILS CIVIL
86	CG502	12893892	GRADING & DRAINAGE DETAILS CIVIL
87	CG503	12893893	GRADING & DRAINAGE DETAILS CIVIL
88	CG504	12893894	GRADING & DRAINAGE DETAILS CIVIL
89	CG505	12893895	GRADING & DRAINAGE DETAILS CIVIL
90	CG506	12893896	GRADING & DRAINAGE DETAILS CIVIL
91	CG507	12893897	GRADING & DRAINAGE DETAILS CIVIL
92	CG508	12893898	GRADING & DRAINAGE DETAILS CIVIL
93	CG509	12893899	GRADING & DRAINAGE DETAILS CIVIL
94	CU100	12893900	UTILITY PLAN - OVERALL CIVIL
95	CU101	12893901	UTILITY PLAN - AREA A CIVIL
96	CU102	12893902	UTILITY PLAN - AREA B CIVIL
97	CU103	12893903	UTILITY PLAN - AREA C CIVIL
98	CU201	12893904	WATERLINE PROFILES CIVIL
99	CU210	12893905	SANITARY SEWER PROFILES CIVIL
100	CU501	12893906	UTILITY DETAILS CIVIL
101	CU502	12893907	UTILITY DETAILS CIVIL
LANDSCAPE			
102	LS101	12893908	LANDSCAPE - AREA A
103	LS102	12893909	LANDSCAPE - AREA B
104	LS103	12893910	LANDSCAPE - AREA C
105	LS501	12893911	LANDSCAPE DETAILS
ELECTRICAL			
106	E-001	12893912	ELECTRICAL GENERAL NOTES
107	E-002	12893913	ELECTRICAL ABBREVIATIONS
108	E-003	12893914	ELECTRICAL SYMBOLS
109	ED101	12893915	ELECTRICAL SITE DEMOLITION PLAN - AREA A
110	ED102	12893916	ELECTRICAL SITE DEMOLITION PLAN - AREA B
111	ED103	12893917	ELECTRICAL SITE DEMOLITION PLAN - AREA C
112	ED104	12893918	ELECTRICAL SITE DEMOLITION PLAN - AREA D
113	ED105	12893919	ELECTRICAL SITE DEMOLITION PLAN - AREA E
114	ED601	12893920	MV SINGLE LINE DIAGRAM - DEMOLITION
115	ES101	12893921	ELECTRICAL SITE PLAN - AREA A

116	ES102	12893922	ELECTRICAL SITE PLAN - AREA B
117	ES103	12893923	ELECTRICAL SITE PLAN - AREA C
118	ES104	12893924	ELECTRICAL SITE PLAN - AREA D
119	ES105	12893925	ELECTRICAL SITE PLAN - AREA E
120	E-501	12893926	ELECTRICAL DETAILS
121	E-502	12893927	ELECTRICAL DETAILS
122	E-503	12893928	ELECTRICAL DETAILS
123	E-504	12893929	ELECTRICAL DETAILS
124	E-601	12893930	MEDIUM VOLTAGE SINGLE LINE DIAGRAM
125	E-602	12893931	LOW VOLTAGE DUCTBANK DIAGRAM
126	E-701	12893932	LIGHTING FIXTURE AND CONTROLS SCHEDULES
TELECOMMUNICATIONS			
127	TS001	12893933	TELECOMMUNICATIONS SYMBOLS AND NOTES
128	TD101	12893934	TELECOMMUNICATIONS DEMO SITE PLAN - AREA E
129	TD102	12893935	TELECOMMUNICATIONS DEMO SITE PLAN - AREA A
130	TD103	12893936	TELECOMMUNICATIONS DEMO SITE PLAN - AREA B
131	TD104	12893937	TELECOMMUNICATIONS DEMO SITE PLAN - AREA C
132	TD105	12893938	TELECOMMUNICATIONS DEMO SITE PLAN - AREA D
133	TS100	12893939	TELECOM SITE PLAN - OVERALL
134	TS101	12893940	TELECOMMUNICATIONS SITE PLAN - AREA A
135	TS102	12893941	TELECOMMUNICATIONS SITE PLAN - AREA B
136	TS103	12893942	TELECOMMUNICATIONS SITE PLAN - AREA C
137	TS104	12893943	TELECOMMUNICATIONS SITE PLAN - AREA D
138	TS105	12893944	TELECOMMUNICATIONS SITE PLAN - AREA E
139	TS106	12893945	TELECOMMUNICATIONS SITE PLAN - AREA F
140	TS107	12893946	TELECOMMUNICATIONS SITE PLAN - AREA G
141	TS108	12893947	TELECOMMUNICATIONS SITE PLAN - AREA H
142	TS109	12893948	TELECOMMUNICATIONS SITE PLAN - AREA I
143	TS110	12893949	TELECOMMUNICATIONS SITE PLAN - AREA J
144	TS111	12893950	TELECOMMUNICATIONS SITE PLAN - AREA K
SECURITY			
145	TY001	12894352	SECURITY SYMBOLS AND NOTES
146	TY100	12894353	SECURITY SITE PLAN - OVERALL
147	TY102	12894354	SECURITY SITE PLAN - AREA B

148	TY103	12894355	SECURITY SITE PLAN - AREA C
149	TY501	12894356	SECURITY SITE DETAIL
150	TY601	12898113	SECURITY SITE DIAGRAM

-- End of Document --

SECTION 01 11 00

SUMMARY OF WORK
08/15, CHG 2: 08/21

PART 1 GENERAL

As set forth in UFC 1-300-02, 2-3.1, in project specifications directed to the Construction Contractor, replace the word **"shall"** with the word **"must"**.

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-300-02	(2014; with Change 3, 2021) Unified Facilities Guide Specifications (UFGS) Format Standard

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Salvage Plan; G

1.3 WORK COVERED BY CONTRACT DOCUMENTS

1.3.1 Project Description

The work includes the replacement of 18 arch type magazines built between 1968 and 1974, that are not configured for storage of modern containerized ordnance and will construct six (6) containerized long weapons storage (CLWS), two (2) Type G magazines, one (1) Type H magazine; will replace Building 524 (Ordnance Operations Building), Building 393 (Truck Inspection and Sentry Building), and install overhead cranes in all new magazines (the CLWS magazines require 25-ton capacity cranes; the Type G and H magazines require 5-ton capacity cranes) and incidental related work.

1.3.2 Location

The work is located within the existing Weapons Storage Compound located at the northern end of the Naval Submarine Base New London along Triton Drive SUBASE New London, Groton, CT, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.4 OCCUPANCY OF PREMISES

Building(s) will be occupied during performance of work under this Contract.

Before work is started, arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

1.5 EXISTING WORK

In addition to FAR 52.236-9 Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements:

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

1.6 LOCATION OF UNDERGROUND UTILITIES

Obtain digging permits prior to start of excavation, and comply with Installation requirements for locating and marking underground utilities. Contact local utility locating service a minimum of 48 hours prior to excavating, to mark utilities, and within sufficient time required if work occurs on a Monday or after a Holiday. Verify existing utility locations indicated on contract drawings, within area of work.

Identify and mark all other utilities not managed and located by the local utility companies. Scan the construction site with Ground Penetrating Radar (GPR), electromagnetic, or sonic equipment, and mark the surface of the ground or paved surface where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.6.1 Notification Prior to Excavation

Notify the Contracting Officer at least 15 days prior to starting excavation work.

1.7 GOVERNMENT-FURNISHED MATERIAL AND EQUIPMENT

Pursuant to Contract Clause FAR 52.245-1 Government Property, the Government will furnish the following materials and equipment for installation by the Contractor:

DESIGNATION NO.	DESCRIPTION	QUANTITY	NOTES
Internal Lock Device (ILD	Magazine Door Lock	9	Internal Lock Contractor to supply all door boltwork components with the exception of the ILD. Complete the Contractor Magazine Bid Information: Door Locking System form and submit to the DoD Lock Program.

Quantities indicated for the above-listed items marked with an asterisk are estimates. It is the intention of the Government to furnish all quantities of the asterisk items required to complete the work as specified, and the various quantities will be adjusted when necessary. Quantities stated for the above items not marked with an asterisk are all that will be furnished by the Government. Provide any additional quantities that are required.

1.7.1 Delivery Schedule

Notify the Contracting Officer in writing at least 60 calendar days in advance of the date on which the materials and equipment are required. Pick up materials and equipment no later than 30 calendar days after such date.

1.7.2 Delivery Location

The materials and equipment will be delivered to the job site.

1.8 GOVERNMENT-INSTALLED WORK

The Government will be responsible for the handling of all ordnance and will ensure that ordnance has been removed from existing magazines prior to the start of work/demolition of a particular magazine.

1.9 NAVY AND MARINE CORPS INTRANET(NMCI) COORDINATION REQUIREMENTS

1.9.1 NMCI Contractor Access

Allow the NMCI Contractor access to the facility towards the end of construction (finishes 90 percent complete, rough-in 100 percent complete, Inside Plant (ISP)/Outside Plant (OSP) infrastructure in place) to provide equipment in the telecommunications rooms and make final connections. Coordinate efforts with the NMCI Contractor to facilitate joint use of building spaces during the final phases of construction. After the Contracting Officer has facilitated coordination meetings between the two contractors, within one week, incorporate the effort of additional coordination with the NMCI Contractor into the construction schedule to demonstrate a plan for maintaining the contract duration.

1.10 SALVAGE MATERIAL AND EQUIPMENT

Items designated by the Contracting Officer to be salvaged remain the property of the Government. Segregate, itemize, deliver and off-load the salvaged property at the Government designated storage area located within 1 mile of the construction site.

Provide a salvage plan, listing material and equipment to be salvaged, and

their storage location. Maintain property control records for material or equipment designated as salvage. Provide a system for property control in the salvage plan. Store and protect salvaged materials and equipment until disposition by the Contracting Officer.

All existing cranes within existing magazines that are designated to be demolished with be considered salvage material and equipment and will be turned over to the Government.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

DoD Lock Program
NAVFAC Engineering and Expeditionary Warfare Center
1100 23rd Avenue, Port Hueneme, CA 93043
(800) 290-7607 or (805) 982-1212
https://exwc.navfac.navy.mil/dod-lock-program/

Contractor Magazine Bid Information: Door Locking System

When bidding on door construction for new Arms, Ammunition and Explosives (AA&E) magazines or retrofit to existing structures, the contractor is required to supply all door boltwork components with the exception of the Internal Locking Device (ILD). The ILD is government furnished equipment purchased from the DoD Lock Program by the end-user via Military Interdepartmental Purchase Request (MIPR).

Figure 1: Single key Internal Locking Device

AA&E storage magazines have either swinging or sliding door(s). As a contractor you may decide to build boltwork components or sub contract the construction. It is important to have the latest drawings for accuracy. The DoD Lock Program will provide the appropriate drawings for various type swinging and sliding doors and Modular Storage Magazine (MSM) doors as shown in the figure below.

Figure 2: Swinging Door (L), Sliding Door (C), MSM Door (R)

Boltworks are not universal. The figure below shows the specific hardware used on the above mentioned door styles. The DoD Lock Program will provide drawing packages for each type boltwork design as not all drawings in circulation are current.

Figure 3: Swinging door boltwork (L), Surface Mount boltwork for sliding door (C), MSM sliding door boltwork (R)

To ensure you are provided appropriate drawings please review the check list below and return form to the DoD Lock Program.

Company: _____

Your name: _____

Your address _____

_____

Phone: _____ Email: _____

New construction? Y☐ N☐

Facility: ☐Armory ☐Earth Covered Magazine (ECM) ☐Modular Storage Magazine (MSM)
☐Other: _____

Door Type: ☐Sliding ☐Swinging ☐Personnel

Door dimensions: _____ High x _____ Wide x _____ Thick

Number of doors (per build/retrofit) _____

Number of installations to be built/retrofitted _____

Are site drawings available? Y☐ N☐

If site drawings are available, please email PDF format to: ILD_Field_Support@navy.mil

NOTE: For boltwork operational testing and installation purposes, a set-up ILD with commercial use lock cylinder and keys will be sent to the contractor when door installation is underway at no additional cost. Once construction is turned over to the government for ownership return the set-up ILD with commercial use lock cylinder and keys to the DoD Lock Program.

SECTION 01 14 00

WORK RESTRICTIONS
11/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. DEPARTMENT OF DEFENSE (DOD)

DESR 6055.09, Edition 1	(2019) Defense Explosive Safety Regulation 6055.09, Edition 1

NEW LONDON INSTRUCTION

SUBASE 8020.IG	SUBASE NEW LONDON INSTRUCTION 8020.IG

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel

Personnel List

Phasing Plan; G

1.3 SPECIAL SCHEDULING REQUIREMENTS

a. All work must be phased in such a way as to minimize impacts to installation weapons handling operations. The new Operations must be constructed, and all staff relocated from the existing Operations Building (B524) into the new operations Building as early as possible in the construction phasing. Physical security requirements (fencing, cameras, intrusion detection/access control, etc.) for the weapons compound (magazine area/compound) and all existing magazines still in operation must be maintained or provided by the contractor. During all phases of construction, the Government shall maintain access control to all magazines that are still in operation; the contractor shall maintain separate construction entrances independent from the weapons compound (magazine area/compound) secured entry. Prior to the start of construction and within 15 days of contract award, provide a Phasing Plan for review and approval by the Contracting Officer and the Weapons Officer. A preliminary Phasing Plan has been provided on the Civil drawings to help inform the contractor of phasing requirements.

The Construction Phasing Plan drawings indicate which magazines are to

be demolished during the respective construction phasing. The other magazines not indicated for demolition must remain operational during the corresponding construction phase.

b. Permission to interrupt any Activity roads, railroads, or utility service must be requested in writing a minimum of 15 calendar days prior to the desired date of interruption.

c. The work under this contract requires special attention to the scheduling and conduct of the work in connection with existing operations. Identify on the construction schedule each factor which constitutes a potential interruption to operations.

The following conditions apply:

(1) Emergency Load/load out requirements

(2) RADCON Drills

(3) Special Ops Training

(4) Suspect Loading

1.3.1 Termination of Existing magazine Operations Between Construction Phases

No construction activities or work can be performed for 30 calendar days after the completion of each construction phase. The existing magazines require closed out inspections and termination. NOSSA Site Approval is required for the newly constructed magazines after each construction phase.

1.3.2 Goose Run Golf Course

The Contractor will be working within a portion of Goose Rune Golf Course. Trenching and installation of new underground utilities are to be conducted within the following time period:

a. 01 November through 30 March

Do not enter the golf course grounds without prior approval of the Contracting Officer and golf course management. All work within the golf course will require a minimum of 30 calendar day advance notice and can not proceed without written authorization from the Contracting Officer and golf course management.

1.3.3 Procedure for Blasting During Construction

Blasting operations are to be conducted in accordance with SUBASE 8020.IG and specification 31 23 06.00 BLASTING - SURFACE.

1.3.4 Time of Year Restriction on Tree Clearing and Blasting

Tree clearing and rock blasting will not be permitted during nesting times of sensitive and endangered species. Tree clearing restrictions is between April 01 and October 31, and blasting restrictions is between April 01 and October 31, due to the presence of habitat for the northern long eared and tricolored bat.

All work associated with the removal or disturbance of vegetation (tree removal, pruning, etc.) is prohibited between April 01 and October 31 of any given year. All timber removed from the project site shall become the property of the Contractor. The Contractor shall reimburse the Government for the value of the timber. The Contractor shall submit payment to the Contracting Officer by cashier's or certified check in the amount of $760.00 made payable to the U.S. Treasury. Payment shall be made no less than five (5) days prior to the start of land clearing operations. See the Temporary Environmental Control specifications 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and 31 11 00 CLEARING AND GRUBBING, paragraph 3.3.1 for additional requirements.

1.3.5 Wetland Permitting

The contractor is responsible for complying with the wetland permit as NAVFAC's representative. No work within the wetland limits is permitted (including laydown) until the wetland permit is received. A copy of approved permit is to be submitted tot he Public Works New London Environment (PW NLON EV) Division.

The contractor is responsible for completing and submitting all required monitoring and inspection reports. Any natural resource damage claim resulting from construction is the sole responsibility of the construction contractor at no additional cost to the government. A copy of any monitoring or inspection reports require by this permit are to be submitted to the Public Works New London Environment (PW NLON EV) Division.

1.3.6 Ribbon Snake Mitigation Plan

The limits of disturbance extend into known habitat of State Protected Species. The contractor serves as the environmental monitor for this effort to ensure that the measures described in the Eastern Ribbon Snake Construction Impact Protection Plan are implemented properly. All work must be completed (and scheduled) in accordance with the contractor provided Ribbon Snake Mitigation Plan. Schedule an meeting with Public Works New London Environment (PW NLON EV) Division a minimum of 21 calendar days in advance of executing the mitigation plan to review the plan and discuss any questions/concerns that might hinder or threaten full plan compliance. The Construction Impact Protection Plan is included as an attachment to these specifications.

1.4 CONTRACTOR ACCESS AND USE OF PREMISES

1.4.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear appropriate personal protective equipment (PPE) in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. Ensure all Contractor equipment, include delivery vehicles, are clearly identified with their company name.

Occupants of any construction trailers near the job site must be directly involved with the project construction. Administrative personnel are not permitted in job site trailers and must be located outside of all installation inhabited building distance (IBD) arcs. Any windows utilized in construction trailers must meet the criteria of OP5 para 8-3. Brake rooms must be outside the IBD as well.

1.4.1.1 Subcontractors and Personnel Contacts

Provide a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.4.1.2 Installation Access

Obtain access to Navy installations through participation in the Defense Biometrics Identification System (DBIDS). Requirements for Contractor employee registration, and transition for employees currently under Navy Commercial Access Control System (NCACS), are available at https://www.cnic.navy.mil/Operations-and-Management/Base-Support/DBIDS/. No fees are associated with obtaining a DBIDS credential.

Participation in the DBIDS is not mandatory, and Contractor personnel may apply for One-Day Passes at the Base Visitor Control Office to access an installation.

1.4.1.2.1 Registration for DBIDS

Registration for DBIDS is available at https://www.cnic.navy.mil/Operations-and-Management/Base-Support/DBIDS/. Procedure includes:

a. Present a letter or official award document (i.e. DD Form 1155 or SF 1442) from the Contracting Officer, that provides the purpose for access, to the base Visitor Control Center representative.

b. Present valid identification, such as a passport or Real ID Act-compliant state driver's license.

c. Provide completed SECNAV FORM 5512/1 to the base Visitor Control Center representative to obtain a background check. This form is available for download at https://www.cnic.navy.mil/Operations-and-Management/Base-Support/DBIDS/.

d. Upon successful completion of the background check, the Government will complete the DBIDS enrollment process, which includes Contractor employee photo, fingerprints, base restriction and several other assessments.

e. Upon successful completion of the enrollment process, the Contractor employee will be issued a DBIDS credential, and will be allowed to proceed to worksite.

1.4.1.2.2 DBIDS Eligibility Requirements

Throughout the length of the contract, the Contractor employee must continue to meet background screen standards. Periodic background screenings are conducted to verify continued DBIDS participation and installation access privileges. DBIDS access privileges will be immediately suspended or revoked if at any time a Contractor employee becomes ineligible.

An adjudication process may be initiated when a background screen failure results in disqualification from participation in the DBIDS, and

Contractor employee does not agree with the reason for disqualification. The Government is the final authority.

1.4.1.2.3 DBIDS Notification Requirements

a. Immediately report instances of lost or stolen badges to the Contracting Officer.

b. Immediately collect DBIDS credentials and notify the Contracting Officer in writing under the following circumstances:

(1) An employee has departed the company without having properly returned or surrendered their DBIDS credentials.

(2) There is a reasonable basis to conclude that an employee, or former employee, might pose a risk, compromise, or threat to the safety or security of the Installation or anyone therein.

1.4.1.2.4 One-Day Passes

Personnel applying for One-Day passes at the Base Visitor Control Office are subject to daily mandatory vehicle inspection, and will have limited access to the installation. The Government is not responsible for any cost or lost time associated with obtaining daily passes or added vehicle inspections incurred by non-participants in the DBIDS.

1.4.1.3 NCACS Identification Badges and Installation Access

Application for and use of badges will be as directed. Obtain access to the installation by participating in the Navy Commercial Access Control System (NCACS), or by obtaining passes each day from the Base Pass and Identification Office. Costs for obtaining passes through the NCACS are the responsibility of the Contractor. One-day passes, issued through the Base Pass and Identification Office, will be furnished without charge. Furnish a completed EMPLOYMENT ELIGIBILITY VERIFICATION (DHS FORM I-9) form for all personnel requesting badges. This form is available at http://www.uscis.gov/portal/site/uscis by searching or selecting Employment Verification (Form I-9). Immediately report instances of lost or stolen badges to the Contracting Officer.

a. NCACS Program: NCACS is a voluntary program in which Contractor personnel who enroll, and are approved, are subsequently granted access to the installation for a period up to one year, or the length of the contract, whichever is less, and are not required to obtain a new pass from the Base Pass and Identification Office for each visit. The Government performs background screening and credentialing. Throughout the year the Contractor employee will continue to meet background screening standards. Periodic background screenings are conducted to verify continued NCACS participation and installation access privileges. Under the NCACS program, no commercial vehicle inspection is required, other than for Random Anti-Terrorism Measures (RAM) or in the case of an elevation of Force Protection Conditions (FPCON). Information on costs and requirements to participate and enroll in NCACS is available at http://www.rapidgate.com or by calling 1-877-727-4342. Contractors should be aware that the costs incurred to obtain NCACS credentials, or costs related to any means of access to a Navy Installation, are not reimbursable. Any time invested, or price(s) paid, for obtaining NCACS credentials will not be compensated in any way or approved as a direct cost of any contract with the

Department of the Navy.

b. One-Day Passes: Participation in the NCACS is not mandatory, and if the Contractor chooses to not participate, the Contractor's personnel will have to obtain daily passes, be subject to daily mandatory vehicle inspection, and will have limited access to the installation. The Government will not be responsible for any cost or lost time associated with obtaining daily passes or added vehicle inspections incurred by non-participants in the NCACS.

The following documents will be required to be presented for base access:

a. Verified license

b. Passport

c. Birth Certificate with SSN card

1.4.1.4 Gate Information

Contractors/Commercial vehicles must use Commercial Gate 7 (CVIS) located separately from main gate between the hours of 5:45am - 1:30pm, Monday through Friday. Closed weekends and holidays. Phone number: 860-694-4360

1.4.1.5 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installation, except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.4.2 Working Hours

Regular working hours will consist of a 9 hour period, between 6:30 a.m. and 4:30 p.m. Monday through Friday, excluding Government holidays.

1.4.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer.

1.4.4 Occupied and Existing Buildings

The Contractor shall be working in existing building and around existing buildings which are occupied. Do not enter the buildings without prior approval of the Contracting Officer.

The Government will remove and relocate other Government property in the areas of the buildings scheduled to receive work.

1.4.5 Utility Cutovers and Interruptions

a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in paragraph WORK OUTSIDE REGULAR HOURS.

b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, and security systems are considered utility cutovers pursuant to the paragraph WORK OUTSIDE REGULAR HOURS.

d. Operation of Station Utilities: The Contractor must not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor must notify the Contracting Officer giving reasonable advance notice when such operation is required.

e. Connection to Existing Sanitary Sewer Line: Provide positive verification that the existing line conveys sanitary sewer; verify line is not incorrectly connected to a storm drain. Obtain Installation's Sanitary Sewer Connection Permit 2 weeks prior to connection and in accordance with Section 33 30 00 SANITARY SEWERAGE.

1.5 SECURITY REQUIREMENTS

Contract Clause FAR 52.204-2 Security Requirements and Alternate II and the following apply:

Installation Security Requirements.

1.5.1 Personnel List

Submit for approval, at least 15 days prior to the desired date of entry, an original alphabetical list of personnel who require entry into Government property to perform work on the project. Furnish for each person:

a. Name

b. Citizenship

c. Company employee works for

"I hereby certify that all personnel on this list are either born U.S. citizens, naturalized U.S. citizens with the naturalization number shown."

Signature/Firm Name

1.5.1.1 Citizenship Requirements

Aliens are not allowed on the project site. Work under this contract is restricted to U.S. citizens.

1.6 EXPLOSIVE SAFETY TRAINING

Contractor personnel shall participate in explosive safety training set forth on the requirements of DESR 6055.09, Edition 1, "Ammunition and Explosives Safety Standards". Coordinate with Naval Submarine Base New London on training requirements and scheduling.

Existing ordnance magazines will remain in service during construction. Construction activities shall not impact ordnance operations.

1.6.1 Hazards of Electromagnetic Radiation to Ordnance (HERO)

All contractor personnel must adhere to HERO requirements associated with the use of mobile and hand-held transmitters. Coordinate with Naval Submarine Base New London safety personnel on training and guidance.

1.6.2 Explosive Safety Requirements

All work must be conducted in accordance with Navy Explosive Safety Requirements for working within explosive arcs and conducting blast operations. No explosives may be brought and stored on the Installation without the approval of the Installation Explosive Safety Officer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

DEPARTMENT OF THE NAVY
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT 06349-5000

SUBASENLONINST 8020.1G
N3
5 Sep 12

SUBASE NEW LONDON INSTRUCTION 8020.1G

From: Commanding Officer, Naval Submarine Base New London

Subj: PROCEDURE FOR BLASTING INCIDENT TO CONSTRUCTION

Ref: (a) U.S. Army Corps of Engineers Safety Manual (EM 385-1-1) of 15 Sep 08, Section 29
(b) NAVSEA SWO23-AG-WHM-010, Fifth Revision, 1 Jun 09
(c) NAVSEA OP 5, Volume 1, Seventh Revision
(d) 49 CFR CH-1 (10-1-04 Edition), Para 173.62

1. Purpose. To publish instructions to control blasting operations at Naval Submarine Base New London (SUBASENLON).

2. Cancellation. SUBASENLONINST 8020.1F. This instruction is a complete revision and shall be read in its entirety.

3. Definitions

a. Blaster. Person(s) authorized and certified to use explosives for blasting purposes.

b. Supervisory Authority. The person or authority who supervises the blasting operation. Reference documents to assist in the supervision of the blasting operation include ANSI A10.7; 29 CFR 1910.109; 29 CFR 1926, Subpart U; 27 CFR 555; the manufacturers, the Institute of Makers of Explosives (IME) and, where applicable, DoD 6055.9-STD.

c. Approving Authority. The organization exercising review and approval authority over the intended blasting operations. The Public Works Officer (PWO), SUBASENLON is the Approving Authority for all blasting operations incident to construction at SUBASENLON.

4. Mandatory Regulations

a. Blasting operations aboard SUBASENLON will be reviewed and approved 30 days in advance by the SUBASENLON Explosives Safety Officer and SUBASENLON Commanding Officer.

b. All requirements of reference (a), Section 29, reference (b) and reference (c) shall be followed.

c. SUBASENLON Security, SUBASENLON Fire Department and Naval Submarine Support Facility (NSSF) Weapons Department will be notified 48 hours in advance of all commercial explosives arriving onboard the installation.

d. Naval Facilities (NAVFAC) Public Works Department (PWD) will coordinate with SUBASENLON Security, SUBASENLON Fire Department, and NSSF Weapons Department as to when and where the blasting contractor will be operating.

e. The blasting contractor and the blaster shall have all required federal, state and local permits for the purchase, transportation, handling, storage and use of explosives.

f. Any and all blasting is strictly prohibited anywhere on Lower Base or within any Explosive Safety Arc without a Naval Ordnance Safety and Security Activity Explosive Safety Site Approval.

g. Changes or deviations to blasting plans, procedures or time of event will be coordinated with NAVFAC PWO, SUBASENLON ESO, SUBASENLON Security, SUBASENLON Fire Department and NSSF Weapons Officer.

h. Prior to bringing any explosives onboard SUBASENLON, the contractor shall submit a blasting safety plan per reference (a). The plan will be reviewed by NSSF Safety, SUBASENLON Safety, NAVFAC Safety, SUBASENLON ESO and SUBASENLON Fire Department.

5. Scheduling Operations

a. Blasting is only allowed Monday - Friday from 0900 - 1500.

b. Drilling operations may be conducted after 1700 only when prior notification has been given and necessary approval has been obtained from the approving authority.

6. Requests to Conduct Blasting Operations

a. Requests to conduct blasting operations within the

confines of SUBASENLON shall be submitted to the NAVFAC PWO, five working days prior to the intended date of blasting. Requests will be coordinated with the SUBASENLON ESO, SUBASENLON Security, SUBASENLON Fire Department and NSSF Weapons Officer.

b. No deliveries of blasting materials will be made prior to receiving authorization from the approving authority. All deliveries will be coordinated with NAVFAC PWO, SUBASENLON ESO, SUBASENLON Security, SUBASENLON Fire Department and NSSF Weapons Officer.

7. Transportation and Storage of Explosive Materials

a. The supervising authority shall be responsible for making necessary arrangements with NAVFAC PWD, SUBASENLON Security and NSSF Weapons Department prior to transporting explosives onboard SUBASENLON.

b. The driver of a vehicle delivering or transporting commercial explosives onboard SUBASENLON must be qualified and certified per reference (a).

c. Deliveries of commercial explosives onboard SUBASENLON will be through Gate 7 only and be subject to all required inspections. A NAVFAC PWD representative will assist the security inspector to assure the explosive material is packaged in accordance with reference (d). Reference (d) requires the package to bear the appropriate United Nations (UN) packaging symbol and UN code. Acceptable materials for exterior packaging include; steel (4A), aluminum (4B), natural ordinary wood (4C1), natural sift-proof wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), and solid plastic (4H2). Interior lining or inner packaging must be a rigid plastic certified to be impervious to nitric esters. Vehicles carrying deliveries of commercial explosives will be marked with an orange 1.1D placard. Deliveries must be accompanied by hazardous materials shipping papers.

d. NAVFAC PWD will escort the commercial explosive laden vehicle at all times when transporting onboard SUBASENLON. SUBASELON Fire Department, SUBASENLON Security and NSSF Weapons Officer will be advised that commercial explosives are en route onboard SUBASENLON.

e. Transportation of commercial explosives is strictly

limited to the most direct route from Gate 7 to the blasting site.

f. Day storage of commercial explosives will meet the requirements of reference (a). A suitable metal storage box must be provided with an adequate lock, with the key in the custody of a responsible supervisor. Caps shall not be stored with explosives. The day storage box shall be marked, locked, and stored in accordance with reference (a).

g. Commercial explosive material used for blasting will not be stored overnight onboard SUBASENLON. All commercial explosive material belonging to the contractor will be removed from SUBASENLON at the end of each day.

h. In the event of an emergency where commercial explosive material cannot be removed from SUBASENLON, the following steps will be taken:

(1) The blasting contractor will immediately contact the NAVFAC PWO and brief the situation.

(2) The NAVFAC PWO will contact SUBASELON ESO and NSSF Weapons Officer. The NAVFAC PWO will coordinate with NSSF Weapons Officer for the plan of action for emergency storage of the commercial explosives.

(3) SUBASELON Commanding Officer, SUBASELON Security, and SUBASELON Fire Department will be briefed of the situation.

8. Conduct of Blasting Operations

a. The blaster will notify the supervising authority no less than 30 minutes before each intended shot. The supervising authority will then notify the SUBASELON Security Department of the time of intended shot. The shot cannot be performed until the supervising authority is contacted.

b. Flagmen will be posted at points of vehicular/pedestrian traffic as directed by the approving authority to ensure the site is clear during blasting. Flagmen will stay posted until the ALL CLEAR SIGNAL is given.

9. Safety Signal

a. All blasting operations shall use the following safety

signals using a standard "fog horn in a can" style audible signal or mechanical equivalent.

(1) **WARNING SIGNAL** - a one-minute series of long audible signals 5 minutes prior to blast signal.

(2) **BLAST SIGNAL** - a series of short audible signals 1 minute prior to the shot.

(3) **ALL CLEAR SIGNAL** - a prolonged audible signal following the inspection of blast area.

10. Safety Precautions

a. During blasting, all necessary precautions shall be taken and all blast areas shall be covered completely and carefully with approved blasting mats to prevent damage to landscape features, buildings or other surrounding objects.

b. All safety precautions concerning blasting contained in reference (a) shall be observed.

c. Blasting will not occur if lightning is within 10 miles.

11. Prohibition of Blasting. Should a blaster violate any of the provisions of this instruction, the NAVFAC PWO is authorized to prohibit the blaster from conducting further blasting operations for a period of up to 30 calendar days at his discretion, depending upon the seriousness of the violation noted. Should a blaster repeatedly violate the provisions of this instruction, the NAVFAC PWO shall forward to the Commanding Officer his recommendation for any longer period of prohibition or of permanent prohibition from blasting on SUBASENLON.

12. Monitoring of Blasting

a. A written plan to monitor the operations shall be established before initiating controlled blasting operations.

b. Where vibration damage may occur, energy ratios and peak particle velocities shall be limited in accordance with state requirements and of the requirements of reference (a), table 29-1, whichever is more restrictive.

13. Records. The following shall be submitted to the NAVFAC PWO for record purposes:

a. Pre-blast and post-blast survey reports.

b. Blast seismograph records.

c. Blasting Safety Plan.

M. A. PENNINGTON
By direction

Distribution:
Gateway 2.0
(https://g2.cnic.navy.mil/SUBASENEWLONDONCT/Pages/default/aspx)

Eastern Ribbon Snake Construction Impact Protection Plan

The Eastern Ribbon Snake (*Thamnophis sauritus*) is a non-venomous species of snake found in wetlands, forests, and shrub lands near bodies of water. Eastern ribbon snakes can be identified by their dark brown to black backs with three well defined yellow stripes running from head to tail. These snakes are harmless to humans and rarely grow above 32 inches in length. Eastern Ribbon Snakes have an active period lasting from April 1 to October 1 and hibernate for the remainder of the year.

Eastern ribbon snakes are listed as a Species of Special Concern under the Connecticut Endangered Species Act. The following protective measures will mitigate harm to Eastern Ribbon Snakes while also limiting impact to other herptofauna within the project area.

P1102 Construction Contractor will serve as the Environmental Monitor for this project to ensure that the following protective measures are implemented properly:

1. Construction Worker and Contractor Education
2. Exclusionary Barrier Installation and Maintenance
3. Targeted Searches
4. Construction Protective Measures
5. Reporting

1. Construction Worker and Contractor Education

a. Prior to the start of construction any and all personnel working within the Eastern Ribbon Snake habitat will attend an education session at the preconstruction meeting. This educational session will consist of an introduction to the species including photos, emphasis of their non-aggressive nature, and the need to follow prescribed protection measures.

b. Personnel will be provided with contacts for the Environmental Monitor to immediately report encounters or sightings of Eastern Ribbon Snakes in or around the construction area.
c. Educational posters will be displayed on the job site to maintain worker awareness of the species.

2. Exclusionary Barrier Installation and Maintenance

a. To prevent Eastern Ribbon Snake entry into construction areas exclusionary barriers will be installed where wetlands are present at the limits of disturbance as shown on the plans.
b. The barrier must be installed and inspected after April 1 and prior to October 1.
c. Exclusionary fencing shall be at least 20 inches tall and must be secured to be in full and continuous contact with the ground. Standard silt fencing is adequate; fencing with netting shall not be used to avoid accidental harm of Eastern Ribbon Snakes.
d. The Environmental Monitor will inspect the barrier after install to ensure it has been satisfactorily installed; Regular inspections will occur to ensure no gaps in the barrier or between the barrier and ground exist.
e. All openings within the barrier, used for work day accessibility, shall be closed by the completion of each work day.
f. No heavy equipment, vehicles, or construction materials shall be stored outside the exclusionary barrier

3. Targeted Searches

a. Upon completion of the exclusionary barrier the project limits will be searched for Eastern Ribbon Snakes during their active period from April 1 to October 1
b. A Relocation Zone will be designated by the Environmental Monitor as a location external to the project area that satisfies the habitat requirements of the species.
c. Prior to work commencing each morning the project area will be searched for the presence of Eastern Ribbon snakes.
d. All Eastern Ribbon Snakes observed in the initial and daily searches will be removed from within the barrier and relocated to the designated Relocation Zone.

4. Construction Protective Measures

a. Care should be taken to not disrupt exclusionary barriers and to close up openings used for access quickly.
b. Any Eastern Ribbon Snakes found during construction activities should be moved with care using a light grasp and supporting its body using two hands. They are non-venomous and unlikely to bite but may excrete a smelly substance called musk as a defense.

5. Reporting

a. Following the completion of construction activities, the Environmental Monitor will provide a report documenting the monitoring and maintenance of exclusionary barriers and other aspects of the protection plan.

b. Any observations of Eastern Ribbon Snakes or other state listed species will be reported to Connecticut Department of Energy & Environmental Protection with photographs, location, disposition, and any other information of the animal gathered.

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES
11/20, CHG 2: 08/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 1110-1-8	(2021) Engineering and Design -- Construction Equipment Ownership and Operating Expense Schedule

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Earned Value Report; G

1.3 EARNED VALUE REPORT

1.3.1 Data Required

This Contract requires the use of a cost-loaded Network Analysis Schedule (NAS). Schedule of Prices must not be used with cost-loaded Network Analysis Schedule (NAS). Use Earned Value Report derived from cost-loaded NAS. Within 15 calendar days of Contract Award, prepare and deliver to the Contracting Officer a Earned Value Report (construction Contract) as directed by the Contracting Officer. Provide a detailed breakdown of the Contract price, giving quantities for each of the various kinds of work, unit prices and extended prices. Contractor overhead and profit including salaries for field office personnel, if applicable, must be proportionately spread over all pay items and not included as individual pay items.

1.3.2 Payment Schedule Instructions

Payments will not be made until the Earned Value Report from the cost-loaded NAS has been submitted to and accepted by the Contracting Officer.

Additionally, the Earned Value Report must be separated as follows:

a. Primary Facilities Cost Breakdown:

Defined as work on the primary facilities out to the 5 foot line. Work out to the 5 foot line includes construction encompassed within a

theoretical line 5 foot from the face of exterior walls and includes attendant construction, such as pad mounted HVAC cooling equipment, cooling towers, and transformers placed beyond the 5 foot line.

b. Supporting Facilities Cost Breakdown:

Defined as site work, including incidental work, outside the 5 foot line.

1.3.3 Schedule Requirements for HVAC TAB

The field work requirements in Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC must be broken down in the Earned Value Report from the cost-loaded NAS by separate line items which reflect measurable deliverables. The value for each pay item listed below will be established on a case by case basis for each Contract. The line items are as follows:

a. Approval of Design Review Report: The TABS Agency is required to conduct a review of the project plans and specifications to identify any feature, or the lack thereof, that would preclude successful testing and balancing of the project HVAC systems. Submit the resulting findings to the Government to allow correction of the design. The progress payment will not be issued until the report is reviewed and approved.

b. Approval of the pre-field engineering report: The TABS Agency submits a report which outlines the scope of field work. The report must contain details of what systems will be tested, procedures to be used, sample report forms for reporting test results and a quality control checklist of work items that must be completed before TABS field work commences.

c. Season I field work: Incremental payments are issued as the TABS field work progresses. The TABS Agency mobilizes to the project site and executes the field work as outlined in the pre-field engineering report. The HVAC water and air systems are balanced and operational data must be collected for one seasonal condition (either summer or winter depending on project timing).

d. Approval of Season I report: On completion of the Season I field work, the data is compiled into a report and submitted to the Government. The report is reviewed, and approved, after ensuring compliance with the pre-field engineering report scope of work.

e. Completion of Season I field QA check: Contract QC and Government representatives meet the TABS Agency at the jobsite to retest portions of the systems reported in the Season I report. The purpose of these tests are to validate the accuracy and completeness of the previously submitted Season I report.

f. Approval of Season II report: The TABS Agency completes all Season II field work, which is normally comprised mainly of taking heat transfer temperature readings, in the season opposite of that under which Season I performance data was compiled. Compile this data into a report and submit to the Government. On completion of submittal review to ensure compliance with the pre-field engineering report scope, progress payment is issued. Progress payment is less than that issued for the Season I report since most of the water and air

balancing work effort is completed under Season I.

1.4 CONTRACT MODIFICATIONS

In conjunction with the Contract Clause DFARS 252.236-7000 Modification Proposals-Price Breakdown, and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, base equipment use rates upon the applicable provisions of the EP 1110-1-8.

1.5 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

1.5.1 Content of Invoice

Requests for payment will be processed in accordance with the Contract Clause FAR 52.232-27 Prompt Payment for Construction Contracts and FAR 52.232-5 Payments Under Fixed-Price Construction Contracts. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies. The requests for payment shall include the documents listed below.

a. The Contractor's invoice, on NAVFAC Form 7300/30 furnished by the Government, showing in summary form, the basis for arriving at the amount of the invoice. Form 7300/30 must include certification by Quality Control (QC) Manager as required by the Contract.

b. The Earned Value Report from the cost-loaded NAS.

c. Contractor's Monthly Estimate for Voucher and Contractors Certification (NAVFAC Form 4330) with Subcontractor and supplier payment certification. Other documents, including but not limited to, that need to be received prior to processing payment include the following submittals as required. These items are still required monthly even when a pay voucher is not submitted.

d. Monthly Work-hour report.

e. Updated Construction Progress Schedule and tabular reports required by the contract.

f. Contractor Safety Self Evaluation Checklist.

g. Updated submittal register.

h. Solid Waste Disposal Report.

i. Certified payrolls.

j. Updated testing logs.

k. Other supporting documents as requested.

1.5.2 Submission of Invoices

If DFARS Clause 252.232-7006 Wide Area WorkFlow Payment Instructions is included in the Contract, provide the documents listed in above paragraph CONTENT OF INVOICE in their entirety as attachments in Wide Area Work Flow (WAWF) for each invoice submitted. The maximum size of each WAWF attachment is two megabytes, but there are no limits on the number of

attachments. If a document cannot be attached in WAWF due to system or size restriction, provide it as instructed by the Contracting Officer.

Monthly invoices and supporting forms for work performed through the anniversary award date of the Contract must be submitted to the Contracting Officer within 5 calendar days of the date of invoice. For example, if Contract award date is the 7th of the month, the date of each monthly invoice must be the 7th and the invoice must be submitted by the 12th of the month.

1.5.3 Final Invoice

a. A final invoice must be accompanied by the certification required by DFARS 252.247.7023 Transportation of Supplies by Sea, and the Contractor's Final Release. If the Contractor is incorporated, the Final Release must contain the corporate seal. An officer of the corporation must sign and the corporate secretary must certify the Final Release.

b. For final invoices being submitted via WAWF, the original Contractor's Final Release Form and required certification of Transportation of Supplies by Sea must be provided directly to the respective Contracting Officer prior to submission of the final invoice. Once receipt of the original Final Release Form and required certification of Transportation of Supplies by Sea has been confirmed by the Contracting Officer, the Contractor must then submit final invoice and attach a copy of the Final Release Form and required certification of Transportation of Supplies by Sea in WAWF.

c. Final invoices not accompanied by the Contractor's Final Release and required certification of Transportation of Supplies by Sea will be considered incomplete and will be returned to the Contractor.

1.6 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

1.6.1 Obligation of Government Payments

The obligation of the Government to make payments required under the provisions of this Contract will, at the discretion of the Contracting Officer, be subject to reductions and suspensions permitted under the FAR and agency regulations including the following in accordance with FAR 32.103 Progress Payments Under Construction Contracts:

a. Reasonable deductions due to defects in material or workmanship;

b. Claims which the Government may have against the Contractor under or in connection with this Contract;

c. Unless otherwise adjusted, repayment to the Government upon demand for overpayments made to the Contractor; and

d. Failure to maintain accurate "as-built" or record drawings in accordance with FAR 52.236.21.

1.6.2 Payment for Onsite and Offsite Materials

Progress payments may be made to the Contractor for materials delivered on the site, for materials stored off construction sites, or materials that are in transit to the construction sites under the following conditions:

a. FAR 52.232-5(b) Payments Under Fixed Price Construction Contracts.

b. Materials delivered on the site but not installed, including completed preparatory work, and off-site materials to be considered for progress payment must be major high cost, long lead, special order, or specialty items, not susceptible to deterioration or physical damage in storage or in transit to the construction site. Examples of materials acceptable for payment consideration include, but are not limited to, structural steel, non-magnetic steel, non-magnetic aggregate, equipment, machinery, large pipe and fittings, precast/prestressed concrete products, plastic lumber (e.g., fender piles/curbs), and high-voltage electrical cable. Materials not acceptable for payment include consumable materials such as nails, fasteners, conduits, gypsum board, glass, insulation, and wall coverings.

c. Materials to be considered for progress payment prior to installation must be specifically and separately identified in the Contractor's estimates of work submitted for the Contracting Officer's approval in accordance with Earned Value Report requirement of this Contract. Requests for progress payment consideration for such items must be supported by documents establishing their value and that the title requirements of the clause at FAR 52.232-5 Payments Under Fixed-Price Construction Contracts have been met.

d. Materials are adequately insured and protected from theft and exposure.

e. Provide a written consent from the surety company with each payment request for offsite materials.

f. Materials to be considered for progress payments prior to installation must be stored either in Hawaii, Guam, Puerto Rico, or the Continental United States. Other locations are subject to written approval by the Contracting Officer.

g. Materials in transit to the job site or storage site are not acceptable for payment.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS
11/20, CHG 2: 05/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map

Progress and Completion Pictures

1.3 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

1.4 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of construction operations. Include aerial photographs. Provide monthly, and within one month of the completion of work, digital photographs, 1600x1200x24 bit true color minimum resolution in JPEG file format showing the sequence and progress of work. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten different viewpoints selected by the Contractor unless otherwise directed by the Contracting Officer. Submit with the monthly invoice two sets of digital photographs, each set on a separate compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as a digital file. Include a date designator in file names. Photographs provided are for unrestricted use by the Government.

1.5 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 Liability,

during the entire period of performance under this contract. Provide other insurance coverage as required by Connecticut law.

1.6 SUPERVISION

1.6.1 Superintendent Qualifications

Provide project superintendent with a minimum of 10 years experience in construction with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule and construction drawings. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

1.6.2 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of Contract work.In addition, if a Quality Control (QC) representative is required on the Contract, then that individual must also have fluent English communication skills.

1.6.3 Duties

The project superintendent is primarily responsible for managing subcontractors and coordinating day-to-day production and schedule adherence on the project. The superintendent is required to attend Red Zone meetings, partnering meetings, and quality control meetings. The superintendent or qualified alternative must be on-site at all times during the performance of this contract until the work is completed and accepted.

1.6.4 Non-Compliance Actions

The Project Superintendent is subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to ensure timely completion. Furthermore, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders is acceptable as the subject of claim for extension of time for excess costs or damages by the Contractor.

1.7 PRECONSTRUCTION MEETING

Immediately after award, prior to commencing any work at the site, coordinate with the Contracting Officer a time and place to meet for the Preconstruction Meeting. The meeting must take place within 35 calendar days after award of the contract, but prior to commencement of any work at the site. The purpose of this meeting is to discuss and develop a mutual understanding of the administrative requirements of the Contract including but not limited to: daily reporting, invoicing, value engineering, safety, base-access, outage requests, hot work permits, schedule requirements, quality control, schedule of prices or earned value report, shop drawings,

submittals, cybersecurity, prosecution of the work, government acceptance, final inspections and contract close-out. Contractor must present and discuss their basic approach to scheduling the construction work and any required phasing.

1.7.1 Attendees

Contractor attendees must include the Project Manager, Superintendent, Site Safety and Health Officer (SSHO), Quality Control Manager and major subcontractors.

1.8 FACILITY TURNOVER PLANNING MEETINGS (Red Zone Meetings)

Meet with the Government to identify strategies to ensure the project is carried to expeditious closure and turnover to the Client. Start planning the turnover process at the Pre-Construction Conference meeting with a discussion of the Red Zone process and convene at regularly scheduled NRZ Meetings beginning at approximately 75 percent of project completion. Include the following in the facility Turnover effort:

1.8.1 Red Zone Checklist

a. Contracting Officer's Technical Representative (COTR) will provide the Contractor a copy of the Red Zone Checklist template.

b. Prior to 75 percent completion, modify the Red Zone Checklist template by adding or deleting critical activities applicable to the project and assign planned completion dates for each activity. Submit the modified Red Zone Checklist to the Contracting Officer. The Contracting Officer may request additional activities be added to the Red Zone Checklist at any time as necessary.

1.8.2 Meetings

a. Conduct regular Red Zone Meetings beginning at approximately 75 percent project completion, or three to six months prior to Beneficial Occupancy Date (BOD), whichever comes first.

b. The Contracting Officer will establish the frequency of the meetings, which is expected to increase as the project completion draws nearer. At the beginning, Red Zone meetings may be every two weeks then increase to weekly towards the final month of the project.

c. Using the Red Zone Checklist as a Plan of Action and Milestones (POAM) and basis for discussion, review upcoming critical activities and strategies to ensure work is completed on time.

d. During the Red Zone Meetings discuss with the COTR any upcoming activities that require Government involvement.

e. Maintain the Red Zone Checklist by documenting the actual completion dates as work is completed and update the Red Zone Checklist with revised planned completion dates as necessary to match progress. Distribute copies of the current Red Zone Checklist to attendees at each Red Zone Meeting.

1.9 PARTNERING

To most effectively accomplish this Contract, the Contractor and

Government must form a cohesive partnership with the common goal of drawing on the strength of each organization in an effort to achieve a successful project without safety mishaps, conforming to the Contract, within budget and on schedule. The partnering team must consist of personnel from both the Government and Contractor including project level and corporate level leadership positions. Key Personnel from the supported command, end user, NAVFAC, PWD, FEAD/ROICC, Contractor, key subcontractors and the Designer of Record are required to participate in the Partnering process.

1.9.1 Facilitated (Formal) Partnering

a. Within 35 calendar days after award and prior to the start of work, host a Formal Partnering session with key personnel from the project team including both Contractor and Government personnel. All costs associated with the Partnering session including the third-party independent Facilitator Consultant, meeting room and other incidental items are the responsibility of the Contractor.

b. Before the Facilitated (Formal) Partnering session, coordinate with the Facilitator all requirements for incidental items (such as audio-visual equipment, easels, flipchart paper, colored markers, note pads, pens/pencils, colored flash cards) and have these items available at the Partnering session. Provide copies of any documents required for distribution to all attendees. Participants will bear their own costs for meals, lodging and transportation associated with Partnering.

c. The Initial Partnering Session must be a duration of one day and be held at a location off base as agreed to by the Contracting Officer. Partnering session may take place concurrently with the Pre-Construction Meeting.

d. Facilitator must be experienced in conducting corporate Partnering sessions and must be a third-party independent facilitating consultant - not an employee of the Contractor. The Facilitator is responsible for leading all aspects of the Partnering session necessary to achieve the Partnering goal.

e. An outcome of the Partnering session must be an escalation matrix agreed upon by both the Government and Contractor, which identifies key Government and Contractor decision makers by name and anticipated decision durations.

f. Host follow-on Partnering Sessions at three- to six-month intervals or more frequently if needed and lasting generally a half day or less. Attendees need only be those required to resolve current issues. The same Facilitator used in the Initial Partnering session must lead the follow-on sessions unless an alternative is permitted by the Contractor Officer. All costs associated with follow-on Partnering sessions are the responsibility of the Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 30 02.00 22

DESIGN, PROCUREMENT, AND INSTALLATION OF AUDIOVISUAL EQUIPMENT
07/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AUDIOVISUAL AND INTEGRATED EXPERIENCE ASSOCIATION (AVIXA)

D401.01:201X	Standard Guide for Audiovisual Systems Design and Coordination Processes
F501.01:2015	Cable Labeling for Audiovisual Systems
202.01:2016	Display Image Size for 2D Content in Audiovisual Systems
A102.01:2017	Audio Coverage Uniformity in Listener Areas
F502.02:201X	Rack Design for AV Systems
V201.01:2022	Image System Contrast Ratio
S601.01:2021	Energy Management for Audiovisual Systems
10:2013	Audiovisual Systems Performance Verification

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preliminary (Pre-Final) AV Package; G, DC44 NAVFAC MIDLANT Electrical Engineering

Final AV Package; G, DC44 NAVFAC MIDLANT Electrical Engineering

Best Value Determination; G, DC44 NAVFAC MIDLANT Electrical Engineering

SD-07 Certificates

Contractor's AV Designer's Qualifications; G, DC44 NAVFAC MIDLANT Electrical Engineering

1.3 GENERAL REQUIREMENTS

This Specification Section outlines the minimum requirements and installation methods for the integrated audiovisual system, hardware, software, cables, accessories, and acceptance testing. System refers to the complete and functional assemblage of equipment required to achieve the specified functionality, performance, and design intent. Audiovisual (AV) system shall include, but is not limited to;

a. Audio equipment: Speakers, mixers, amplifiers, microphones, signal processing equipment, and source equipment.

b. Video equipment: Displays, signal routing and processing equipment, and source equipment.

c. Video projection screens

d. Remote control equipment including touch panels, control processors, software, and programming.

e. Equipment racks and associated hardware such as rack screws, power distribution products, cooling products, and blank panels.

f. Cables, snakes, connectors, plates, and wiring.

g. Other similar parts that may be required for normal operation such as projector bulbs and lenses.

h. Mounts, rigging, and required hardware such as all-thread, unistrut, chains, and cables.

i. Display wall boxes

j. System commissioning

k. Training

l. Documentation

m. Communication and coordination with all team members and trades to fulfill the requirements of this Specification.

AV System shall be fully integrated with the building systems and finishes. AV system may also include specialty equipment for which the customer activity shall be responsible for specifying.

The design and documentation of the AV system shall be funded as the AV Services Option. The purchase and installation of the AV Package shall be funded separately as the AV Planned Modification. The Government AV budget on the Bid Schedule/Price Proposal Form for the AV Planned Modification is located in cost estimate and does NOT include the Contractor's Handling and Administration Rate (HAR). This Government AV estimate shall not be altered by Contractors during the bid process.

All AV items are subject to the Buy American Act/Trade Agreements Act.

1.4 AUDIOVISUAL DESIGN SERVICES OPTION

1.4.1 Qualifications and Affiliations

The AV Designer of Record, hereafter referred to as the Prime Contractor's AV Designer, shall be AVIXA Certified Technology Specialist - Design certified with at least five years of design experience utilizing D401.01:201X, F501.01:2015, 202.01:2016, A102.01:2017, F502.02:201X, V201.01:2022, S601.01:2021, and 10:2013 on designs similarly sized and complex as this project. Provide documentation of the Prime Contractor's AV Designer's Qualifications and past project performance for at least three projects. The Government reserves the right to approve/disapprove the Prime Contractor's AV Designer.

1.4.2 Concept AV package

A Concept AV package, prepared by the A/E's AV Designer, indicating the salient characteristics of all required AV items and CADD drawings, will be provided to the Prime Contractor. As a separately priced option, the Prime Contractor shall provide the services of a Certified Technology Specialist - Design (CTS-D), other than the A/E's AV Designer, to function as Prime Contractor's AV Designer, to prepare and provide the Final, Best Valued AV Package and procurement data based on the Concept AV package.

All fixed and movable furnishings selections shall be closely coordinated with the final construction documents and interior finishes. The Prime Contractor's AV Designer shall validate, through Needs Analysis, all AV requirements with the Activity, and make any necessary changes to the AV System Design. The AV package includes the design, selection, specification, color coordination, and procurement documentation of the required items necessary to meet the functional, operational, sustainability, and security needs of the facility. The AV package shall be fully integrated with the design, construction, and schedule of all building systems (HVAC, Plumbing, Fire Protection, Communications, Electrical, Data, Architecture, etc. All outlets, switches, fire extinguishers, thermostats, etc. shall be fully accessible. All sprinkler heads, ADA, etc. clearances shall be accommodated.

The Prime Contractor's AV Designer shall attend walk-throughs, any and all required meetings, and coordinate system requirements to accomplish this task. The Contractor's AV Designer and equipment specialists shall be responsible for designing and providing specifications for procurement of the AV System, to include delivery and installation, for the facilities built or renovated under this contract as directed by the NAVFAC Electrical Engineering Branch (DC44). AV specifications shall be based on NAVSUP Blanket Purchase Agreements (BPA's), GSA schedules, and other Federal contracts and complying with priorities found in FAR Part 8.404. The utilization of the current NAVSUP BPA list is required for BVD Analysis Request for Pricing. The current NAVSUP BPA list is available at:

https://acquisition.navy.mil/rda/home/acquisition_one_source/strategic_sourcing/don_furniture_acquisition

1.5 AUDIOVISUAL (AV) SUBMITTALS FOR THE AV DESIGN SERVICES OPTION

Develop design as described and in accordance with the Activity requirements. Include in the design all AV equipment required to produce an optimum functional facility, consistent with quality commercial design. This project also includes the preparation of specific detailed

information for each selected item. Each submittal shall demonstrate thorough interaction with the Activity requirements and complete coordination with the facility design.

a. The Contractor's AV Designer shall be responsible for inventorying existing AV Equipment to be relocated to the new facility and incorporating the existing AV Equipment into the AV plan.

b. For all projects, including fast track projects, the Prime Contractor shall be responsible for sufficiently scheduling all AV and any revisions to submittals early enough to obtain the required government approvals, and meet all ordering and installation lead times to complete the project by the contract completion date.

These are minimum requirements and the Prime Contractor shall be prepared to provide any/all additional meetings and submittals that may be necessary to support the AV Design effort/ and coordination.

1.5.1 Audiovisual Requirements (AV Design Orientation) Meeting

This meeting shall occur via conference call to the AV "Over the Shoulder" Review and the development of the AV package. The NAVFAC Electrical Engineer will provide the Contractor's AV Designer a sample format of the AV submittal, review the Best Value Determination (BVD) process. Minutes of this meeting shall be submitted to the NAVFAC Project Manager within 7 business days.

1.5.2 AV "Over the Shoulder" Review

Prior to the AV Concept Presentation and Best Value Determination (BVD) Analysis, the Contractor's AV Designer shall meet with the NAVFAC Electrical Engineer for an "over-the-shoulder" review to present preliminary AV options. These can be presented in a "loose" format for preliminary approval prior to the Activity presentation. The "over-the-shoulder" review meeting shall be held via conference call.

1.5.3 AV Concept Presentation

The Prime Contractor's AV Designer shall present the NAVFAC approved Preliminary (Pre-final) AV package to the Activity, located at Naval Submarine Base New London, CT, for approval. This presentation shall include preliminary drawings and basis of design equipment.

1.5.4 Best Value Determination(BVD) Analysis "Over the Shoulder Review"

Prior to issuing the Best Value Determination (BVD) Analysis, the Prime Contractor's AV Designer shall meet with the NAVFAC Electrical Engineer for an "over-the-shoulder" review of the solicitation package. The "over-the-shoulder" review meeting shall be held via conference call. The Contractor's AV Designer must provide a copy of the BVD Analysis Request for Pricing cover letter to the Contractor for review and comment prior to the BVD Analysis "Over the Shoulder Review" meeting.

BVD Analysis Solicitation shall include the following;

a. Copy of the BVD Analysis Request for Pricing cover letter.

b. BVD Analysis Request for Pricing Spreadsheet/Questionnaire with "basis of design" item product numbers, photos & descriptions.

c. Technical Specification to establish minimum acceptable AV requirements.

d. Project Specific Room/Furniture/Rack Typicals.

e. Floor Plans with Legends coded to the BVD Analysis RFP (PDF format).

1.5.5 BVD Submittal and "Over the Shoulder Review"

The Prime Contractor's AV Designer shall submit one (1) copy of the Preliminary BVA BVD package to the NAVFAC Electrical Engineer. An electronic copy shall be sent to the NAVFAC Contracting Officer. The "over-the-shoulder" review meeting shall be held via conference call to review the results of the solicitation and determine a best value recommendation. The BVD Submittal shall be in a 3-ring binder and shall include the following items for review and approval:

a. Cover Title Page (project name, project #, location, submittal date, submittal title)

b. Table of Contents.

c. Point of Contact List.

d. Narrative of AV Designer Objectives.

e. BVD Analysis Request for Pricing Spreadsheet/Questionnaire completed by all bidders and completed Questionnaire.

f. Copy of all information sent to bidders and documentation that all required sources were contacted.

g. Back-up Information submitted by each bidder (cut sheets/highlighted pricing sheets/technical specifications, pricing, dealer and manufacturer qualification for each product showing that products meets all requirements).

h. BVD Analysis Pricing Evaluation Spreadsheet comparing bidder quotes/responses.

i. Contractor's AV Designer recommendation for the Best Value vendor and justifications.

1.5.6 Preliminary AV Submittal

The Preliminary AV submittal shall be presented to the Activity and NAVFAC in digital format at a meeting to occur at the Activity, located at Naval Submarine Base New London, CT. Three (3) submittals will be required; (1) for the NAVFAC Project Manager, (1) for the FEAD/ROICC and Base Property, and (1) for the Activity.

Submit the following in a 3-ring binder for review and approval:

a. Cover Title Page (project name and number, submittal date and title).

b. Table of Contents.

c. Point of Contact List (includes contact info for recommended Best Value vendors and subcontractors).

d. Preliminary AV list (Cost Summary) to include shipping, freight, handling, professional installation, project management, HAR and applicable sales tax.

e. AV floor plans coded to the Bill of Materials.

f. Technical Specifications used in bid request for the AV System.

g. Copy of Quote(s)/Bill of Materials (BOM) on letterhead from the vendor(s) determined to be the best value. Code BOM line items to AV Cost Summary Item Codes.

1.5.7 Final AV Submittal

The Final AV submittal shall be due 10 months prior to BOD following the receipt of review comments on the preliminary AV submittal and shall shall be in the format described below.

These are minimum requirements and the Contractor shall be prepared to provide any additional meetings and submittals that may be necessary to support the AV Design effort and coordination.

The Final AV Submittal shall be submitted digitally and in a 3-ring binder for review and approval. The number of final submittals required shall be;

Three (3) total; One each for the NAVFAC Project Manager, the FEAD/ROICC and the Activity.

The Final AV Submittal shall include the following;

a. Cover Title Page with project name, project #, submittal date, submittal title identified on binder cover and spine.

b. Table of Contents.

c. Point of Contact List which includes contact info for recommended Best Value vendors and subcontractors.

d. Final AV list (Cost Summary) to include shipping, handling, freight, professional installation, project management, HAR and any applicable sales tax.

e. Copy of Final Quote(s)/Bill of Materials (BOM) on letterhead from the vendor(s) determined to be the Best Value. Code BOM line items to AV Cost Summary Item Codes.

f. Best Value Determination Guidelines sheets; completed and signed by the Contactor's AV Designer.

g. Final AV Placement Plans coded to the AV list, Procurement Data Sheets and specifications.

h. CD copy of the final AV binder.

1.5.8 Punch List:

See section 2.1.13 Punch List.

1.5.9 AV Construction Submittals

Submit any revisions or deviations caused by discontinued items or NAVFAC required changes to the Contracting Officer for approval by the NAVFAC Electrical Engineer. All submittal due dates for the AV shall be reflected in the Contractor's construction schedule. Changes to the AV schedule shall be submitted to the Contracting Officer or their Representative for approval. The Final AV package shall be submitted no later than 9 months prior to the contract completion date.

1.6 BEST VALUE DETERMINATION

A Best Value Determination (BVD) is required by FAR 8.404 when placing orders against Federal Supply Schedules. Best Value is defined in FAR 2.101 as ensuring that the order to be placed under a Federal Supply Schedule results in the lowest overall cost alternative (considering price, special features, administrative costs and client's needs) to meet the government's needs.

a. A (BVD) shall be performed on a minimum of three manufacturers for orders exceeding a total procurement of $25,000 from an individual manufacturer. Multiple BVDs may be required in order to complete the final AV package.

b. The required quantity of BVD's to be performed will be determined by the NAVFAC Electrical Engineer during the design phase and is dependent on the specific project requirements.

c. Documentation shall be provided to the Government with the final AV package. Specific Documentation is indicated in the Preliminary BVD Submittal and "Over the Shoulder Review." The BVD Statement shall be

completed and signed by the Contractor's AV Designer.

The Prime Contractor's AV Designer is responsible for the following written BVD justifications:

1.6.1 Total procurement of $25,000 or less

For any procurement in the AV package with a value of $25,000 or less, the AV Designer may utilize any vendor. If the BPA holders cannot supply the item, then any other vendor may be utilized.

1.6.2 Total procurement greater than $25,000 and less than $250,000

For any procurement in the AV package with a value greater than $25,000 and $250,000 or less, the Prime Contractor's AV Designer shall always review pricing from at least three vendors. In addition to the review of published list prices, the Contractor's AV Designer must confirm the pricing with the vendor. Manufacturer's quotes are NOT required. The BVD form must be completed and submitted for all AV procurements greater than $25,000 and $250,000 or less.

1.6.3 Total procurement greater than $250,000

For any procurement in the AV package with a value greater than $250,000, the Prime Contractor's AV Designer shall always review pricing from at least six vendors. The BVD form must be completed and submitted for all AV procurements greater than $250,000 and manufacturer's quotes and a summary of all proposals must be attached.

1.6.4 Evaluation Factors

The Best Value Determination shall address issues such as:

a. Special features of the supply or service required for effective program performance; Perceived appropriateness of offered product compared to Request for Pricing requirements.

b. Dealer/installation team must be located within 150 driving miles of Naval Submarine Base New London, CT to provide proximity for support and maintenance to the Base after delivery of the product.

c. Price (including freight)

d. Probable life of the item offered as compared with that of a comparable item; Perceived product durability and quality

e. Past performance.

f. Warranty considerations.

g. Maintenance availability; Dealer/manufacturer proximity for support.

h. Environmental and energy efficiency considerations (sustainability).

i. Comfort/suitability of the system and/or component.

j. Compatibility with existing furniture and/or products.

k. Product performance.

l. Delivery terms.

m. Other (Describe).

n. Emphasis shall be to create a fully integrated design solution by providing quality products to meet the functional needs of the customer. Customer preferences shall be considered. The focus shall be on the best overall value. Use the NAVFAC Best Value Determination forms provided by the NAVFAC Electrical Engineer.

PART 2 AV TURNKEY EFFORT

2.1 AV PLANNED MODIFICATION

AV Planned Modification: As a planned modification, provide procurement and installation coordination of the complete and usable Final AV package. The AV Package must include shipping, freight, handling, installation, applicable state sales tax, and the Prime Contractor's AV Handling and Administration Rate (HAR) percentage as applied to the final AV total cost (excluding taxes).

2.1.1 Authorization

The Government will provide separate funding for procurement and installation coordination of the AV package. Construction funds will not be used. Upon receipt of required funding, the Prime Contractor shall be authorized by the Contracting Officer, as a planned modification to the construction contract, to procure and install all Final AV utilizing NAVSUP Blanket Purchase Agreements (BPA's), GSA schedules, and other Federal contracts and complying with priorities found in FAR Part 8.404. The Prime Contractor will be expected to procure and coordinate the installation of the approved Final AV package exactly as specified, or approved equal. The amount of the modification will be the actual cost of these items from the Federal Government price schedules (NAVSUP BPAs and/or GSA), including any freight and installation charges from the vendor as well as the Prime Contractor's HAR and any applicable state sales tax. The HAR includes all of the Prime Contractor's effort related to storage, coordination, handling, administration of subcontractors, and all other associated costs and profit for the procurement of AV Equipment.

The Government will indicate the AV estimate based on the Concept Design in the contract solicitation Price Proposal Form (Bid Schedule). This Government estimate shall not be altered by Prime Contractors during the bid process.

Prime Contractors shall propose a Handling and Administration Rate (HAR)

only. The Prime Contractor will propose the AV HAR in the contract solicitation. The Prime Contractor's proposed HAR may not exceed 5 percent of the total AV costs, as noted on the bid schedule. The HAR shall not include costs associated with the AV Design Services required in the AV Design Services Option.

AV items are subject to the Buy American Act/Trade Agreements Act.

2.1.2 Procurement and Installation

The Prime Contractor shall coordinate the building completion date with the installation dealer(s) specified in the AV Package. The Prime Contractor shall anticipate possible manufacturer price increases if order placement is delayed. It is recommended to order the AV product once the planned modification is awarded and funds are received to avoid incurring additional costs. Delayed production and delivery dates can be noted at the time of order placement to coincide with the contract completion date. Any costs incurred due to manufacturer price increases will be the burden of the Prime Contractor.

2.1.3 Deposits

The Prime Contractor should anticipate providing a deposit of between 30 percent and 50 percent of the AV costs when placing the orders with the manufacturer's dealerships.

2.1.4 Davis Bacon Wages

Davis Bacon wages do not apply to the AV installer from the Government supply sources. The workforce for the AV installation and delivery shall be separate and distinct from the labor workforce performing under the construction contract.

2.1.5 Sales Tax

The Prime Contractor shall take maximum advantage of all exemptions from State and Local taxation authorities whether available to it directly or available to the Prime Contractor based on an exemption afforded the Government. The responsibility for paying applicable taxes rests with the Prime Contractor. Any state and local taxes applicable to the AV shall be included within the AV Dealer's quote.

2.1.6 Bonds

AV items are not considered construction and the prime contractor shall not be required to secure any additional bond for the award of the AV line item unless otherwise indicated in the contract. If any additional bond is required for the AV line item it is to be included in the prime contractor's AV HAR.

2.1.7 Unique Item Identification (IUID) and Valuation

Unique item identification and valuation is a system of marking and valuing items delivered to DoD that enhances logistics, contracting, and financial business transactions. The IUID policy is mandatory for all DoD contracts that require the delivery of items. An item is a single article or a single unit formed by a grouping of subassemblies, components, or constituent parts. The Prime Contractor shall provide DoD Unique item

identification, valuation and delivery of data for all required AV items for which the government's unit acquisition cost is $5,000 or more.

PART 3 EXECUTION

3.1 Installation

The AV package includes the installation of all AV Equipment as specified in the AV package. The installation dealer(s) specified in the AV package shall receive, store as required, transport to the project site, off load, inside deliver, unpack, assemble, place/install, clean, and dispose of all the trash for all AV Equipment. It is the Prime Contractor's responsibility to coordinate the building completion, occupancy, and AV System installation dates with the installation dealer(s) specified in the AV package. Any costs associated with or delaying AV Equipment shipments is the responsibility of the Prime Contractor.

The Prime Contractor shall provide and coordinate all Building Systems (HVAC, Plumbing, Fire Protection, Communications, Electrical, Data, Architectural, etc. with the AV plans and AV installation. All outlets, switches, thermostats, etc. shall be fully accessible. All sprinkler heads, fire extinguishers, ADA, etc., clearances shall be accommodated.

3.2 Installation Warranty

All AV Equipment shall be installed in accordance with the manufacturer's instructions and warranty requirements. All Racks shall be level and aligned. All doors, drawers and accessories shall be level and aligned to open, close and otherwise operate smoothly and securely.

All AV Equipment shall be installed by the furniture manufacturer's dealer of record and not the Prime Contractor. The Government reserves the right to approve/disapprove the Prime Contractor's AV installers. In addition, installation dealer(s) must be located within a 150 mile radius of the project site unless approved by the Government Electrical Engineer. The Prime Contractor shall repair, to the Government's satisfaction, any/all damage to any facility finish that is a result of the AV installation and correct all punch list items.

3.3 Ordering Documentation

After award of the AV package, two CD copies and one binder copy of all ordering documentation, including Factory Order number (FO) and warranty information for all products, shall be provided to the Contracting Officer at the final AV walk-thru.

3.4 Post Award Changes

After award of the AV turnkey modification, any request to change the AV items must be submitted to the Contracting Officer. The AV turnkey modification will have been accepted, priced, and negotiated as detailed in the final package. Those items will have been agreed to considering color, specific type and quality of material, price, sustainability, life cycle, and dealership service. The Government will require the Prime Contractor to provide exactly those items. Should changes become necessary, careful consideration shall be essential to assure that equivalent quality, price and other aspects of the item are maintained. Otherwise, price adjustments must be negotiated. Coordination with building services and other AV items is required for all proposed and

approved substitutions. The Prime Contractor shall obtain approval from the Contracting Officer and NAVFAC Electrical Engineer for any changes to the AV Package.

Post award AV manufacturer's price increases, beyond the pricing guarantee date, are the responsibility of the Prime Contractor and shall not be transferred to the Government.

3.5 Punch List

The Contractor and their AV Designer shall attend at least one punch list site visit with the installation dealer(s), NAVFAC Electrical Engineer and the Base Representative/Activity Contact. The first site visit shall identify all punch list items (at installation dealer's 98 percent completion) and the second (at 100 percent completion) will confirm that all punch list items have been resolved.

3.6 Best Value Determination

A best value determination has been performed on the final AV package. A best value determination is required by FAR 8.404 when placing orders against Federal Supply Schedules for the selection of furniture and furnishings. Best Value is defined in FAR 2.101 as ensuring that the order to be placed under a Federal Supply Schedule results in the lowest overall cost alternative (considering price, special features, administrative costs and client's needs) to meet the government's needs.

-- End of Section --

SECTION 01 31 23.13 20

ELECTRONIC CONSTRUCTION AND FACILITY SUPPORT CONTRACT MANAGEMENT SYSTEM
05/17, CHG 7: 11/21

PART 1 GENERAL

1.1 CONTRACT ADMINISTRATION

Utilize the Naval Facilities Engineering Command's (NAVFAC's) Electronic Construction and Facility Support Contract Management System (eCMS) for the transfer, sharing, and management of electronic technical submittals and documents. The web-based eCMS is the designated means of transferring technical documents between the Contractor and the Government. Paper media or e-mail submission, including originals or copies, of the documents identified in Table 1 are not permitted, except where eCMS is unavailable, non-functional, or specifically requested in addition to electronic submission.

1.1.1 Format Naming Convention for Files Uploaded Into eCMS

Include the identification number of the document, the type of document, the name/subject or title, and for daily reports, the date (day of work) with format YYYY/MM/DD in the filename. For example, for RFI's, 0011_RFI_Roof_Leaking.doc; for submittals, 0032a_Submittals_Light_Fixture.pdf; for Daily Reports, 0132_Daily_Report_20190504.xls. Contact the Contracting Officer's Representative (COR) regarding availability of eCMS training and reference materials.

1.1.2 Uploading Documents Processed Outside of eCMS

When specifically requested to provide documents outside of eCMS, upload all final project documentation (e.g., documents that are signed and/or adjudicated by the Government) mentioned in Table 1 into eCMS by creating a record in the module associated with that document type and uploading the document(s). Subject/title of the record should include the type of record i.e., RFI/Submittal/Other, the identification number(s), and the statement "Processed Outside of eCMS". For example, "RFI 001-012 Processed Outside of eCMS".

1.2 USER PRIVILEGES

The Contractor will be provided access to eCMS. All technical submittals and documents must be transmitted to the Government via the COR. Project roles and system roles will be established to control each user's menu, application, and software privileges, including the ability to create, edit, or delete objects.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contractor's Personnel; G

1.4 SYSTEM REQUIREMENTS AND CONNECTIVITY

1.4.1 General

The eCMS requires a web-browser (platform-neutral) and Internet connection. Obtain from an approved vendor an External Certification Authority (ECA), Primary Key Infrastructure (PKI) certificate, or other similar digital identification to support two-factor authentication and access to eCMS. Provide and maintain computer hardware and software for the eCMS access throughout the duration of the contract for all Contractor-designated users. Provide connectivity, speed, bandwidth, and access to the Internet to ensure adequate functionality. 70 mbps download speed recommended, 40 mbps minimum for loading large files. Neither upgrading of the Contractor's computer system nor delays associated from the usage of the eCMS will be justification or grounds for a time extension or cost adjustment to the Contract.

1.4.2 Contractor Personnel List

Within 20 calendar days of contract award, provide to the Contracting Officer a list of Contractor's personnel who will have the responsibility for the transfer, sharing and management of electronic technical submittals and documents and will require access to the eCMS. Project personnel roles to be filled in the eCMS include the Contractor's Project Manager, Superintendent, Quality Control (QC) Manager, and Site Safety and Health Officer (SSHO). Personnel must be capable of electronic document management. Notify the COR immediately of any personnel changes to the project. The Contracting Officer reserves the right to perform a security check on all potential users. Provide the following information:

First Name
Last Name
E-mail Address
Office Address
Project Role (e.g. Project Manager, QC Manager, Superintendent)

1.5 SECURITY CLASSIFICATION

In accordance with Department of Navy guidance, all military construction contract data are unclassified, unless specified otherwise by a properly designated Original Classification Authority (OCA) and in accordance with an established Security Classification Guide (SCG). Refer to the project's OCA when questions arise about the proper classification of information.

The eCMS and tablet computer must only be used for the transaction of unclassified information associated with construction projects. In conformance with the Freedom of Information Act (FOIA), DoD INSTRUCTION 5200.48 CONTROLLED UNCLASSIFIED INFORMATION (CUI), and DoD requirements, any unclassified project documentation uploaded into the eCMS must be designated either "U - UNCLASSIFIED" (U) or "CUI - CONTROLLED UNCLASSIFIED INFORMATION"
(CUI).

1.6 ECMS UTILIZATION

Establish, maintain, and update data and documentation in the eCMS

throughout the duration of the contract.

Personally Identifiable Information (PII) transmittal is not permitted in the eCMS.

1.6.1 Information Security Classification/Identification

The eCMS must be used for the transmittal of the following documents. This requirement supersedes conflicting requirements in other sections, however, submittal review times in Section 01 33 00 SUBMITTAL PROCEDURES remain applicable. Table 1 - Project Documentation Types provides the appropriate U and CUI designations for various types of project documents. Construction documents requiring CUI status must be marked accordingly. Apply the appropriate markings before any document is uploaded into eCMS. Markings are not required on U documents.

Table 1 also identifies which eCMS application is to be used in the transmittal of data (these are subject to change based on the latest software configuration). If a designated application is not functional within 4 hours of initial attempt, defer to the Submittal application and submit the required data as an uploaded portable document (e.g. PDF), word processor, spreadsheet, drawing, or other appropriate format. Hard copy or e-mail submission of these items is acceptable only if eCMS is documented to be not available or not functional or specifically requested in addition to electronic submission. After uploading documents to the Submittal application, transmit the submittals and attachments to the COR via the Transmittal application. For Submittals, select the following:

Preparation by = Contractor personnel assigned to prepare the submittal
Approval by = Contracting Officer Representative (COR)
Returned by = Design Lead/Manager
Forwarded to = Contractor project manager

Table 1 - Project Documentation Types

SUBJECT/NAME	DESIG	REMARKS	ECMS APPLICATION
As-Built Drawings	U	Locations of sensitive areas must be labeled as either "Controlled Area" or "Restricted Area" and may be shown on unclassified documents with the approval from Site Security Manager	Submittals and Transmittals
Building Information Modeling (BIM)	U	1. Locations of sensitive areas must be labeled as either "Controlled Area" or "Restricted Area" and may be shown on unclassified documents with the approval from Site Security Manager 2. Design reviews will be performed in existing "Dr Checks"	Submittals and Transmittals

SUBJECT/NAME	DESIG	REMARKS	ECMS APPLICATION
Construction Permits	U	Refer to rules of the issuing activity, state or jurisdiction	Submittals and Transmittals
Construction Schedules (Activities and Milestones)	U	After the schedule submittal is approved by the COR, import the schedule file into the scheduling application, and select "Approve" to establish a new schedule baseline	Submittals, Transmittals and Scheduling App
Construction Schedules (Cost-Loaded)	CUI	After the schedule submittal is approved by the COR, import the schedule file into the scheduling application, and select "Approve" to establish a new schedule baseline	Submittals, Transmittals and Scheduling App
Construction Schedules (3-Week Lookahead)	U	Import the schedule file into the scheduling application, and select "Approve" to establish a new schedule baseline	Scheduling App
DD 1354 Transfer of Real Property	U		Submittals and Transmittals
Daily Production Reports	CUI	Provide weather conditions, crew size, man-hours, equipment, and materials information	Daily Report
Daily Quality Control (QC) Reports	CUI	Provide QC Phase, Definable Features of Work Identify visitors	Daily Report
Designs and Specifications	U	1. Locations of sensitive areas must be labeled as either "Controlled Area" or "Restricted Area" and may be shown on unclassified documents with the approval from Site Security Manager 2. Design reviews will be performed in existing "Dr Checks"	Submittals and Transmittals
Environmental Notice of Violation (NOV), Corrective Action Plan	U	Refer to rules of the issuing activity, state or jurisdiction	Submittals and Transmittals
Environmental Protection Plan (EPP)	CUI		Submittals and Transmittals

SUBJECT/NAME	DESIG	REMARKS	ECMS APPLICATION
Invoice (Supporting Documentation)	CUI	Applies to supporting documentation only. Invoices are submitted in Wide-Area Workflow (WAWF)	Submittals and Transmittals
Jobsite Documentation, Bulletin Board, Labor Laws, SDS	U		Submittals and Transmittals
Meeting Minutes	CUI		Meeting Minutes
Modification Documents	CUI	Provide final modification documents for the project. Upload into "Modifications - RFPs	Document Management
Operations & Maintenance Support Information (OMSI/eOMSI), Facility Data Worksheet	U	1. Locations of sensitive areas must be labeled as either "Controlled Area" or "Restricted Area" and may be shown on unclassified documents with the approval from Site Security Manager 2. Design reviews will be performed in existing "Dr Checks"	Submittals and Transmittals
Photographs	U	Subject to base/installation restrictions	Submittals and Transmittals
QCM Initial Phase Checklists	CUI		Checklists (Site Management)
QCM Preparatory Phase Checklists	CUI		Checklists (Site Management)
Quality Control Plans	CUI		Submittals and Transmittals
QC Certifications	U		Submittals and Transmittals
QC Punch List	U		Punch Lists (Testing Logs)
Red-Zone Checklist	U		Checklists (Site Management)
Rework Items List	CUI		Punch Lists (Testing Logs)

SUBJECT/NAME	DESIG	REMARKS	ECMS APPLICATION
Request for Information (RFI) Post-Award	CUI		RFIs
Safety Plan	CUI		Daily Report
Safety - Activity Hazard Analyses (AHA)	CUI		Daily Report
Safety - Mishap Reports	CUI		Daily Report
SCIF/SAPF Accreditation Support Documents	CUI	Note: Some Construction Security plans may be classified as Secret. Classified information must not be uploaded into eCMS. Refer to the Site Security Manager, as applicable.	Submittals and Transmittals
Shop Drawings	U	Locations of sensitive areas must be labeled as either "Controlled Area" or "Restricted Area" and may be shown on unclassified documents with the approval from Site Security Manager	Submittals and Transmittals
Storm Water Pollution Prevention (Notice of Intent - Notice of Termination)	U	Refer to rules of the issuing activity, state or jurisdiction	Submittals and Transmittals
Submittals and Submittal Log	U		Submittals and Transmittals
Testing Plans, Logs, and Reports	CUI		Submittals and Transmittals
Training/Reference Materials	U		Submittals and Transmittals
Training Records (Personnel)	CUI		Submittals and Transmittals
Utility Outage/Tie-In Request/Approval	CUI		Submittals and Transmittals
Warranties/BOD Letter	CUI		Submittals and Transmittals

SUBJECT/NAME	DESIG	REMARKS	ECMS APPLICATION
Quality Assurance Reports	CUI		Checklists (Government initiated)
Non-Compliance Notices	CUI		Non-Compliance Notices (Government initiated)
Other Government-prepared documents	CUI		GOV ONLY
All Othere Documents	CUI	Refer to FOIA guidelines and contact the FOIA official to determine whether exemptions exist	As applicable

1.6.2 Markings on CUI documents

a. Only CUI documents being electronically uploaded into the eCMS (.docx, .xlsx, .ppt and others as appropriate), and associated paper documents described in the paragraph CONTRACT ADMINISTRATION require CUI markings as indicated in the subparagraphs below.

b. CUI documents that are originally created within the eCMS application using the web-based forms (RFIs, Daily Reports, and others as appropriate) will be automatically watermarked by the eCMS software, and these do not require additional markings.

c. CUI documents must be marked "CONTROLLED UNCLASSIFIED INFORMATION" at the bottom of the outside of the front cover (if there is one), the title page, the first page, and the outside of the back cover (if there is one).

d. CUI documents must be marked on the internal pages of the document as "CONTROLLED UNCLASSIFIED INFORMATION" at top and bottom.

e. Where Installations require digital photographs to be designated CUI, place the markings on the face of the photograph.

f. For visual documentation, other than photographs and audio documentation, mark with either visual or audio statements as appropriate at both the beginning and end of the file.

1.7 QUALITY ASSURANCE

Requested Government response dates on Transmittals and Submittals must be in accordance with the terms and conditions of the Contract. Requesting response dates earlier than the required review and response time, without concurrence by the Government COR, may be cause for rejection.

Incomplete submittals will be rejected without further review and must be resubmitted. Required Government response dates for resubmittals must reflect the date of resubmittal, not the original submittal date.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION 01 32 17.00 20

COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS)
05/18, CHG 3: 08/20

PART 1 GENERAL

1.1 DEFINITIONS

The cost-loaded Network Analysis Schedule (NAS) is a tool to manage the project, both for Contractor and Government activities. The NAS is also used to report progress, evaluate time extensions, and provide the basis for progress payments.

For consistency, when scheduling software terminology is used in this section, the terms in Primavera's scheduling programs are used.

1.2 SCHEDULE REQUIREMENTS PRIOR TO THE START OF WORK

1.2.1 Preliminary Scheduling Meeting

Before preparation of the Project Baseline Schedule, and prior to the start of work, meet with the Contracting Officer to discuss the proposed schedule and the requirements of this section. Propose projected data dates for monthly update schedules for the project and incorporate each monthly update submittal into submittal register. Discuss required forms, terminology, and submittal requirements of this section and other requirements related to schedule management for this contract.

1.2.2 Project Baseline Schedule

Submit the Baseline NAS within 45 calendar days after contract award. Data date must be set to contract award date and no progress statused for any activity. Only bonds may be paid prior to acceptance of the Baseline NAS. The acceptance of a Baseline NAS is a condition precedent to:

a. The Contractor starting demolition work or construction stage(s) of the contract.

b. Processing Contractor's invoices(s) for any items other than bonds.

c. Review of any schedule updates.

Submittal of the Baseline NAS is the Contractor's certification that the submitted schedule meets the requirements of the Contract Documents and represents the Contractor's plan on how the work will be accomplished. Provide all items listed in paragraph REQUIRED TABULAR REPORTS AND NATIVE P6 XER FILES with baseline NAS submittal.

1.3 THREE-WEEK LOOK AHEAD SCHEDULE

1.3.1 Weekly CQC Coordination and Production Meeting

Deliver electronic file of 3-Week Look Ahead Schedule to the Contracting Office at least 24 hours prior to the weekly scheduled CQC Coordination and Production Meeting. Contractor is required to provide all attendees at the CQC Coordination and Production Meeting with a hard copy of the 3-Week Look Ahead Schedule.

1.3.2 Look Ahead Schedule Requirements

Prepare and issue a 3-Week Look Ahead schedule to provide a more detailed day-to-day plan of upcoming work identified on the Project Network Analysis Schedule. Requirements include:

a. For each Look Ahead schedule activity, identify parent NAS activity number(s). The parent NAS activity is the activity in the NAS that would incorporate the Look Ahead schedule activity requirement and or scope of work.

b. Update schedule each week to show the planned work for the current and following two-week period. Also include previous week, as-built work, showing actual start and finish dates.

c. Include upcoming outages, closures, preparatory meetings, and initial meetings, testing and inspections.

d. Clearly identify longest path activities on the Three-Week Look Ahead Schedule. Include a key or legend that distinguishes longest path activities. Include all Longest Path activity NAS start/finish dates exceeded and/or occurring during this period.

e. The detail work plans are to be bar chart type schedules, derived from but maintained separately from the Project NAS on an electronic spreadsheet program and printed on 11 by 17 inch sheets as directed by the Contracting Officer.

f. Activities must not exceed 5 working days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work.

1.4 MONTHLY NETWORK ANALYSIS

Submittal of Monthly NAS is the Contractor's certification that the submitted schedule meets the requirements of the Contract Documents and represents the Contractor's plan on how the work will be accomplished. Provide all items listed in paragraph REQUIRED TABULAR REPORTS AND NATIVE P6 XER FILES with the monthly NAS submittal.

1.4.1 Monthly Network Analysis Updates

a. Regardless of whether an invoice is being submitted monthly, an updated schedule must be submitted monthly to the Government. The Monthly NAS update must be submitted within 10 calendar days of the data date.

b. Provide all items listed in paragraph REQUIRED TABULAR REPORTS AND NATIVE P6 XER FILES, with each monthly NAS update submittal.

c. Meet with Government representative(s) at monthly intervals to review and agree on the information presented in the updated project schedule. The submission of an accepted, updated schedule to the Government is a condition precedent to the processing of the Contractor's invoice.

d. Activity progress must incorporate as-built events as they occurred and correspond to records including but not limited to submittals and

daily production and quality control reports. Software Settings: Handle schedule calculations and Out-of-Sequence progress (if applicable) through Retained Logic, not Progress Override. Show all activity durations and float values in days. Show activity progress using Remaining Duration. Set default activity type to "Task Dependent".

e. Update schedule must reflect current Contract Completion Date and contract value in accordance with all conformed contract modifications issued prior to data date of NAS update.

1.4.2 As-Built Schedule

As a condition precedent to the release of retention and making final payment, submit an "As-Built Schedule," as the last schedule update showing all activities at 100 percent completion. This schedule must reflect the exact manner in which the project was actually constructed.

1.5 CORRESPONDENCE AND TEST REPORTS

Reference Schedule activity IDs that are being addressed in each correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs) and test report (e.g., concrete, soil compaction, weld, pressure).

1.6 ADDITIONAL SCHEDULING REQUIREMENTS

Other specification sections may include additional scheduling requirements, including systems to be inspected, tested and commissioned, and submittal procedures. Those schedule requirements must be incorporated into the NAS schedule.

1.7 SUBMITTALS

Government approval/acceptance is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Baseline NAS; G

Designated Project Scheduler; G

SD-07 Certificates

Three-Week Look Ahead Schedule; G

Monthly Network Analysis Updates; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.8 SOFTWARE

Prepare and maintain project schedules using Primavera P6 software in a

version compatible with Government's current version. Importing data into P6 using data conversion techniques or third party software is cause for rejection of the submitted schedule. Schedules with Performing Organizational Breakdown Structure (POBS) data is cause for rejection.

1.9 DESIGNATED PROJECT SCHEDULER

Within 30 calendar days of contract award, submit to the Contracting Officer for approval an individual who will serve as the Designated Project Scheduler. Include a copy of the candidate's resume with qualifications. The Contracting Officer may remove the Designated Project Scheduler, and require replacement, if the scheduler does not effectively fulfill their duties in accordance with the contract requirements. Payment request will not be processed without an approved Designated Project Scheduler.

1.9.1 Qualifications

The Designated Project Scheduler must have prepared and maintained at least three previous construction schedules, of similar size and complexity to this contract, using Primavera P6.

1.9.2 Duties

Duties of the Designated Project Scheduler:

a. Prepare Baseline NAS.

b. Prepare monthly schedule updates.

c. Prepare tabular reports.

d. Prepare Time Impact Analysis (TIA) as necessary.

e. Provide certification that NAS and TIA submittals conform to the contract requirements.

f. Participate with the Prime Contractor and Government Representative in a monthly teleconference call, and scheduled with sufficient time to support the Monthly Network Analysis Updates process, to discuss project status, schedule updates, critical activities, potential delays, and contract modifications impacting the schedule. Have a computer with P6 software available during the meeting.

1.10 NETWORK SYSTEM FORMAT

Prepare the schedule in accordance with the following Primavera P6 settings and parameters. Deviation from these settings and parameters, without prior consent of the Contracting Officer, is cause for rejection of schedule submission.

1.10.1 Schedule Activity Properties and Level of Detail

1.10.1.1 Activity Identification and Organization

a. Identify construction activities planned for the project and other activities that could impact project completion if delayed in the NAS.

b. Each activity must have a unique name.

c. Identify administrative type activity/milestones, including all pre-construction submittal and permit requirements prior to demolition or construction stage.

d. Include times for procurement, Contractor quality control and construction, acceptance testing and training in the schedule.

e. Include the Government approval time required for the submittals that require Government Approval prior to construction, as indicated in Section 01 33 00 SUBMITTAL PROCEDURES.

f. Create separate activities for each Phase, Area, Floor Level and Location the activity is occurring.

g. Do not use construction category activity to represent non-work type reference (e.g. Serial Letter, Request for Information) in NAS. Place Non-work reference within the P6 activity details notebook.

Activity categories included in the schedule are specified below.

1.10.1.2 Activity Logic

a. With the exception of the Contract Award and Contract Completion Date (CCD) milestone activities, activity must not be open-ended; each activity must have at least one predecessor and at least one successor.

b. Activities must not have open start or open finish (dangling) logic.

c. Do not use lead or lag logic without Contracting Officer prior approval.

d. Minimize redundant logic ties.

e. Once an activity exists on the schedule it must not be deleted or renamed to change the scope of the activity and must not be removed from the schedule logic without approval from the Contracting Officer.

(1) While an activity cannot be deleted, where said activity is no longer applicable to the schedule, but must remain within the logic stream for historical record, change the activity original and remaining duration to zero and clearly label "(NO LONGER REQUIRED)" after the activity name. Actual finish date for activity that falls behind the data date. Redistribute accordingly any remaining budget associated with that activity, to other remaining appropriate activity.

(2) Document any such change in the activities' "Notebook," including a date and explanation for the change.

(3) The ID number for a "NO LONGER REQUIRED" activity must not be re-used for another activity.

1.10.1.3 Longest Path Activity Baseline Limitation

For P6 settings, critical activities are defined as being on the Longest Path. Longest Path (Critical) Activities must not make up more than 30 percent of all activity within the Construction Baseline Schedule.

1.10.1.4 Assigned Calendars

All NAS activity must be assigned calendars that reflect required and anticipated non-work days.

1.10.1.5 Activity Categories

1.10.1.5.1 Pre-construction Activities

Examples of pre-construction activities include, but are not limited to, bond approval, permits, pre-construction submittals and approvals. Include pre-construction activities that are required to be completed prior to the Contractor starting the demolition or construction stage of work.

1.10.1.5.2 Procurement Activities

Examples of procurement activities include, but are not limited to: Material/equipment submittal preparation, submittal and approval of material/equipment; material/equipment fabrication and delivery, and material/equipment on-site. As a minimum, separate procurement activities must be provided for critical items, long lead items, items requiring Government approval and material/equipment procurement for which payment will be requested in advance of installation. Show each delivery with relationship tie to the Construction Activity specifically for the delivery.

1.10.1.5.3 Government Activities

Government and other agency activities that could impact progress must be clearly identified. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted inspections/tests, environmental permit approvals by State regulators, utility outages, and delivery of Government Furnished Material/Equipment.

1.10.1.5.4 Construction Quality Management (CQM) Activities

The Preparatory and Initial Phase meetings for each Definable Feature of Work identified in the Contractor's Quality Control Plan must be included in the Three-Week Look Ahead Schedule. Preparatory and Initial phase meetings are not required in the NAS, but can be represented by a start milestone linked to successor parent Construction Activity. The Follow-up Phase must be represented by the Construction Activities themselves in the NAS.

1.10.1.5.5 Construction Activities

On-site construction activities must not have a duration in excess of 20 working days. Contractor activities must be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days, unless otherwise defined in this contract. Federal Holidays are as defined in 5 USC 6103.

1.10.1.5.6 Turnover and Closeout Activities

Include activities or milestones for items on the NAVFAC Red Zone Checklist/POAM that are applicable to this project. As a minimum, include required Contractor testing, required Government acceptance inspections on equipment, Pre-Final Inspection, Punch List Completion, Final Inspection

and Acceptance. Add an unconstrained start milestone for the initial NAVFAC Red Zone - Facility Turnover Planning Meeting at approximately 75 percent construction contract completion or six months prior to Contract Completion Date (CCD), whichever is sooner.

1.10.1.5.7 Testing of HVAC - DALT, TAB, and PVT Activities

Include in the baseline schedule, activities and milestones associated with Government acceptance of Duct Air Leakage Test (DALT), Testing, Adjusting, and Balancing (TAB) and Performance Verification Test (PVT) as required and in accordance with Section 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC and Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

a. Identify the general area or location(s) for Government Acceptance Testing of DALT, TAB and PVT.

b. Incorporate into the baseline schedule, time periods required for advance notification of work, and Government submittal review in accordance with Section 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC, paragraph DALT AND TAB SUBMITTAL AND WORK SCHEDULE.

c. Include the following as schedule activities or milestones:

(1) Pre-DALT/TAB/PVT Meeting

(2) TAB Design Review Report, Government review

(3) TAB Pre-Field Engineering Report, Government review

(4) DALT Field Work

(5) DALT Field Acceptance Testing

(6) Certified Final DALT Report, Government review

(7) Control Contractors PVT Plan, Government review

(8) Equipment Suppliers PVT Plan, Government review

(9) Season I TAB Field Work

(10) Season I Certified Final TAB Report, Government review

(11) Endurance Testing, Government review

(12) PVT Field Work

(13) PVT Report, Government review

(14) Season I TAB Field Acceptance Testing

(15) Season II TAB Field Work

(16) Season II Certified Final TAB Report, Government review

(17) Season II TAB Field Acceptance Testing

(18) Post-Occupancy Endurance Testing Government review

(19) Post-Occupancy PVT Field Work

1.10.1.5.8 Commissioning Activities

Include in the baseline schedule activities and milestones associated with Commissioning.

a. Identify the general area or location(s) of systems for Commissioning Inspection and Testing

b. Incorporate into the baseline schedule time periods for Government submittal review

1.10.1.6 Contract Milestones and Constraints

1.10.1.6.1 Project Start Date Milestones

Include as the first activity on the schedule a start milestone titled, "Contract Award", which must have a Mandatory Start constraint equal to the Contract Award Date.

1.10.1.6.1.1 Post-Award Kickoff (PAK) meeting Milestone

Include an unconstrained finish milestone on the schedule titled, "Post-Award Kickoff Meeting". The Post Award Kickoff Meeting may be a single day, or it may range over several days. The intent is to cover all PAK topics, including Partnering and Concept Design Workshop (if required) in one continuous session.

1.10.1.6.2 Pre-Construction Meeting Milestone

Include an unconstrained finish milestone on the schedule titled, "Pre-Construction Meeting". The Pre-Construction meeting may be a single day, or it may range over several days. The intent to cover all the Pre-Con topics, including Partnering and DD1354.

1.10.1.6.3 Preconstruction Submittals Finish Milestone

Include an unconstrained finish milestone on the schedule titled, "Preconstruction Submittals". This milestone is complete when all required preconstruction submittals have been reviewed and approved by the Government.

1.10.1.6.4 Contractor Mobilization Finish Milestone

Include an unconstrained finish milestone on the schedule titled, "Contractor Mobilization".

1.10.1.6.5 NAVFAC Red Zone - Facility Turnover Planning Meeting Milestones

See paragraph TURNOVER AND CLOSEOUT ACTIVITIES above.

1.10.1.6.6 Substantial Completion Milestone

Include an unconstrained finish milestone on the schedule titled "Substantial Completion." Substantial Completion is defined as the point in time the Government would consider the project ready for beneficial occupancy wherein by mutual agreement of the Government and Contractor,

Government use of the facility is allowed while construction access continues in order to complete remaining items (e.g. punch list and other close out submittals). Include a separate Substantial Completion Milestone for each phase if the contract requires construction to be completed in phases.

1.10.1.6.7 DD-1354 Finish Milestone

Add unconstrained finish milestone, titled "DD-1354" and scheduled 30 calendar days prior to Substantial Completion, whenever a Form DD-1354 is required in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS.

1.10.1.6.8 Projected Completion Milestone

Include an unconstrained finish milestone on the schedule titled "Projected Completion." Projected Completion is defined as the point in time all contract requirements are complete and verified by the Government with a successful Final Inspection in accordance with Section 01 45 00.00 20 QUALITY CONTROL. This milestone must have the Contract Completion Date (CCD) milestone as its only successor.

1.10.1.6.9 Contract Completion Date (CCD) Milestone

Last schedule entry must be an unconstrained finish milestone titled "Contract Completion (CCD: DD-MM-YY)." DD-MM-YYYY is the current contract completion date at data date, day-month-year corresponding to P6 Must Finish By Date. NAS milestone updates of Project Completion finish date for longest path must reflect calculated float as positive or negative based on CCD. Calculation of schedule updates must be such that if the finish of the "Projected Completion" milestone falls after the contract completion date, then negative float is calculated on the longest path. If the finish of the "Projected Completion" milestone falls before the contract completion date, the float calculation must reflect positive float on the longest path.

1.10.1.6.10 Additional Milestones

Provide up to 5 additional milestones as required by Contracting Officer.

1.10.1.7 Work Breakdown Structure & Activity Code

At a minimum, establish a Work Breakdown Structure (WBS) and provide activity codes identified as follows:

1.10.1.7.1 Work Breakdown Structure (WBS)

Group all activities and milestones within appropriate WBS categories including, at a minimum, the following:

a. Project Milestones:

(1) Management Milestones

(2) Project Administrative Meetings

(3) Permits

b. Pre-Construction Phase:

(1) Submittals and Reviews

(2) Procurement

(3) Mobilization

c. Construction Phase: Create multiple sub-sections in accordance with project specific categories of work including in WBS descending order as follows:

(1) General Area

(a) Type of Work Item

1. Location

d. Project Closeout: Include activity items such as, but not limited to, Punchlist, Demobilization, O&M, As-built Drawings, Training, and As-built NAS.

e. Modifications: Create sub-category of Conformed and Non-Conformed under Modification WBS. Create multiple sub-sections as the project progresses identified by issue and Fragnet placed in Conformed for modifications issued prior data date, or Non-Conformed for issues not modified to contract prior data date.

f. Removed Activity: Activity is "removed" by remaining within logic sequence, eliminating duration and adding "(NO LONGER REQUIRED)" after Activity Name in Activity Table.

g. Commissioning & Testing:

(1) Specific area/locations of commissioning

(2) Final Testing

(3) Training

1.10.1.7.2 Responsibility Code

All activities in the project schedule must be identified with the resource for completing the task. Activities must not belong to more than one responsible party.

1.10.1.7.3 Activity Category Code

Provide user defined "CAT" codes for Project Level activity codes. Use the following codes:

a. Assign "PROC" value to Procurement type activity

b. Assign "PRE-CON" value to Pre-construction activity

c. Assign "CONS" value to Construction type activity

d. Assign "TEST" value to dedicated testing type activities

e. Assign "CX" value to dedicated Commissioning type activities

f. Assign "CLOS" value to dedicated Close Out type activity

g. Assign "OTHR" to other activity not otherwise designated

1.10.1.7.4 Construction Specification Institute (CSI) Masterformat Code

Provide up to an additional five activity codes as required by the Contracting Officer.

1.10.1.7.5 Drawing Code

Identify all activities in the project schedule with its respective Drawing Code. The Drawing Code is the Sheet Number on the primary project drawing which indicates work to be performed. If an activity does not have an applicable Drawing Code (e.g. Mobilize), the code must be "0000".

1.10.1.8 Adverse Weather Lost Work Days

Use the National Oceanic and Atmospheric Administration's (NOAA) Summary of Monthly Normals report to obtain the historical average number of days each month with precipitation, using a nominal 30-year, greater than 0.10 inch precipitation amount parameter, as indicated on the Station Report for the NOAA location closest to the project site as the basis for establishing a "Weather Calendar" showing the number of anticipated non-workdays for each month due to adverse weather, in addition to Saturdays, Sundays and all Federal Holidays as non-work days.

Assign the Weather Calendar to any activity that could be impacted by adverse weather. The Contracting Officer will issue a modification in accordance with the contract clauses, giving the Contractor a time only extension for the difference of days between the anticipated and actual adverse weather delay if the number of actual adverse weather delay days exceeds the number of days anticipated for the month in which the delay occurs and the adverse weather delayed activities are on the longest path to contract completion in the period when delay occurred. A lost workday due to weather conditions is defined as a day in which the Contractor cannot work at least 50 percent of the day on the impacted activity. Impacts resulting from adverse weather must be documented in Narrative Report for the month that it occurred.

Make changes to P6 project calendars to reflect as-built conditions where work occurred where originally anticipated as non-work days, and where work did not occur (lost work day).

1.10.1.9 Anticipated Restricted Delays

Unless otherwise noted or defined in Section 01 14 00 WORK RESTRICTIONS, allow in the schedule one lost workday for every one month of project duration for instances where base access is not permitted or where work areas are temporarily not accessible for security reasons which causes a delay in the work. Use Anticipated Restricted Delays as basis for establishing a "Security Calendar" showing the number of anticipated non-workdays for each month due to anticipated restrictions, in addition to anticipated adverse weather, Saturdays, Sundays and all Federal Holidays as non-work days. Assign the Security Calendar to any activity that could be impacted by restriction delays. The Contracting Officer will issue a modification in accordance with the contract clauses, giving the Contractor a time extension for the difference of days between the anticipated and actual lost work days if the number of actual restriction

delay days exceeds the number of anticipated for the month in which the delay occurs and the restriction delayed activities are critical to contract completion. A lost workday due to restriction delay is defined as a day in which the Contractor cannot work at least 50 percent of the day on the impacted activity.

Impacts resulting from restriction delays must be documented in Narrative Report for the month that it occurred.

Make changes to P6 project calendars to reflect as-built conditions where work occurred where originally anticipated as non-work days, and where work did not occur (lost work day).

1.10.1.10 Cost Loading

The Project Network Analysis Schedule (NAS) must be cost-loaded and will provide the basis for progress payments. Earned Value Reports must be derived from and correspond to cost loaded NAS. Use the Critical Path Method (CPM) and the Precedence Diagram Method (PDM) to satisfy time and cost applications.

1.10.1.10.1 Cost Loading Activities

Assign material and equipment costs, including their quantities, for which payment will be requested in advance of installation, to their respective procurement activity. Assign labor costs, including their quantities, for material and equipment paid for after installation to their respective construction activities. Include all typical mobilization costs dispersed over early construction activities. Costs for mobilization will not be paid as individual pay items with the exception of batch plant set-up, mobilization of dredging equipment or other similar labor-intensive situations. The value of commissioning, testing and closeout WBS section may not be less than 10 percent of the total costs for procurement and construction activities. ALL activities assigned Government responsibility will have Zero Cost. No contractor cost should be assigned to an activity designated as a Government responsibility. Do not include field overhead positions as individual pay items. Evenly disperse overhead costs and profit to each activity over the duration of the project.

1.10.1.10.2 Partial Payment

Breakdown unit of measure and cost must be defined within P6 Activity Detail Expenses for partial payment of any cost loaded activity. Lump sum cost loaded activity will not be partially paid.

1.10.2 Schedule Software Settings and Restrictions

a. Activity Constraints: Date/time constraint(s), other than those required by the contract, are not allowed unless accepted by the Contracting Officer. Identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report as described in paragraph REQUIRED TABULAR REPORTS.

b. Default Progress Data Disallowed: Actual Start is date work begins on activity with intent to pursue work to substantial completion. Actual Finish is date work is substantially complete to point where successor activity can begin. Actual dates on the CPM schedule must correspond with activity dates reported on the Contractor Quality Control and

Production Reports.

c. At a minimum, include the following settings and parameters in P6 Schedule preparation:

(1) General: Define or establish Calendars and Activity Codes at the "Project" level, not the "Global" level.

(2) Admin Drop-Down Menu, Admin Preferences, Time Periods Tab:

(a) Set time periods for P6 to 8.0 Hours/Day, 40.0 Hours/Week, 172.0 Hours/Month and 2000.0 Hours/Year.

(b) Use assigned calendar to specify the number of work hours for each time period: Must be checked.

(3) Admin Drop-Down Menu, Admin Preferences, Earned Value Tab:

(a) Earned Value Calculation: Use "Budgeted values with current dates".

(4) Project Level, Dates Tab:

(a) Set "Must Finish By" date to "Contract Completion Date", and set "Must Finish By" time to 05:00pm.

(5) Project Level, Defaults Tab:

(a) Duration Type: Set to "Fixed Duration & Units".

(b) Percent Complete Type: Set to "Physical".

(c) Activity Type: Set to "Task Dependent".

(d) Calendar: Set to "Standard 5 Day Workweek". Calendar must reflect Saturday, Sunday and all Federal holidays as non-work days. Alternative calendars may be used with Contracting Officer approval.

(6) Project Level, Calculations Tab:

(a) Default Price/Unit for activities without resource or role Price/Units: Set to "$1/h".

(b) Activity percent complete based on activity steps: Must be Checked.

(c) Link Budget and At Completion for not started activities: Must be Checked.

(d) Reset Remaining Duration and Units to Original: Must be Selected.

(e) Subtract Actual from At Completion: Must be Selected.

(f) Recalculate Actual units and Cost when duration percent complete changes: Must be Checked.

(g) Update units when costs change on resource assignments: Must

be Unchecked.

(h) Link Actual to Date and Actual This Period Units and Cost: Must be Checked.

(7) Project Level, Settings Tab:

(a) Define Critical Activities: Check "Longest Path".

(8) Work Breakdown Structure Level, Earned Value Tab:

(a) Technique for Computing Performance Percent Complete: "Activity percent complete" is selected.

(b) Technique for Computing Estimate to Complete (ETC): "PF = 1" is selected.

1.10.3 Required Tabular Reports and Native P6 XER Files

Include the following reports with the Baseline, Monthly Update and any other required schedule submittals:

a. Time Scaled Logic Schedule

Provide formatted 11 by 17-inch Time-scaled Logic Schedule in color and landscape-oriented with each schedule submittal. Clearly show activities on the longest path setting Gantt chart longest path activity bars to red. Group activities by WBS and sort by finish date in ascending order. Include the following information in column form for each activity and include accompanying Gantt chart:

(1) Activity ID

(2) Activity Name

(3) Original Duration

(4) Remaining duration

(5) Physical Percent Complete

(6) Start Date

(7) Finish Date

(8) Total Float

b. Previous Monthly Update Comparison Time Scaled Logic Schedule (Submit with all Monthly Update Schedule Submittals.)

Provide formatted 11 by 17-inch Time-scaled Logic Schedule in color and landscape-oriented with each monthly update schedule submittal. Clearly show activities on the current month longest path setting Gantt chart longest path activities bars to red. Show previous month activities as yellow bars and previous month milestones in yellow within Gantt chart. Sort by finish date in ascending order. Filter activities for longest path. Maintain and assign the accepted previous month update or the accepted baseline schedule for the first update submittal as the baseline and primary baseline in P6 before

printing the schedule. Include the following information in column form for each activity and include accompanying Gantt chart:

(1) Activity ID

(2) Activity Name

(3) Original Duration

(4) Current Month Remaining Duration

(5) Current Month Start Date

(6) Previous Month Update Start Date (BL Project Start)

(7) Start Date Delta between Current Month and Previous Month (Variance - BL Project Start Date)

(8) Current Month Finish Date

(9) Previous Month Finish Date (BL Project Finish)

(10) Finish Date Delta between Current Month and Previous Month (Variance - BL Project Start Date)

(11) Current Month Total Float

c. P6 native XER file: Include the back-up native .xer program file compatible with the Government version of P6. Each native schedule file must have a unique file name to include project name and data date using (yyyy-mm-dd) convention. Each native schedule must have a unique Project ID and Project Name.

d. Log Report: P6 Scheduling/Leveling Report.

e. Narrative Report: Identify and justify:

(1) Provide Project Summary Data in format below:

(a) Data Date _____

(b) Award Date: _____

(c) Original Project Duration: _____ days post Award Date

(d) Current Project Duration: _____ days post Award Date

(e) Time percent elapsed: _____ percent at data date

(f) Original CCD: _____

(g) Current CCD: _____ (thru MOD _____)

(h) Anticipated CCD: _____ (___ calendar days early/late)

(i) Original Contract Value: $_____

(j) Current Contract Value: $_____

(k) Invoiced Amount: $_____ (____ percent)

(l) Cost Growth: ____ percent

(m) Schedule Growth: ____ percent

(n) There are a total of _____ activities, _____ activities complete (____ percent), ____ activities in progress (____ percent), _____ activities not started (____ percent). Of the in progress and not started activities; ____ (____ percent) are on the longest path. The longest path has duration of _____ calendar days from data-date to anticipated project completion.

(2) Progress made in each area of the project;

(3) Longest Path;

(4) Date/time constraint(s), other than those required by the contract

(5) Listing of all changes made between the previous schedule and current updated schedule include: added or deleted activities, original and remaining durations for activities that have not started, logic (sequence constraint lag/lead), milestones, planned sequence of operations, longest path, calendars or calendar assignments, and cost loading;

(6) Any decrease in previously reported activity Earned Amount;

(7) Pending items and status thereof, including permits, changes orders, and time extensions;

(8) Status of Contract Completion Date and interim milestones;

(9) Status of Projected Completion Milestone and account of difference in calendar days between previous update Projected Completion Milestone

(10) Current and anticipated delays listing Activity Names and IDs for impacted activities(describe cause of delay and corrective actions(s) and mitigation measures to minimize);

(11) Description of current and potential future schedule problem areas.

(12) Identification of any weather and restricted lost time as compared to anticipated weather for the month and anticipated restricted days for which the update is submitted. Impacts resulting from adverse weather must be documented in tabular form showing the calendar month (or billing period) with the days on which construction activity incurred Lost Work Days due to adverse weather. In narrative form, describe the adverse weather cause such as precipitation measurement, temperature, wind or other influencing factors, and why work was impacted. Describe the construction activity(s) that was (were) scheduled, impacted.

Each entry in the narrative report must cite the respective Activity ID and Activity Name, the date and reason for the change, and description of the change.

f. Earned Value Report: Derive from and correspond to P6 cost loaded schedule. List all activities having a budget amount cost loaded. Compile total earnings on the project from notice to proceed to current progress payment request. Show current budget, previous physical percent complete, to-date physical percent complete, previous earned value, to-date earned value, cost this period and cost to complete on the report for each activity.

g. Schedule Variance Control (SVC) Diagram: With each schedule submission, provide a SVC diagram showing 1) A Cash Flow Curve indicating planned project cost based on each of projected early and projected late activity finish dates and 2) one curve for Earned Value to-date. Revise Cash Flow Curves when the contract is modified, or as directed by the Contracting Officer Include a legend on report clearly indication 3 curves: early finish, late finish, and earned-value to date.

Use the following settings in Activity Usage Profile Options:

(1) In the Data section, under Display, the radio box for Cost must be selected.

(2) In the Data section, under Filter for Bars/Graphs, the checkbox for Total must be checked.

(3) In the Show Bars/Curves section:

(a) Under the By Date column, the checkboxes for Baseline, Actual and Remaining Late must be checked. The checkboxes for Budgeted and Remaining Early must be unchecked.

(b) Under the Cumulative column, the checkboxes for Baseline, Actual and Remaining Late must be checked. The checkboxes for Budgeted and Remaining Early must be unchecked.

(c) Set the color for Baseline to green.

(d) Set the color for Actual to blue.

(e) Set the color for Remaining Late to red.

(4) In the Show Earned Value Curves section, the checkboxes for Planned Value Cost, Earned Value Cost and Estimate at Completion must be unchecked.

h. Logic Diagram showing timescale from data date to 60 days after data date with filter for longest path. Leave Group By selection blank and sort by finish date in ascending order.

i. Baseline or Monthly Update Checklist as applicable completed and certified by Qualified Scheduler. Baseline Project Schedule and Monthly Update Schedule Checklists can be found on the Whole Building Design Guide website at https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-01-32-17-00-20

j. Screen shot PDF of P6 Time Periods Settings referenced in paragraph SCHEDULE SOFTWARE SETTINGS AND RESTRICTIONS, list item d.(2): ADMIN DROP-DOWN MENU, ADMIN PREFERENCES, TIME PERIODS TAB

k. Daily Reported Production Activity: Submit on a monthly basis, in electronic spreadsheet (format provided by the Government), summary of daily reported production activity for the reporting month in the update schedule. Use the following columns for reporting:

(1) Date

(2) Activity ID

(3) Work Description

(4) Contractor

(5) Billable Hours

l. HVAC/COMMISSIONING KTR Checklist. See Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC for checklist requirements. Complete checklist listing all items with baseline submittal. Complete checklist as required to complete project, submitting complete checklist in intermediately following monthly update submittal.

1.11 CONTRACT MODIFICATION

1.11.1 Time Impact Analysis (TIA)

Submit a Time Impact Analysis with each cost and time proposal for a proposed change. TIA must illustrate the influence of each change or delay on the Contract Completion Date or milestones. No time extensions will be granted nor delay damages paid unless a delay occurs which consumes all available Project Float, impacts the longest path, and extends the Projected Completion beyond the Contract Completion Date.

a. Each TIA must be in both narrative and schedule form. The narrative must define the scope and conditions of the change; provide start and finish dates of impact, successor and predecessor activity to impact period, responsible party; describe how it originated, and how it impacts the schedule's longest path. The schedule submission must consist of three native XER files:

(1) Fragnet used to define the scope of the changed condition

(2) Most recent accepted schedule update as of the time of the impact start date. Update this schedule to show all activity progress as of the time of the impact start date. The impact start date is identified as the time when an existing activity is impeded for either starting or finishing.

(3) The impacted schedule that has the fragnet inserted in the updated schedule and the schedule "run" so that the new completion date is determined.

b. For claimed as-built project delay, the inserted fragnet TIA method must be modified to account for as-built events known to occur after the data date of schedule update used. Updated schedules for periods following the impact start date will be used to evaluate how the project progressed (as-built) through the finish of impact. Impact to longest path must be determined for each following update period.

c. All TIAs must include any mitigation, and must determine the apportionment of the overall delay assignable to each individual delay. Apportionment must provide identification of delay type and classification of delay by compensable and non-compensable events. The associated narrative must clearly describe analysis methodology used, and the findings in a chronological listing beginning with the earliest delay event.

(1) Identify and classify types of delay defined as follows:

(a) Force majeure delay (e.g. weather delay): Any delay event caused by something or someone other than the Government or the Contractor, or the risk of which has not been assigned solely to the Government or the Contractor. If the force majeure delay is on the longest path, in absence of other types of concurrent delays, the Contractor is granted an extension of contract time, classified as a non-compensable event.

(b) A Contractor-delay: Any delay event caused by the Contractor, or the risk of which has been assigned solely to the Contractor. If the contractor-delay is on the longest path, in absence of other types of concurrent delays, Contractor is not granted extension of contract time, and classified as a non-compensable event. Where absent other types of delays, and having impact to project completion, Contractor must provide to Contracting Officer a Corrective Action Plan identifying plan to mitigate delay.

(c) A Government-delay: Any delay event caused by the Government, or the risk of which has been assigned solely to the Government. If the Government-delay is on the longest path, in absence of other types of concurrent delays, the Contractor is granted an extension of contract time, and classified as a compensable event.

(2) Functional concurrency must be used to analyze concurrent delays, where: separate delay issues delay project completion, do not necessarily occur at same time, rather occur within same monthly schedule update period at minimum, or within same as-built period under review. If a combination of functionally concurrent delay types occurs, it is considered Concurrent Delay, which is defined in the following combinations:

(a) Government-delay concurrent with contractor-delay: excusable time extension, classified non-compensable event.

(b) Government-delay concurrent with force majeure delay: excusable time extension, classified non-compensable event.

(c) Contractor-delay concurrent with force majeure delay: excusable time extension, classified non-compensable event.

(3) Pacing delay reacting to another delay (parent delay) equally or more critical than paced activity must be identified prior to pacing. Contracting Officer will notify Contractor prior to pacing. Contractor must notify Contracting Officer prior to pacing. Notification must include identification of parent delay issue, estimated parent delay time period, paced activity(s) identity, and pacing reason(s). Pacing Concurrency is defined as follows:

(a) Government-delay concurrent with contractor-pacing: excusable time extension, classified compensable event.

(b) Contractor-delay concurrent with Government-pacing: inexcusable time extension, classified non-compensable event

d. Submit electronic file containing the narrative and the source schedule files used in the time impact analysis.

1.12 PROJECT FLOAT

Project Float is the length of time between the Contractor's Projected Completion Milestone and the Contract Completion Date. Project Float available in the schedule will not be for the exclusive use of either the Government or the Contractor.

The use of Resource Leveling or other techniques used for the purpose of artificially adjusting activity durations to consume float and influence longest path is prohibited.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES
08/18, CHG 4: 02/21

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

Submittal requirements are specified in the technical sections. Examples and descriptions of submittals identified by the Submittal Description (SD) numbers and titles follow:

SD-01 Preconstruction Submittals

Certificates Of Insurance

Surety Bonds

List Of Proposed Subcontractors

List Of Proposed Products

Baseline Network Analysis Schedule (NAS)

Submittal Register

Schedule Of Prices Or Earned Value Report

Accident Prevention Plan

Work Plan

Quality Control (QC) plan

Environmental Protection Plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those that will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report that includes findings of a test required to be performed on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report that includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily logs and checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits

Text of posted operating instructions

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS)concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data provided by the manufacturer, or the system provider, including manufacturer's help and product line documentation, necessary to maintain and install equipment, for operating and maintenance use by facility personnel.

Data required by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

Data incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.1.2 Approving Authority

Office or designated person authorized to approve the submittal.

1.1.3 Work

As used in this section, on-site and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or

to be incorporated in such construction. In exception, excludes work to produce SD-01 submittals.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or “S” classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

1.3.1 Government Approved (G)

Government approval is required for extensions of design, critical materials, variations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Government.

Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, submittals are considered to be "shop drawings."

1.3.2 For Information Only

Submittals not requiring Government approval will be for information only. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are not considered to be "shop drawings."

1.3.3 Sustainability Reporting Submittals (S)

Submittals for Guiding Principle Validation (GPV) or Third Party Certification (TPC) are indicated with an "S" designation. These submittals are for information only and for use as specified in Section 01 33 29 SUSTAINABILITY REPORTING.

Schedule submittals for these items throughout the course of construction as provided; do not wait until closeout.

1.4 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

As soon as practicable after award of contract, and before procurement or fabrication, forward to Architect-Engineer: Jacobs, submittals required in the technical sections of this specification, including shop drawings, product data and samples. In addition, forward a copy of the submittals to the Contracting Officer.

1.4.1 O&M Data

Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

In the event the Contractor fails to deliver O&M data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the items to which such O&M data apply.

1.4.2 Submittals Reserved for NAVFAC MIDATLANTIC Approval

As an exception to the standard submittal procedure for Government Approval, submit the following to the Commander, NAVFAC MIDATLANTIC, Code CI4:

a. Section 21 13 13: All fire protection system submittals

b. Section 28 31 76: All fire alarm system submittals

c. Section 01 91 00.15 20 TOTAL BUILDING COMMISSIONING: SD-06 Commissioning Plan, Certificate of Readiness, and Commissioning Report submittals

d. Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC: SD-06 field test report submittals

e. Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC: All submittals

1.5 PREPARATION

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to the office of the approving authority using the transmittal form prescribed by the Contracting Officer. Include all information prescribed by the transmittal form and required in paragraph IDENTIFYING SUBMITTALS. Use the submittal transmittal forms to record actions regarding samples.

1.5.2 Identifying Submittals

The Contractor's Quality Control Manager must prepare, review and stamp submittals, including those provided by a subcontractor, before submittal to the Government.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location

b. Construction contract number

c. Dates of the drawings and revisions

d. Name, address, and telephone number of Subcontractor, supplier, manufacturer, and any other Subcontractor associated with the submittal.

e. Section number of the specification by which submittal is required

f. Submittal description (SD) number of each component of submittal

g. For a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission

h. Product identification and location in project.

1.5.3 Submittal Format

1.5.3.1 Format of SD-01 Preconstruction Submittals

When the submittal includes a document that is to be used in the project, or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.5.3.2 Format for SD-02 Shop Drawings

Provide shop drawings not less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full-size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless another form is required. Ensure drawings are suitable for reproduction and of a quality to produce clear, distinct lines and letters, with dark lines on a white background.

a. Include the nameplate data, size, and capacity on drawings. Also include applicable federal, military, industry, and technical society publication references.

b. Dimension drawings, except diagrams and schematic drawings. Prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Present larger drawings in sets. Submit an electronic copy of drawings in PDF format.

1.5.3.2.1 Drawing Identification

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

Number drawings in a logical sequence. Each drawing is to bear the number of the submittal in a uniform location next to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

Reserve a blank space, no smaller than 4 inches on the right-hand side of each sheet for the Government disposition stamp.

1.5.3.3 Format of SD-03 Product Data

Present product data submittals for each section as a complete, bound volume. Include a table of contents, listing the page and catalog item numbers for product data.

Indicate, by prominent notation, each product that is being submitted; indicate the specification section number and paragraph number to which it pertains.

1.5.3.3.1 Product Information

Supplement product data with material prepared for the project to satisfy

the submittal requirements where product data does not exist. Identify this material as developed specifically for the project, with information and format as required for submission of SD-07 Certificates.

Provide product data in units used in the Contract documents. Where product data are included in preprinted catalogs with another unit, submit the dimensions in contract document units, on a separate sheet.

1.5.3.3.2 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.3.3.3 Data Submission

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal that is marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of the construction effort.

Submit the manufacturer's instructions before installation.

1.5.3.4 Format of SD-04 Samples

1.5.3.4.1 Sample Characteristics

Furnish samples in the following sizes, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:

a. Sample of Equipment or Device: Full size.

b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

e. Sample Volume of Nonsolid Materials: Pint. Examples of nonsolid materials are sand and paint.

f. Color Selection Samples: 2 by 4 inches. Where samples are specified

for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

1.5.3.4.2 Sample Incorporation

Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at the time of use.

Recording of Sample Installation: Note and preserve the notation of any area constituting a sample installation, but remove the notation at the final clean-up of the project.

1.5.3.4.3 Comparison Sample

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

1.5.3.5 Format of SD-05 Design Data

Provide design data and certificates on 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.5.3.6 Format of SD-06 Test Reports

Provide reports on 8 1/2 by 11 inch paper in a complete bound volume.

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.5.3.7 Format of SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.5.3.8 Format of SD-08 Manufacturer's Instructions

Present manufacturer's instructions submittals for each section as a complete, bound volume. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry, and technical-society publication references. If supplemental information is needed to clarify the manufacturer's data, submit it as specified for SD-07 Certificates.

Submit the manufacturer's instructions before installation.

1.5.3.8.1 Standards

Where equipment or materials are specified to conform to industry or

technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.3.9 Format of SD-09 Manufacturer's Field Reports

Provide reports on 8 1/2 by 11 inch paper in a complete bound volume.

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.5.3.10 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.5.3.11 Format of SD-11 Closeout Submittals

When the submittal includes a document that is to be used in the project or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.5.4 Source Drawings for Shop Drawings

1.5.4.1 Source Drawings

The entire set of source drawing files (DWG) will not be provided to the Contractor. Request the specific Drawing Number for the preparation of shop drawings. Only those drawings requested to prepare shop drawings will be provided. These drawings are provided only after award.

1.5.4.2 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim, and waives to the fullest extent permitted by law any claim or cause of action of any nature against the Government, its agents, or its subconsultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities, or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic source drawing files are not construction documents. Differences may exist between the source drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic source drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. The Contractor is responsible for determining if any conflict exists. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished source drawing files, the signed and sealed construction documents govern. Use of these source drawing files does not relieve the Contractor of the duty to fully comply with the contract documents, including and without limitation the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indication of ownership (seals, logos, signatures, initials and dates).

1.5.5 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide three hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, and coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is searchable and can be copied. If documents are scanned, optical character resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature or a scan of a signature.

E-mail electronic submittal documents smaller than 10MB to an e-mail address as directed by the Contracting Officer. Provide electronic documents over 10 MB on an optical disc or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website: https://safe.amrdec.army.mil/safe/.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of SD-01 Preconstruction Submittal Copies

Unless otherwise specified, submit three sets of administrative submittals.

1.6.2 Number of SD-02 Shop Drawing Copies

Submit three copies of submittals of shop drawings requiring review and approval by a QC organization. Submit three copies of shop drawings requiring review and approval by the Contracting Officer.

1.6.3 Number of SD-03 Product Data Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.4 Number of SD-04 Samples

a. Submit two samples, or two sets of samples showing the range of variation, of each required item. One approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in the technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of nonsolid materials.

1.6.5 Number of SD-05 Design Data Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.6 Number of SD-06 Test Report Copies

Submit in compliance with quantity and quality requirements specified for shop drawings, other than field test results that will be submitted with QC reports.

1.6.7 Number of SD-07 Certificate Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.8 Number of SD-08 Manufacturer's Instructions Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.6.9 Number of SD-09 Manufacturer's Field Report Copies

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.6.10 Number of SD-10 Operation and Maintenance Data Copies

Submit three copies of O&M data to the Contracting Officer for review and approval.

1.6.11 Number of SD-11 Closeout Submittals Copies

Unless otherwise specified, submit three sets of administrative submittals.

1.7 INFORMATION ONLY SUBMITTALS

Submittals without a "G" designation must be certified by the QC manager and submitted to the Contracting Officer for information-only. Provide information-only submittals to the Contracting Officer a minimum of 14 calendar days prior to the Preparatory Meeting for the associated Definable Feature of Work (DFOW). Approval of the Contracting Officer is not required on information only submittals. The Contracting Officer will

mark "receipt acknowledged" on submittals for information and will return only the transmittal cover sheet to the Contractor. Normally, submittals for information only will not be returned. However, the Government reserves the right to return unsatisfactory submittals and require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.8 PROJECT SUBMITTAL REGISTER

A sample Project Submittal Register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register."

1.8.1 Submittal Management

Prepare and maintain a submittal register, as the work progresses. Do not change data that is output in columns (c), (d), (e), and (f) as delivered by Government; retain data that is output in columns (a), (g), (h), and (i) as approved. As an attachment, provide a submittal register showing items of equipment and materials for which submittals are required by the specifications. This list may not be all-inclusive and additional submittals may be required.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD Number. and type, e.g., SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in each specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting the project requirements.

Column (f): Lists the approving authority for each submittal. Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns and all dates on which submittals are received by and returned by the Government.

1.8.2 Preconstruction Use of Submittal Register

Submit the submittal register. Include the QC plan and the project schedule. Verify that all submittals required for the project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for the approving authority to receive submittals.

Column (h) Contractor Approval Date: Date that Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.3 Contractor Use of Submittal Register

Update the following fields with each submittal throughout the contract.

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) Date submittal transmitted.

Column (q) Date approval was received.

1.8.4 Approving Authority Use of Submittal Register

Update the following fields:

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (l) Date submittal was received.

Column (m) through (p) Dates of review actions.

Column (q) Date of return to Contractor.

1.8.5 Action Codes

1.8.5.1 Government Review Action Codes

"A" - "Approved as submitted"

"AN" - "Approved as noted"

"RR" - "Disapproved as submitted"; "Completed"

"NR" - "Not Reviewed"

"RA" - "Receipt Acknowledged"

1.8.6 Delivery of Copies

Submit an updated electronic copy of the submittal register to the Contracting Officer with each invoice request. Provide an updated Submittal Register monthly regardless of whether an invoice is submitted.

1.9 VARIATIONS

Variations from contract requirements require Contracting Officer approval pursuant to contract Clause FAR 52.236-21 Specifications and Drawings for Construction, and will be considered where advantageous to the Government.

1.9.1 Considering Variations

Discussion of variations with the Contracting Officer before submission will help ensure that functional and quality requirements are met and minimize rejections and resubmittals. For variations that include design changes or some material or product substitutions, the Government may require an evaluation and analysis by a licensed professional engineer hired by the contractor.

Specifically point out variations from contract requirements in a transmittal letter. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.9.2 Proposing Variations

Specifically point out variations from contract requirements in a transmittal letter. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.9.3 Warranting that Variations are Compatible

When delivering a variation for approval, the Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.9.4 Review Schedule Extension

In addition to the normal submittal review period, a period of 14 working days will be allowed for the Government to consider submittals with variations.

1.10 SCHEDULING

Schedule and submit concurrently product data and shop drawings covering component items forming a system or items that are interrelated. Submit pertinent certifications at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. Allow 21 working days for review and approval of submittals for submittals identified in paragraph titled "Submittals Reserved for NAVFAC MIDATLANTIC Approval".

a. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. The Contractor is responsible for additional time required for Government reviews resulting from required resubmittals. The review period for each resubmittal is the same as for the initial submittal.

b. Submittals required by the contract documents are listed on the submittal register. If a submittal is listed in the submittal register but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but that have been omitted from the register or marked "N/A."

c. Resubmit the submittal register and annotate it monthly with actual submission and approval dates. When all items on the register have been fully approved, no further resubmittal is required.

Contracting Officer review will be completed within 21 working days after the date of submission, unless otherwise noted.

d. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 15 working days for submittals for QC manager approval and 21 working days for submittals where the Contracting Officer is the approving authority. The period of review for submittals with Contracting Officer approval begins when the Government receives the submittal from the QC organization.

e. For submittals requiring review by a Government fire protection engineer, allow a review period, beginning when the Government receives the submittal from the QC organization, of 30 working days for return of the submittal to the Contractor.

1.10.1 Reviewing, Certifying, and Approving Authority

The QC Manager is responsible for reviewing all submittals and certifying that they are in compliance with contract requirements. The approving authority on submittals is the QC Manager unless otherwise specified. At each "Submittal" paragraph in individual specification sections, a notation "G" following a submittal item indicates that the Contracting Officer is the approving authority for that submittal item. Provide an additional copy of the submittal to the Government Approving authority

1.10.2 Constraints

Conform to provisions of this section, unless explicitly stated otherwise for submittals listed or specified in this contract.

Submit complete submittals for each definable feature of the work. At the same time, submit components of definable features that are interrelated as a system.

When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, the submittal will be returned without review.

Approval of a separate material, product, or component does not imply approval of the assembly in which the item functions.

1.10.3 QC Organization Responsibilities

a. Review submittals for conformance with project design concepts and compliance with contract documents.

b. Process submittals based on the approving authority indicated in the submittal register.

(1) When the QC manager is the approving authority, take appropriate action on the submittal from the possible actions defined in paragraph APPROVED SUBMITTALS.

(2) When the Contracting Officer is the approving authority or when variation has been proposed, forward the submittal to the Government, along with a certifying statement, or return the submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of the submittal determines the appropriate action.

c. Ensure that material is clearly legible.

d. Stamp each sheet of each submittal with a QC certifying statement or an approving statement, except that data submitted in a bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When the approving authority is the Contracting Officer, the QC organization will certify submittals forwarded to the Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with Contract Number _____ is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

(2) When approving authority is the QC manager, the QC manager will use the following approval statement when returning submittals to the Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with Contract Number _____ is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

e. Sign the certifying statement or approval statement. The QC organization member designated in the approved QC plan is the person signing certifying statements. The use of original ink for signatures is required. Stamped signatures are not acceptable.

f. Update the submittal register as submittal actions occur, and maintain the submittal register at the project site until final acceptance of all work by the Contracting Officer.

g. Retain a copy of approved submittals and approved samples at the project site.

h. For "S" submittals, provide a copy of the approved submittal to the

Government Approving authority.

1.11 GOVERNMENT APPROVING AUTHORITY

When the approving authority is the Contracting Officer, the Government will:

a. Note the date on which the submittal was received from the QC manager.

b. Review submittals for approval within the scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with comments and markings appropriate for the action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. Three copies of the submittal will be retained by the Contracting Officer and zero copies of the submittal will be returned to the Contractor.

1.11.1 Review Notations

Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize proceeding with the work covered.

b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize proceeding with the work covered provided that the Contractor takes no exception to the corrections.

c. Submittals marked "not approved," "disapproved," or "revise and resubmit" indicate incomplete submittal or noncompliance with the contract requirements or design concept. Resubmit with appropriate changes. Do not proceed with work for this item until the resubmittal is approved.

d. Submittals marked "not reviewed" indicate that the submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

e. Submittals marked "receipt acknowledged" indicate that submittals have been received by the Government. This applies only to "information-only submittals" as previously defined.

1.12 DISAPPROVED SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications, give notice to the Contracting Officer as required under the FAR clause titled CHANGES. The Contractor is responsible for the dimensions and design of connection details and the construction of work. Failure to point out

variations may cause the Government to require rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and resubmit in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals is not to be construed as a complete check, and indicates only that

Approval or acceptance by the Government for a submittal does not relieve the Contractor of the responsibility for meeting the contract requirements or for any error that may exist, because under the Quality Control (QC) requirements of this contract, the Contractor is responsible for ensuring information contained within each submittal accurately conforms with the requirements of the contract documents.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, provide assurance that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those that may be damaged in testing, will be returned to the Contractor, at its expense, upon completion of the contract. Unapproved samples will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make as that material. The Government reserves the right to disapprove any material or equipment that has previously proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Replace such materials or equipment to meet contract requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
P-1102

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 11 00	SD-01 Preconstruction Submittals															
			Salvage Plan	1.10	G													
		01 14 00	SD-01 Preconstruction Submittals															
			List of Contact Personnel	1.4.1.1														
			Personnel List	1.5.1														
			Phasing Plan	1.3	G													
		01 20 00	SD-01 Preconstruction Submittals															
			Earned Value Report	1.3	G													
		01 30 00	SD-01 Preconstruction Submittals															
			View Location Map	1.3														
			Progress and Completion	1.4														
			Pictures															
		01 30 02.00 22	SD-02 Shop Drawings															
			Preliminary (Pre-Final) AV	1.5.3	G													
			Package															
			Final AV Package	1.5.9	G													
			Best Value Determination	1.6	G													
			SD-07 Certificates															
			Contractor's AV Designer's	1.4.1	G													
			Qualifications															
		01 31 23.13 20	SD-01 Preconstruction Submittals															
			List of Contractor's Personnel	1.4.2	G													
		01 32 17.00 20	SD-01 Preconstruction Submittals															
			Baseline NAS	1.2.2	G													
			Designated Project Scheduler	1.9	G													
			SD-07 Certificates															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 32 17.00 20	Three-Week Look Ahead	1.3	G													
			Schedule															
			Monthly Network Analysis	1.4.1	G													
			Updates															
			SD-11 Closeout Submittals															
			As-Built Schedule	1.4.2	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.8	G													
		01 33 29	SD-01 Preconstruction Submittals															
			Preliminary High Performance	1.5.3.2	G													
			and Sustainable Building Checklist															
			Sustainability Action Plan	1.4.1	G													
			Preliminary Sustainability	1.5.3.2	G													
			eNotebook															
			SD-11 Closeout Submittals															
			Final High Performance and	1.5.3.2	G													
			Sustainable Building Checklist															
			Final Sustainability eNotebook	1.5.3.2	G													
			Amended Final Sustainability	1.5.3.2	G													
			eNotebook															
			Amended Final High	1.5.3.2	G													
			Performance and Sustainable															
			Building Checklist															
			Third Party Certification	3.2	G													
			Certificate, Assessment, or															
			Validation and Compliance Report															

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		01 35 26	SD-01 Preconstruction Submittals															
			APP - Construction	1.8.1	G													
			Accident Prevention Plan (APP)	1.8	G													
			SD-06 Test Reports															
			Monthly Exposure Reports	1.4														
			Notifications and Reports	1.13														
			Accident Reports	1.13.2	G													
			LHE Inspection Reports	1.13.3														
			SD-07 Certificates															
			Contractor Safety Self-Evaluation	1.5														
			Checklist															
			Crane Operators/Riggers	1.7.1.4														
			Standard Lift Plan	1.8.3.2	G													
			Critical Lift Plan	1.8.3.3	G													
			Naval Architecture Analysis	1.8.3.4	G													
			Activity Hazard Analysis (AHA)	1.9														
			Confined Space Entry Permit	1.10.1														
			Hot Work Permit	1.10.1														
			Certificate of Compliance	1.13.4														
		01 45 00.00 20	SD-01 Preconstruction Submittals															
			Construction Quality Control (QC)	1.6.1	G													
			Plan															
			Indoor Air Quality (IAQ)	1.16	G	S												
			Management Plan															
			Final IAQ Management Plan	1.16	S													

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		01 45 00.00 20	Preconstruction Stakeout of Earth	3.2	G													
			Covered Magazines															
		01 45 25	SD-06 Test Reports															
			Daily Reports	3.1.1														
			Biweekly	3.1.1														
			SD-07 Certificates															
			Certificate of Compliance	1.4	G													
			SD-11 Closeout Submittals															
			Interim Report	3.1.1	G													
			Comprehensive Final Report	3.1.1	G													
		01 45 35	SD-06 Test Reports															
			Daily Reports	3.1.2														
			Biweekly Reports	3.1.1														
			SD-07 Certificates															
			AISC Certified Steel Fabricator	2.1														
			Steel Joist Institute Membership	2.1														
			Certificate of Compliance	2.1														
			Special Inspector	1.5	G													
			SD-11 Closeout Submittals															
			Comprehensive Final Report	3.1.2	G													
		01 45 36	SD-01 Preconstruction Submittals															
			SIOR Letter of Acceptance	3.1.1	G													
			Project Manual	3.1.1	G													
			Project Manual	3.1.1	G													
			Ordnance Magazine Electrical	3.2														
			Inspection Plan															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 45 36	Visual Inspection Checklist	3.2.1														
			Electrical Construction Special	3.2.2														
			Inspections Report															
			SD-06 Test Reports															
			Daily Reports	3.1.1														
			Daily Reports	3.1.3														
			Biweekly Reports	3.1.1														
			SD-07 Certificates															
			AISC Certified Steel Fabricator	2.1														
			Certificate of Compliance	2.1														
			Special Inspector of Record	1.5.7	G													
			Special Inspector	1.5	G													
			SD-11 Closeout Submittals															
			Interim Report	3.1.1	G													
			Comprehensive Final Report	3.1.1	G													
			Electrical Construction Special	3.2.2	G													
			Inspections Report															
		01 50 00	SD-01 Preconstruction Submittals															
			Construction Site Plan	1.3	G													
			Traffic Control Plan	3.4.1	G													
			Haul Road Plan	2.2.1	G													
			Contractor Computer	1.6.1.4	G													
			Cybersecurity Compliance															
			Statements															

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		01 50 00	Contractor Temporary Network	1.6.6	G													
			Cybersecurity Compliance															
			Statements															
			SD-03 Product Data															
			Backflow Preventers	1.4	G													
			SD-06 Test Reports															
			Backflow Preventer Tests	3.5														
			SD-07 Certificates															
			Backflow Tester	1.4.1														
			Backflow Preventers	1.4														
		01 57 19	SD-01 Preconstruction Submittals															
			Preconstruction Survey	1.6.1														
			Regulatory Notifications	1.6.2	G													
			Environmental Manager	1.6.4	G													
			Qualifications															
			Employee Training Records	1.6.5	G													
			Environmental Protection Plan	1.7	G													
			Dirt and Dust Control Plan	1.7.9.1	G													
			Solid Waste Management Permit	1.10	G													
			Stormwater Pollution Control Plan	3.2.1.1	G													
			Stormwater Notice of Intent	3.2.1.2	G													
			Spill Prevention Control And	3.15.2	G													
			Countermeasure (SPCC) Plan															
			Post-construction Stormwater	1.8	G													
			Management General Permit															
			Wastewater Collection System	1.7.7	G													

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		01 57 19	Inland Wetlands and	1.8	G													
			Watercourse															
			Water Quality	3.3.1	G													
			Water Distribution System	1.7.7	G													
			Hazardous Waste Treatment,	1.7.6	G													
			Storage, Disposal, and Handling															
			Clearing	1.7.3	G													
			Endangered Species/Critical	1.7.3	G													
			Habitat - Habitat Protection Plan															
			related to the Eastern Ribbon															
			Snake															
			Payment of Standing Timber	1.7.3	G													
			Removal to Real Property															
			Pollution Generating Equipment	1.7.9.2	G													
			Stationary Internal Combustion	1.7.9.3	G													
			Engines															
			Soil Management Plan	1.5.1.1.2	G													
			Imported Fill Management Plan	1.5.1.1.3	G													
			Imported Fill Summary Report	1.5.1.1.3	G													
			Dewatering Plan for OU 2 and 3	1.5.1.1.5	G													
			SD-06 Test Reports															
			Monthly Solid Waste Disposal	1.10.1	G													
			Report															
			Inspection Reports	3.2.1.3														
			Laboratory Analysis Results	1.5.1.1.2														
			Laboratory Analysis Results	1.5.1.1.5														

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		01 57 19	SD-07 Certificates															
			ECATTS Certificate Of	1.4.1.2	G													
			Completion															
			Employee Training Records	1.6.5	G													
			Erosion and Sediment Control	1.6.5														
			Inspector															
			Laboratory Certifications and	1.5.1.1.2														
			Accreditations															
			Laboratory Certifications and	1.5.1.1.5														
			Accreditations															
			SD-11 Closeout Submittals															
			Regulatory Notifications	1.6.2	G													
			Assembled Employee Training	1.6.5	G													
			Records															
			Solid Waste Management Permit	1.10	G													
			Stormwater Pollution Control Plan	3.2.1.4	G													
			Compliance Notebook															
			Stormwater Notice of Termination	3.2.1.5	G													
			Eastern Ribbon Snake Protection	3.1	G													
			Plan Report															
			As-Built Topographic Survey	3.2.1.5														
			Waste Determination	1.5.1.1.2	G													
			Documentation															
			Waste Determination	3.7.1	G													
			Documentation															

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		01 57 19	Project Solid Waste Disposal	3.7.2.1	G													
			Documentation Report															
			Sales Documentation	3.7.2.1	G													
			Hazardous Waste/Debris	3.7.3.1	G													
			Management															
			Disposal Documentation for	3.7.3.6	G													
			Hazardous and Regulated Waste															
			Contractor Hazardous Material	3.8.1	G													
			Inventory Log															
		01 58 00	SD-02 Shop Drawings															
			Preliminary Drawing Indicating	1.3.1	G													
			Layout And Text Content															
		01 74 19	SD-01 Preconstruction Submittals															
			Construction Waste Management	1.7	G													
			Plan															
			SD-11 Closeout Submittals															
			Final Construction Waste	1.9	S													
			Diversion Report															
		01 78 00	SD-03 Product Data															
			Warranty Management Plan	1.6.1														
			Warranty Tags	1.6.4														
			Final Cleaning	3.3														
			Spare Parts Data	1.5														
			SD-08 Manufacturer's Instructions															
			Instructions	1.6.1														

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		01 78 00	SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.2	G													
			Manuals															
			SD-11 Closeout Submittals															
			As-Built Drawings	3.1	G													
			As-Built Record of Equipment	1.6.1														
			and Materials															
			Certification of EPA Designated	2.1	G													
			Items															
			Certification Of USDA Designated	2.2	G													
			Items															
			Interim DD FORM 1354	3.4.1	G													
			Checklist for DD FORM 1354	3.4.2	G													
			High Performance and	3.4.2	G													
			Sustainable Building (HPSB)															
			Checklist															
		01 78 23	SD-10 Operation and Maintenance															
			Data															
			Training Plan	3.1.1	G													
			Training Outline	3.1.3	G													
			Training Content	3.1.2	G													
			SD-11 Closeout Submittals															
			Training Video Recording	3.1.4	G													
			Validation of Training Completion	3.1.6	G													
		01 78 24.00 20	SD-11 Closeout Submittals															

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		01 78 24.00 20	eOMSI, Progress Submittal	1.4.1	G													
			eOMSI, Prefinal Submittal	1.4.2	G													
			eOMSI, Final Submittal	1.4.3	G													
		01 78 30.00 22	SD-01 Preconstruction Submittals															
			Technical Approach Document	1.4.1	G													
			SD-05 Design Data															
			Preliminary Gis Deliverable	1.4.1	G													
			SD-11 Closeout Submittals															
			GIS Data Deliverables	1.4.2	G													
		02 41 00	SD-01 Preconstruction Submittals															
			Demolition Plan	1.2.2	G													
			Deconstruction Plan	1.2.2	G													
			Existing Conditions	1.10														
			SD-07 Certificates															
			Notification	1.7	G													
			SD-11 Closeout Submittals															
			Receipts	3.3.4														
			Waste Diversion from Landfill	3.1.1	S													
			Report															
		02 65 00	SD-01 Preconstruction Submittals															
			Work Plan	1.4.4	G													
			Site Safety and Health Plan	1.4.4.1	G													
			Excavation and Material Handling	1.4.4.2	G													
			Plan															
			Field Sampling and Laboratory	1.4.4.3	G													
			Testing Plan															

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		02 65 00	Tank and Piping Removal and	1.4.4.4	G													
			Disposal Plan															
			Spill and Discharge Control Plan	1.4.4.5	G													
			Qualifications	1.4.1	G													
			Laboratory Services	1.4.2	G													
			State Licensed Hazardous Waste	3.12.3														
			Transporter															
			SD-06 Test Reports															
			Laboratory and Field-Testing	3.15														
			Reports															
			Backfill Material	2.1														
			Tank Contents Verification	3.2														
			Contaminated Water Disposal	3.5.2														
			Soil Examination, Testing, and	3.10														
			Analysis															
			Backfilling	3.11	G													
			SD-11 Closeout Submittals															
			Salvage Rights	3.12.4	G													
			Tank Closure Report	3.15														
		02 81 00	SD-03 Product Data															
			Packaging Notifications	2.1.1														
			Hazardous Waste Management	3.1	G													
			Plan															
			Onsite Hazardous Waste	3.2	G													
			Management															

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		02 81 00	Notices of Non-Compliance and	3.3														
			Notices of Violation															
			SD-06 Test Reports															
			Recordkeeping	3.7	G													
			Exception Report	3.7	G													
			Spill Response	3.8														
			SD-07 Certificates															
			Transportation and Disposal	1.4.1	G													
			Coordinator															
			Training	1.4.2	G													
			Certification	1.4.3														
			Shipping Documents and	3.3.3	G													
			Packagings Certification															
			Security Plan	3.3.4														
			Certificates of Disposal	3.3.5														
			Waste Minimization	3.6														
		02 82 00	SD-03 Product Data															
			Amended Water	1.3.2	G													
			Safety Data Sheets (SDS) for All	1.4.9	G													
			Materials															
			Encapsulants	2.1	G													
			Respirators	3.1.2.1	G													
			Local Exhaust Equipment	3.1.7	G													
			Pressure Differential Automatic	3.1.7	G													
			Recording Instrument															
			Vacuums	3.1.8	G													

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		02 82 00	Glovebags	3.1.10	G													
			SD-06 Test Reports															
			Air Sampling Results	1.6.5	G													
			Pressure Differential Recordings	1.6.6	G													
			for Local Exhaust System															
			Clearance Sampling	3.2.11.4	G													
			Asbestos Disposal Quantity	3.3.3.2	G													
			Report															
			SD-07 Certificates															
			Employee Training	1.4.4	G													
			Notifications	1.4.5	G													
			Respiratory Protection Program	1.4.7	G													
			Asbestos Hazard Abatement Plan	1.4.10	G													
			Testing Laboratory	1.4.11	G													
			Landfill Approval	1.4.12	G													
			Delivery Tickets	1.4.12	G													
			Waste Shipment Records	1.4.12	G													
			Transporter Certification	1.4.13	G													
			Medical Certification	1.4.14	G													
			Private Qualified Person	1.6.1	G													
			Documentation															
			Designated Competent Person	1.6.2	G													
			Worker's License	1.6.3	G													
			Contractor's License	1.6.4	G													
			Federal, State or Local Citations	1.6.7	G													
			on Previous Projects															

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		02 82 00	Encapsulants	2.1	G													
			Equipment Used to Contain	3.1	G													
			Airborne Asbestos Fibers															
			Water Filtration Equipment	3.1.3.3	G													
			Vacuums	3.1.8	G													
			Ventilation Systems	3.1.8	G													
			SD-11 Closeout Submittals															
			Permits and Licenses	1.4.5	G													
			Notifications	1.4.5	G													
			Respirator Program Records	1.4.7.1	G													
			Rental Equipment	1.8.1	G													
		02 83 00	SD-01 Preconstruction Submittals															
			Competent Person	1.6.1.1	G													
			Training Certification	1.6.1.2	G													
			Occupational and Environmental	1.6.2.3	G													
			Assessment Data Report															
			Medical Examinations	1.6.2.4	G													
			Lead, Cadmium, Chromium	1.6.2.8	G													
			Waste Management Plan															
			Licenses, Permits and	1.6.4	G													
			Notifications															
			Occupant Protection Plan	1.6.5	G													
			Lead, Cadmium, Chromium	1.6.2.2	G													
			Compliance Plan															
			Written Evidence of TSD	3.5.2.1	G													
			Approval															

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		02 83 00	SD-03 Product Data															
			Respirators	1.7.1	G													
			Vacuum Filters	1.7.4	G													
			Negative Air Pressure System	1.7.7	G													
			Materials and Equipment	2.1	G													
			Expendable Supplies	2.1.1	G													
			Local Exhaust Equipment	3.1.1.5	G													
			Pressure Differential Automatic	3.1.1.5	G													
			Recording Instrument															
			Pressure Differential Log	3.1.1.6	G													
			SD-06 Test Reports															
			Sampling and Analysis	1.4.3	G													
			Occupational and Environmental	1.6.2.3	G													
			Assessment Data Report															
			Sampling Results	1.6.2.3	G													
			Pressure Differential Recordings	1.6.3	G													
			For Local Exhaust System															
			SD-07 Certificates															
			Testing Laboratory	1.6.1.3	G													
			Third Party Consultant	1.6.1.4	G													
			Qualifications															
			Occupant Notification	3.1.1.1	G													
			Notification of the	3.1.1.1	G													
			Commencement of LBP Hazard															
			Abatement															
			Clearance Certification	3.5.1.1	G													

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		02 83 00	SD-11 Closeout Submittals															
			Hazardous Waste Manifest	3.5.2.1	G													
			Turn-In Documents or Weight	3.5.2.1	G													
			Tickets															
		02 84 16	SD-07 Certificates															
			Qualifications of CIH	1.9.1	G													
			Training Certification	1.9.1	G													
			PCB and Lamp Removal Work	1.9.2	G													
			Plan															
			PCB and Lamp Disposal Plan	1.9.3	G													
			SD-11 Closeout Submittals															
			Transporter Certification	3.5.2	G													
			Certification of Decontamination	3.2.4														
			Certificate of Disposal and/or	3.5.2.1														
			recycling															
			DD Form 1348-1	3.5.3.2														
		02 84 33	SD-01 Preconstruction Submittals															
			PCB Removal Work Plan	1.7.3														
			PCB Disposal Plan	1.7.4														
			SD-07 Certificates															
			Training certification	1.7.1														
			Qualifications of CIH	1.7.2														
			Notification	1.7.5														
			Transporter Certification	3.8														
			Certification of Decontamination	3.5.4														
			Post Cleanup Sampling	3.5.5														

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		02 84 33	Certificate of Disposal	3.8.1														
		03 30 00	SD-01 Preconstruction Submittals															
			Quality Control Plan	1.6.6	G													
			Quality Control Personnel	1.6.7	G													
			Certifications															
			Quality Control Organizational	1.6.7														
			Chart															
			Laboratory Accreditation	1.6.9	G													
			Form Removal Schedule	1.6.2.1	G													
			Maturity Method Data	3.3.9														
			SD-02 Shop Drawings															
			Formwork	1.6.2.1	G													
			Reinforcing Steel	1.6.2.2	G													
			SD-03 Product Data															
			Joint Sealants	2.4.5														
			Joint Filler	2.4.4														
			Formwork Materials	2.1														
			Recycled Aggregate Materials	2.3.3.3														
			Cementitious Materials	2.3.1														
			Vapor Retarder	2.4.6														
			Concrete Curing Materials	2.4.1														
			Reinforcement	2.6														
			Liquid Chemical Floor Hardeners	2.4.3.1														
			and Sealers															
			Admixtures	2.3.4														
			Reinforcing Fibers	2.6.5														

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		03 30 00	Plate Dowels	2.6.6	G													
			Waterstops	2.2.2														
			Biodegradable Form Release	2.2.3														
			Agent															
			Nonshrink Grout	2.4.2														
			Recycled Content for Portland	1.6.1.2	S													
			Cement replacement in Concrete															
			Mix															
			Recycled Content for Aggregate	1.6.1.2	S													
			in Concrete Mix															
			Recycled Content for Steel	2.6.1	S													
			Reinforcing Bars															
			Recycled Content for Steel Wire	2.6.2	S													
			Reinforcement															
			Biobased Form Release Agent	2.2.3	S													
			SD-05 Design Data															
			Concrete Mix Design	1.6.1.2	G													
			Formwork and Shoring	1.6.1.1	G													
			Calculations															
			SD-06 Test Reports															
			Concrete Mix Design	1.6.1.2	G													
			Fly Ash	1.6.4.1														
			Pozzolan	1.6.4.1														
			Slag Cement	1.6.4.2														
			Aggregates	1.6.4.3														
			Compressive Strength Tests	3.13.3.3	G													

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		03 30 00	Slump Tests	3.13.3.1														
			Water	2.3.2														
			SD-07 Certificates															
			Reinforcing Bars	2.6.1														
			Welder Qualifications	1.9														
			Silica Fume Manufacturer's	1.6.3.1														
			Representative															
			VOC Content for Form Release	1.6.3.2														
			Agents, Curing Compounds, and															
			Concrete Penetrating Sealers															
			Safety Data Sheets	1.6.3.3														
			Field Testing Technician and	1.6.7.2														
			Testing Agency															
			Indoor Air Quality for Adhesives	1.8.1	S													
			and Sealants															
			Indoor Air Quality for Concrete	1.8.1	S													
			Curing Compound															
			Indoor Air Quality for	1.8.1	S													
			Waterproofing Sealer															
			Indoor Air Quality for Form	1.8.1	S													
			Release Agent															
			Certified Sustainably Harvested	1.8.2	S													
			Wood Formwork															
			SD-08 Manufacturer’s Instructions															
			Liquid Chemical Floor Hardeners	2.4.3.1														
			and Sealers															

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		03 30 00	Joint Sealants	2.4.5														
			Curing Compound	2.4.1														
		03 70 00	SD-02 Shop Drawings															
			Concrete Lifts	3.2.2.4	G													
			Equipment	2.3	G													
			SD-03 Product Data															
			Batch Plant	2.3.1	G													
			Mixers	2.3.6														
			Construction Joint Treatment	3.1.5	G													
			Curing and Protection	3.4	G													
			Cold-Weather Protection	3.4.7	G													
			Hot-weather Placing	3.2.2.2	G													
			SD-07 Certificates															
			Sheet Curing	2.2.3.1														
			Nonshrink Grout	2.2.6	G													
			Bonding Agents	2.2.8														
		04 20 00	SD-02 Shop Drawings															
			Cut CMU	3.3.3.1	G													
			Detail Drawings	3.4.1.1	G													
			SD-03 Product Data															
			Hot Weather Procedures	1.5.1	G													
			Cold Weather Procedures	1.5.2	G													
			Cement	2.2.2.2.1	G													
			Cementitious Materials	2.4.1.1	G													
			Insulation	2.6.7	G													

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		04 20 00	Recycled Content for Steel	2.6.4	S													
			Reinforcement															
			Recycled Content for CMU	2.2.2.2.2	S													
			SD-04 Samples															
			Concrete Masonry Units (CMU)	2.2.2.2	G													
			Admixtures for Masonry Mortar	2.4.1.4	G													
			Anchors, Ties, and Bar	2.6.2	G													
			Positioners															
			Joint Reinforcement	2.6.3	G													
			Insulation	2.6.7	G													
			SD-05 Design Data															
			Masonry Compressive Strength	2.1.2	G													
			Fire-Rated Concrete Masonry	2.2.2.4														
			Units															
			Bracing Calculations	3.2.5	G													
			SD-06 Test Reports															
			Fire-Rated Concrete Masonry	2.2.2.4														
			Units															
			Field Testing of Mortar	3.6.1.1														
			Field Testing of Grout	3.6.1.2														
			SD-07 Certificates															
			Special Masonry Inspector	1.3.1														
			Qualifications															
			Concrete Masonry Units (CMU)	2.2.2.2														
			Precast Concrete Units	2.2.3														
			Cementitious Materials	2.4.1.1														

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		04 20 00	Admixtures for Masonry Mortar	2.4.1.4														
			Admixtures for Grout	2.4.2.2														
			Anchors, Ties, and Bar	2.6.2														
			Positioners															
			Joint Reinforcement	2.6.3														
			Insulation	2.6.7														
			SD-08 Manufacturer's Instructions															
			Admixtures for Masonry Mortar	2.4.1.4														
			Admixtures for Grout	2.4.2.2														
			SD-10 Operation and Maintenance															
			Data															
			Take-Back Program	3.8														
		05 05 20	SD-01 Preconstruction Submittals															
			Installer Qualifications	1.5.1.1	G													
			Post-Installed Anchor Special	1.5.1.2	G													
			Inspector Qualifications															
			SD-03 Product Data															
			Mechanical Anchors in Concrete	2.1.1.3	G													
			Adhesive Anchor System in	2.1.1.4	G													
			Concrete															
			Mechanical and Adhesive	2.1.1.5	G													
			Anchors in Masonry															
			Non-Shrink, Non-Metallic Grout	3.1.3	G													
			Recycled Content for Metal	2.1.1	S													
			SD-06 Test Reports															

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		05 05 20	Post-Installed Anchor Special	3.3.4	G													
			Inspections Report															
			SD-07 Certificates															
			Post-Installed Anchor	2.1.1.1	G													
			Certification															
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Printed	2.1.1.2	G													
			Installation Instructions															
			Non-Shrink, Non-Metallic Grout	3.1.3	G													
			Manufacturer's Material Safety	1.5														
			Data Sheets															
		05 12 00	SD-01 Preconstruction Submittals															
			Erection and Erection Bracing	1.4.1.1	G													
			Drawings															
			SD-02 Shop Drawings															
			Fabrication Drawings	1.4.2	G													
			SD-03 Product Data															
			Shop Primer	2.6.2														
			Welding Electrodes and Rods	2.4.1														
			Direct Tension Indicator Washers	2.3.2.3														
			Non-Shrink Grout	2.4.2														
			Tension Control Bolts	2.3.3														
			Recycled Content for Structural	2.2.1	S													
			Steel															
			Recycled Content for Structural	2.2.2	S													
			Steel Tubing															

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		05 12 00	Recycled Content for Steel Pipe	2.2.3	S													
			SD-06 Test Reports															
			Class B Coating	2.6.2														
			Bolts, Nuts, and Washers	2.3														
			Weld Inspection Reports	3.7.1.2														
			Direct Tension Indicator Washer	3.7.2.1														
			Inspection Reports															
			Bolt Testing Reports	3.7.3.1														
			Embrittlement Test Reports	3.7.4														
			SD-07 Certificates															
			Steel	2.2														
			Bolts, Nuts, and Washers	2.3														
			Galvanizing	2.5														
			AISC Structural Steel Fabricator	1.3														
			Quality Certification															
			AISC Structural Steel Erector	1.3														
			Quality Certification															
			Welding Procedures and	1.4.3.1														
			Qualifications															
			Welding Electrodes and Rods	2.4.1														
			Certified Welding Inspector	3.7.1.1														
			NDT Technician	3.7.1.2														
			Welding Procedure Specifications	3.4														
			(WPS)															
			Overhead, Top Running Crane	1.4.3.2														
			Runway Rail															

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		05 21 00	SD-01 Preconstruction Submittals															
			Welder Qualification	1.3.2														
			SD-02 Shop Drawings															
			Steel Joist Framing	1.3.1	G													
			SD-03 Product Data															
			Recycled Content Of Steel	2.3	S													
			Products															
			SD-05 Design Data															
			Design Calculations	2.2	G													
			SD-06 Test Reports															
			Erection Inspection	3.4														
			Welding Inspections	3.4														
			SD-07 Certificates															
			Certification of Compliance	1.3.2														
		05 30 00	SD-02 Shop Drawings															
			Fabrication Drawings	1.3.4	G													
			SD-03 Product Data															
			Accessories	2.2														
			Deck Units	2.1														
			Galvanizing Repair Paint	2.1.5														
			Mechanical Fasteners	2.2.14														
			Touch-Up Paint	2.1.5														
			Welding Equipment	1.3.2														
			Welding Rods and Accessories	1.3.2														
			Recycled Content of Steel	2.1	S													
			Products															

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		05 30 00	SD-04 Samples															
			Metal Roof Deck Units	2.1.1														
			Flexible Closure Strips	2.2.4														
			SD-05 Design Data															
			Deck Units	2.1	G													
			SD-07 Certificates															
			Welder Qualifications	1.3.2														
			Welding Procedures	1.3.2														
			Fire Safety	1.3.3.1														
			Wind Storm Resistance	1.3.3.2														
			Manufacturer's Certificate	1.3.1														
		05 50 13	SD-02 Shop Drawings															
			Bollards/Pipe Guards	2.5	G													
			Angles and Plates	2.7	G													
			Roof Hatches	2.8	G													
			Exterior Canopy Support	1.3.1	G													
			Drawings															
			Fabrication Drawings	1.5.1	G													
			SD-03 Product Data															
			Corner Guards	2.4														
			Roof Hatches	2.8	G													
			Downspout Terminations	2.6	G													
			Canopy	1.3.1	G													
			Recycled Content	2.1	S													
			SD-05 Design Data															
			Metal Canopy System	1.3.1	G													

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		05 51 33	SD-02 Shop Drawings															
			Ladders	2.3														
			SD-03 Product Data															
			Ladders	2.3														
			SD-07 Certificates															
			Fabricator Certification for Ladder	1.3														
			Assembly															
		05 52 00	SD-02 Shop Drawings															
			Fabrication Drawings	1.2.1	G													
			SD-03 Product Data															
			Aluminum Plates, Shapes, and	3.2	G													
			Bars															
			Concrete Inserts	2.2.1	G													
			Aluminum Railings and Handrails	2.2.3	G													
			Anchorage and Fastening	1.2.1	G													
			Systems															
			Recycled Content for Aluminum	2.1.1	S													
			SD-07 Certificates															
			Welding Procedures	1.4.1	G													
			Welder Qualification	1.4.2	G													
			SD-08 Manufacturer's Instructions															
			Installation Instructions	3.2														
		06 10 00	SD-03 Product Data															
			Underlayment	2.3.1														
			Fire-retardant Treatment	1.8														
			Oriented Strand Board	2.2														

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		06 10 00	Adhesives	2.3.3														
			SD-06 Test Reports															
			Preservative-treated	1.4.3														
			SD-07 Certificates															
			Certificates of Grade	1.11.1														
			Certified Sustainably Harvested	2.2.1.1	S													
			Plywood for Other Uses															
			Preservative Treatment	1.7														
			Indoor Air Quality for Non-aerosol	2.3.3	S													
			Adhesives															
			Indoor Air Quality for Composite	1.11.3.2	S													
			Wood															
		06 41 16.00 10	SD-02 Shop Drawings															
			Shop Drawings	2.8														
			Installation	3.1														
			SD-03 Product Data															
			Wood Materials	2.1														
			Finish Schedule	2.8.7.3														
			Certification	1.5.2														
			Medium Density Fiberboard	1.5.2.1	S													
			Particleboard	1.5.2.1	S													
			Panel Substrate	1.5.2.1	S													
			SD-04 Samples															
			Plastic Laminates	2.2														
			Cabinet Hardware	2.5														
			SD-07 Certificates															

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		06 41 16.00 10	Quality Assurance	1.5														
			Laminate Clad Casework	3.1														
			Certified Sustainably Harvested	1.5.2.2	S													
			Wood															
			Indoor Air Quality for	1.5.2.1	S													
			Particleboard															
			Indoor Air Quality for Medium	1.5.2.1	S													
			Density Fiberboard															
			Indoor Air Quality for Hardwood	1.5.2.1	S													
			Plywood															
			Indoor Air Quality for Panel	1.5.2.1	S													
			Substrate															
			Indoor Air Quality for Adhesives,	1.5.2.1	S													
			Caulks, and Sealants															
		06 61 16	SD-02 Shop Drawings															
			Detail Fabrication Drawings	2.1	G													
			Installation	3.1	G													
			SD-03 Product Data															
			Solid Polymer	2.1.1	G													
			Indoor air quality for solid surface	2.2.2	S													
			seam and sealant products															
			Quartz Agglomerate Material	2.1	G													
			Recycled Content for Solid	2.1.1	S													
			Surfacing Materials															
			SD-04 Samples															
			Material	2.1	G													

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		06 61 16	Counter Tops	2.3.5	G													
			SD-06 Test Reports															
			Test Report Results	2.1.1														
			SD-07 Certificates															
			Qualifications	1.4.1														
			Indoor Air Quality for solid	2.1.1	S													
			surface fabrication products															
			SD-10 Operation and Maintenance															
			Data															
			Solid Polymer	2.1.1	G													
			Quartz Agglomerate Material	2.1	G													
		07 05 23	SD-01 Preconstruction Submittals															
			Work Plan	1.4	G													
			SD-03 Product Data															
			Thermal Imaging Camera	2.2	G													
			SD-05 Design Data															
			Envelope Surface Area	3.2	G													
			Calculations															
			SD-07 Certificates															
			Pressure Test Agency	1.6.2.1														
			Thermographer Qualifications	1.6.2.2														
			Test Instruments	1.6.3														
			Date Of Last Calibration	1.6.3														
			SD-06 Test Reports															
			Pressure Test Procedures	3.5	G													
			Air Leakage Test Report	1.6.4	G													

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		07 05 23	Air Leakage Test Report	3.5.7	G													
			Diagnostic Test Report	1.6.4	G													
			Diagnostic Test Report	3.6.5	G													
		07 11 13	SD-07 Certificates															
			Materials	1.3														
		07 13 53	SD-03 Product Data															
			Manufacturer's Standard Details	1.3	G													
			Elastomeric Waterproofing Sheet	2.2	G													
			Material															
			Protection Board	2.6	G													
			Primers, Adhesives, and Mastics	1.4	G													
			Primers, Adhesives, and Mastics	2.2	G													
			Recycled Content for	2.1.2	S													
			Waterproofing Sheet Material															
			SD-06 Test Reports															
			Elastomeric Waterproofing Sheet	2.2	G													
			Material															
			Protective Covering	3.6	G													
			SD-07 Certificates															
			Elastomeric Waterproofing Sheet	2.2														
			Material															
			Primers, Adhesives, and Mastics	1.4	G													
			Primers, Adhesives, and Mastics	2.2	G													
			Protective Coverings	1.4	G													
			Special Warranties	1.8	G													
			Special Warranties	1.8	G													

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		07 13 53	Certificates Of Compliance	2.1.1	G													
			Certificates Of Compliance	2.1.2	G													
			Primer and Mastic	2.1.1	S													
			Indoor Air Quality for Adhesive	2.1.1	S													
			and Sealant															
			SD-08 Manufacturer's Instructions															
			Primers, Adhesives, and Mastics	1.4	G													
			Primers, Adhesives, and Mastics	2.2	G													
			SD-11 Closeout Submittals															
			Certificates Of Compliance	2.1.1	G													
			Certificates Of Compliance	2.1.2	G													
		07 14 00	SD-03 Product Data															
			Fluid-Applied Membrane	2.1														
			Membrane Primer	2.2														
			Elastomeric Sheet	2.8														
			Flexible Foam-Backed	2.10														
			Elastomeric Sheet															
			Solvent	3.3														
			Moisture Meter	3.4.1														
			Protection Board	2.11														
			Bond Breaker	2.7														
			SD-11 Closeout Submittals															
			Warranty	1.6														
			Information Card	3.6														
			Instructions To Government	3.5														
			Personnel															

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		07 21 13	SD-03 Product Data															
			Board Insulation	2.1	G													
			Vapor Retarder	3.6	G													
			Pressure Sensitive Tape	2.2	G													
			Protection Board or Coatings	1.4	G													
			Accessories	2.4	G													
			Recycled Content for Board Insulation	2.1.4	S													
			SD-07 Certificates															
			Board Insulation	2.1	G													
			SD-08 Manufacturer’s Instructions															
			Board Insulation	2.1														
			Adhesive	2.4.1														
		07 21 16	SD-03 Product Data															
			Blanket Insulation	2.1														
			Recycled Content for Insulation Materials	2.1.2	S													
			Pressure Sensitive Tape	2.3														
			Accessories	2.4														
			SD-07 Certificates															
			Indoor Air Quality for Insulation Materials	2.1.4	S													
			Indoor Air Quality for Adhesives	2.4.1	S													
			SD-08 Manufacturer’s Instructions															
			Insulation	3.3.1														
		07 22 00	SD-02 Shop Drawings															

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		07 22 00	Insulation Board Layout	1.3	G													
			Verification of Existing Conditions	1.3	G													
			SD-03 Product Data															
			Insulation	2.1	G													
			Cover Board	1.4	G													
			Fasteners	2.4	G													
			Moisture Control	2.3	G													
			Recycled Content For Insulation	2.1.2	S													
			SD-06 Test Reports															
			Flame Spread Rating	1.8.1	G													
			SD-07 Certificates															
			Installer Qualifications	1.6	G													
			Certificates Of Compliance For	1.6	G													
			Felt Materials															
			Indoor Air Quality For Insulation	2.1.3	S													
			SD-08 Manufacturer’s Instructions															
			Fasteners	2.4	G													
			Insulation	2.1	G													
		07 27 10.00 10	SD-02 Shop Drawings															
			Air Barrier System Shop	2.1	G													
			Drawings															
			SD-03 Product Data															
			Air Barrier System Product Data	2.1	G													
			SD-04 Samples															
			Material Samples For Air Barrier	2.1	G													
			System															

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		07 27 10.00 10	SD-05 Design Data															
			Design Data And Calculations	1.8	G													
			For The Air Barrier System															
			SD-06 Test Reports															
			Design Review Report	1.8	G													
			Testing and Inspection	3.1.2	G													
			SD-07 Certificates															
			Air Barrier Inspector	1.7	G													
		07 27 19.01	SD-01 Preconstruction Submittals															
			Qualifications of Manufacturer	1.8.1	G													
			Qualifications of Installer	1.8.2	G													
			SD-02 Shop Drawings															
			Self-adhering Air Barrier	1.4	G													
			SD-03 Product Data															
			Self-adhering Air Barrier	1.4	G													
			Primers, Adhesives, and Mastics	2.2	G													
			Safety Data Sheets	1.4.2	G													
			SD-06 Test Reports															
			Field Peel Adhesion Test	1.6	G													
			Flame Propagation of Wall	1.4.3	G													
			Assemblies															
			Flame Spread and Smoke	1.4.3	G													
			Developed Index Ratings															
			Site Inspections and Testing	3.4.1	G													
			SD-07 Certificates															
			Self-adhering Air Barrier	1.4	G													

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		07 27 19.01	SD-08 Manufacturer's Instructions															
			Self-adhering Air Barrier	1.4	G													
			Primers, Adhesives, and Mastics	2.2	G													
		07 27 26	SD-01 Preconstruction Submittals															
			Qualifications of Manufacturer	1.9.1	G													
			Qualifications of Installer	1.9.2	G													
			SD-02 Shop Drawings															
			Fluid-Applied Membrane Air	1.4	G													
			Barrier															
			SD-03 Product Data															
			Fluid-Applied Membrane Air	1.4	G													
			Barrier															
			Transition Membrane	2.3	G													
			Primers, Adhesives, and Mastics	2.2	G													
			Reinforcement	2.6	G													
			Safety Data Sheets	1.4.2	G													
			SD-06 Test Reports															
			Capillary Moisture Test	1.6	G													
			Field Peel Adhesion Test	1.4.3	G													
			Flame Propagation of Wall	1.4.3	G													
			Assemblies															
			Flame Spread and Smoke	1.4.3	G													
			Developed Index Ratings															
			Site Inspections	3.4.1	G													
			SD-07 Certificates															

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		07 27 26	Fluid-Applied Membrane Air	1.4	G													
			Barrier															
			Transition Membrane	2.3	G													
			Indoor Air Quality for	1.4.4	S													
			Fluid-Applied Air Barrier															
			Indoor Air Quality for Primer and	1.4.4	S													
			Mastic															
			Indoor Air Quality for Adhesive	1.4.4	S													
			and Sealant															
			SD-08 Manufacturer's Instructions															
			Fluid-Applied Membrane Air	1.4	G													
			Barrier															
			Transition Membrane	2.3	G													
			Primers, Adhesives, and Mastics	2.2	G													
		07 54 23	SD-02 Shop Drawings															
			Detail Drawings	1.6	G													
			Roof Plan	1.6	G													
			SD-03 Product Data															
			TPO Roofing Membrane	3.3.2	G													
			Recycled Content for TPO	2.2	S													
			Bonding Adhesive	2.1.3														
			Flashing	1.5.4														
			Flashing	3.3.2.2														
			Membrane Fasteners and Plates	2.1.6														
			Roof Insulation	2.1.9														
			Pre-Manufactured Accessories	2.1.7														

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		07 54 23	Information Card	2.1.1														
			SD-05 Design Data															
			Wind Uplift Resistance	1.3.2	G													
			SD-07 Certificates															
			Qualification of Manufacturer	1.5.1														
			Qualifications of Applicator	1.5.2														
			Qualification of Engineer of	1.5.3														
			Record															
			Wind Uplift Resistance	1.3.2														
			Fire Resistance	1.3.1														
			Minimum Polymer Thickness	2.1.1														
			Minimum Polymer Thickness	2.1.5														
			Sample	1.10	G													
			SD-08 Manufacturer’s Instructions															
			Application Method	3.3	G													
			Membrane Flashing	2.1.5	G													
			Membrane Flashing	3.4.2	G													
			Perimeter Attachment	3.3.4														
			Auxiliary Fasteners	2.1.6.2														
			Pre-Manufactured Accessories	2.1.7														
			Cold Weather	1.8	G													
			SD-11 Closeout Submittals															
			Warranty	1.10	G													
			Information Card	2.1.1	G													
			Instructions to Government	3.11	G													
			Personnel															

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		07 60 00	SD-02 Shop Drawings															
			Exposed Sheet Metal	2.2.1	G													
			Downspouts	3.1.15	G													
			Gravel Stops and fascia	2.2.1	G													
			Base Flashing	3.1.10	G													
			Counterflashing	3.1.11	G													
			Flashing at Roof Penetrations	3.1.19	G													
			and Equipment Supports															
			Reglets	2.2.9	G													
			Scuppers	3.1.16	G													
			Copings	3.1.22	G													
			Conductor Heads	3.1.17	G													
			Recycled Content	2.1	S													
			SD-03 Product Data															
			Cool Roof	2.2.6	G													
			SD-04 Samples															
			Finish Samples	1.4.2	G													
			SD-08 Manufacturer's Instructions															
			Instructions for Installation	1.4.3	G													
			Quality Control Plan	3.5	G													
			SD-10 Operation and Maintenance															
			Data															
			Cleaning and Maintenance	1.4.3	G													
		07 84 00	SD-02 Shop Drawings															
			Firestopping System	2.1	G													
			SD-03 Product Data															

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		07 84 00	Firestopping Materials	2.2	G													
			SD-06 Test Reports															
			Inspection	3.3	G													
			SD-07 Certificates															
			Inspector Qualifications	1.5.2														
			Firestopping Materials	2.2														
			Installer Qualifications	1.5.1	G													
		07 92 00	SD-03 Product Data															
			Sealants	2.1	G													
			Primers	2.2	G													
			Bond Breakers	2.3	G													
			Backstops	2.4	G													
			SD-06 Test Reports															
			Field Adhesion	3.1	G													
			SD-07 Certificates															
			Indoor Air Quality For Interior	2.1.1	S													
			Sealants															
			Indoor Air Quality For Interior	2.1.3	S													
			Floor Joint Sealants															
			Indoor Air Quality For Interior	2.1.4	S													
			Acoustical Sealants															
		08 11 13	SD-02 Shop Drawings															
			Doors	2.1	G													
			Doors	2.1	G													
			Frames	2.5	G													
			Frames	2.5	G													

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		08 11 13	Accessories	2.3														
			SD-03 Product Data															
			Doors	2.1	G													
			Recycled Content for Steel Door	2.1	S													
			Product															
			Frames	2.5	G													
			Recycled Content for Steel Frame	2.5	S													
			Product															
			Accessories	2.3														
		08 11 16	SD-02 Shop Drawings															
			Door and Frame Assembly	1.5.1	G													
			SD-03 Product Data															
			Door and Frame Assembly	1.5.1	G													
			Recycled Content of Aluminum	2.2.3	S													
			Material															
			SD-04 Samples															
			Finish Samples	1.5.2	G													
			SD-05 Design Data															
			Calculations	1.2.1	G													
			Air Infiltration	1.2.3	G													
			Water Penetration	1.2.4	G													
			NFRC Project Label Certificates	1.2.5	G													
			for Fenestration															
			SD-08 Manufacturer's Instructions															
			Door and Frame Assembly	1.5.1	G													

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		08 11 16	Adjustments, Cleaning, and	1.5.4	G													
			Maintenance															
			NFRC Project Label Certificates	1.2.5	G													
			for Fenestration															
		08 31 00	SD-02 Shop Drawings															
			Access Doors And Panels	1.3	G													
			SD-03 Product Data															
			Access Doors And Panels	1.3	G													
			Hardware	1.3.2	G													
			Accessories	2.2.8	G													
			Recycled Content	2.1	S													
			SD-04 Samples															
			Finishes	2.5	G													
		08 34 59	SD-02 Shop Drawings															
			Vault Door Unit	2.1	G													
			Day Gate	2.3	G													
			SD-03 Product Data															
			Vault Door and Frame	2.2														
			SD-07 Certificates															
			Vault Door and Frame	2.2														
			SD-08 Manufacturer's Instructions															
			Installation	3.1														
		08 34 73	SD-02 Shop Drawings															
			Fabrication Drawings	2.1														
			SD-03 Product Data															

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		08 34 73	Hollow Metal Sound Retardant	2.1	G													
			Doors															
			Door Frames	2.1	G													
			Door Hardware	2.1	G													
			Door Frame Sound Infill	2.3.2	G													
			Thresholds	2.1	G													
			SD-06 Test Reports															
			Water Leakage Tests	2.4.3	G													
			Acoustical Tests	2.4.3	G													
			Air Infiltration Tests	2.4.3	G													
			SD-07 Certificates															
			Hollow Metal Sound Retardant	2.1	G													
			Doors															
			Door Frames	2.1	G													
			Door Hardware	2.1	G													
			Thresholds	2.1	G													
			Indoor Air Quality for Composite	1.3.1.3	S													
			Wood Doors															
		08 39 55.00 20	SD-01 Preconstruction Submittals															
			Manufacturer's Qualifications	1.4.3	G													
			Installer's Qualifications	1.4.4	G													
			Acceptance Testing Procedure	3.5	G													
			Field Testing Instructions	1.3.1	G													
			Coating Submittal Package	2.6	G													
			Sequence of Welding	2.2.3	G													

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		08 39 55.00 20	Manufacturer's Installation	1.3.1	G													
			Instructions															
			Installation Plan	3.1.1	G													
			Quality Control Plan	1.4.2	G													
			SD-02 Shop Drawings															
			Shop Drawings	1.3.1	G													
			Electrical Package	2.5	G													
			Trench Package	2.1.4.5	G													
			Boltworks Locking System	2.5.2	G													
			SD-03 Product Data															
			Product Data	1.3.1	G													
			SD-05 Design Data															
			Design Data	1.3.1	G													
			SD-07 Certificates															
			Welding Procedures and	1.4.5	G													
			Welder's Qualifications															
			NDT Certificates	3.3.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Training Video	3.6	G													
			Door Description Information	1.3.1	G													
			Draft Operations and	2.3.3	G													
			Maintenance Manual, Data															
			Package 2															

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		08 39 55.00 20	Final Operations and	2.3.3	G													
			Maintenance Manual, Data															
			Package 2															
			SD-11 Closeout Submittals															
			Weld Inspection Report	3.3.2	G													
			Report of Special Inspections	2.7	G													
			Shop and Field Operating Test	3.3	G													
			Reports															
			Acceptance Testing Report	3.5	G													
			Manufacturer's Warranty	1.4.6	G													
		08 41 13	SD-01 Preconstruction Submittals															
			Sample Warranty	1.3.1	G													
			List of Product Installations	1.3.1	G													
			SD-02 Shop Drawings															
			Installation Drawings	3.3	G													
			Fabrication Drawings	2.2	G													
			SD-03 Product Data															
			Manufacturer's Catalog Data	1.3.1	G													
			Finish	2.2.3	G													
			Recycled Content of Aluminum	2.1.1.2	S													
			Material															
			SD-04 Samples															
			Finish and Color Samples	1.3.1	G													
			SD-06 Test Reports															
			Certified Test Reports	1.3.1	G													
			Deflection	3.4.3														

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		08 41 13	Air Infiltration	3.4.1														
			Condensation Resistance and	3.4.4														
			Thermal Transmittance															
			Water Infiltration	3.4.5														
			SD-07 Certificates															
			Indoor Air Quality For Sealants	1.5.3	S													
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Instructions	3.3														
			SD-11 Closeout Submittals															
			Manufacturer's Product Warranty	3.6														
		08 71 00	SD-02 Shop Drawings															
			Manufacturer's Detail Drawings	1.4	G													
			Verification of Existing Conditions	1.4	G													
			Hardware Schedule	1.6	G													
			Keying System	2.3.7	G													
			SD-03 Product Data															
			Hardware Items	2.3	G													
			SD-08 Manufacturer’s Instructions															
			Installation	3.1														
			SD-10 Operation and Maintenance															
			Data															
			Hardware Schedule	1.6	G													
			SD-11 Closeout Submittals															
			Key Bitting	1.7.1														
		08 81 00	SD-03 Product Data															
			Insulating Glass	2.3														

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		08 81 00	Glazing Accessories	1.3														
			Sealants	2.4.1.1														
			Joint Backer	2.4.2														
			SD-04 Samples															
			Insulating Glass	2.3														
			Tape	2.4.4														
			Sealing Tapes	2.4.4														
			SD-07 Certificates															
			Insulating Glass	2.3														
			Indoor Air Quality for Glazing	2.1.1	S													
			Sealant and Sealant Primer															
			SD-08 Manufacturer’s Instructions															
			Setting and Sealing Materials	2.4														
			Glass Setting	3.2														
			SD-11 Closeout Submittals															
			Insulated Glass Units	1.7.1														
		08 91 00	SD-02 Shop Drawings															
			Wall Louvers	1.4														
			SD-03 Product Data															
			Metal Wall Louvers	2.2														
			Door Louvers	3.1.2														
			SD-04 Samples															
			Wall Louver Samples	1.5	G													
			Door Louver Samples	1.5	G													
		08 95 00	SD-02 Shop Drawings															

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		08 95 00	Design & Installation Detail	1.9	G													
			Drawings															
			SD-03 Product Data															
			Product Description	1.9	G													
			Design Requirements &	1.9	G													
			Calculations															
			SD-06 Test Reports															
			Tests, Inspections, and	1.9	G													
			Verifications															
			SD-07 Certificates															
			Materials	2.1														
			Qualifications	1.10														
			Engineer Testing Certification	1.9														
		09 22 00	SD-02 Shop Drawings															
			Metal Support Systems	2.1	G													
			SD-03 Product Data															
			Metal Support Systems	2.1														
			Recycled Content for Metal	2.1	S													
			Support Systems															
		09 29 00	SD-03 Product Data															
			Cementitious Backer Units	2.1.6														
			Glass Mat Water-Resistant	2.1.2														
			Gypsum Tile Backing Board															
			Glass Mat Covered or Reinforced	2.1.3														
			Gypsum Sheathing															

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		09 29 00	Glass Mat Covered or Reinforced	2.1.3.1														
			Gypsum Sheathing Sealant															
			Abuse Resistant Gypsum Board	2.1.4														
			Accessories	2.1.9														
			Gypsum Board	2.1.1														
			Recycled Content for Gypsum	2.1.1	S													
			Board															
			Recycled Content for Paper	2.1.1	S													
			Facing and Gypsum Cores															
			VOC Content of Joint Compound	2.1.7	S													
			SD-07 Certificates															
			Asbestos Free Materials	2.1	G													
			Indoor Air Quality for Gypsum	2.1.1	S													
			Board															
			SD-08 Manufacturer's Instructions															
			Safety Data Sheets	2.1														
			SD-10 Operation and Maintenance															
			Data															
			Manufacturer Maintenance	2.1														
			Instructions															
		09 30 10	SD-02 Shop Drawings															
			Detail Drawings	3.2	G													
			SD-03 Product Data															
			Porcelain Tile	2.1.1	G													
			Porcelain Tile Wall Base	2.1.2	G													

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		09 30 10	Recycled Content for Porcelain	2.1.1	S													
			Tile															
			Recycled Content for Porcelain	2.1.2	S													
			Tile															
			Mosaic Tile	2.1.3	G													
			Recycled Content for Mosaic Tile	2.1.3	S													
			Transition Strips	2.1	G													
			Transition Strips	2.6.1	G													
			Metal Strips	2.6.2	G													
			Setting-Bed	2.2	G													
			Mortar, Grout, and Adhesive	2.4	G													
			Reinforcing Wire Fabric	2.2.6														
			Cementitious Backer Units	2.5.1	G													
			Glass-Mat Gypsum	2.5.2	G													
			Water-Resistant Backing Board															
			Glass-Mat Gypsum	2.5.2	G													
			Water-Resistant Backing Board															
			Waterproof Membrane	2.7	G													
			Crack Isolation Membrane	2.8	G													
			SD-04 Samples															
			Tile	2.1	G													
			Accessories	2.1	G													
			Transition Strips	2.1	G													
			Transition Strips	2.6.1	G													
			Metal Strips	2.6.2	G													
			Grout	1.4	G													

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		09 30 10	SD-07 Certificates															
			Indoor Air Quality for Adhesives	2.4	S													
			Indoor Air Quality for Sealants	2.4.8	S													
			Indoor Air Quality for Mortar and	1.3.1.2	S													
			Grout															
			Indoor Air Quality for Waterproof	1.3.1.3	S													
			Membrane															
			Indoor Air Quality for Crack	1.3.1.3	S													
			Isolation Membrane															
			Indoor Air Quality for Glass-Mat	1.3.1.1	S													
			Gypsum Water-Resistant Backing															
			Board															
			Indoor Air Quality for Glass-Mat	2.5	S													
			Gypsum Water-Resistant Backing															
			Board															
			Indoor Air Quality for	1.3.1.1	S													
			Cementitious Backer Units															
			Indoor Air Quality for	2.5	S													
			Cementitious Backer Units															
			Water Absorption Rates	1.3.2														
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Approved	3.8														
			Cleaning Instructions															
			SD-10 Operation and Maintenance															
			Data															
			Porcelain Tile	2.1.1	G													

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		09 30 10	Mosaic Tile	2.1.3	G													
			Transition Strips	2.1	G													
			Transition Strips	2.6.1	G													
			Metal Strips	2.6.2	G													
		09 51 00	SD-02 Shop Drawings															
			Approved Detail Drawings	2.1														
			SD-03 Product Data															
			Recycled Content for Type XII	2.2.1.1	S													
			Ceiling Tiles															
			Recycled Content for Suspension	2.3	S													
			Systems															
			Acoustical Performance	2.1.1														
			SD-04 Samples															
			Acoustical Units	2.2														
			Acoustical Ceiling Tiles	2.2.1.1														
			SD-07 Certificates															
			Indoor Air Quality for Type XII	2.2.1.1	S													
			Ceiling Tiles															
			Indoor Air Quality for Adhesives	2.6	S													
			Indoor Air Quality for Sealants	2.9	S													
		09 65 00	SD-02 Shop Drawings															
			Resilient Flooring and	2.9	G													
			Accessories															
			SD-03 Product Data															
			Resilient Flooring and	2.9	G													
			Accessories															

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		09 65 00	Adhesives	2.5														
			Luxury Vinyl Tile	2.1														
			Recycled content for Luxury Vinyl	2.1	S													
			Tile															
			Solid Vinyl Tile	2.2														
			Wall Base	2.3														
			Recycled Content for Wall Base	2.3	S													
			SD-04 Samples															
			Resilient Flooring and	2.9	G													
			Accessories															
			SD-06 Test Reports															
			Moisture, Alkalinity and Bond	3.3	G													
			Tests															
			SD-07 Certificates															
			Indoor Air Quality for Luxury Vinyl	2.1	S													
			Tile															
			Indoor Air Quality for Solid Vinyl	2.2	S													
			Tile															
			Indoor Air Quality for Wall Base	1.3.1.1	S													
			Indoor Air Quality for Wall Base	2.3	S													
			Indoor Air Quality for Adhesives	2.5	S													
			SD-08 Manufacturer's Instructions															
			Surface Preparation	3.2	G													
			Installation	3.1	G													
			SD-10 Operation and Maintenance															
			Data															

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		09 65 00	Resilient Flooring and	2.9	G													
			Accessories															
		09 68 00	SD-02 Shop Drawings															
			Installation Drawings	3.4	G													
			SD-03 Product Data															
			Carpet	2.1	G													
			Recycled Content for Carpeting	2.1.1	S													
			Moldings	2.4	G													
			Indoor Air Quality for Aerosol	2.3	S													
			Adhesives															
			Indoor Air Quality for Non-Aerosol	2.3	S													
			Adhesives															
			Indoor Air Quality for Concrete	2.3	S													
			Primer															
			SD-04 Samples															
			Carpet	2.1	G													
			Moldings	2.4	G													
			SD-06 Test Reports															
			Moisture and Alkalinity Tests	3.2	G													
			SD-07 Certificates															
			Indoor Air Quality for Carpet	2.1.2	S													
			Proof of No PFOS or PFOA	1.3.2	S													
			Chemicals in Carpet															
			SD-08 Manufacturer's Instructions															
			Surface Preparation	3.1														

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		09 68 00	SD-10 Operation and Maintenance															
			Data															
			Cleaning and Protection	3.5														
			Maintenance Service	3.7.2														
			SD-11 Closeout Submittals															
			Warranty	1.6														
		09 90 00	SD-02 Shop Drawings															
			Piping Identification	3.10														
			SD-03 Product Data															
			Coating	2.1	G													
			Product Data Sheets	2.1														
			SD-04 Samples															
			Color	2.2	G													
			SD-07 Certificates															
			Indoor Air Quality for Paints and	1.6.4	S													
			Coatings															
			Indoor Air Quality for Paints and	1.6.4	S													
			Coatings															
			Indoor Air Quality for	1.6.4														
			Consolidated Latex Paints															
			SD-08 Manufacturer’s Instructions															
			Mixing	2.1														
			Manufacturer's Safety Data	1.8.1														
			Sheets															
			SD-10 Operation and Maintenance															
			Data															

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		09 90 00	Coatings	2.1	G													
		09 97 13.27	SD-07 Certificates															
			Contract Errors, Omissions, and	1.4.1														
			Other Discrepancies															
			Corrective Action Procedures	1.4.2.1														
			Qualifications Of Individuals	1.4.3.2														
			Performing Abrasive Blasting															
			Qualifications of QC Specialist	1.4.3.1														
			Coating Inspector															
			Qualifications of Testing	1.4.3.3														
			Laboratory for Coatings															
			Qualifications of Testing	1.4.3.4														
			Laboratory for Abrasive															
			Metallic Abrasive	1.4.3.5														
			SD-08 Manufacturer's Instructions															
			Joint Sealant Instructions	1.5.1														
		10 14 00.10	SD-02 Shop Drawings															
			Approved Detail Drawings	3.1	G													
			SD-03 Product Data															
			Installation	3.1														
			Exterior Signage	1.2	G													
			SD-04 Samples															
			Exterior Signage	1.2	G													
			SD-10 Operation and Maintenance															
			Data															
			Protection and Cleaning	3.1.2	G													

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		10 14 00.20	SD-02 Shop Drawings															
			Detail Drawings	1.4.2	G													
			SD-03 Product Data															
			Room Identification And	2.1	G													
			Directional Signage System															
			Exit Door Tactile Sign	2.2	G													
			Building Directories	2.3	G													
			SD-04 Samples															
			Interior Signage	1.4.1	G													
			Software	1.3	G													
			Room Identification And	2.1	G													
			Directional Signage System															
			Exit Door Tactile Sign	2.2	G													
			Building Directories	2.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Approved Manufacturer's	3.1	G													
			Instructions															
			Protection and Cleaning	3.1.2	G													
		10 14 53	SD-03 Product Data															
			Traffic Signposts	2.1														
			Traffic Sign Retroreflective	2.4														
			Sheeting															
			SD-04 Samples															
			Flexible Posts	2.6.2														
		10 21 13	SD-02 Shop Drawings															

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		10 21 13	Fabrication Drawings	2.1														
			Installation Drawings	3.3	G													
			SD-03 Product Data															
			Cleaning and Maintenance	2.1														
			Instructions															
			Colors And Finishes	2.7														
			Anchoring Devices and Fasteners	2.2.2														
			Hardware and Fittings	2.2.4														
			Brackets	2.2.3														
			Door Hardware	2.2.5														
			Toilet Enclosures	2.3.1														
			Urinal Screens	2.3.2														
			Finishes	2.2.4.2	G													
			Finishes	2.7.2	G													
			Recycled content for solid	2.3	S													
			phenolic partitions and screens															
			SD-04 Samples															
			Colors and Finishes	2.7	G													
			Hardware and Fittings	2.2.4														
			Anchoring Devices and Fasteners	2.2.2														
			SD-07 Certificates															
			Warranty	1.6														
			Indoor Air Quality for Partitions	1.3.1.1	S													
			and Screens															
			SD-10 Operation and Maintenance															
			Data															

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		10 21 13	Plastic Identification	2.1.1	G													
		10 26 00	SD-02 Shop Drawings															
			Corner Guards	2.2	G													
			SD-03 Product Data															
			Corner Guards	2.2	G													
			Recycled content for steel	2.2.1	S													
			component of corner guards															
			SD-04 Samples															
			Corner Guards	2.2	G													
			SD-07 Certificates															
			Indoor air quality for wall covering	1.3.1.1	S													
			and panels															
			Indoor air quality for adhesives	1.3.1.2	S													
			Indoor air quality for adhesives	2.5	S													
			SD-10 Operation and Maintenance															
			Data															
			Corner Guards	2.2	G													
		10 28 13	SD-02 Shop Drawings															
			Product Schedule	2.1	G													
			SD-03 Product Data															
			Recycled content for stainless	2.1	S													
			steel toilet accessories															
			Item A5030	2.1.3	G													
			Item A5080	2.1.4	G													
			Item A5090	2.1.5	G													
			Item A5109	2.1.6	G													

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		10 28 13	Item A5110	2.1.7	G													
			Item A5135	2.1.8	G													
			Item A5145	2.1.9	G													
			Item A5170	2.1.10	G													
			Item A5175	2.1.11	G													
			Item A5200	2.1.12	G													
			Item A5205	2.1.13	G													
			SD-10 Operation and Maintenance															
			Data															
			Item A5030	2.1.3	G													
			Item A5080	2.1.4	G													
			Item A5090	2.1.5	G													
			Item A5109	2.1.6	G													
			Item A5110	2.1.7	G													
			Item A5145	2.1.9	G													
			Item A5170	2.1.10	G													
			Item A5175	2.1.11	G													
			Item A5200	2.1.12	G													
			Item A5205	2.1.13	G													
		10 44 16	SD-02 Shop Drawings															
			Fire Extinguishers	1.3	G													
			Accessories	Part 2														
			Cabinets	Part 2	G													
			Wall Brackets	2.2.2	G													
			Replacement Parts List	3.2.1														
		10 51 13	SD-02 Shop Drawings															

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		10 51 13	Types	2.1	G													
			Location	1.4	G													
			Installation	3.1														
			Numbering system	3.2														
			SD-03 Product Data															
			Material	2.2														
			Locking Devices	2.3.1														
			Lock Control Chart	2.3.1														
			Handles	2.3.4														
			Finish	2.2.3														
			components	2.3														
			Assembly	3.1														
			Recycled Content For Lockers	2.2.1	S													
			SD-04 Samples															
			Color chips	1.5.1	G													
		12 00 01.00 20	SD-01 Preconstruction Submittals															
			FF&E Schedule and Schedule	3.1.1.3	G													
			Updates															
			Contractor's Interior Designer's	3.1.1.1	G													
			Qualifications															
			SD-04 Samples															
			Interior Finish Construction	3.1.2.11	G													
			Submittals															
			Post Option Award FF&E Finish	3.2.3	G													
			Submittals															
			SD-05 Design Data															

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		12 00 01.00 20	FF&E Basis of Design Package	3.1.2.2.1	G													
			FF&E BVD Request for Quotation	3.1.2.5	G													
			(RFQ) Package															
			FF&E BVD Bid Package	3.1.2.6	G													
			Draft Pre-Final FF&E	3.1.2.8	G													
			Procurement Package															
			Pre-Final FF&E Procurement	3.1.2.9	G													
			Package															
			Final FF&E Procurement	3.1.2.10	G													
			Package															
			SD-10 Operation and Maintenance															
			Data															
			Warranty and Maintenance	3.5.1	G													
			Information															
			SD-11 Closeout Submittals															
			Punch List(s) Submittal	3.3.2	G													
		12 21 00	SD-02 Shop Drawings															
			Installation	3.2														
			SD-03 Product Data															
			Window Blinds	2.1	G													
			Recycled Content for aluminum	2.1	S													
			components															
			SD-04 Samples															
			Window Blinds	2.1	G													
			SD-06 Test Reports															
			Window Blinds	2.1														

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		12 21 00	SD-07 Certificates															
			Indoor Air Quality for window	2.1	S													
			blinds															
			Indoor Air Quality for window	2.1	S													
			blinds															
			SD-08 Manufacturer’s Instructions															
			Window Blinds	2.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Window Blinds	2.1	G													
		12 93 00	SD-03 Product Data															
			Benches and Chairs	2.5														
			Tables	2.6														
		13 48 73	SD-02 Shop Drawings															
			Bracing	3.1	G													
			Equipment Requirements	2.1														
			SD-03 Product Data															
			Bracing	3.1	G													
			Equipment Requirements	2.1														
			Anchor Bolts	3.3	G													
			SD-05 Design Data															
			Design Calculations	1.2.3	G													
		21 13 13	SD-01 Preconstruction Submittals															
			Qualified Fire Protection Engineer	1.2.3	G													
			(QFPE)															
			Sprinkler System Designer	1.4.2.1	G													

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		21 13 13	Sprinkler System Installer	1.4.2.2	G													
			SD-02 Shop Drawings															
			Shop Drawing	1.2.1.1	G													
			SD-03 Product Data															
			Pipe	2.2.1	G													
			Fittings	2.3.1.2	G													
			Valves	2.3.4	G													
			Sprinklers	2.7	G													
			Pipe Hangers and Supports	2.3.3	G													
			Sprinkler Alarm Switch	2.4.1	G													
			Valve Supervisory (Tamper)	2.4.2	G													
			Switch															
			Fire Department Connection	2.6	G													
			Backflow Prevention Assembly	2.5	G													
			Air Vent	2.8.5	G													
			Hose Valve	2.5.1	G													
			Nameplates	2.1.2	G													
			SD-05 Design Data															
			Hydraulic Calculations	1.2.1.2	G													
			SD-06 Test Reports															
			Test Procedures	3.7.1	G													
			SD-07 Certificates															
			Verification of Compliant	3.7.2.1	G													
			Installation															
			Request for Government Final	3.7.2.2	G													
			Test															

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		21 13 13	SD-10 Operation and Maintenance															
			Data															
			Operating and Maintenance	3.9	G													
			(O&M) Instructions															
			Spare Parts	1.6	G													
			SD-11 Closeout Submittals															
			As-built drawings	3.9														
		22 00 00	SD-02 Shop Drawings															
			Plumbing System	3.8.1	G													
			SD-03 Product Data															
			Recycled Content for Steel Pipe	2.1	S													
			Recycled Content for Cast Iron	2.1	S													
			Pipe															
			Backflow Prevention Assemblies	3.8.1.1	G													
			Shower Faucets	2.6.2	G													
			Fixtures	2.4														
			Flush Valve Water Closets	2.4.2	G													
			WaterSense Label for Flush	2.4.2	S													
			Valve Water Closet															
			Flush Valve Urinals	2.4.3	G													
			WaterSense Label for Urinal	2.4.3	S													
			Wall Hung Lavatories	2.4.4	G													
			Lavatories	2.4.5	G													
			Break Room Sink, Lactation	2.4.6	G													
			Room Sink															
			Water Coolers	3.3.3	G													

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		22 00 00	Energy Star Label for Wheelchair	2.4.7	S													
			Electric Water Cooler															
			WaterSense Label for	2.6.2	S													
			Showerhead															
			Plastic Shower Stalls	2.4.8	G													
			Water Heaters	2.10	G													
			Pumps	2.11	G													
			Welding	1.5.1														
			Plumbing System	3.8.1														
			SD-06 Test Reports															
			Tests, Flushing and Disinfection	3.8														
			Test of Backflow Prevention	3.8.1.1	G													
			Assemblies															
			SD-07 Certificates															
			Materials and Equipment	1.3														
			Bolts	2.1.1														
			SD-10 Operation and Maintenance															
			Data															
			Plumbing System	3.8.1	G													
		23 05 48.19	SD-02 Shop Drawings															
			Coupling and Bracing	3.1														
			Flexible Couplings or Joints	3.2														
			Equipment Restraint	2.2														
			Contractor Designed Bracing	1.2.2	G													
			SD-03 Product Data															
			Coupling and Bracing	3.1	G													

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		23 05 48.19	Flexible Couplings Or Joints	3.2	G													
			Equipment Restraint	2.2	G													
			Contractor Designed Bracing	1.2.2	G													
			Anchor Bolts	3.7														
			Vibration Isolators	2.2.2														
			SD-05 Design Data															
			Design Calculations	1.2.2														
			SD-06 Test Reports															
			Anchor Bolts	3.7	G													
		23 05 93	SD-01 Preconstruction Submittals															
			Records of Existing Conditions	1.3.2	G													
			Independent TAB Agency and	1.5.1	G													
			Personnel Qualifications															
			TAB Design Review Report	3.7	G													
			TAB Firm	1.2	G													
			SD-02 Shop Drawings															
			TAB Schematic Drawings and	1.3.2	G													
			Report Forms															
			SD-03 Product Data															
			Equipment and Performance	1.3	G													
			Data															
			TAB Related HVAC Submittals	1.5.1.2	G													
			SD-06 Test Reports															
			Completed Pre-Final DALT	3.3.5	G													
			Report															
			Certified Final DALT Report	3.3.8	G													

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		23 05 93	Prerequisite HVAC Work	3.7	G													
			Checkout List															
			Prerequisite HVAC Work	3.7	G													
			Checkout List															
			Prerequisite HVAC Work	3.7	G													
			Checkout List															
			Proportional Balancing	3.4.4.1	G													
			Proportional Balancing	3.7	G													
			Season 1	3.4.4.2	G													
			Season 1	3.7	G													
			Season 2	3.4.4.2	G													
			Season 2	3.7	G													
			SD-07 Certificates															
			Independent TAB Agency and	1.5.1	G													
			Personnel Qualifications															
			DALT and TAB Submittal and	3.7	G													
			Work Schedule															
			Instrument Calibration	1.5.3	G													
			Certificates															
			DALT and TAB Procedures	3.7	G													
			Summary															
			Completed Pre-Final DALT Work	3.7	G													
			Checklist															
			Advance Notice of Pre-Final	3.3.2	G													
			DALT Field Work															
			Season 1	3.4.4.2	G													

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		23 05 93	Season 1	3.7	G													
			Season 2	3.4.4.2	G													
			Season 2	3.7	G													
		23 07 00	SD-02 Shop Drawings															
			MICA Plates	3.2.2.4	G													
			Duct Insulation Systems	3.3														
			Recycled content for insulation	2.3.1	S													
			materials															
			SD-03 Product Data															
			Pipe Insulation Systems	2.3	G													
			Pipe Insulation Systems	3.2	G													
			Duct Insulation Systems	3.3	G													
			SD-04 Samples															
			Display Samples	3.1.1	G													
			SD-07 Certificates															
			Indoor air quality for adhesives	1.4.1	S													
			and sealants															
			Indoor Air Quality for Insulation	1.4.2	S													
			Materials															
			Indoor Air Quality for Vapor	1.4.3	S													
			Barrier Mastic Coating															
			SD-08 Manufacturer's Instructions															
			Pipe Insulation Systems	2.3	G													
			Pipe Insulation Systems	3.2	G													
			Duct Insulation Systems	3.3	G													
		23 09 00	SD-02 Shop Drawings															

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		23 09 00	DDC Contractor Design Drawings	3.2	G													
			Draft As-Built Drawings	3.2	G													
			Final As-Built Drawings	3.2	G													
			SD-03 Product Data															
			Programming Software	1.8.3	G													
			Controller Application Programs	1.8.4	G													
			Configuration Software	1.8.1	G													
			Controller Configuration Settings	1.8.2	G													
			Manufacturer's Product Data	2.2	G													
			Niagara Framework Supervisory	1.8.5	G													
			Gateway Backups															
			Niagara Framework Wizards	1.5	G													
			SD-06 Test Reports															
			Pre-Construction Quality Control	1.9.1	G													
			(QC) Checklist															
			Post-Construction Quality Control	1.9.2	G													
			(QC) Checklist															
			Start-Up Testing Report	3.4.2	G													
			PVT Procedures	3.5.3	G													
			PVT Report	3.5.4	G													
			Control Contractor’s Performance	3.5.7	G													
			Verification Testing Plan															
			Equipment Supplier’s	3.5.5.1	G													
			Performance Verification Testing															
			Plan															
			Endurance Testing Results	3.5.10.3	G													

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		23 09 00	Performance Verification Test	3.5.11	G													
			Report															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.6	G													
			(O&M) Instructions															
			Training Documentation	3.8.1	G													
			SD-11 Closeout Submittals															
			Enclosure Keys	2.5	G													
			Password Summary Report	3.1.6.1	G													
			Closeout Quality Control (QC)	1.9.3	G													
			Checklist															
		23 23 00	SD-03 Product Data															
			Refrigerant Piping System	2.2														
			Qualifications	2.1														
			Refrigerant Piping Tests	3.5														
			Verification of Dimensions	3.1														
			SD-06 Test Reports															
			Refrigerant Piping Tests	3.5														
			SD-07 Certificates															
			Service Organization	2.1														
		23 30 00	SD-02 Shop Drawings															
			Detail Drawings	1.4.4	G													
			SD-03 Product Data															
			Insulated Nonmetallic Flexible	2.7.1.1														
			Duct Runouts															

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		23 30 00	Duct Connectors	2.7.1.1														
			Duct Access Doors	2.7.2	G													
			Fire Dampers	2.7.3	G													
			Manual Balancing Dampers	2.7.4	G													
			Constant Airflow Regulators	2.7.5	G													
			Diffusers	2.7.7.1														
			Registers and Grilles	2.7.7.2														
			Louvers	2.7.8														
			VAV Box	2.7.1	G													
			Energy Recovery Ventilator	2.8.2	G													
			In-line Centrifugal Fans	2.8.3	G													
			Indoor Air Quality for Duct	2.7.1	S													
			Sealants															
			SD-06 Test Reports															
			Performance Tests	3.12	G													
			Damper Acceptance Test	3.10	G													
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Installation	3.2														
			Instructions															
			Operation and Maintenance	3.14.2														
			Training															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.14.1	G													
			Manuals															
			Fire Dampers	2.7.3	G													

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		23 30 00	Manual Balancing Dampers	2.7.4	G													
			Constant Airflow Regulators	2.7.5	G													
			VAV Box	2.7.1	G													
			Energy Recovery Ventilator	2.8.2	G													
			SD-11 Closeout Submittals															
			Indoor Air Quality During	3.13	S													
			Construction															
		23 81 00	SD-03 Product Data															
			System Performance Tests	3.6														
			Training	3.4	G													
			Supplied Products	2.1														
			Manufacturer's Standard Catalog	2.2														
			Data															
			Small-Capacity Split-System	2.3.1.1	G													
			Air-Conditioners															
			Large-Capacity Split-System	2.3.1.2	G													
			Air-Conditioners															
			Dedicated Outside Air System	2.3.1.3	G													
			SD-06 Test Reports															
			DOAS Factory Test Reports	2.6	G													
			Split System Air Handling Unit	2.6	G													
			Factory Test Reports															
			Refrigerant Tests, Charging, and	3.5	G													
			Start-Up															
			System Performance Tests	3.6	G													
			SD-07 Certificates															

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		23 81 00	Service Organizations	3.7.1														
			SD-10 Operation and Maintenance															
			Data															
			Manual	3.4	G													
			Operation and Maintenance	3.4	G													
			Manuals															
			SD-11 Closeout Submittals															
			EPA SNAP for refrigerants	2.2.2.3	S													
		23 83 00.00 20	SD-02 Shop Drawings															
			Heater Installation Drawing	3.1														
			SD-03 Product Data															
			Electric Unit Heaters	2.1	G													
			Thermostat	2.1.5														
			SD-10 Operation and Maintenance															
			Data															
			Electric Unit Heaters	2.1														
		25 05 11.23	SD-01 Preconstruction Submittals															
			Cybersecurity Interconnection	1.8.2	G													
			Schedule															
			Device Account Lock Exception	3.3.2	G													
			Request															
			Cybersecurity Subject Matter	1.7.1	G													
			Expert Qualifications															
			Multiple Ethernet Connection	3.2.3.1	G													
			Device Request															

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		25 05 11.23	Contractor Computer	1.10.1.6	G													
			Cybersecurity Compliance															
			Statements															
			Contractor Temporary Network	1.10.6	G													
			Cybersecurity Compliance															
			Statements															
			Proposed STIG and SRG	1.8.1	G													
			Applicability Report															
			SD-02 Shop Drawings															
			Network Communication Report	1.8.3	G													
			Cybersecurity Riser Diagram	1.8.6	G													
			SD-03 Product Data															
			Control System Cybersecurity	1.8.8	G													
			Documentation															
			SD-07 Certificates															
			Software Licenses	1.9	G													
			SD-11 Closeout Submittals															
			Password Change Summary	3.4.5.5	G													
			Report															
			Enclosure Keys	3.3.5	G													
			Software and Configuration	1.8.5	G													
			Backups															
			Auditing Front End Software	3.5.3	G													
			Device Audit Record Upload	3.5.4.1	G													
			Software															

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		25 05 11.23	System Maintenance Tool	3.9	G													
			Software															
			Control System Scanning Tools	3.11.2	G													
			STIG, SRG and Vendor Guide	1.8.7	G													
			Compliance Result Report															
			Control System Inventory Report	1.8.4	G													
		25 05 11.28	SD-01 Preconstruction Submittals															
			Wireless Communication	3.1.6.3	G													
			Request															
			Device Account Lock Exception	3.1.3.2	G													
			Request															
			Multiple IP Connection Device	3.9	G													
			Request															
			Contractor Computer	1.10.1.4	G													
			Cybersecurity Compliance															
			Statements															
			Contractor Temporary Network	1.10.6	G													
			Cybersecurity Compliance															
			Statements															
			Qualifications	1.7.1.2	G													
			SD-02 Shop Drawings															
			User Interface Banner Schedule	3.1.4.1	G													
			Network Communication Report	1.8.2	G													
			Cybersecurity Riser Diagram	1.8.5	G													
			Control System Inventory Report	1.8.3	G													

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		25 05 11.28	Cybersecurity Interconnection	1.8.1	G													
			Schedule															
			SD-03 Product Data															
			Control System Cybersecurity	1.8.6	G													
			Documentation															
			SD-06 Test Reports															
			Wireless Communication Test	3.1.6.4	G													
			Report															
			SD-07 Certificates															
			Software Licenses	1.9	G													
			SD-11 Closeout Submittals															
			Password Summary Report	3.5.2.2.5	G													
			Software Recovery And	1.8.4	G													
			Reconstitution Images															
			Device Audit Record Upload	3.2.2.1	G													
			Software															
		25 08 10	SD-06 Test Reports															
			PVT Plan	3.1.1	G													
			PVT Phase I Report	3.1.2.1	G													
			PVT Phase II Report	3.1.2.2	G													
			SD-07 Certificates															
			Test Instrumentation Calibration	1.4	G													
			Certificates															
		25 10 10	SD-02 Shop Drawings															
			UMCS Contractor Design	3.2.2	G													
			Drawings															

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		25 10 10	Draft As-Built Drawings	3.2.3	G													
			Final As-Built Drawings	3.2.3	G													
			SD-03 Product Data															
			Product Data Sheets	2.1.5	G													
			Computer Software	2.4	G													
			Enclosure Keys	2.6.1	G													
			SD-05 Design Data															
			UMCS IP Network Bandwidth	3.2.1	G													
			Usage Estimate															
			SD-06 Test Reports															
			Pre-Construction QC Checklist	1.7	G													
			Post-Construction QC Checklist	1.7	G													
			Factory Test Procedures	3.1	G													
			Factory Test Report	3.1	G													
			Start-Up and Start-Up Testing	3.6	G													
			Report															
			PVT Phase I Procedures	3.7.1	G													
			PVT Phase I Report	3.7.2	G													
			PVT Phase II Report	3.7.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.8	G													
			(O&M) Instructions															
			Preventive Maintenance Work	3.8.8.1	G													
			Plan															
			Basic Training Documentation	3.9.1	G													

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		25 10 10	Advanced Training	3.9.1	G													
			Documentation															
			SD-11 Closeout Submittals															
			Closeout QC Checklist	1.7	G													
		26 05 26.00 40	SD-01 Preconstruction Submittals															
			Grounding and Bonding Quality	3.2	G													
			Assurance Plan															
			SD-03 Product Data															
			Ground Rods	2.1.1	G													
			Ground Wires	2.1.2	G													
			Connectors and Fasteners	2.1.3	G													
			Test Wells	2.1.4	G													
			Conductive Corrosion Inhibiting	2.1.5	G													
			Compounds															
			Ground Buses	2.1.6	G													
			SD-06 Test Reports															
			Bond Resistance Test	3.2.1	G													
			Ground Resistance Tests	3.2.2	G													
			Ground Isolation Test	3.2.3	G													
			Equipment Continuity Test	3.2.4	G													
			SD-07 Certificates															
			Ground Resistance Test	1.3.3	G													
			Equipment															
			Micro-Ohmmeter Test Equipment	1.3.4	G													
			SD-11 Closeout Submittals															
			Record Drawings	3.3	G													

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		26 05 26.00 40	Grounding and Bonding Test and	3.2	G													
			Inspection Report															
		26 08 00	SD-06 Test Reports															
			Acceptance Tests and	3.1	G													
			Inspections															
			SD-07 Certificates															
			Qualifications	1.4.1	G													
			Acceptance Test and Inspections	1.4.3	G													
			Procedure															
		26 12 19.10	SD-02 Shop Drawings															
			Pad-mounted Transformer	1.5.1	G													
			Drawings															
			SD-03 Product Data															
			Pad-mounted Transformers	2.2	G													
			SD-06 Test Reports															
			Acceptance Checks and Tests	3.6.1	G													
			SD-07 Certificates															
			Transformer Efficiencies	2.2.2.1	G													
			SD-09 Manufacturer's Field															
			Reports															
			Transformer Test Schedule	2.8.1	G													
			Design Tests	2.8.2	G													
			Routine and Other Tests	2.8.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Transformer(s)	1.6.1	G													

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		26 13 00	SD-02 Shop Drawings															
			Switchgear Drawings	1.5.1	G													
			SD-03 Product Data															
			Electronic Overcurrent Control	1.5.3	G													
			Curves															
			SF6/High-Firepoint Fluid	1.6.1	G													
			Insulated Pad-mounted Switchgear															
			SF6/High-Firepoint Fluid	2.1	G													
			Insulated Pad-mounted Switchgear															
			Insulated High-Voltage	2.2	G													
			Connectors															
			Surge Arresters	2.3	G													
			SD-06 Test Reports															
			Acceptance Checks and Tests	3.4.1	G													
			SD-07 Certificates															
			Paint Coating System	1.5.2	G													
			Cybersecurity	1.7	G													
			SD-09 Manufacturer's Field															
			Reports															
			Switchgear Design and	2.4.1	G													
			Production Tests															
			SD-10 Operation and Maintenance															
			Data															
			SF6/High-Firepoint Fluid	1.6.1	G													
			Insulated Pad-mounted Switchgear															

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		26 13 00	SF6/High-Firepoint Fluid	2.1	G													
			Insulated Pad-mounted Switchgear															
		26 20 00	SD-02 Shop Drawings															
			Panelboards	2.14														
			Transformers	2.16														
			Cable Trays	2.4														
			Wireways	2.28														
			Marking Strips	3.1.11.1	G													
			Grounding	2.23	G													
			SD-03 Product Data															
			Receptacles	2.13														
			Circuit Breakers	2.14.3														
			Switches	2.11														
			Transformers	2.16														
			Enclosed Circuit Breakers	2.15														
			Motor Controllers	2.18	G													
			Manual Motor Starters	2.19														
			Secondary Bonding Busbar	2.23.3														
			Surge Protective Devices	2.29														
			Cable Trays	2.4														
			SD-05 Design Data															
			Cable Tray Design	2.4	G													
			SD-06 Test Reports															
			600-volt Wiring Test	3.5.2	G													
			Grounding System Test	3.5.6	G													
			Transformer Tests	3.5.3	G													

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		26 20 00	Ground-fault Receptacle Test	3.5.4														
			Arc-fault Receptacle Test	3.5.5														
			SD-07 Certificates															
			Fuses	2.12														
			SD-09 Manufacturer’s Field															
			Reports															
			Transformer Factory Tests	2.31.1														
			SD-10 Operation and Maintenance															
			Data															
			Electrical Systems	1.5.1	G													
		26 24 13	SD-02 Shop Drawings															
			Switchboard Drawings	1.5.2														
			SD-03 Product Data															
			Switchboard	2.2														
			SD-06 Test Reports															
			Switchboard Design Tests	2.5.2														
			Switchboard Production Tests	2.5.3														
			Acceptance Checks and Tests	3.5.1														
			SD-10 Operation and Maintenance															
			Data															
			Switchboard Operation and	1.6.1														
			Maintenance															
			SD-11 Closeout Submittals															
			Assembled Operation and	1.6.2														
			Maintenance Manuals															
			Equipment Test Schedule	2.5.1														

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		26 24 13	Service Entrance Available Fault	2.8														
			Current Label															
		26 27 14.00 20	SD-02 Shop Drawings															
			Installation Drawings	1.3.1	G													
			SD-03 Product Data															
			Electricity Meters	2.1.4	G													
			Current Transformer	2.1.3	G													
			Potential Transformer	2.1.2	G													
			Communications	2.2	G													
			Configuration Software	3.1.1	G													
			SD-06 Test Reports															
			Acceptance Checks and Tests	3.2.1	G													
			System Functional Verification	3.2.2	G													
			Building Meter Installation Sheet,	3.2.1	G													
			per Building															
			Meter Configuration Template	2.1.1	G													
			Meter Configuration Report	3.2.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Electricity Meters and	1.4.1	G													
			Accessories															
			SD-11 Closeout Submittals															
			System Functional Verification	3.2.2	G													
		26 28 01.00 10	SD-03 Product Data															
			Fault Current Analysis	2.1														

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		26 28 01.00 10	Protective Device Coordination	2.1														
			Study															
			System Coordinator	1.4.1														
		26 29 23	SD-02 Shop Drawings															
			Schematic Diagrams	1.5.1	G													
			Interconnecting Diagrams	1.5.2	G													
			Installation Drawings	1.5.3	G													
			As-Built Drawings	1.5.3	G													
			SD-03 Product Data															
			Adjustable Speed Drives	2.1	G													
			Wires and Cables	2.3														
			Equipment Schedule	1.5.4														
			SD-06 Test Reports															
			ASD Test	3.3.1														
			Performance Verification Tests	3.3.2														
			Endurance Test	3.3.3														
			SD-08 Manufacturer’s Instructions															
			Installation instructions	1.5.5														
			SD-09 Manufacturer’s Field															
			Reports															
			ASD Test Plan	2.5.1	G													
			Standard Products	1.5.6														
			SD-10 Operation and Maintenance															
			Data															
			Adjustable Speed Drives	2.1														
		26 32 15.00	SD-02 Shop Drawings															

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		26 32 15.00	Engine-Generator Set and	2.1.1	G													
			Auxiliary Equipment															
			Auxiliary Systems	1.4.9	G													
			Detailed Drawings	1.4.8	G													
			Acceptance	3.15	G													
			SD-03 Product Data															
			Harmonic Requirements	2.1.8	G													
			Engine-Generator Set	2.1.1	G													
			Efficiencies															
			Emissions	2.13	G													
			filters	2.7.2	G													
			special tools	2.15	G													
			Remote Alarm Annunciator	2.14.4	G													
			Engine-Generator Parameter	2.1.1														
			Schedule															
			Heat Exchanger	2.8.2														
			Generator	2.16	G													
			Manufacturer's Catalog	2.5														
			Site Welding	1.4.2														
			Spare Parts	1.7.2														
			Vibration-Isolation	2.1.7														
			Posted Data and Instructions	3.14	G													
			Instructions	3.5.7.1	G													
			Experience	1.4.6														
			Field Engineer	1.4.7														
			General Installation	3.2														

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		26 32 15.00	Exciter	2.17														
			SD-05 Design Data															
			Performance Criteria	2.16														
			Sound Limitations	2.9	G													
			Base Main Fuel Storage Tank	2.6.4														
			Power Factor	3.5.1.2														
			Heat Exchanger	2.8.2														
			Time-Delay on Alarms	2.20.5														
			Cooling System	2.8														
			Vibration Isolation	2.1.7														
			Battery Charger	2.14.3.2														
			Capacity Calculations for	2.1.1	G													
			Engine-Generator Set															
			Brake Mean Effective Pressure	2.1.1	G													
			(BMEP) Calculations															
			Torsional Vibration Stress	2.1.1	G													
			Analysis Computations															
			Capacity Calculations for	2.1.1	G													
			Batteries															
			Turbocharger Load Calculations	2.1.1	G													
			SD-06 Test Reports															
			Performance Tests	3.5.9														
			Factory Inspection and Tests	2.28														
			Factory Tests	2.28.2														
			Onsite Inspection and Tests	3.5	G													
			Acceptance Checks and Tests	3.8.1	G													

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		26 32 15.00	Functional Acceptance Tests	3.9.2	G													
			Operation and Maintenance	1.7	G													
			Manuals															
			Inspections	3.5.3	G													
			Functional Acceptance Test	3.8.5	G													
			Procedure															
			SD-07 Certificates															
			Cooling System	2.8														
			Vibration Isolation	2.1.7														
			Prototype Test	2.28.2														
			Reliability and Durability	2.1.5														
			Fuel System Certification	1.4.11	G													
			Start-Up Engineer	3.7	G													
			Instructor's Qualification Resume	3.10.1	G													
			Engine Emission Limits	2.1.2.1	G													
			Sound Limitations	2.9														
			Site Visit	3.1														
			Current Balance	2.16.1														
			Materials and Equipment	2.4														
			Factory Inspection and Tests	2.28														
			Engine Tests	3.5.4	G													
			Generator Tests	3.5.5	G													
			Assembled Engine-Generator Set	3.5.6	G													
			Tests															
			SD-10 Operation and Maintenance															
			Data															

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		26 32 15.00	Preliminary Assembled Operation	3.8.4	G													
			and Maintenance Manuals															
			Posted Data and Instructions	3.14	G													
			Training Plan	3.10.2	G													
		26 36 23	SD-02 Shop Drawings															
			Automatic Transfer Switch	1.5.2	G													
			Drawings															
			SD-03 Product Data															
			Automatic Transfer Switches	2.1	G													
			By-Pass/Isolation Switch (BP/IS)	2.2	G													
			SD-06 Test Reports															
			Acceptance Checks and Tests	3.3.1	G													
			Functional Acceptance Tests	3.3.2	G													
			Factory Testing	2.5	G													
			Factory Test Reports	2.5.2	G													
			SD-07 Certificates															
			Proof of Listing	1.5.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.4	G													
			Manual															
		26 41 00	SD-01 Preconstruction Submittals															
			Lightning Protection Quality	1.4	G													
			Assurance Plan															
			SD-02 Shop Drawings															

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		26 41 00	Overall lightning protection	1.4.1.1	G													
			system															
			Each major component	1.4.1.2	G													
			SD-03 Product Data															
			Air Terminals	2.2.1	G													
			Ground Rods	2.2.2	G													
			Ground Conductors	2.1.3	G													
			Connectors and Terminations	2.2.3	G													
			Test Wells	2.2.5	G													
			Surge Protection	2.2.6	G													
			SD-06 Test Reports															
			Lightning Protection and	1.4.3	G													
			Grounding System Test Plan															
			Lightning Protection and	3.4.1	G													
			Grounding System Test															
			SD-07 Certificates															
			Lightning Protection System	1.2.3	G													
			Installers Documentation															
			Component UL Listed and	1.4.2	G													
			Labeled															
			Lightning protection system	1.4.4	G													
			inspection certificate															
			Roof manufacturer's warranty	3.1.1	G													
			SD-11 Closeout Submittals															
			Record Drawings	1.4.5	G													

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		26 41 00	Lightning Protection Inspection	1.4.4	G													
			Report															
		26 51 00	SD-02 Shop Drawings															
			Luminaire Drawings	1.5.1														
			Occupancy/Vacancy Sensor	1.5.8	G													
			Coverage Layout															
			Lighting Control System One-Line	1.7.2	G													
			Diagram															
			Sequence of Operation for	2.5.1	G													
			Lighting Control System															
			SD-03 Product Data															
			Luminaires	2.2	G													
			Light Sources	2.3	G													
			LED Drivers	2.4	G													
			Luminaire Warranty	1.6.1	G													
			Lighting Controls Warranty	1.6.2	G													
			Local Area Controller	2.5.1.1.1	G													
			Lighting Relay Panel	2.5.1.2.1	G													
			Lighting Control Panel	2.5.1.2.2	G													
			Lighting Contactor	2.5.1.2.3	G													
			Switches	2.5.2.1														
			Digital Switch Timers	2.5.2.2														
			Wall Box Dimmers	2.5.2.3														
			Scene Wallstations	2.5.2.4	G													
			Occupancy/Vacancy Sensors	2.5.2.5	G													
			Photosensors	2.5.2.6														

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		26 51 00	Time Clocks	2.5.2.7														
			Power Packs	2.5.2.5.5														
			Power Hook Luminaire Hangers	2.7.4														
			Mini Inverters	2.6.4	G													
			Exit Signs	2.6.1	G													
			Emergency Drivers	2.6.2	G													
			Design Lighting Consortium Label	2.2	S													
			for Luminaires															
			Linear LED Lamps	2.3.1.1														
			SD-06 Test Reports															
			ANSI/IES LM-79 Test Report	1.5.3														
			ANSI/IES LM-80 Test Report	1.5.4														
			ANSI/IES TM-21 Test Report	1.5.5														
			ANSI/IES TM-30 Test Report	1.5.6														
			Occupancy/Vacancy Sensor	3.2.1.1	G													
			Verification Test															
			Photosensor Verification Test	3.2.1.1	G													
			SD-07 Certificates															
			LED Driver and Dimming Switch	1.5.7														
			Compatibility Certificate															
			SD-10 Operation and Maintenance															
			Data															
			Lighting System	1.7.1	G													
			Lighting Control System	1.7.2	G													
			Maintenance Staff Training Plan	3.3.1.1	G													
			End-User Training Plan	3.3.1.2	G													

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		26 56 00	SD-02 Shop Drawings															
			Luminaire Drawings	1.5.1.1														
			Pole Drawings	1.5.1.2														
			Control System One-Line	1.8.2	G													
			Diagram															
			SD-03 Product Data															
			Luminaires	2.2	G													
			Light Sources	2.3	G													
			LED Drivers	2.4	G													
			Luminaire Warranty	1.7.1	G													
			Lighting Controls Warranty	1.7.2	G													
			Pole Warranty	1.7.3	G													
			Motion Sensors	2.5.2.3	G													
			Photosensors	2.5.2.2	G													
			Time Clock	2.5.2.1	G													
			Lighting Contactor	2.5.2.4	G													
			Poles	2.6	G													
			Brackets	2.6.3														
			ENERGY STAR Label or Design	1.5.2	S													
			Lighting Consortium Label for															
			Luminaires															
			SD-05 Design Data															
			Luminaire Design Data	1.5.2	G													
			SD-06 Test Reports															
			ANSI/IES LM-79 Test Report	1.5.3														
			ANSI/IES LM-80 Test Report	1.5.4														

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		26 56 00	ANSI/IES TM-21 Test Report	1.5.5														
			Pressure Treated Wood Pole	1.5.6	G													
			Quality															
			SD-08 Manufacturer's Instructions															
			Poles	2.6														
			SD-10 Operation and Maintenance															
			Data															
			Lighting System	1.8.1	G													
			Exterior Lighting Control System	1.8.2	G													
			Maintenance Staff Training Plan	3.3.1.1	G													
			End-User Training Plan	3.3.1.2	G													
		27 10 00	SD-02 Shop Drawings															
			Telecommunications Drawings	1.6.1.1	G													
			Telecommunications Space	1.6.1.2	G													
			Drawings															
			SD-03 Product Data															
			Telecommunications Cabling	2.3	G													
			Patch Panels	2.4.5	G													
			Telecommunications	2.5	G													
			Outlet/Connector Assemblies															
			Equipment Support Frame	2.4.2	G													
			Connector Blocks	2.4.3	G													
			Spare Parts	1.10.3	G													
			SD-06 Test Reports															
			Telecommunications Cabling	3.5.1	G													
			Testing															

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		27 10 00	SD-07 Certificates															
			Telecommunications Contractor	1.6.2.1	G													
			Key Personnel	1.6.2.2	G													
			Manufacturer Qualifications	1.6.2.3	G													
			Test Plan	1.6.3	G													
			SD-09 Manufacturer's Field															
			Reports															
			Factory Reel Tests	2.10.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Telecommunications Cabling and	1.10.1	G													
			Pathway System															
			SD-11 Closeout Submittals															
			Record Documentation	1.10.2	G													
		27 13 23.00 40	SD-01 Preconstruction Submittals															
			Qualifications	1.3.1	G													
			Quality Assurance Plan	1.3.1	G													
			SD-02 Shop Drawings															
			Fiber Optic System Contract	1.3.1	G													
			Drawings															
			Detailed Shop Drawings	1.3.1	G													
			Record (As-Built) Drawings	3.3	G													
			SD-03 Product Data															
			Optical Fibers	1.3.1	G													
			Fiber Optic Cable Design	1.3.1	G													
			Splice Organizers	1.3.1	G													

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		27 13 23.00 40	Pre-Connected Cable Assembly	1.3.1	G													
			Fiber Optic Terminal Cabinets	1.3.1	G													
			Fiber Optic Terminal Cabinets	2.2.4	G													
			Optical Patch Panel Assemblies	1.3.1	G													
			Fiber Optic Media Types	1.3.1	G													
			Fiber Optic Terminations and	1.3.1	G													
			Connectors															
			Fiber Optic Enclosures	1.3.1	G													
			SD-06 Test Reports															
			Factory Test Certificates	2.4.2	G													
			Single and Multi-Mode OTDR	3.2.1.1	G													
			Test															
			End-to-End Attenuation Tests	3.2.1.2	G													
			End-to-End Bandwidth Tests	3.2.1.3	G													
			Fiber Optic Factory Test Plan	1.5.4	G													
			Fiber Optic Field Tests Plan	1.5.5	G													
			SD-07 Certificates															
			Fiber Optic Cable Installer and	1.3.1	G													
			Splicer Qualifications															
			Manufacturer's Qualifications	1.3.1	G													
			SD-08 Manufacturer’s Instructions															
			Fiber Optic System Instructions	1.3.1	G													
		27 41 00	SD-01 Preconstruction Submittals															
			Qualifications	1.7	G													
			Bid Pricing	1.8	G													
			SD-02 Shop Drawings															

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		27 41 00	Shop Drawings	1.9	G													
			SD-09 Manufacturer's Field															
			Reports															
			Status Reports and Meeting	1.10	G													
			Minutes															
			SD-10 Operation and Maintenance															
			Data															
			Record Drawings	3.12	G													
			Operation and Maintenance	3.13	G													
			(O&M) Manuals															
		27 51 16	SD-01 Preconstruction Submittals															
			Qualifications	1.7	G													
			SD-02 Shop Drawings															
			Detail Drawings	2.1.3	G													
			System Layout	1.2.1	G													
			SD-03 Product Data															
			Spare Parts	1.9														
			SD-05 Design Data															
			Design Analysis and Calculations	1.5.7	G													
			SD-06 Test Reports															
			Approved Test Procedures	3.5	G													
			Acceptance Tests	3.5														
			Accreditation	1.6	G													
			SD-07 Certificates															
			Components	2.2														

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		27 51 16	SD-10 Operation and Maintenance															
			Data															
			Public Address System	2.1	G													
		28 08 10	SD-05 Design Data															
			Test Plan	3.1	G													
			SD-06 Test Reports															
			Final Test Report	3.4	G													
			Pre-Acceptance Test Certification	3.2	G													
			SD-07 Certificates															
			Qualifications	1.4.1														
		28 10 05	SD-02 Shop Drawings															
			ESS Components	1.3.3.1	G													
			Overall System Schematic	1.3.3.2	G													
			SD-03 Product Data															
			Premise Control Unit	2.3.6	G													
			Detection Sensors	2.3.7	G													
			Access Control Unit	2.4.4	G													
			Access Control Devices	2.4.5	G													
			Cameras	2.5.1	G													
			Camera Lenses	2.5.1.2	G													
			Camera Housing and Mounts	2.5.1.3	G													
			Video Recording	2.5.2.1	G													
			Printers	2.6.2	G													
			Communications Interface	2.7	G													
			Devices															
			Radio Frequency Link	2.7.3	G													

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		28 10 05	Network Switch	2.7.5	G													
			Video and ESS Transmission	2.7.6	G													
			Uninterruptible Power Supply	2.8.1	G													
			(UPS)															
			Batteries	2.8.2	G													
			Component Enclosure	2.10	G													
			Equipment Rack	2.11	G													
			SD-05 Design Data															
			Backup Battery Capacity	1.5.1	G													
			Calculations															
			Throughput Rates	2.4.2	G													
			CCTV Storage Calculations	1.5.2														
			SD-07 Certificates															
			Contractor Qualifications	1.3.4.1	G													
			Instructor Qualifications	1.3.4.2	G													
			Data Encryption	2.7.4	G													
			SD-10 Operation and Maintenance															
			Data															
			Training Plan	3.6.1	G													
			Training Content	3.6	G													
			ESS Components	1.3.3.1	G													
			ESS Software	1.6	G													
			SD-11 Closeout Submittals															
			As-Built Drawings	1.7	G													
		28 31 76	SD-01 Preconstruction Submittals															

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		28 31 76	Qualified Fire Protection Engineer	1.3.2	G													
			(QFPE)															
			Fire alarm system designer	1.8.2.1	G													
			Supervisor	1.8.2.2	G													
			Technician	1.8.2.3	G													
			Installer	1.8.2.4	G													
			Test Technician	1.8.2.5	G													
			Fire Alarm System Site-Specific	1.7	G													
			Software Acknowledgement															
			SD-02 Shop Drawings															
			Nameplates	1.8.1.3	G													
			Instructions	2.2.4	G													
			Wiring Diagrams	1.8.1.4	G													
			System Layout	1.8.1.5	G													
			Notification Appliances	1.8.1.6	G													
			Initiating devices	1.8.1.7	G													
			Amplifiers	1.8.1.8	G													
			Battery Power	1.8.1.9	G													
			Voltage Drop Calculations	1.8.1.10	G													
			SD-03 Product Data															
			Fire Alarm and Mass Notification	2.3	G													
			Control Unit (FMCU)															
			Local Operating Console (LOC)	1.4.4	G													
			Amplifiers	1.8.1.8	G													
			Tone Generators	2.5	G													
			Digitalized voice generators	2.5	G													

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		28 31 76	LCD Annunciator	2.6.1	G													
			Manual Stations	2.7	G													
			Smoke Detectors	2.8	G													
			Duct Smoke Detectors	2.8.2	G													
			Addressable Interface Devices	2.9	G													
			Addressable Control Modules	2.10	G													
			Notification Appliances	1.8.1.6	G													
			Textual Display Sign Control	1.6	G													
			Panel															
			Textual Display Signs	2.11.3	G													
			Batteries	2.13.1	G													
			Battery Chargers	2.13.2	G													
			Supplemental Notification	2.13.1.1	G													
			Appliance Circuit Panels															
			Surge Protective Devices	2.14	G													
			Alarm Wiring	2.14	G													
			Back Boxes and Conduit	3.3.4	G													
			Ceiling Bridges	3.2.8	G													
			Automatic Fire Alarm	2.16	G													
			Transmitters															
			Radio Transmitter and Interface	2.16.1	G													
			Panels															
			Mass Notification Transceiver	1.3.1	G													
			Document Storage Cabinet	3.10.3	G													
			SD-06 Test Reports															
			Test Procedures	3.6.1	G													

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		28 31 76	SD-07 Certificates															
			Verification of Compliant	3.6.2.1	G													
			Installation															
			Request for Government Final	3.6.2.2	G													
			Test															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.8	G													
			(O&M) Instructions															
			Instruction of Government	3.9	G													
			Employees															
			SD-11 Closeout Submittals															
			As-Built Drawings	1.8.1.13														
			Spare Parts	1.10.1														
		31 00 00	SD-01 Preconstruction Submittals															
			Shoring	3.5	G													
			Dewatering Work Plan	1.2	G													
			Blasting	1.5.2	G													
			Rock Fall Protection System Plan	3.20.3.3	G													
			SD-03 Product Data															
			Magazine Earth Cover Material	1.4.10	G													
			Capillary Water Barrier	2.5	G													
			Utilization of Excavated Materials	3.9	G													
			Rock Excavation	1.5.1.2	G													
			Flowable Fill Mix Design	2.2	G													

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		31 00 00	Opening of any Excavation or	3.4														
			Borrow Pit															
			Shoulder Construction	3.15														
			Rock Fall Protection System	3.20.3.3	G													
			(Materials)															
			SD-06 Test Reports															
			Testing	3.18	G													
			Wire Rope Anchor Support Test	3.20.3.4	G													
			Reports															
			SD-07 Certificates															
			Testing	3.18														
		31 05 19.13	SD-04 Samples															
			Geotextiles	2.2.1														
			SD-06 Test Reports															
			Geotextiles	2.2.1														
			Site Verification	2.2.2														
			SD-07 Certificates															
			Geotextiles	2.2.1	G													
			Needle Punched Geotextile	2.2.1.3	G													
		31 11 00	SD-03 Product Data															
			Tree Wound Paint	2.1.1														
		31 21 13	SD-03 Product Data															
			Radon Mitigation Systems	2.1.2	G													
			Components															
			Radon Mitigation Systems	2.2	G													
			Enclosure Components															

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		31 21 13	Radon Mitigation Systems	2.2	G													
			Enclosure Components															
			SD-06 Test Reports															
			Post Mitigation Testing	3.4.2	G													
			SD-07 Certificates															
			Worker Protection Plan	1.7	G													
			Medical Certification	1.7.3	G													
			Worker Notification	1.7.4	G													
			Respiratory Protection Program	1.8	G													
			Contractor Qualifications	1.9.1.1	G													
			Contractor Experience	1.9.1.2	G													
			Testing Laboratory Certification	1.9.2	G													
			Proof Of Current Calibration For	1.9.3	G													
			Testing Devices															
			Radon Mitigation System	3.4.1	G													
			Inspection															
			SD-08 Manufacturer's Instructions															
			Radon Mitigation Systems	2.1.2														
			Components															
			Radon Mitigation Systems	2.2														
			Enclosure Components															
			Radon Mitigation Systems	2.2														
			Enclosure Components															
			SD-10 Operation and Maintenance															
			Data															
			Radon Mitigation Systems	2.1	G													

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		31 21 13	SD-11 Closeout Submittals															
			Radon Detector Location Log	1.6	G													
			Respirator Program Records	1.8.1	G													
		31 23 06.00	SD-01 Preconstruction Submittals															
			Blasting Consultant's	3.3.1.1	G													
			Qualifications															
			Vibration Monitoring Specialty	3.3.6	G													
			Firm															
			Structural Inspection/Evaluation	3.3.7	G													
			Technician															
			Blasting Safety Plan	3.4.2	G													
			Master Blasting Plan	3.4.1	G													
			Survey Control Plan	3.4.1	G													
			Test-Blast Plan	3.7	G													
			Pre-Blast Surveys	3.4.3	G													
			Public Notice Of Blasting	3.2.3														
			Operations															
			SD-03 Product Data															
			Seismographs	3.3.6	G													
			Lightning Detection Device	3.2.8	G													
			SD-05 Design Data															
			Individual Shot Plan	3.5.1	G													
			SD-06 Test Reports															
			Individual Shot Reports	3.5.3	G													
			Post-Blast Surveys	3.5.5														
			Individual Shot Videos	3.5.4														

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		31 23 06.00	Drilling Logs	3.5.2														
			Downhole Deviation Surveys	3.8														
			Individual Shot Monitoring Report	3.6.1														
			SD-07 Certificates															
			Blasting Consultant	3.3.1	G													
			Blasting Specialist	3.3.2	G													
			Blaster In Charge	3.3.3	G													
			Blasting Administrator	3.3.4	G													
			Magazine Keeper	3.3.5	G													
			Structural Inspection/Evaluation Technician	3.3.7	G													
			Seismic Specialist	3.6.1	G													
		31 31 16.13	SD-01 Preconstruction Submittals															
			Termiticide Application Plan	3.1.5	G													
			SD-03 Product Data															
			Termiticides	2.2.1														
			SD-05 Design Data															
			Mixing Formulation	3.2.2														
			SD-06 Test Reports															
			Soil Moisture	1.6.1														
			Calibration Test	3.2.1														
			SD-07 Certificates															
			Qualifications	1.4.2	G													
			Foundation Exterior	3.1.2														
			Utilities and Vents	3.1.3														
			Crawl and Plenum Air Spaces	3.1.4														

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		31 31 16.13	List of Equipment	3.2.1														
			SD-08 Manufacturer's Instructions															
			Termiticides	2.2.1														
			SD-11 Closeout Submittals															
			Verification of Measurement	3.3.1														
			Warranty	1.7														
			Pest Management Report	3.4														
		31 66 13	SD-01 Preconstruction Submittals															
			Designer And Installer	1.6.1	G													
			Qualifications															
			Independent Geotechnical	1.7	G													
			Engineering And Testing Agency															
			(IGETA)															
			Professional Liability	1.6.1	G													
			Load Test Program	1.6.2	G													
			Work Plan	1.6.3	G													
			Obstruction Mitigation Plan	1.6.4	G													
			Preconstruction Meeting	1.6.8														
			SD-02 Shop Drawings															
			Rigid Inclusion/Load Transfer	1.6.5	G													
			Platform															
			SD-03 Product Data															
			Installation Equipment	1.6.3														
			Engineered Fill	2.1.1														
			Geogrid Reinforcement	2.1.2														
			Grout	2.2														

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		31 66 13	Cementitious Materials	2.3														
			Grout Fluidifier	2.4														
			SD-05 Design Data															
			Design Calculations	1.8.1	G													
			SD-06 Test Reports															
			Modulus Test or Load test	1.7	G													
			Compressive Strength Tests	1.6.7	G													
			IGETA Inspection Summary	1.7	G													
			Report															
			SD-07 Certificates															
			Installation Equipment	1.6.3														
			Load Test Equipment	1.6.2														
			SD-11 Closeout Submittals															
			As-Built Drawings	3.6	G													
			Daily Rigid Inclusion Progress	1.6.6	G													
			Reports															
		32 05 33	SD-01 Preconstruction Submittals															
			Integrated Pest Management	2.4	G													
			Plan															
		32 11 20	SD-03 Product Data															
			Plant, Equipment, and Tools	2.3	G													
			SD-06 Test Reports															
			Initial Tests	2.2.1	G													
			In-Place Tests	3.13.1	G													
		32 11 23.23	SD-03 Product Data															
			Plants, Equipment, and Tools	2.2.1	G													

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		32 11 23.23	SD-06 Test Reports															
			Initial Tests	1.3.3.1	G													
		32 12 13	SD-03 Product Data															
			Local/Regional Materials	2.2.2														
			SD-06 Test Reports															
			Sampling and Testing	3.7														
		32 12 16.16	SD-02 Shop Drawings															
			Placement Plan	2.1	G													
			SD-03 Product Data															
			Mix Design	2.4	G													
			Contractor Quality Control	3.1	G													
			Recycled Content in Asphalt Mix	2.5.1	S													
			Solar Reflectance Index for	2.6	S													
			Asphalt Surface Coating															
			SD-06 Test Reports															
			Aggregates	2.2	G													
			QC Monitoring	3.1.3.9														
			SD-07 Certificates															
			Asphalt Cement Binder	2.3	G													
			Laboratory Accreditation and	1.3.11														
			Validation															
		32 13 13.06	SD-03 Product Data															
			Curing Materials	2.1.6														
			Reinforcement	2.1.5.3														
			Epoxy Resin	2.1.9														
			Epoxy Resin	2.1.9														

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		32 13 13.06	Cementitious Materials	2.1.1	G													
			Cementitious Materials	2.1.1	G													
			Albedo	2.2.1.5														
			Dowel Bars	2.1.5.1														
			Expansion Joint Filler	2.1.10.1														
			Recycled Content in Concrete	2.1.5	S													
			Mix															
			Recycled Content for Steel	2.1.5	S													
			Reinforcement															
			Biobased Content for	2.1.8	S													
			Biodegradable Form Release															
			Agent															
			SD-04 Samples															
			Test Section	2.3.4.3	G													
			SD-05 Design Data															
			Mix Design Report	2.2.2	G													
			SD-06 Test Reports															
			Concrete Slump Tests	3.7.2														
			Concrete Uniformity	2.3.1														
			Flexural Strength	3.7.3														
			Air Content	3.7.4														
			SD-07 Certificates															
			Batch Tickets	1.3.3														
			NRMCA Certificate Of	1.3.1														
			Conformance															
		32 13 73.19	SD-03 Product Data															

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		32 13 73.19	Equipment	2.1														
			Manufacturer's Instructions	3.1.1														
			SD-04 Samples															
			Compression Seals	2.2	G													
			SD-06 Test Reports															
			Test Requirements	2.1.3	G													
		32 15 00	SD-03 Product Data															
			Plant, Equipment, and Tools	1.4	G													
			SD-06 Test Reports															
			Initial Tests	2.3.1	G													
			In-Place Tests	3.10.1	G													
		32 16 19	SD-03 Product Data															
			Concrete	2.1														
			Biodegradable Form Release	2.6.5														
			Agent															
			Biodegradable Form Release	3.2														
			Agent															
			Recycled Content for Portland	2.6.5	S													
			Cement replacement in Concrete															
			Mix															
			Biobased Content for	2.6.5	S													
			Biodegradable Form Release															
			Agent															
			SD-06 Test Reports															
			Field Quality Control	3.8														
		32 17 23	SD-03 Product Data															

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		32 17 23	Surface Preparation Equipment	2.1.1.1	G													
			List															
			Application Equipment List	2.1.2	G													
			Exterior Surface Preparation	3.2														
			Safety Data Sheets	1.3.1	G													
			Waterborne Paint	2.2.1	G													
			Solventborne Paint	2.2.2	G													
			Solar Reflectance Index for	2.2	S													
			Asphalt Surface Coating															
			SD-07 Certificates															
			Qualifications	1.3.2	G													
			Waterborne Paint	2.2.1														
			Solventborne Paint	2.2.2														
			Volatile Organic Compound	1.3.1	G													
			SD-08 Manufacturer's Instructions															
			Waterborne Paint	2.2.1	G													
			Solventborne Paint	2.2.2	G													
		32 31 13.53	SD-02 Shop Drawings															
			Fence Installation Drawings	3.2.1	G													
			SD-03 Product Data															
			Fabric	2.1.1.1														
			Posts	2.1.2														
			Post Caps	2.1.2.2														
			Chain Link Braces	2.1.3														
			Line Posts	2.1.2.1														
			Sleeves	3.2.3.2														

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		32 31 13.53	Rails	2.1.3														
			Tension Wire	2.1.2.2														
			Barbed Wire	2.2.1.2														
			Barbed Wire Supporting Arms	2.1.2.2														
			Latches	2.1.4.3														
			Hinges	2.1.4.3														
			Stops	2.1.4.3														
			Keepers	2.1.4.3														
			Padlocks	2.1.5														
			Wire Ties	2.2.1.1														
			SD-07 Certificates															
			Chain Link Fence	2.1.2.1														
			Fabric	2.1.1.1														
			Barbed Wire	2.2.1.2														
			Gate Hardware and Accessories	3.2.1														
			Concrete	2.2.2														
		32 92 19	SD-03 Product Data															
			Wood Cellulose Fiber Mulch	2.5.3														
			Fertilizer	2.4														
			SD-06 Test Reports															
			Topsoil Composition Tests	2.2.3	G													
			SD-07 Certificates															
			Seed	2.1														
		32 93 00	SD-01 Preconstruction Submittals															
			State Landscape Contractor's	1.4.3														
			License															

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		32 93 00	Time Restrictions and Planting	1.6														
			Conditions															
			SD-06 Test Reports															
			Topsoil Composition Tests	2.2.4														
			SD-07 Certificates															
			Nursery Certifications	2.1.1														
		33 11 00	SD-01 Preconstruction Submittals															
			Connections	3.1.1	G													
			SD-03 Product Data															
			Pipe, Fittings, Joints and	2.1.1	G													
			Couplings															
			Valves	2.1.2	G													
			Valve Boxes	2.1.2.4	G													
			Fire Hydrants	2.1.4.1	G													
			Pipe Restraint	2.2.1	G													
			Tapping Sleeves	2.2.2	G													
			Corporation Stops	2.2.7.1	G													
			Disinfection Procedures	3.2.2	G													
			Automated Flushing System	2.1.5	G													
			SD-06 Test Reports															
			Bacteriological Samples	3.3.1.4	G													
			Hydrostatic Sewer Test	3.2.1.1.5														
			Leakage Test	3.3.1.3														
			Hydrostatic Test	3.3.1.1														
			SD-07 Certificates															

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		33 11 00	Pipe, Fittings, Joints and	2.1.1														
			Couplings															
			Lining	2.1.1.1.1														
			Valves	2.1.2														
			Fire Hydrants	2.1.4.1														
			SD-08 Manufacturer’s Instructions															
			Ductile-Iron Piping	2.1.1.1														
			Copper Pipe For Service Lines	2.1.1.2														
		33 30 00	SD-01 Preconstruction Submittals															
			Contractor's License	1.3.1	G													
			SD-02 Shop Drawings															
			Installation Drawings	3.1.1	G													
			SD-03 Product Data															
			Precast Concrete Manholes	2.2.5														
			Frames, Covers, and Gratings	2.2.8														
			Gravity Pipe	2.2.1														
			SD-06 Test Reports															
			Precast Concrete Sewer Manhole	3.3.1.2.1	G													
			Test															
			Hydrostatic Sewer Test	3.3.1.1	G													
			Infiltration Tests And Exfiltration	3.3.1.2	G													
			Tests															
			Negative Air Pressure Test	3.3.1.2.1	G													
			Low-Pressure Air Tests	3.3.1.2.2	G													
			SD-07 Certificates															
			Portland Cement	2.2.3														

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		33 30 00	Gaskets	2.2.1.1.2														
			Pre-Installation Inspection	3.3.3.1	G													
			Request															
			Post-Installation Inspection	3.3.3.2	G													
		33 40 00	SD-02 Shop Drawings															
			Thermoplastic corrugated wall	2.3	G													
			stormwater collection chambers															
			Underground Stormwater	2.4	G													
			Retention/Detention System															
			Precast Reinforced Concrete	2.5.4	G													
			Manholes and Catch Basins															
			SD-06 Test Reports															
			Leakage Test	3.9.1.1	G													
			SD-07 Certificates															
			Hydrostatic Test on Watertight	2.6.1	G													
			Joints															
			Frame and Cover or Gratings	2.5.5	G													
			SD-08 Manufacturer's Instructions															
			Placing Pipe	3.3	G													
			SD-11 Closeout Submittals															
			Post-Installation Inspection	3.9.2.1.3	G													
			Report															
			LID Verification Report	3.9.2.2	G													
		33 46 13	SD-04 Samples															
			Materials	2.1														
			SD-07 Certificates															

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		33 46 13	Materials	2.1														
		33 46 16	SD-04 Samples															
			Geotextile	2.2														
			Pipe and Pipe Fittings	2.1														
			SD-07 Certificates															
			Geotextile	2.2														
			Pipe and Pipe Fittings	2.1														
		33 71 01	SD-03 Product Data															
			Conductors	2.6	G													
			Insulators	2.5	G													
			Wood Poles	2.2.1														
			Pole Top Switch	3.1.7	G													
			Cutouts	2.13	G													
			Surge Arresters	2.12	G													
			Guy Strand	2.8														
			Anchors	2.10														
			SD-06 Test Reports															
			Wood Crossarm Inspection	1.5.4														
			Report															
			Field Test Plan	1.5.4.1	G													
			Field Quality Control	3.5	G													
			Ground Resistance Test Reports	1.5.3	G													
			Medium-Voltage Preassembled	3.5.3	G													
			Cable Test															
			Sag and Tension Test	3.5.4	G													
			Low-Voltage Cable Test	3.5.5	G													

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		33 71 01	Acceptance Checks and Tests	3.5.7														
			SD-07 Certificates															
			Wood Poles	2.2.1	G													
			Wood Crossarms	2.3.1	G													
			SD-09 Manufacturer's Field															
			Reports															
			Operation and Maintenance	1.6	G													
			Manuals															
			Operation and Maintenance	1.6.1	G													
			Manuals															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.6	G													
			Manuals															
			Operation and Maintenance	1.6.1	G													
			Manuals															
		33 71 02	SD-02 Shop Drawings															
			Precast Underground Structures	1.5.1	G													
			SD-03 Product Data															
			Medium Voltage Cable	2.5	G													
			Medium Voltage Cable Joints	2.7	G													
			Medium Voltage Cable	2.6	G													
			Terminations															
			Precast Concrete Structures	2.13.2.1	G													
			Sealing Material	2.13.2.4														
			Pulling-In Irons	3.5.3														

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		33 71 02	Manhole Frames and Covers	2.13.3	G													
			Handhole Frames and Covers	2.13.4	G													
			Composite/Fiberglass Handholes	2.13.6	G													
			Cable Supports	2.14	G													
			SD-06 Test Reports															
			Medium Voltage Cable	2.16.2	G													
			Qualification and Production Tests															
			Field Acceptance Checks and	3.18.1	G													
			Tests															
			Arc-proofing Test	2.16.1	G													
			Cable Installation Plan and	3.3	G													
			Procedure															
			SD-07 Certificates															
			Cable splicer/terminator	1.5.2	G													
			Cable Installer Qualifications	1.5.3	G													
		33 82 00	SD-02 Shop Drawings															
			Telecommunications Outside	1.6.1.1	G													
			Plant															
			Telecommunications Entrance	1.6.1.2	G													
			Facility Drawings															
			SD-03 Product Data															
			Wire and Cable	2.8	G													
			Cable Splices, and Connectors	2.5	G													
			Closures	2.3	G													
			Building Protector Assemblies	2.2.1	G													
			Protector Modules	2.2.2	G													

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		33 82 00	Cross-Connect Terminal	2.4	G													
			Cabinets															
			SD-06 Test Reports															
			Pre-installation Tests	3.5.1	G													
			Acceptance Tests	3.5.2	G													
			Outside Plant Test Plan	1.6.3	G													
			SD-07 Certificates															
			Telecommunications Contractor	1.6.2.1	G													
			Key Personnel	1.6.2.2	G													
			Manufacturer's Qualifications	1.6.2.3	G													
			SD-08 Manufacturer’s Instructions															
			Building Protector Assembly	2.2.1	G													
			Installation															
			Cable Tensions	3.1.7.1	G													
			Fiber Optic Splices	3.1.8.2	G													
			SD-09 Manufacturer’s Field															
			Reports															
			Factory Reel Test Data	2.15.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Telecommunications Outside	1.6.1.1	G													
			Plant (OSP)															
			SD-11 Closeout Submittals															
			Record Documentation	1.8.1	G													
		41 22 13.14	SD-02 Shop Drawings															

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		41 22 13.14	Overhead Electric Traveling	1.6.4	G													
			Crane															
			Complete Schematic Wiring	3.3.2	G													
			Diagram															
			Control System and Network	1.6.4	G													
			Drawings															
			SD-03 Product Data															
			Gear Reducers	2.3.7.1	G													
			Hoist Brakes	2.3.10	G													
			Travel Brakes	2.3.9	G													
			Couplings	2.3.11	G													
			Load Blocks and Hooks	2.3.3	G													
			Wheels	2.3.8	G													
			Hoists	2.3.1	G													
			Sheaves	2.3.5	G													
			Commercial Hoist and Trolley	2.3.1	G													
			Units															
			End Trucks	2.2.5	G													
			Bridge Rails	2.2.3	G													
			End Stops	2.2.7	G													
			Bumpers	2.2.7	G													
			Motors	2.4.1	G													
			Runway Conductor System	2.4.8.1	G													
			Bridge Conductor System	2.4.8.2	G													
			Limit Switches	2.4.6	G													
			Pendant Pushbutton Station	2.4.7.1	G													

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		41 22 13.14	Pendant Conductor System	2.4.7.1.1	G													
			Controls	2.4.2	G													
			Control Parameter Settings	3.3.2	G													
			Capacity Overload Protective	2.4.9	G													
			Device															
			Load Indicating Device	2.4.9	G													
			Painting System	2.5	G													
			Control System and Network	2.4.13.1	G													
			SD-05 Design Data															
			Load and Sizing Calculations	1.6.5	G													
			SD-06 Test Reports															
			Hook Non-destructive Test (NDT)	1.6.2.2.1	G													
			Post-erection Inspection	3.4.1	G													
			Operational Tests	3.4.2	G													
			Hook Tram Measurement	3.4.4	G													
			Load Tests	3.4.5	G													
			SD-07 Certificates															
			Wire Ropes	1.6.3	G													
			Crane Runway System	1.6.3	G													
			Hazardous Material	1.6.3	G													
			Loss of Power Test	1.6.3	G													
			Coupling Alignment Verification	1.6.3	G													
			Record															
			Overload Test	1.6.3	G													
			Brake Adjustment Record	1.6.3	G													

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		41 22 13.14	Compliance with Listed	1.6.3	G													
			Standards															
			Contractor Hazardous	1.6.3	G													
			Environment															
			Public Domain Software	1.6.3	G													
			Software and Services	1.6.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.6	G													
			Manuals															
			SD-11 Closeout Submittals															
			Disabled Ports, Connectors, and	2.4.13.2	G													
			Interfaces															
			Network-Capable Control	2.4.13	G													
			Devices															
			Control System Access Control	2.4.13.3	G													
			Control System Account	2.4.13.4	G													
			Management															
			Patch Management and Updates	2.4.13.9	G													
			Malware Detection and Protection	2.4.13.10	G													
			Wireless Technology Provisions	2.4.13.12	G													
			Control System Inventory	2.4.13.13	G													
			Evaluation Status of Hardware	2.4.13.2	G													
			and Software															
		41 22 13.15	SD-02 Shop Drawings															
			Overhead Electric Crane System	1.6.3	G													

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		41 22 13.15	Crane Support Structure	1.4	G													
			Complete Schematic Wiring	3.2.2	G													
			Diagram															
			Control System and Network	1.6.3	G													
			Drawings															
			SD-03 Product Data															
			Hoist Brakes	2.3.2.1	G													
			Travel Brakes	2.3.4	G													
			Load Block and Hook	2.3.2.2	G													
			Hoist and Trolley Units	2.3.2	G													
			Hoisting Rope	2.3.2.3	G													
			Wheels	2.3.5	G													
			Bridge End Trucks	2.2.3	G													
			Crane Bridge Girder	2.2.2	G													
			End Stops	2.2.4	G													
			Bumpers	2.2.5	G													
			Crane Runway System	2.2.6	G													
			Motors	2.4.1	G													
			Enclosures	2.4.10	G													
			Circuit Breakers	2.4.3	G													
			Disconnect Switch	2.4.3	G													
			Contactors and Relays	2.4.5	G													
			Fuses	2.4.3	G													
			Variable Frequency Drives	2.4.1	G													
			Limit Switches	2.4.6	G													
			Resistors	2.4.4	G													

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		41 22 13.15	Pendant Push-Button Station	2.4.7.1	G													
			Pendant Conductor System	2.4.7.1.1	G													
			Crane Controllers	2.4	G													
			Control Parameter Settings	2.4.2	G													
			Pilot Devices	2.4.12	G													
			Load Indicating Device	2.4.9	G													
			Warning Devices	2.4.11	G													
			Runway Conductor System	2.4.8.1	G													
			Bridge Conductor System	2.4.8.2	G													
			Overload Protection	2.4.9	G													
			Painting System	2.5	G													
			Control System and Network	2.4.13.1	G													
			SD-05 Design Data															
			Load and Sizing Calculations -	1.6.4	G													
			Cranes															
			Design Calculations for Crane	1.6.4	G													
			Support Structures															
			SD-06 Test Reports															
			Hook Non-Destructive Test (NDT)	1.6.2.1.1	G													
			Post-Erection Inspection	3.3.1	G													
			Operational Tests	3.3.2	G													
			Hook Tram Measurement	3.3.4	G													
			Load Tests	3.3.5	G													
			SD-07 Certificates															
			Wire Rope	1.6.5	G													
			Crane Runway	1.6.5	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
P-1102

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		41 22 13.15	Hazardous Material	1.6.5	G													
			Loss of Power Test	1.6.5	G													
			Overload Test	1.6.5	G													
			Overload Test	1.6.5	G													
			Brake Adjustment Record	1.6.5	G													
			Contractor Hazardous	1.6.5	G													
			Environment															
			Public Domain Software	1.6.5	G													
			Software and Services	1.6.5	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.5	G													
			Manuals															
			SD-11 Closeout Submittals															
			Network-Capable Control	2.4.13	G													
			Devices															
			Disabled Ports, Connectors, and	2.4.13.2	G													
			Interfaces															
			Evaluation Status of Hardware	2.4.13.2	G													
			and Software															
			Control System Access Control	2.4.13.3	G													
			Control System Account	2.4.13.4	G													
			Management															
			Patch Management and Updates	2.4.13.9	G													
			Malware Detection and Protection	2.4.13.10	G													
			Wireless Technology Provisions	2.4.13.12	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
P-1102

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		41 22 13.15	Control System Inventory	2.4.13.13	G													

SECTION 01 33 29

SUSTAINABILITY REQUIREMENTS AND REPORTING
02/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

BIFMA INTERNATIONAL (BIFMA)

ANSI/BIFMA M7.1	(2011; R 2021) Test Method for Determining VOC Emissions from Office Furniture Systems, Components and Seating

COUNCIL ON ENVIRONMENTAL QUALITY (CEQ) (WHITE HOUSE)

HPSB Guiding Principles	(2020) Guiding Principles for Sustainable Federal Buildings and Determining Compliance with the Guiding Principles for Sustainable Federal Buildings

GREEN BUSINESS CERTIFICATION INC. (GBCI)

GP Assessment (DOD)	Guiding Principles Assessment for Department of Defense

INTERNATIONAL CODE COUNCIL (ICC)

ICC IgCC	(2018) International Green Construction Code

U.S. DEPARTMENT OF AGRICULTURE (USDA)

FSRIA 9002	Farm Security and Rural Investment Act Section 9002 (USDA BioPreferred Program)

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-02	(2020; with Change 1, 2022) High Performance and Sustainable Building Requirements
UFC 3-600-01	(2016; with Change 6, 2021) Fire Protection Engineering for Facilities

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247	Comprehensive Procurement Guideline for

1.2 SUMMARY

This section includes requirements for Sustainability documentation and reporting submittals per the federally mandated High Performance and Sustainable Building (HPSB) or HPSB "Guiding Principles" (GP), and Third Party Certification (TPC) requirements, in accordance with UFC 1-200-02 High Performance and Sustainable Building Requirements, and other identified requirements.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preliminary High Performance and Sustainable Building Checklist; G, S

Sustainability Action Plan; G, S

Preliminary Sustainability eNotebook; G, S

SD-11 Closeout Submittals

Final High Performance and Sustainable Building Checklist; G, S

Final Sustainability eNotebook; G, S

Amended Final Sustainability eNotebook; G, S

Amended Final High Performance and Sustainable Building Checklist; G, S

Third Party Certification Certificate, Assessment, or Validation and Compliance Report; G, S

1.4 GUIDING PRINCIPLES VALIDATION (GPV)

Provide the following sustainability activities and documentation to verify achievement of HPSB Guiding Principles Validation (GPV):

a. Analysis of each Guiding Principle Requirement and how project complies. Include final government approved narrative(s) in the HPSB Checklist submittal.

b. No changes to the HPSB Checklist are allowed without approval from the Contracting Officer, in accordance with Section 01 33 00 SUBMITTAL REQUIREMENTS. Immediately bring to the attention of the Contracting Officer any project changes that impact meeting the approved HPSB Guiding Principles Requirements for this project. Demonstrate the change will not increase the life-cycle cost and maintains or improves the building performance.

c. Documentation of all work required to incorporate the applicable

HPSB Guiding Principles requirements indicated on the HPSB Checklist and in this contract, including all "S" submittals.

d. Sustainability Action Plan.

e. Construction related documentation for the project Sustainability eNotebook and keep updated with regularly-scheduled Construction Quality Control Meetings. Include construction related documentation containing the following components:

(1) HPSB Checklist(s)

(2) Sustainability Action Plan

(3) Documentation illustrating HPSB Guiding Principles Requirements compliance, including "S" submittals

1.4.1 Sustainability Action Plan

Include the following information in the Sustainability Action Plan:

a. Analysis of each HPSB Guiding Principles Requirement and how project will comply. Final government approved narrative(s) must be included in the HPSB Checklist submittal.

b. Name and contact information for: Contractor's Point of Contact (POC) ensuring sustainability goals are accomplished and documentation is assembled. For TPC that include on-site visit by third party representative, provide list of required attendees.

c. Indoor Air Quality plan.

d. Construction Waste Management Plan. Refer to Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for requirements.

1.4.2 Calculations

Provide all calculations, product data, labels and product certifications required in this specification to demonstrate compliance with the HPSB Guiding Principles Requirements.

1.5 SUSTAINABILITY SUBMITTALS

Provide HPSB Checklist and other documentation in the Sustainability eNotebook to indicate compliance with the sustainability requirements of the project.

1.5.1 High Performance Sustainable Building (HPSB) Checklist

Provide construction documentation that provides proof of, and supports compliance with, the completed HPSB Checklist.

1.5.1.1 HPSB Checklist Submittals

Submit updated HPSB Checklist with each Sustainability eNotebook submittal. Include the final HPSB Checklist(s) with the interim DD1354 Real Property Record Submittal.

1.5.2 "S" Submittals for Sustainability Documentation

"S" submittals are the sustainability documentation requirements cited in the various sections of this contract. Submit the GPV and TPC sustainability documentation required in this section as "S" submittals in all affected UFGS Sections.

a. Highlight GPV and TPC compliance data in "S" submittal.

b. Add "S" submittals to the Sustainability eNotebook only after submittal approval, and bookmark them as required in paragraph SUSTAINABILITY ENOTEBOOK below.

c. Ensure all approved "S" submittals are included in each Sustainability eNotebook submittal.

1.5.3 Sustainability eNotebook

The Sustainability eNotebook is an electronic organizational file that serves as a repository for all required sustainability submittals. To support documentation of compliance with an approved HPSB and TPC checklist, provide and maintain a comprehensive and current Sustainability eNotebook. Include all required data in Sustainability eNotebook, to support full compliance with the HPSB Guiding Principles Requirements, including:

a. HPSB checklist

b. Sustainability Action Plan

c. Calculations

d. Labels

e. "S" submittals

f. Certifications, assessments, or validations and compliance report

g. TPC documentation required in paragraph THIRD PARTY CERTIFICATION (TPC).

1.5.3.1 Sustainability eNotebook Format

Provide Sustainability eNotebook in the form of an Adobe PDF file; bookmark each HPSB Guiding Principles Requirement, TPC requirement, and sub-bookmark at each document. Match format to HPSB Guiding Principles numbering system indicated herein. Maintain up-to-date information, such as spreadsheets, templates, with each current submittals. For TPC projects, provide a second Table of Contents using TPC numbering system, for maintaining documentation unique to TPC.

Contracting Officer may deduct from the monthly progress payment accordingly if Sustainability eNotebook information is not current and on track per project goals.

1.5.3.2 Sustainability eNotebook Submittal Schedule

Provide Sustainability eNotebook Submittals at the following milestones of the project:

a. Preliminary Sustainability eNotebook

Submit preliminary Sustainability eNotebook with updated Preliminary High Performance and Sustainable Building Checklist and TPC checklist at the first post award meeting in accordance with Section 01 30 00 ADMINISTRATIVE REQUIREMENTS.

b. Construction Quality Control Meetings.

Provide up-to-date GP and TPC documentation in the Sustainability eNotebook and TPC Online tool for each meeting.

c. Final Sustainability eNotebook

Submit updated Sustainability eNotebook with updated Final High Performance and Sustainable Building Checklist with TPC Checklist at Beneficial Occupancy Date (BOD). Final progress payment retainage may be held by Contracting Officer until Final Sustainability construction phase documentation is complete.

d. Amended Final Sustainability eNotebook

Amend and resubmit the Amended Final Sustainability eNotebook with Amended Final High Performance and Sustainable Building Checklist and amended TPC Checklist, to include post-occupancy corrections, updates, and requirements. Final progress payment retainage may be held by Contracting Officer until amended final sustainability documentation is complete. Submit the Amended Final Sustainability eNotebook Submittal on DVDs to the Contracting Officer no later than 30 days after final GP, TPC determination.

1.6 DOCUMENTATION REQUIREMENTS

a. Incorporate each of the following HPSB Guiding Principles requirements into project and provide documentation that proves compliance with each listed requirement. Items below are organized by HPSB Guiding Principles. For life-cycle cost analysis requirements, one document with all analyses is acceptable, with Contracting Officer approval.

b. For each of the following paragraphs that require the use of products listed on Government-required websites, provide documentation of the process used to select products, or process used to determine why listed products do not meet project performance requirements.

1.6.1 Commissioning (Cx)

Develop and incorporate Commissioning requirements into the documents, in accordance with Section 01 91 00.15 20 TOTAL BUILDING COMMISSIONING.

1.6.2 Energy Efficient Products

Provide only energy-using products that are Energy Star rated or have Federal Energy Management Program (FEMP) recommended efficiency. Where Energy Star or FEMP recommendations have not been established, provide most efficient products that are life-cycle cost-effective. Provide only energy using products that meet FEMP requirements for low standby power consumption. Energy efficient products can be found at:

https://www.energy.gov/eere/femp/federal-energy-management-program and http://www.energystar.gov/.

For construction submittal documentation, provide proof that product is labeled energy efficient and complies with the cited requirements.

1.6.3 Building-level Power Metering

Provide building-level meters for electricity, natural gas, and steam where applicable.

1.6.3.1 Construction Submittal Documentation

Provide manufacturer's data validating compatibility with base-wide system and component advanced meter requirements.

1.6.4 Indoor Water Use

Provide Construction Documentation proof that fixtures are labeled EPA WaterSense, for products available with EPA WaterSense labeling; for all other fixtures, proof they comply with EPA WaterSense efficiency requirements and ICC IgCC 601.3.2.2 (6.3.2.1) Plumbing Fixtures and Fittings requirements.

1.6.5 Indoor Water Metering

Provide building-level meters for potable water use. Provide the requirements cited in the following paragraphs:

1.6.5.1 Construction Submittal Documentation

Provide manufacturer's data validating compatibility with base-wide system and component advanced meter requirements.

1.6.6 Moisture Control

Provide the following:

1.6.6.1 Construction Submittal Documentation

Ensure construction materials are separated and protected in accordance with other sections in this contract document, with adequate humidity controls during construction. In accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA, includes plan for ongoing building moisture control.

Coordinate with the moisture control requirements of Section 01 45 00.00 20 QUALITY CONTROL.

1.6.7 Reduce Volatile Organic Compounds (VOC) (Low-Emitting Materials)

Meet the requirements of Table 3-1 at the end of this specification.

For Construction submittal documentation, provide certifications or labels that demonstrate compliance with cited requirements, based on the attached TABLE 3-1.

1.6.8 Indoor Air Quality During Construction

Prior to construction, create indoor air quality plan. Develop and implement an IAQ construction management plan during construction and flush building air before occupancy.

For new construction, meet the requirements of ICC IgCC 1001.3.1.5 (10.3.1.4) Indoor Air Quality (IAQ) Construction Management. Coordinate with moisture control requirements in Section 01 45 00.00 20 Quality Control.

Provide documentation showing that after construction ends and prior to occupancy, HVAC filters were replaced and building air was flushed out or baseline IAQ testing conducted and demonstrated contaminate maximum concentration results in accordance with the cited standard.

1.6.9 Recycled Content

Comply with 40 CFR 247. Refer to: https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program for assistance identifying products cited in 40 CFR 247. Selected products must comply with non-proprietary requirements of the Federal Acquisition Regulation and must meet performance requirements.

1.6.9.1 Construction Submittal Documentation

a. Provide manufacturers' documents stating the recycled content by material, or written justification for claiming one of the exceptions allowed on the cited website.

b. Substitutions: Submit for Government approval for proposed alternative products or systems that provide equivalent performance and appearance and have greater contribution to project recycled content requirements. For all such proposed substitutions, submit with the Sustainability Action Plan accompanied by product data demonstrating equivalence.

c. In order to complete compliance with FAR 52.223-9 Estimate of Percentage of Recovered Material Content for EPA Designated Items, refer to submittal requirement for recycled/recovered material content in Section 01 78 00 CLOSEOUT SUBMITTALS.

1.6.10 Bio-Based Products

Provide products and materials composed of the highest percentage of bio-based materials (including rapidly renewable resources and certified sustainably harvested products), consistent with FSRIA 9002 USDA BioPreferred Program, to the maximum extent possible without jeopardizing the intended end use or detracting from the overall quality delivered to the end user and when available at a reasonable cost. Use only supplies and materials of a type and quality that conform to applicable specifications and standards.

Comply with FSRIA 9002 USDA BioPreferred Program. Refer to www.biopreferred.gov for the product categories and BioPreferred Catalog. Selected products must comply with non-proprietary requirements of the Federal Acquisition Regulation and must meet performance requirements. Provide the following documentation:

a. USDA BioPreferred label for each product; for bio-based products used on project but not listed with BioPreferred program, provide bio-based content and percentage.

b. Provide wood products certified as sustainably harvested by FSC STD 01 001, ATFS STANDARDS, CSA Z809-08 (R2013), SFI 2015-2019, or other third-party program certified by PEFC ST 2002:2020. Provide a letter of certification of sustainably harvested wood signed by the wood supplier. Identify certifying organization and their third-party program name and indicate compliance with chain-of-custody program requirements

c. In order to complete compliance with FAR 52.223-1 Biobased Product Certification, refer to submittal requirement for biobased products in Section 01 78 00 CLOSEOUT SUBMITTALS, paragraphs CERTIFICATION OF EPA DESIGNATED ITEMS and CERTIFICATION OF USDA DESIGNATED ITEMS.

1.6.11 Waste Material Management (Recycling – Construction)

Divert demolition and construction debris in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.6.12 Additional Sustainability Requirements

Provide the additional sustainability requirements cited in this paragraph.

1.6.12.1 Significant New Alternatives Policy (SNAP)

Do not use ozone-depleting substances and high global warming potential (GWP) chemicals where EPA Significant New Alternative Policy (SNAP) Program has identified acceptable substitutes or where other environmentally preferable products are available for use in construction, repair, or end-of-life replacements. Provide product data for EPA SNAP compliance for refrigerants and other products as applicable.

1.6.12.2 Prohibition on Procurement

Prohibition on Procurement of Certain Items Containing Perfluorooctane Sulfonate (PFOS) or Perfluorooctanoic Acid (PFOA). Effective April 1, 2023, in accordance with section 333 of the William M.(Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, the Department of Defense must not procure any covered items that contain PFOS or PFOA. The Contractor must not provide any covered items containing PFOS or PFOA in performance of this contract, task order, delivery order, or blanket purchase agreement order.

Prohibit carpet and textiles (furniture upholstery, wall coverings, and window shades) that contain PFOS or PFOA.

For construction submittal documentation, provide certifications or product labels that demonstrate no PFOS or PFOA chemicals in carpet and textiles.

1.6.12.3 Third Party Certification (TPC) Documentation

Third Party Certification certificate, assessment, or validation, and compliance report requirements are in addition to all requirements under header above GUIDING PRINCIPLES VALIDATION (GPV).

1.6.12.4 Third Party Certification (TPC) Documentation

1.6.12.4.1 TPC Already Registered

Project is already registered with TPC organization to achieve GP Assessment (DOD) (GBCI Project Number: 15786865). When applicable, request TPC online access turnover from Government. Manage and provide all documentation for requirements of TPC and obtain Final Certification or validation. Third Party Certification is met when Government receives TPC organization certificate, assessment, or validation and compliance report.

1.6.12.4.2 TPC Management and Certification

Execute the following TPC Certification, assessment, or validation requirements:

a. Refer to TPC Checklist at the end of this specification section.

b. Immediately bring to the attention of the Contracting Officer any project changes that impact meeting the approved TPC Requirements for this project. Demonstrate the change will not increase the life-cycle cost and maintains or improves the building performance.

c. Complete all work required to incorporate the applicable TPC Requirements.

d. Maintain the construction related information in the Sustainability eNotebook pertaining to additions and changes to the approved sustainability requirements. When construction changes are made that affect design sustainability requirements, provide all required updates to affected design requirements and update in the Sustainability eNotebook. Maintain the Sustainability eNotebook in electronic format. For more explanation, refer to paragraph SUSTAINABILITY eNOTEBOOK. Provide the following components in the Sustainability eNotebook, in addition to the GPV components above:

(1) TPC Checklist

(2) Completed TPC forms. Transmit by the method required by the TPC organization.

(3) Copy of all correspondence with the TPC organization including proof of TPC registration

(4) Documentation illustrating compliance with TPC requirements and additional documentation as requested by the TPC

(5) TPC Award Certificate, assessment, or validation and compliance report.

e. Provide the following information in the Sustainability Action Plan. Provide this TPC information in addition to the Sustainability Action Plan items above:

(1) Planned method to achieve each TPC requirement.

(2) For each TPC requirement that is attempted but not achieved, provide narrative explaining how mission or activity precludes

achieving specific sustainability requirement or goal. Provide analysis of particular requirement and level to which project is able to comply.

(3) Provide name and contact information for: Sustainability point of contact (POC) and other names of sustainability professionals responsible for ensuring TPC sustainability goals are accomplished and documentation is assembled. Sustainability POCs are also responsible for ensuring GPV required in paragraph GUIDING PRINCIPLES VALIDATION (GPV) above.

f. Bear all costs associated with construction changes that affect sustainability design requirements, constructing, demonstrating, and documenting that project complies with approved TPC requirements, including but not limited to:

(1) Final TPC review, certification, assessment, or validation fees.

(2) Online TPC management and documentation.

(3) Obtaining TPC certification or validation based on Government-approved sustainability goals.

(4) Construction work required to incorporate TPC requirements.

(5) Submittals required to demonstrate compliance with Government approved TPC checklists.

g. Provide all calculations, product data, and certifications, assessments, or validations required in this specification to demonstrate compliance with the TPC Requirements.

h. Provide all TPC management and documentation. Transmit TPC requirements by the method required by TPC organization.

i. Provide all required responses to third party organization.

j. Provide TPC Certificate, assessment, or validation. Provide TPC compliance report that includes reasons for non-compliance or not applicable elements. Use format below to create the Certificate, assessment or validation, compliance report, and Letter of Congratulations (when provided). Forward to parties designated by Contracting Officer:

(1) Certificate, Assessment or Validation:

Project Title, first line: P-1102; Form DD1391 Weapons Magazines & Ordnance Operations Facility.

Project Title, second line: UIC N00129 (Installation code)

(2) Letter Congratulations (when provided):

Address letter to Facility's Installation Commander Name. Address the letter to an individual person.

(3) Compliance Report:

Title page must cite Project title: P-1102; (1391 Weapons

Magazines & Ordnance Operations Facility); Final Building Name if known; UIC N00129 (installation code); Owner Service; User organization if known; date of compliance.

Include TPC scoresheet if applicable.

Once Final Certification is achieved, turn over Administrative rights to online TPC to the designee, contact information provided by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 SUSTAINABILITY COORDINATION

Provide sustainability focus and coordination at all meetings to achieve sustainability goals. Coordinate meeting requirements with other UFGS Sections meeting requirements in this project. Ensure the designated sustainability professional responsible for GP and TPC documentation participates in these meetings to coordinate documentation completion. Review GP and TPC sustainability requirements, HPSB Checklist and TPC documentation, Sustainability Action Plan, and completeness status of Sustainability eNotebook, and TPC status at the following meetings:

a. Pre-Construction Conference

b. Construction Quality Control Meetings

c. Facility Turnover Meetings

Conduct review no later than 60 days before final turnover and identify any outstanding issues that affect correct completion of all documentation and final TPC certification, assessment or validation, and actions that will achieve requirements. Conduct corrective actions prior to turnover, to ensure all requirements are achieved.

3.2 THIRD PARTY CERTIFICATION CERTIFICATE, ASSESSMENT, OR VALIDATION AND COMPLIANCE REPORT

Finalize the process requirements and obtain the TPC Certificate, assessment, or validation, and compliance report, indicating completion of the project's sustainability goals. Include TPC compliance report with final TPC scoresheet as applicable.

Deliver original certificate, assessment, or validation, and compliance report to Contractor Officer, unless otherwise instructed.

3.3 TABLE 3-1 VOLATILE ORGANIC COMPOUNDS (VOC) (LOW EMITTING MATERIALS) REQUIREMENTS

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IgCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Adhesives and Sealants	**CDPH/EHLB/Standard method V1.1 (California Section 01350)** (Use "office" or "classroom" space limits for all applications)	or	Adhesives (carpet, resilient, wood flooring; base cove; ceramic tile; drywall and panel; primers) Sealants (acoustical; sealant; firestop; HVAC Air duct; primers) Caulks	**SCAQMD Rule 1168** (Use "other" category for HVAC duct sealant) (for firestop adhesive, UFC 3-600-01 overrides conflicting requirements)
			Aerosol adhesives	**Section 3 of Green Seal Standard GS-36** (except: cleaners, solvent cements, and primers used with plastic piping and conduit in plumbing, fire suppression, and electrical systems; HVAC air duct sealants when the application space air temp is less than 40 F (4.5 C).

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IgCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Paints and Coatings	**CDPH/EHLB/Standard method V1.1 (California Section 01350)** (Use "office" or "classroom" space limits for all applications)	or	Flat and nonflat, nonflat high-gloss, specialty, basement specialty, fire-resistive, floor, low-solids, rust preventative, wood, reflective wall coatings; concrete/masonry sealers; primers; sealers; undercoaters; shellacs (clear and opaque); stains; varnishes; conjugated oil varnish; lacquer; clear brushing lacquer	**Green Seal Standard GS-11**

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IgCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Paints and Coatings	**CDPH/EHLB/Standard method V1.1 (California Section 01350)** (Use "office" or "classroom" space limits for all applications)	or	Concrete curing compounds; dry fog, faux finishing, graphic arts (sign paints), industrial maintenance, mastic texture, metallic pigmented, multicolor, recycled coatings; pretreatment wash primers, reactive penetrating sealers; specialty primers, wood preservatives, and zinc primers	**California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings** or **SCAQMD Rule 1113r**
Paints and Coatings	**CDPH/EHLB/Standard method V1.1 (California Section 01350)** (Use "office" or "classroom" space limits for all applications)	or	High-temperature coatings; stone consolidants; swimming-pool coatings; tub- and tile-refining coatings; and waterproofing membranes	**California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings**

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IgCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	**EMISSIONS REQUIREMENT**		**MATERIALS WITH ADDED VOC REQUIREMENT**	**EMISSIONS REQUIREMENTS**
Floor Covering Materials Exemptions (inherently non-emitting sources that do not include integral organic-based surface coatings, binders, or sealants): Ceramic tile, Concrete tile, Natural stone, Clay masonry, Concrete masonry, Concrete, Metal	For carpet, resilient flooring, and base all locations: **CDPH/EHLB/Standard Method V1.1 (California Section 01350)** or label for **Section 9** of **CDPH/EHLB/Standard Method V1.1 (California Section 01350)**		none	none
Insulation	**CDPH/EHLB/Standard method V1.1** (California Section 01350) (Use "office" or "classroom" space limits for all applications)		none	none

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IgCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Composite Wood, Wood Structural Panel, and Agrifiber Products, no added urea-formaldehyde resins including laminating adhesives for composite wood and agrifiber assemblies - particleboard, medium density fiberboard (MDF), wheatboard, strawboard, panel substrates, door cores	Third-party certification (approved by CARB) of **California Air Resource Board's (CARB) regulation**, Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products	or	none	**CDPH/EHLB/Standard method V1.1** (California Section 01350) (Use "office" or "classroom" space limits for all applications) (except: Structural panel components such as plywood, particle board, wafer board, and oriented strand board identified as "EXPOSURE 1," "EXTERIOR," or "HUD-APPROVED" are considered acceptable for interior use.)
Office Furniture Systems and Seating installed prior to occupancy(Test according to ANSI/BIFMA M7.1)	**ANSI/BIFMA X7.1:** (95-percent of installed office furniture system workstations and seating units) **Section 7.6.2 of ANSI/BIFMA e3** (50-percent of office furniture system workstations and seating units)		none	none

TABLE 3-1 Volatile Organic Compounds (VOC) (Low Emitting Materials) Requirements

Source: ICC IgCC Chapter 8 (Materials) (Interior Applications Only)

MATERIAL CATEGORY	EMISSIONS REQUIREMENT		MATERIALS WITH ADDED VOC REQUIREMENT	EMISSIONS REQUIREMENTS
Ceiling and Wall assemblies and systems including: acoustical treatments; ceiling panels and tiles; tackable wall panels and coverings; wall coverings; wall and ceiling paneling and planking	**CDPH/EHLB/Standard method V1.1 (California Section 01350)** (Use "office" or "classroom" space limits for all applications)		none	none

-- End of Section --

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NAVFAC HIGH PERFORMANCE AND SUSTAINABLE BUILDING CHECKLIST -- GOALS

PROJECT INFORMATION

Work Order No.: 1667770 FY 2024 MILCON P No. / Customer Reference No.: P-1102

Project Title: Magazine & Ordnance Operations Facility

Location UIC/Name: N00129 NAVSUBASE New London, CT

NAVFAC Project Manager: Suzanne M. Pence Project Design Level: 100%

Facility Area: 11,243 U/M: GSF Category Code: 42122 Facility #: ____

AE Contract # & T.O. N40085-18-D-8728, N4008520F4215 AE Firm Sustainability Coordinator: Linda Davisson

AE Firm Name: Jacobs Government Services Company

Project Phase: [✔] Design Start / PDA [ ] Solicitation Documents Complete

Construction Contract Award Date (P): ____ BOD (P): ____

SUSTAINABILITY DATA - GUIDING PRINCIPLES for SUSTAINABLE DEVELOPMENT

Use this form to collect Design Goals information to be recorded on the Sustainable and Energy Tab in eProjects

NOTE: **1. Mark "N/A" only when at least one of the listed justifications is applicable, and mark those justifications. Otherwise, mark "Yes."**
2. If project is for more than one building for which tracking is required, complete a separate form for each building.

PRELIMINARY PROJECT INFORMATION

1 How many buildings are included in this project? 1

The unoccupied Sentry House and Magazine structures do not meet the threshold for HPSB tracking, reporting, or TPC, but have been designed to meet HPSB to greatest extent practical.

2 New building or stand-alone addition >/=10,000 GSF

-OR-

Existing building renovation (including additions) >/=10,000 GSF, and with a cost >$3M and 50% Estimated Replacement Cost (ERC)? Yes [✔] No [ ]

3 Identify the building to be tracked in this tab: Ops Building

DESIGN DEVELOPMENT - DOCUMENTATION OF COMPLIANCE WITH GUIDING PRINCIPLES

I. Employ Integrated Design Principles

1 Integrated Design Goals — In Compliance [✔] Yes [ ] N/A

N/A due to
- [ ] Mission preclusion
- [ ] Building/site issue
- [ ] Not LCCE
- [ ] Renovation only: not part of scope
- [ ] Installation/region issue

2 Commissioning Goals — In Compliance [ ] Yes [✔] N/A

N/A due to
- [ ] Mission preclusion
- [ ] Building/site issue
- [ ] Not LCCE
- [ ] Renovation only: not part of scope
- [ ] Installation/region issue

(i) Systems commissioned: HVAC, Lighting Systems, Hot Water, Building Controls, Utility Monitoring C

II. Optimize Energy Performance

3. Energy Efficiency Goals — In Compliance [ ] Yes [✔] N/A

N/A due to
- [ ] Mission preclusion
- [✔] Building/site issue
- [ ] Not LCCE
- [ ] Renovation only: not part of scope
- [ ] Installation/region issue

(i) Energy Savings Below Baseline % 34.90

(ii) Energy Standard

- [x] ASHRAE 90.1-2013 (06NOV16+)
- [ ] ASHRAE 90.1-2016
- [ ] IECC
- [ ] OTHER:

C. Energy Efficient Products

Goals In Compliance [x] Yes [ ] N/A

N/A due to

- [ ] Mission preclusion
- [ ] Not LCCE
- [ ] Installation/region issue
- [ ] Building/site issue
- [ ] Renovation only: not part of scope

4. Renewable Energy

Goals In Compliance [ ] Yes [x] N/A

N/A due to

- [ ] Mission preclusion
- [x] Not LCCE
- [ ] Installation/region issue
- [ ] Building/site issue
- [ ] Renovation only: not part of scope

A. Renewable energy technology types

- [ ] Geothermal
- [ ] Ground Source Heat Pumps
- [ ] Solar Photovoltaic
- [ ] Solar Thermal - domestic hot water
- [ ] Solar Thermal - space conditioning
- [ ] Daylighting (quantified passive)
- [ ] Mechanical (i.e., direct water pumping)
- [ ] Micro-hydro
- [ ] Concentrating (sterling)
- [ ] Wind

(i) Annual % of total load _____

(ii) System size (kwatts) _____

Solar PV system on the roof was determined to be not LCCE given a solar study conducted demonstrating limited solar resource and shading of the location. No LCCA was completed.

B. Solar Hot Water Percentage - 30% target

Goals In Compliance [ ] Yes [x] N/A

N/A due to

- [ ] Mission preclusion
- [x] Not LCCE
- [ ] Installation/region issue
- [ ] Building/site issue
- [ ] Renovation only: not part of scope

(i) Annual % of total load _____

(ii) System size (kBTU/Year) _____

5. Meter (Energy)

Goals In Compliance [x] Yes [ ] N/A

N/A due to

- [ ] Mission preclusion
- [ ] Not LCCE
- [ ] Installation/region issue
- [ ] Building/site issue
- [ ] Renovation only: not part of scope

6. Energy Use Intensity kBTU/Sq Ft/Year

(i) Total Design Energy Use Intensity (EUI): kBTU/Sq Ft/Year 58.3

III. Protect and Conserve Water

7. Indoor Water Use

A. Water-Efficient Products

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

(i) Total Design Indoor Water Use Intensity (WUI): Gallons/Sq Ft/Year 4

B. Indoor Water Meter

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

8. Outdoor Water Use

A. Outdoor Water Meter (for 25,000 SF of irrigation)

(i) Is there a permanent irrigation system serving more than 25,000 SF of landscaping?

☐ Yes ☑ No

(ii) Water Meter

Goals In Compliance ☐ Yes ☑ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

B. Water-efficient landscape

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

9. Alternative Water Use (indoor or outdoor water)

Goals In Compliance ☐ Yes ☑ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

Methods Proposed:

☐ Air Handler Condensate Capture ☐ Reclaimed Water

☐ Grey Water ☐ Treated Wastewater

☐ Harvested Rainwater ☐ OTHER:

10. Stormwater Management - update the LID Data tab infiltration chamber

IV. Enhance Indoor Environmental Quality

11. Ventilation and Thermal Comfort

A. Ventilation

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

B. Thermal Comfort

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

12. Daylighting and Lighting Controls

A. Daylight

Goals In Compliance ☐ Yes ☑ N/A

N/A due to

☑ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

B. Automatic dimming controls

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

No daylight due to mission preclusion, therefore no daylight controls, however, automated lighting controls for occupancy provided as required by UFC 3-530-01.

13. Indoor Air Quality

A. Moisture Control

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

B. Low-Emitting Materials

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

C. Indoor Air Quality during Construction

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

14. Occupant Health and Wellness

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue

☐ Not LCCE ☐ Renovation only: not part of scope

☐ Installation/region issue

V. Reduce the Environmental Impact of Materials

15. Material Content and Performance

A. Resource Conservation and Recovery Act (RCRA) Section 6002 (recycled content)

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue
☐ Not LCCE ☐ Renovation only: not part of scope
☐ Installation/region issue

B. Farm Security and Rural Investment Act (FSRIA) section 9002 (Biobased content)

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue
☐ Not LCCE ☐ Renovation only: not part of scope
☐ Installation/region issue

16. Waste Management

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue
☐ Not LCCE ☐ Renovation only: not part of scope
☐ Installation/region issue

17. Waste Diversion - 60% target

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue
☐ Not LCCE ☐ Renovation only: not part of scope
☐ Installation/region issue

(i) Percent diverted _____

VI. Assess and Consider Climate Change Risks

18. Address Climate Change Risk

Goals In Compliance ☑ Yes ☐ N/A

N/A due to

☐ Mission preclusion ☐ Building/site issue
☐ Not LCCE ☐ Renovation only: not part of scope
☐ Installation/region issue

THIRD PARTY CERTIFICATION INFORMATION

Is this building pursuing Third Party Certification? ☑ Yes ☐ No

N/A due to ☐ Installation/region issue ☐ Mission preclusion ☐ Renovation only: not part of scope

Sustainability Third Party Certification Rating

Third Party Certification Rating System and Level

☐ USGBC LEED Certified
☐ USGBC LEED Silver
☐ USGBC LEED Gold
☐ USGBC LEED Platinum
☑ USGBC "Guiding Principles Assessment"
☐ OTHER

☐ GBI Green Globes 1 Globe
☐ GBI Green Globes 2 Globe
☐ GBI Green Globes 3 Globe
☐ GBI Green Globes 4 Globe
☐ GBI "Guiding Principles Compliance"

GPA Registration ID#: 1000158240

i. Third Party Certification Rating system - Other

Guiding Principles Assessment
Project Information Form

New Construction and Renovations
Guiding Principles Implemented by GBCI
UFC 1-200-02 (01 December 2020 – Change O1, 03 Jan 2022)

GBCI Project ID:	**1000158240**
Project Name:	**P-1102 Magazine & Ordnance Operations Facility**
Application Phase:	Design - Preliminary Submission

Directions: Select the documentation path for each requirement. See the Technical Guide section for more information on documentation paths. Provide this form with the initial design and construction submissions to GBCI and if updates are necessary between review phases. The 'Team Management' tab will update accordingly.

2-2 Employ Integrated Design Principles

2-2.1 Integrated Design - Design Submittal	
Documentation Path:	Path One
2-2.1.1 Integrated Planning - Design Submittal	
Documentation Path:	Path One
2-2.1.2 Evaluation for Design Strategies - Design Submittal	
Documentation Path:	Path One
2-2.1.3 Evaluation of the Site - Design Submittal	
Documentation Path:	Path One
2-2.1.4 Site Integration and Design of the Building - Design Submittal	
Documentation Path:	Path One
2-2.2 Commissioning - Construction Submittal	
Documentation Path:	Path One

Guiding Principles Assessment
Project Information Form

New Construction and Renovations
Guiding Principles Implemented by GBCI
UFC 1-200-02 (01 December 2020 – Change O1, 03 Jan 2022)

GBCI Project ID:	**1000158240**
Project Name:	**P-1102 Magazine & Ordnance Operations Facility**
2-3 Optimize Energy Performance	
2-3.1.1 Commercial and Multi-Family High-Rise Residential Building - Design Submittal	
Documentation Path:	Path One
2-3.1.2 Low-Rise Residential Buildings - Design Submittal	
Documentation Path:	Path Two
2-3.1.3 Renovations - Design Submittal	
Documentation Path:	Path Two
2-3.1.4 Energy Efficient Products - Construction Submittal	
Documentation Path:	Path One
2-3.1.5 Standby Powered Device - Construction Submittal	
Documentation Path:	Path One
2-3.2 On-Site Renewable Energy - Design Submittal	
Documentation Path:	Path Three
2-3.2.1 Solar Domestic Hot Water (SDHW) - Design Submittal	
Documentation Path:	Path One
2-3.4 Metering - Design Submittal	
Documentation Path:	Path One

Guiding Principles Assessment
Project Information Form

New Construction and Renovations
Guiding Principles Implemented by GBCI
UFC 1-200-02 (01 December 2020 – Change O1, 03 Jan 2022)

GBCI Project ID:	**1000158240**
Project Name:	**P-1102 Magazine & Ordnance Operations Facility**
2-4 Protect and Conserve Water	
2-4.1 Indoor Water - Design Submittal	
Documentation Path:	Path Two
2-4.1.1 Indoor Water Metering - Design Submittal	
Documentation Path:	Path One
2-4.2.1 Outdoor Water Landscaping - Design Submittal	
Documentation Path:	Path One
2-4.2 Outdoor Water Metering - Design Submittal	
Documentation Path:	Path Two
2-4.3 Alternative Water- Design Submittal	
Documentation Path:	Path Two
2-4.3.1 Stormwater Management - Design Submittal	
Documentation Path:	Path One

Guiding Principles Assessment
Project Information Form

New Construction and Renovations
Guiding Principles Implemented by GBCI
UFC 1-200-02 (01 December 2020 – Change O1, 03 Jan 2022)

GBCI Project ID:	**1000158240**
Project Name:	**P-1102 Magazine & Ordnance Operations Facility**
2-5 Enhance Indoor Environmental Quality	
2-5.1 Part 1 - Ventilation - Design Submittal	
Documentation Path:	Path One
2-5.1 Part 2 - Thermal Comfort - Design Submittal	
Documentation Path:	Path One
2-5.2 Daylighting & Lighting Controls - Design Submittal	
Documentation Path:	Path Three
2-5.3.1 IAQ Moisture Control - Construction Submittal	
Documentation Path:	Path One
2-5.3.2 Reduce VOC Low-Emitting Materials - Construction Submittal	
Documentation Path:	Path One
2-5.3.3 Protect Indoor Air Quality During Construction - Construction Submittal	
Documentation Path:	Path One
2-5.4 Occupant Health and Wellness - Design Submittal	
Documentation Path:	Path One

Guiding Principles Assessment
Project Information Form

New Construction and Renovations
Guiding Principles Implemented by GBCI
UFC 1-200-02 (01 December 2020 – Change O1, 03 Jan 2022)

GBCI Project ID:	**1000158240**
Project Name:	**P-1102 Magazine & Ordnance Operations Facility**
2-6 Reduce Environmental Impact of Materials	
2-6.1.1 Recycled Content - Construction Submittal	
Documentation Path:	Path One
2-6.1.2 Biologically-Based Products - Construction Submittal	
Documentation Path:	Path One
2-6.1.3 Ozone Depleting Substances - Construction Submittal	
Documentation Path:	Path One
2-6.2.1 Storage and Collection of Recyclables - Design Submittal	
Documentation Path:	Path One
2-6.2.2 Waste Diversion- Construction Submittal	
Documentation Path:	Path One
2-7 Address Climate Change Risk	
2-7 Address Climate Change Risk - Design Submittal	
Documentation Path:	Path One

v1.1

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS
11/20, CHG 3: 02/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B30.3	(2020) Tower Cranes
ASME B30.5	(2021) Mobile and Locomotive Cranes
ASME B30.7	(2021) Winches
ASME B30.8	(2020) Floating Cranes and Floating Derricks
ASME B30.9	(2018) Slings
ASME B30.20	(2018) Below-the-Hook Lifting Devices
ASME B30.22	(2016) Articulating Boom Cranes
ASME B30.23	(2016) Personnel Lifting Systems Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
ASME B30.26	(2015; R 2020) Rigging Hardware

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.22	(2007; R 2017) Safety Requirements for Rope-Guided and Non-Guided Workers’ Hoists
ASSP A10.34	(2021) Protection of the Public on or Adjacent to Construction Sites
ASSP A10.44	(2020) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSP Z244.1	(2016) The Control of Hazardous Energy Lockout, Tagout and Alternative Methods
ASSP Z359.0	(2018) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSP Z359.1	(2020) The Fall Protection Code
ASSP Z359.2	(2017) Minimum Requirements for a Comprehensive Managed Fall Protection

	Program
ASSP Z359.3	(2019) Safety Requirements for Lanyards and Positioning Lanyards
ASSP Z359.4	(2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components
ASSP Z359.6	(2016) Specifications and Design Requirements for Active Fall Protection Systems
ASSP Z359.7	(2019) Qualification and Verification Testing of Fall Protection Products
ASSP Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSP Z359.12	(2019) Connecting Components for Personal Fall Arrest Systems
ASSP Z359.13	(2013) Personal Energy Absorbers and Energy Absorbing Lanyards
ASSP Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSP Z359.15	(2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems
ASSP Z359.16	(2016) Safety Requirements for Climbing Ladder Fall Arrest Systems
ASSP Z359.18	(2017) Safety Requirements for Anchorage Connectors for Active Fall Protection Systems

ASTM INTERNATIONAL (ASTM)

ASTM F855	(2019) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048	(2016) Guide for Protective Grounding of Power Lines
IEEE C2	(2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA Z535.2	(2011; R 2017) Environmental and Facility Safety Signs

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2022; ERTA 1 2021) Standard for Portable Fire Extinguishers
NFPA 51B	(2019; TIA 20-1) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2023) National Electrical Code
NFPA 70E	(2021) Standard for Electrical Safety in the Workplace
NFPA 241	(2022) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 306	(2019) Standard for the Control of Gas Hazards on Vessels

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-222	(2018H; Add 1 2019) Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures
TIA-1019	(2012; R 2016) Standard for Installation, Alteration and Maintenance of Antenna Supporting Structures and Antennas

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1910.333	Selection and Use of Work Practices
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1915.89	Control of Hazardous Energy (Lockout/Tags-Plus)
29 CFR 1926	Safety and Health Regulations for Construction

29 CFR 1926.16	Rules of Construction
29 CFR 1926.450	Scaffolds
29 CFR 1926.500	Fall Protection
29 CFR 1926.552	Material Hoists, Personal Hoists, and Elevators
29 CFR 1926.553	Base-Mounted Drum Hoists
29 CFR 1926.1400	Cranes and Derricks in Construction
CPL 02-01-056	(2014) Inspection Procedures for Accessing Communication Towers by Hoist
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA’s Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person requirements, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in

excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSP Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented including experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the training material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even when provided by a physician or registered personnel.

1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the definition requirements of EM 385-1-1 Appendix Q, and ASSP Z359.2 standard, having a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

1.2.16 Recordable Injuries or Illnesses

Recordable Injuries or Illnesses are any work-related injury or illness that results in:

a. Death, regardless of the time between the injury and death, or the length of the illness;

b. Days away from work (any time lost after day of injury/illness onset);

c. Restricted work;

d. Transfer to another job;

e. Medical treatment beyond first aid;

f. Loss of consciousness; or

g. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (a) through (f) above

1.2.17 Government Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.18 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document an LHE mishap or accident using the NAVFAC prescribed Navy Crane Center (NCC) accident form.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

APP - Construction; G

Accident Prevention Plan (APP); G

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G

LHE Inspection Reports

SD-07 Certificates

Contractor Safety Self-Evaluation Checklist

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan ; G

Naval Architecture Analysis; G

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

1.5 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction meeting. Complete the checklist monthly and submit with each request for payment voucher. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90 may result in retention of up to 10 percent of the voucher. The Contractor Safety Self-Evaluation checklist can be found on the Whole Building Design Guide website at www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-01-35-26

1.6 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this Contract, comply with the most recent edition of USACE EM 385-1-1, and federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.6.1 Subcontractor Safety Requirements

For this Contract, neither Contractor nor any subcontractor may enter into Contract with any subcontractor that fails to meet the following requirements. The term subcontractor in this and the following paragraphs means any entity holding a Contract with the Contractor or with a subcontractor at any tier.

1.6.1.1 Experience Modification Rate (EMR)

Subcontractors on this Contract must have an effective EMR less than or equal to 1.10, as computed by the National Council on Compensation Insurance (NCCI) or if not available, as computed by the state agency's rating bureau in the state where the subcontractor is registered, when

entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable EMR range cannot be achieved. Relaxation of the EMR range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain the certified EMR ratings for all subcontractors on the project and make them available to the Government at the Government's request.

1.6.1.2 OSHA Days Away from Work, Restricted Duty, or Job Transfer (DART) Rate

Subcontractors on this Contract must have a DART rate, calculated from the most recent, complete calendar year, less than or equal to 3.4 when entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The OSHA Dart Rate is calculated using the following formula:

(N/EH) x 200,000

where:

N = number of injuries and illnesses with days away, restricted work, or job transfer

EH = total hours worked by all employees during most recent, complete calendar year

200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year)

The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable OSHA Dart rate range cannot be achieved for a particular subcontractor. Relaxation of the OSHA DART rate range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain self-certified OSHA DART rates for all subcontractors on the project and make them available to the Government at the Government's request.

1.7 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.7.1 Personnel Qualifications

1.7.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and Government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

1.7.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO may not serve as the Quality Control Manager. The SSHO may not serve as the Superintendent.

1.7.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the Contracting Officer for information in consultation with the Safety Office.

1.7.1.2.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space in accordance with EM 385-1-1, Section 34.

Since this work involves operations that handle combustible or hazardous materials, this person must have the ability to understand and follow through on the air sampling, Personal Protective Equipment (PPE), and instructions of a Marine Chemist, Coast Guard authorized persons, or Certified Industrial Hygienist. Confined space and enclosed space work must comply with NFPA 306, OSHA 29 CFR 1915, Subpart B, "Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment," or as applicable, 29 CFR 1910.146 for general industry.

1.7.1.2.2 Competent Person for Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

1.7.1.2.3 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04, 21.B.03, and herein.

1.7.1.3 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards, Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

a. Prepare class presentations that cover construction-related safety requirements and includes topics covered in the NAVFAC Construction Safety Hazard Awareness Course for Contractors.

b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.

c. Update training course materials whenever an update of the EM 385-1-1 becomes available.

d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.

e. Request, review and incorporate student feedback into a continuous course improvement program.

1.7.1.4 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 50,000 pounds or greater, designate crane operators qualified by a source that qualifies crane operators (i.e., union, a Government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

1.7.2 Personnel Duties

1.7.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.

c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and

subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.

d. Maintain applicable safety reference material on the job site.

e. Attend the pre-construction meeting, pre-work meetings including preparatory meetings, and periodic in-progress meetings.

f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.

g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.

h. Ensure subcontractor compliance with safety and health requirements.

i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.

k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above or any other required duties are not being effectively carried out. If either the Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.7.3 Meetings

1.7.3.1 Preconstruction Meeting

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction meeting. This includes the project superintendent, Site Safety and Occupational Health Officer, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the Contract. This list of proposed AHAs will be reviewed and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.

c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for

review prior to the start of construction. Work is not permitted to begin until an APP is established that is acceptable to the Contracting Officer.

1.7.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors at the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.8 ACCIDENT PREVENTION PLAN (APP)

1.8.1 APP - Construction

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the Contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer within 30 calendar days of Contract award and not less than 10 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the Contract. Disregarding the provisions of this Contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the Contract. Changes to the accepted

APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSP A10.34), and the environment.

1.8.2 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

1.8.3 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.8.3.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this Contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by Contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

1.8.3.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of three

months.

1.8.3.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

a. Lifts over 50 percent of the capacity of barge mounted mobile crane's hoist.

b. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.

c. For lifts with anticipated binding conditions.

d. When erecting cranes.

1.8.3.3.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

1.8.3.3.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

1.8.3.4 Barge Mounted Mobile Crane Lift Plan

Provide a Naval Architecture Analysis and include an LHE Manufacturer's Floating Service Load Chart in accordance with EM 385-1-1, Section 16.L.03.

1.8.3.5 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. Demonstrate that the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.8.3.6 Fall Protection and Prevention (FP&P) Plan

The plan must be in accordance with the requirements of EM 385-1-1, Section 21.D and ASSP Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training

requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

1.8.3.7 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSP Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

1.8.3.8 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1915.89, ASSP Z244.1, and ASSP A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.8.3.9 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A and Section 31 00 00 EARTHWORK.

1.8.3.10 Lead, Cadmium, and Chromium Compliance Plan

Identify the safety and health aspects of work involving lead, cadmium and chromium, and prepare in accordance with Section 02 83 00 LEAD REMEDIATION.

1.8.3.11 Asbestos Hazard Abatement Plan

Identify the safety and health aspects of asbestos work, and prepare in accordance with Section 02 82 00 ASBESTOS REMEDIATION.

1.8.3.12 Polychlorinated Biphenyls (PCB) Plan

Identify the safety and health aspects of Polychlorinated Biphenyls work, and prepare in accordance with Sections 02 84 33 REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs).

1.8.3.13 Site Demolition Plan

Identify the safety and health aspects, and prepare in accordance with Section 02 41 00 DEMOLITION and referenced sources. Include engineering survey as applicable.

1.9 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW)

involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.9.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.9.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.10 DISPLAY OF SAFETY INFORMATION

1.10.1 Safety Bulletin Board

Prior to commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.10.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of

the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

a. Date deficiency identified;

b. Description of deficiency;

c. Name of person responsible for correcting deficiency;

d. Projected resolution date;

e. Date actually resolved.

1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.12 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment in accordance with EM 385-1-1. Government has no responsibility to provide emergency medical treatment.

1.13 NOTIFICATIONS and REPORTS

1.13.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than four hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; Contract title; type of Contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

1.13.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the

applicable NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). Complete and submit an accident investigation report in ESAMS within 5 days for mishaps defined in EM 385-1-1 01.D.03 and 10 days for accidents defined by EM 385-1-1 01.D.05. Complete an investigation report within 30 days for those mishaps defined by EM 385-1-1 01.D.04. Mishaps defined by EM 385-1-1 01.D.04 and 01.D.05 must include a written report submitted as an attachment in ESAMS using the following outline: (1) Mishap summary description to include process, findings and outcomes; (2) Root Cause; (3) Direct Factors; (4) Indirect and Contributing Factors; (5) Corrective Actions; and (6) Recommendations. The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: For Navy Projects, complete the applicable documentation in NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). Near miss reports are considered positive and proactive Contractor safety management actions.

c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

1.13.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.13.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this Contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

1.14 HOT WORK

1.14.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the installation Fire Marshal. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper

resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency installation Fire Marshal phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE installation Fire Marshal IMMEDIATELY.

1.14.2 Work Around Flammable Materials

Obtain permit approval from a NFPA Certified Marine Chemist, or Certified Industrial Hygienist for "HOT WORK" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.15 CONFINED SPACE ENTRY REQUIREMENTS

Confined space entry must comply with Section 34 of EM 385-1-1, OSHA 29 CFR 1926, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, and OSHA Directive CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used. Contractors entering and working in confined spaces while performing shipyard industry work are required to follow the requirements of OSHA 29 CFR 1915 Subpart B.

1.15.1 Entry Procedures

Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.15.2 Forced Air Ventilation

Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its action level.

1.15.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.15.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures.

The rescue plan must not rely on local emergency responders for rescue from a confined space.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

Provide permanent signs integral to or securely attached to access covers for new permit-required confined spaces. Signs for confined spaces must comply with NEMA Z535.2. Provide signs with wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" in bold letters a minimum of one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" must be red and readable from 5 feet.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

a. Hard Hat

b. Long Pants

c. Appropriate Safety Shoes

d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. Develop an employee check-in/check-out communication procedure to ensure employee safety.

3.1.2 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Office or their designated representative prior to being brought onto the job site or prior to any other use in connection with this Contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

3.1.3 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this Contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.4 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4 Changes and FAR 52.236-2 Differing Site Conditions.

3.2 UTILITY OUTAGE REQUIREMENTS

Apply for utility outages at least 30 days in advance. At a minimum, the written request must include the location of the outage, utilities being affected, duration of outage, any necessary sketches, and a description of the means to fulfill energy isolation requirements in accordance with EM 385-1-1, Section 11.A.02 (Isolation). Some examples of energy isolation devices and procedures are highlighted in EM 385-1-1, Section 12.D. In accordance with EM 385-1-1, Section 12.A.01, where outages involve Government or Utility personnel, coordinate with the Government on all activities involving the control of hazardous energy.

These activities include, but are not limited to, a review of HECP and HEC procedures, as well as applicable Activity Hazard Analyses (AHAs). In accordance with EM 385-1-1, Section 11.A.02 and NFPA 70E, work on energized electrical circuits must not be performed without prior Government authorization. Government permission is considered through the permit process and submission of a detailed AHA. Energized work permits are considered only when de-energizing introduces additional or increased hazard or when de-energizing is infeasible.

3.3 OUTAGE COORDINATION MEETING

After the utility outage request is approved and prior to beginning work on the utility system requiring shut-down, conduct a pre-outage coordination meeting in accordance with EM 385-1-1, Section 12.A. This meeting must include the Prime Contractor, the Prime and subcontractors performing the work, the Contracting Officer, and the Installation

representative and Public Utilities representative, as appropriate. All parties must fully coordinate HEC activities with one another. During the coordination meeting, all parties must discuss and coordinate on the scope of work, HEC procedures (specifically, the lock-out/tag-out procedures for worker and utility protection), the AHA, assurance of trade personnel qualifications, identification of competent persons, and compliance with HECP training in accordance with EM 385-1-1, Section 12.C. Clarify when personal protective equipment is required during switching operations, inspection, and verification.

3.4 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, 29 CFR 1915.89, ASSP A10.44, NFPA 70E, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

3.4.1 Safety Preparatory Inspection Coordination Meeting with the Government or Utility

For electrical distribution equipment that is to be operated by Government or Utility personnel, the Prime Contractor and the subcontractor performing the work must attend the safety preparatory inspection coordination meeting, which will also be attended by the Contracting Officer's Representative, and required by EM 385-1-1, Section 12.A.02. The meeting will occur immediately preceding the start of work and following the completion of the outage coordination meeting. Both the safety preparatory inspection coordination meeting and the outage coordination meeting must occur prior to conducting the outage and commencing with lockout/tagout procedures.

3.4.2 Lockout/Tagout Isolation

Where the Government or Utility performs equipment isolation and lockout/tagout, the Contractor must place their own locks and tags on each energy-isolating device and proceed in accordance with the HECP. Before any work begins, both the Contractor and the Government or Utility must perform energy isolation verification testing while wearing required PPE detailed in the Contractor's AHA and required by EM 385-1-1, Sections 05.I and 11.B. Install personal protective grounds, with tags, to eliminate the potential for induced voltage in accordance with EM 385-1-1, Section 12.E.06.

3.4.3 Lockout/Tagout Removal

Upon completion of work, conduct lockout/tagout removal procedure in accordance with the HECP. In accordance with EM 385-1-1, Section 12.E.08, each lock and tag must be removed from each energy isolating device by the authorized individual or systems operator who applied the device. Provide formal notification to the Government (by completing the Government form if provided by Contracting Officer's Representative), confirming that steps of de-energization and lockout/tagout removal procedure have been conducted and certified through inspection and verification. Government or Utility locks and tags used to support the Contractor's work will not be removed until the authorized Government employee receives the formal notification.

3.5 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSP Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

3.5.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards and using personal fall protection equipment. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSP Z359.2 in the AHA.

3.5.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M, ASSP Z359.0, ASSP Z359.1, ASSP Z359.2, ASSP Z359.3, ASSP Z359.4, ASSP Z359.6, ASSP Z359.7, ASSP Z359.11, ASSP Z359.12, ASSP Z359.13, ASSP Z359.14, ASSP Z359.15, ASSP Z359.16 and ASSP Z359.18.

3.5.2.1 Additional Personal Fall Protection Measures

In addition to the required fall protection systems, other protective measures such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.O through 21.O.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

3.5.2.2 Personal Fall Protection Equipment

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap hooks and carabineers must be self-closing and self-locking, capable of being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper

energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. Equip all full body harnesses with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

3.5.3 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

(1) For work within 6 feet from unprotected edge of a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by the use of conventional fall protection systems (personal fall arrest/restraint systems, guardrails, or safety nets) in accordance with EM 385-1-1, Section 21 and 29 CFR 1926.500. A safety monitoring system is not adequate fall protection and is not authorized.

(2) For work greater than 6 feet from the unprotected roof edge, addition to the use of conventional fall protection systems the use of a warning line system is also permitted, in accordance with 29 CFR 1926.500 and EM 385-1-1, Section 21.L.

b. Steep-Sloped Roofs: Work on a roof having a slope greater than 4:12 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

3.5.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

3.5.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.

3.5.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the

following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must be in accordance with the requirements of EM 385-1-1, ASSP Z359.2, and ASSP Z359.4.

3.6 WORK PLATFORMS

3.6.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.

b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.

c. An adequate gate is required.

d. Employees performing scaffold erection and dismantling must be qualified.

e. Scaffold must be capable of supporting at least four times the maximum intended load, and provide appropriate fall protection as delineated in the accepted fall protection and prevention plan.

f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.

g. Special care must be given to ensure scaffold systems are not overloaded.

h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.

i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.

j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than 6 feet.

k. Delineate fall protection requirements when working above 6 feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.6.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with

manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP). Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWPs must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWPs must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

3.7 EQUIPMENT

3.7.1 Material Handling Equipment (MHE)

a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.

c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.7.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during such operations must be reported.

a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.

b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the Contracting Officer. A copy of the permitting process will be provided at the Preconstruction Meeting. Contractor's operator must remain with the crane during the spot check. Rigging gear must be in accordance with OSHA, ASME B30.9 Standards safety standards.

c. Comply with the LHE manufacturer's specifications and limitations for

erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.

e. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.

f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.

g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.

i. Use cribbing when performing lifts on outriggers.

j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.

l. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

m. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.

n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated

capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

p. On mobile cranes, lifts where the load weight is greater than 90 percent of the equipment's capacity are prohibited.

q. Follow FAA guidelines when required based on project location.

3.7.3 Machinery and Mechanized Equipment

a. Proof of qualifications for operator must be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

3.7.4 Base Mounted Drum Hoists

a. Operation of base mounted drum hoists must be in accordance with EM 385-1-1 and ASSP A10.22.

b. Rigging gear must be in accordance with applicable ASME/OSHA standards.

c. When used on telecommunication towers, base mounted drum hoists must be in accordance with TIA-1019, TIA-222, ASME B30.7, 29 CFR 1926.552, and 29 CFR 1926.553.

d. When used to hoist personnel, the AHA must include a written standard operating procedure. Operators must have a physical examination in accordance with EM 385-1-1 Section 16.B.05 and trained, at a minimum, in accordance with EM 385-1-1 Section 16.U and 16.T. The base mounted drum hoist must also comply with OSHA Instruction CPL 02-01-056 and ASME B30.23.

e. Material and personnel must not be hoisted simultaneously.

f. Personnel cage must be marked with the capacity (in number of persons) and load limit in pounds.

g. Construction equipment must not be used for hoisting material or personnel or with trolley/tag lines. Construction equipment may be used for towing and assisting with anchoring guy lines.

3.7.5 Use of Explosives

Explosives must not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval does not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, must be only where directed and in approved storage facilities. These facilities must be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.8 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.8.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility department.

3.8.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within 3 feet of the underground system.

3.8.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever Contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.9 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Sections 11 and 12.

3.9.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

When working in energized substations, only qualified electrical workers

are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

3.9.2 Qualifications

Electrical work must be performed by QP with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State and Local requirements applicable to where work is being performed.

3.9.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.9.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

3.9.5 Testing

Temporary electrical distribution systems and devices must be inspected, tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

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SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS
02/19

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g., ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

ACOUSTICAL SOCIETY OF AMERICA (ASA)
1305 Walt Whitman Road, Suite 300
Melville, NY 11747-4300
Ph: 516-576-2360
Fax: 631-923-2875
E-mail: asa@acousticalsociety.org
Internet: https://acousticalsociety.org/

AIR BARRIER ASSOCIATION OF AMERICA (ABAA)
1600 Boston-Providence Hwy
Walpole, MA 02081
Ph: 1-866-956-5888
Fax: 1-866-956-5819
Internet: https://www.airbarrier.org/

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. (AMCA)
30 West University Drive
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088
E-mail: communications@amca.org
Internet: http://www.amca.org

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
2111 Wilson Blvd, Suite 400
Arlington, VA 22201
Ph: 703-524-8800
Internet: http://www.ahrinet.org

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)
1200 G Street, NW, Suite 500
Washington, D.C. 20005
Ph: 202-628-6380

E-mail: nbutler@atis.org
Internet: http://www.atis.org

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Internet: https://www.pefc.org/

RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC)
E-Mail: boltcouncil@gmail.com
Internet: http://www.boltcouncil.org

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)
2000 Powell Street, Suite 600
Emeryville, CA 94608
Ph: 510-452-8000
Fax: 510-452-8001
E-mail: info@SCSglobalservices.com
Internet: https://www.scsglobalservices.com/

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
4201 Lafayette Center Drive
Chantilly, VA 20151-1219
Ph: 703-803-2980
Fax: 703-803-3732
Internet: https://www.smacna.org/

SINGLE PLY ROOFING INDUSTRY (SPRI)
465 Waverley Oaks Road, Suite 421
Waltham, MA 02452
Ph: 781-647-7026
Fax: 781-647-7222
E-mail: info@spri.org
Internet: https://www.spri.org/

SOCIETY FOR PROTECTIVE COATINGS (SSPC)
800 Trumbull Drive
Pittsburgh, PA 15205
Ph: 877-281-7772 or 412-281-2331
Fax: 412-444-3591
E-mail: customerservice@sspc.org
Internet: http://www.sspc.org

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)
400 Commonwealth Drive
Warrendale, PA 15096
Ph: 877-606-7323 or 724-776-4841
Fax: 724-776-0790
E-mail: customerservice@sae.org

Internet: https://www.sae.org/

SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS (SCTE)
140 Philips Road
Exton, PA 19341-1318
Ph: 800-542-5040 or 610-363-6888
Fax: 610-884-7237
E-Mail: info@scte.org
Internet: https://www.scte.org/

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)
21865 Copley Drive
Diamond Bar, CA 91765
Ph: 909-396-2000
E-mail: webinquiry@aqmd.gov
Internet: http://www.aqmd.gov

SOUTHERN PINE INSPECTION BUREAU (SPIB)
P.O. Box 10915
Pensacola, FL 32524-0915
Ph: 850-434-2611 or 800-995-7742
Fax: 850-434-1290
E-mail: spib@spib.org
Internet: https://www.spib.org/

STEEL DECK INSTITUTE (SDI)
P.O. Box 426
Glenshaw, PA 15116
Ph: 412-487-3325
Fax: 412-487-3326
Internet: https://www.sdi.org/

STEEL DOOR INSTITUTE (SDI/DOOR)
30200 Detroit Road
Westlake, OH 44145
Ph: 440-899-0010
Fax: 440-892-1404
E-mail: info@steeldoor.org
Internet: https://www.steeldoor.org/

STEEL JOIST INSTITUTE (SJI)
234 W. Cheves Street
Florence, SC 29501
Ph: 843-407-4091
Internet: https://steeljoist.org/

SUSTAINABLE FOREST INITIATIVE (SFI)
2121 K Street NW
Suite 750
Washington, DC 20037
Ph: 202-596-3450
Fax: 202-596-3451
E-mail: info@sfiprogram.org
Internet: http://www.sfiprogram.org

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)
1320 North Courthouse Rosd, Suite 200
Arlington, VA 22201
Ph: 703-907-7700

Fax: 703-907-7727
E-mail: marketing@tiaonline.org
Internet: https://www.tiaonline.org/

THE MASONRY SOCIETY (TMS)
105 South Sunset Street, Suite Q
Longmont, CO 80501-6172
Ph: 303-939-9700
Fax: 303-541-9215
E-mail: info@masonrysociety.org
https://masonrysociety.org/

TILE COUNCIL OF NORTH AMERICA (TCNA)
100 Clemson Research Boulevard
Anderson, SC 29625
Ph: 864-646-8453
Fax: 864-646-2821
E-mail: info@tileusa.com
Internet: https://www.tcnatile.com/

TREE CARE INDUSTRY ASSOCIATION (TCIA)
136 Harvey Road, Suite 101
Londonderry, NH 03053
Ph: 603-314-5380 or 800-733-2622
Fax: 603-314-5386
Internet: https://tcia.org/

TRIDIUM, INC (TRIDIUM)
3951 Westerre Parkway, Suite 350
Richmond, VA 23233
Ph: 804-747-4771
Fax: 804-747-5204
E-mail: support@tridium.com
Internet: https://www.tridium.com/

U.S. ARMY CORPS OF ENGINEERS (USACE)
CRD-C DOCUMENTS available on Internet:
http://www.wbdg.org/ffc/army-coe/standards
Order Other Documents from:
Official Publications of the Headquarters, USACE
E-mail: hqpublications@usace.army.mil
Internet: http://www.publications.usace.army.mil/
or
https://www.hnc.usace.army.mil/Missions/Engineering-Directorate/TECHINFO/

U.S. CODE (USC)
Office of the Law Revision Counsel
U.S. House of Representatives
H2-308 Ford House Office Building
Washington, DC 20515
Ph: 202-226-2411
E-mail: uscode@mail.house.gov
Internet: http://uscode.house.gov/

U.S. DEFENSE LOGISTICS AGENCY (DLA)
Andrew T. McNamara Building
8725 John J. Kingman Road
Fort Belvoir, VA 22060-6221
Ph: 877-352-2255

E-mail: dlacontactcenter@dla.mil
Internet: http://www.dla.mil

U.S. DEPARTMENT OF AGRICULTURE (USDA)
Order AMS Publications from:
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Gastonia, NC 28054-2193
Ph: 704-810-8884
E-mail: PA@ams.usda.gov
Internet: https://www.ams.usda.gov/
Order Other Publications from:
USDA Rural Development
Rural Utilities Service
STOP 1510, Rm 5135
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Washington, DC 20250-1510
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Internet:
https://www.rd.usda.gov/about-rd/agencies/rural-utilities-service

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Internet: https://www.ntis.gov/
Obtain Military Specifications, Standards and Related Publications from:
Acquisition Streamlining and Standardization Information System (ASSIST)
Department of Defense Single Stock Point (DODSSP)
Document Automation and Production Service (DAPS)
Building 4/D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Ph: 215-697-6396 - for account/password issues
Internet: https://assist.dla.mil/online/start/; account registration required
Obtain Unified Facilities Criteria (UFC) from:

Whole Building Design Guide (WBDG)
National Institute of Building Sciences (NIBS)
1090 Vermont Avenue NW, Suite 700
Washington, DC 20005
Ph: 202-289-7800
Fax: 202-289-1092
Internet:
https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc

U.S. DEPARTMENT OF ENERGY (DOE)
1000 Independence Avenue Southwest
Washington, D.C. 20585
Ph: 202-586-5000
Fax: 202-586-4403
E-mail: The.Secretary@hq.doe.gov
Internet: https://www.energy.gov/

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
HUD User
P.O. Box 23268
Washington, DC 20026-3268
Ph: 800-245-2691 or 202-708-3178
TDD: 800-927-7589
Fax: 202-708-9981
E-mail: helpdesk@huduser.gov
Internet: https://www.huduser.gov

U.S. DEPARTMENT OF TRANSPORTATION (DOT)
1200 New Jersey Ave., SE
Washington, DC 20590
Ph: 202-366-4000
Internet: https://www.transportation.gov/

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-564-4700
Internet: https://www.epa.gov
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National Technical Information Service (NTIS)
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Alexandria, VA 22312
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Fax: 703-605-6880
TDD: 703-487-4639
E-mail: info@ntis.gov
Internet: https://www.ntis.gov/

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Internet: https://www.gpo.gov/

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E-mail: ExecSecretariat.FHWA@dot.gov
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Acquisition Streamlining and Standardization Information System (ASSIST)
Internet: https://assist.dla.mil/online/start/; account registration required

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2101 L St NW, Suite 500
Washington, DC 20037
Ph: 202-828-7422
Internet: https://new.usgbc.org/

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
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College Park, MD 20740-6001
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Internet: https://www.gpo.gov/

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)
1322 Patterson Ave. SE, Suite 1000
Washington Navy Yard, DC 20374-5065
Ph: 202-685-9387
Internet: http://www.navfac.navy.mil

U.S. NAVAL SEA SYSTEMS COMMAND (NAVSEA)
Commander Naval Sea Systems Command
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376
Ph: 202-781-0000
Internet: https://www.navsea.navy.mil/

UNDERWRITERS LABORATORIES (UL)
2600 N.W. Lake Road
Camas, WA 98607-8542
Ph: 877-854-3577 or 360-817-5500
E-mail: CustomerExperienceCenter@ul.com
Internet: https://www.ul.com/
UL Directories available through IHS at https://ihsmarkit.com/

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)
Corporate Headquarters
2711 LBJ Freeway, Suite 1000
Dallas, TX 75234
Ph: 972-243-3902
Fax: 972-243-3907
E-mail: info@uni-bell.org
Internet: https://www.uni-bell.org/

VIBRATION ISOLATION AND SEISMIC CONTROL MANUFACTURERS ASSOCIATION (VISCMA)
994 Old Eagle School Road
Suite 1019
Wayne, PA 19087-1866
Ph: 610-971-4850
E-mail: info@viscma.com
Internet: http://www.viscma.com

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)
6980 S.W. Varns
Tigard, OR 97223
Ph: 503-639-0651
Fax: 503-684-8928
E-mail: info@wclib.org
Internet: http://www.wclib.org

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)
1500 SW First Ave., Suite 870
Portland, OR 97201
Ph: 503-224-3930
E-mail: info@wwpa.org
Internet: http://www.wwpa.org

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)
2025 M Street, NW, Suite 800
Washington, DC 20036-3309
Ph: 202-367-1157
or
330 N Wabash Avenue, Suite 2000
Chicago, IL 60611
Ph: 312-321-6802
E-mail: membersupport@wdma.com
Internet: https://www.wdma.com/

WOODWORK INSTITUTE (WI)
3188 Industrial Blvd.
West Sacramento, CA 95691
Ph: 916-372-9943
Fax: 916-372-9950
E-mail: info@woodinst.com
Internet: https://woodworkinstitute.com

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01 45 00.00 20

QUALITY CONTROL
11/11, CHG 8: 02/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.2	(2012) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

ASTM INTERNATIONAL (ASTM)

ASTM D6245	(2012) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation
ASTM D6345	(2010) Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air
ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

ANSI/SMACNA 008	(2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 4-420-01	(2015, with Change 1, 2022) Ammunition And Explosives Storage Magazines

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Construction Quality Control (QC) Plan; G

Indoor Air Quality (IAQ) Management Plan; G, S

Final IAQ Management Plan; S

Preconstruction Stakeout of Earth Covered Magazines; G

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Prior to commencing work on construction, the Contractor can obtain a single copy set of the current report forms from the Contracting Officer. The report forms will consist of the Contractor Production Report, Contractor Production Report (Continuation Sheet), Contractor Quality Control (CQC) Report, CQC Report (Continuation Sheet), Preparatory Phase Checklist, Initial Phase Checklist, Rework Items List, and Testing Plan and Log.

Deliver the following to the Contracting Officer during Construction:

a. CQC Report: Submit the report electronically by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work.

b. Contractor Production Report: Submit the report electronically by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work.

c. Preparatory Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Preparatory Phase held.

d. Initial Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Initial Phase held.

e. Field Test Reports: Within two working days after the test is performed, submit the report as an electronic attachment to the CQC Report.

f. Monthly Summary Report of Tests: Submit the report as an electronic attachment to the CQC Report at the end of each month.

g. Testing Plan and Log: Submit the report as an electronic attachment to the CQC Report, at the end of each month. Provide a copy of the final Testing Plan and Log to the preparer of the Operation & Maintenance (O&M) documentation.

h. Rework Items List: Submit lists containing new entries daily, in the same manner as the CQC Report.

i. CQC Meeting Minutes: Within two working days after the meeting is held, submit the report as an electronic attachment to the CQC Report.

j. QC Certifications: As required by the paragraph QC CERTIFICATIONS.

k. Special Inspection Report: Submit the Special Inspection reports, in the same manner as the CQC Report.

Perform additional Quality Control in accordance with UFC 4-420-01, Chapter 3, Design Considerations and Requirements, paragraph 3-9, Additional Electrical Construction Quality Control.

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. This QC program is a key element in meeting the objectives of NAVFAC Commissioning. The QC program consists of a QC Organization, QC Plan, QC Plan Meeting(s), a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, completion inspections, QC certifications, independent Special Inspections in accordance with Section 01 45 35 SPECIAL INSPECTIONS, and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program must cover on-site and off-site work and be keyed to the work sequence. No construction work or testing may be performed unless the QC Manager is on the work site. The QC Manager must report to an officer of the firm and not be subordinate to the Project Superintendent or the Project Manager. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the QC Manager is the primary individual responsible for quality control, all individuals will be held responsible for the quality of work on the job.

1.4.1 Acceptance of the Construction Quality Control (QC) Plan

Acceptance of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel are subject to acceptance by the Contracting Officer. The Contracting Officer may require the removal of any individual for non-compliance with quality requirements specified in the Contract.

1.4.2 Preliminary Construction Work Authorized Prior to Acceptance

The only construction work that is authorized to proceed prior to the acceptance of the QC Plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.3 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed changes in the QC Plan or changes to the QC organization personnel, a minimum of 10 work days prior to a proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

1.4.4 Special Inspections

Perform all required Special Inspections per Section 01 45 35 SPECIAL INSPECTIONS, the statement of Special Inspections and the Schedule of Special Inspections.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The only duties and responsibilities of the QC Manager are to manage and implement the QC program on this Contract. The QC Manager is required to attend the partnering meetings, QC Plan Meetings, Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this Contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by testing laboratory personnel and any other inspection and testing personnel required by this Contract. The QC Manager is the manager of all QC activities. The QC manager is responsible for notifying the Special Inspector of Record of activities which require their review. The QC manager is responsible for coordinating the Special Inspection activities, see paragraph QUALITY CONTROL MANAGER, in Section 01 45 35 SPECIAL INSPECTIONS. The QC manager is responsible for the quality control for Secure Space perimeter construction.

1.5.1.2 Qualifications

An individual with a minimum of 10 years combined experience in the following positions: Project Superintendent, QC Manager, Project Manager, Project Engineer or Construction Manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual must have at least two years experience as a QC Manager. The individual must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification, safety compliance, and sustainability.

1.5.2 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager must have completed the course entitled "Construction Quality Management (CQM) for Contractors." If the QC Manager does not have a current certification, they must obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

1.5.3 Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager must be the same as for the QC Manager.

1.5.4 Special Inspector of Record

The Special Inspector of Record (SIOR) must be an independent third party hired directly by the Prime Contractor. The SIOR must not be a company employee of the Contractor or any Sub-Contractor performing the work to be

inspected. The qualifications of the SIOR are defined in Section 01 45 35 SPECIAL INSPECTION.

1.5.5 Registered Fire Protection Engineer

The U.S. Registered Fire Protection Engineer (FPE) must be an independent third party hired directly by the Prime Contractor as an integral part of the Prime Contractor's Quality Control Organization. This FPE must have no business relationships (owner, partner, operating officer, distributor, salesman, or technical representative) with any subcontractors involved with this project, or with any fire protection equipment device manufacturers, suppliers, or installers for any such equipment provided as part of this project. This FPE is responsible for review, approval, and coordination of all fire protection system material submittals, calculations, shop drawings, etc.

1.5.6 QC for Secure Space (SIPR OIS, OIS OFF and Weapons Officer) Perimeter Construction

1.5.6.1 Periodic (Follow-Up Phase) Inspections

Once construction begins, perform periodic inspections of Secure Space identified in the contract drawings at least once every two weeks. Increase frequency to weekly inspections within 30 days of planned acceptance testing. Inspections must verify that construction and materials comply with the contract documents, the description of the assembly in the ASTM E90 Factory Report for acoustical testing, and the approved submittals. Focus inspections on the construction of the sound rated assemblies, perimeter penetrations, perimeter doors, and electronic security system. Document periodic inspections in Daily QC Reports.

1.5.6.2 Preliminary Inspection

The Government and QC Manager will perform a joint preliminary inspection of the Secure Space after construction of the assembly is complete to verify compliance with the design requirements and other contract documents. The Contracting Officer's Representative will participate in the preliminary inspection. Provide the Contracting Officer a minimum 14 calendar days notification in advance of the preliminary inspection.

As a result of the preliminary inspection, prepare a Secure Space punch list with deficiencies identified. Include with the punch list the estimated date by which the deficiencies will be corrected. Document the preliminary inspection in the Daily QC Report and attach the punch list. Notify the Contacting Officer's Representative when deficiencies are corrected. Deficiencies from the Preliminary Inspection must be corrected prior to scheduling the Final Acceptance Inspection.

1.5.6.3 Acceptance Testing for Sound Attenuation

Perform acceptance testing for sound transmission loss of sound rated door assemblies as required in Section 08 34 73 SOUND CONTROL DOOR ASSEMBLIES and Section 09 29 00 GYPSUM BOARD for sound rated assemblies. Acceptance testing must be performed during the preliminary inspection. The Contracting Officer's Representative must witness acceptance testing. Deficiencies identified during acceptance testing must be included in the Secure Space punch list and corrected prior to the final acceptance inspection.

1.5.6.4 Acceptance Testing for Electronic Security Systems

Acceptance testing must be performed during the preliminary inspection. The Contracting Officer's Representative must witness acceptance testing. Deficiencies identified during acceptance testing must be included in the Secure Space punch list and corrected prior to the Final Inspection.

1.5.6.5 Final Inspection

Perform a final inspection of the Secure Space after required testing has been successfully completed as part of the preliminary inspection and all punch list items corrected. Testing is not permitted during the final inspection. QC Manager and Superintendent must attend the final inspection and Government attendees will include the Contracting Officer's Representative. Request a final inspection by the Contracting Officer a minimum of 14 calendar days in advance.

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Construction Quality Control (QC) Plan

Submit a Construction QC Plan prior to start of construction.

1.6.1.1 Requirements

Provide a Construction QC Plan, prior to start of construction, that includes a table of contents, with major sections identified, with pages numbered sequentially, and that documents the proposed methods and responsibilities for accomplishing quality control during the construction of the project:

a. QC ORGANIZATION: A chart showing the QC organizational structure.

b. NAMES AND QUALIFICATIONS: Names and qualifications, in resume format, for each person in the QC organization. Include the CQM for Contractors course certifications for the QC Manager and Alternate QC Manager as required by the paragraphs CONSTRUCTION QUALITY MANAGEMENT TRAINING and ALTERNATE QC MANAGER DUTIES AND QUALIFICATIONS.

c. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL: Duties, responsibilities, and authorities of each person in the QC organization.

d. OUTSIDE ORGANIZATIONS: A listing of outside organizations, such as architectural and consulting engineering firms, that will be employed by the Contractor and a description of the services these firms will provide.

e. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as described in this Contract. Include in this letter the responsibility of the QC Manager and Alternate QC Manager to implement and manage the three phases of control, and their authority to stop work which is not in compliance with the Contract. Letters of direction are to be issued by the QC Manager to all other QC Specialists outlining their duties, authorities, and responsibilities. Include copies of the letters in the QC Plan.

f. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving, and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in Section 01 33 00 SUBMITTAL PROCEDURES.

g. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs ACCREDITATION REQUIREMENTS, as applicable.

h. TESTING PLAN AND LOG: A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.

i. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track, and complete rework items.

j. LIST OF DEFINABLE FEATURES: A Definable Feature of Work (DFOW) is a task that is separate and distinct from other tasks and has control requirements and work crews unique to that task. A DFOW is identified by different trades or disciplines and is an item or activity on the construction schedule. Include in the list of DFOWs, but not be limited to, all critical path activities on the NAS. Include all activities for which this specification requires QC Specialists or specialty inspection personnel. Provide separate DFOWs in the Network Analysis Schedule for each submittal package.

k. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL: Identify procedures used to ensure the three phases of control to manage the quality on this project. For each DFOW, a Preparatory and Initial phase checklist will be filled out during the Preparatory and Initial phase meetings. Conduct the Preparatory and Initial Phases and meetings with a view towards obtaining quality construction by planning ahead and identifying potential problems for each DFOW.

l. PERSONNEL MATRIX: A personnel matrix showing for each section of the specification who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document the testing.

m. PROCEDURES FOR COMPLETION INSPECTION: Procedures for identifying and documenting the completion inspection process. Include in these procedures the responsible party for punch out inspection, pre-final inspection, and final acceptance inspection.

n. TRAINING PROCEDURES AND TRAINING LOG: Procedures for coordinating and documenting the training of personnel required by the Contract.

o. ORGANIZATION AND PERSONNEL CERTIFICATIONS LOG: Procedures for coordinating, tracking and documenting all certifications on subcontractors, testing laboratories, suppliers, personnel, etc. QC Manager will ensure that certifications are current, appropriate for the work being performed, and will not lapse during any period of the contract that the work is being performed.

1.7 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to Government approval and the start of construction, the QC Manager will meet with the Contracting

Officer to present the QC program required by this Contract. When a new QC Manager is appointed, the coordination and mutual understanding meeting must be repeated.

1.7.1 Purpose

The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, design intent, Cx in accordance with Section 01 91 00.15 20 TOTAL BUILDING COMMISSIONING, environmental requirements and procedures, coordination of activities to be performed, Special Inspections, and the coordination of the Contractor's management, production, and QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each DFOW, as well as how each DFOW will be affected by each management plan or requirement as listed below:

a. Waste Management Plan.

b. IAQ Management Plan.

c. Procedures for noise and acoustics management.

d. Environmental Protection Plan.

e. Environmental regulatory requirements.

f. Special Inspections.

1.7.2 Coordination of Activities

Coordinate activities included in various sections to assure efficient and orderly installation of each component. Coordinate operations included under different sections that are dependent on each other for proper installation and operation. Schedule construction operations with consideration for indoor air quality as specified in the IAQ Management Plan. Coordinate special inspections.

1.7.3 Attendees

As a minimum, the Contractor's personnel required to attend include an officer of the firm, the Project Manager, Project Superintendent, QC Manager, Alternate QC Manager, Special Inspector of Record, Environmental Manager, and subcontractor representatives. Each subcontractor who will be assigned QC responsibilities must have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by the Contractor and the Contracting Officer. Provide a copy of the signed minutes to all attendees and include in the QC Plan.

1.8 QC MEETINGS

After the start of construction, conduct weekly QC meetings by the QC Manager at the work site with the Project Superintendent, the Special Inspector of Record, and the foremen who are performing the work of the DFOWs. The QC Manager is to prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. The Contracting Officer may attend these meetings. As a minimum, accomplish the following at each meeting:

a. Review the minutes of the previous meeting.

b. Review the schedule and the status of work and rework.

c. Review the status of submittals.

d. Review the work to be accomplished in the next two weeks and documentation required.

e. Resolve QC and production problems (RFI, etc.).

f. Address items that may require revising the QC Plan.

g. Review Accident Prevention Plan (APP).

h. Review environmental requirements and procedures.

i. Review Waste Management Plan.

j. Review IAQ Management Plan.

k. Review Environmental Management Plan.

l. Review the status of training completion.

1.9 THREE PHASES OF CONTROL

Adequately cover both on-site and off-site work with the Three Phases of Control and include the following for each DFOW.

1.9.1 Preparatory Phase

Notify the Contracting Officer at least two work days in advance of each preparatory phase meeting. The meeting will be conducted by the QC Manager and attended by the Project Superintendent, the Special Inspector of Record, and the foreman responsible for the DFOW. When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman must attend the preparatory phase meeting. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report and in the Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

a. Review each paragraph of the applicable specification sections.

b. Review the Contract drawings.

c. Verify that field measurements are as indicated on construction and/or shop drawings before confirming product orders, in order to minimize waste due to excessive materials.

d. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.

e. Review the testing plan and ensure that provisions have been made to provide the required QC testing.

f. Review special inspections required by Section 01 45 35 SPECIAL INSPECTION, the statement of special inspections and the schedule of

special inspections.

g. Examine the work area to ensure that the required preliminary work has been completed.

h. Coordinate the schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

i. Arrange for the return of shipping/packaging materials, such as wood pallets, where economically feasible.

j. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data and are properly stored.

k. Discuss specific controls used and construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW.

l. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Safety Data Sheets (SDS) are submitted.

1.9.2 Initial Phase

Notify the Contracting Officer at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the Project Superintendent, the Special Inspector of Record, and the foreman responsible for that DFOW. Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily CQC Report and in the Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

a. Establish level of workmanship and verify that it meets the minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

b. Resolve any workmanship issues.

c. Ensure that testing is performed by the approved laboratory.

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

e. Review project specific work plans (i.e. Cx, HAZMAT Abatement, Stormwater Management) to ensure all preparatory work items have been completed and documented.

f. Coordinate scheduled work with special inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the statement of special inspections and the schedule of special inspections.

1.9.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as

necessary, until the completion of each DFOW and document in the daily CQC Report:

a. Ensure the work is in compliance with Contract requirements.

b. Maintain the quality of workmanship required.

c. Ensure that testing is performed by the approved laboratory.

d. Ensure that rework items are being corrected.

e. Assure manufacturers representatives have performed necessary inspections if required and perform safety inspections.

f. Coordinate scheduled work with special inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the statement of special inspections and the schedule of special inspections.

1.9.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

1.9.5 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.10 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section 01 33 00 SUBMITTAL PROCEDURES.

1.11 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

1.11.1 Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing must meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

1.11.2 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at https://www.nist.gov/nvlap, the American Association of State Highway and Transportation Officials

(AASHTO) Accreditation Program at http://www.aashtoresource.org/aap/overview, International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, U.S. Army Corps of Engineers Materials Testing Center (MTC) at http://www.erdc.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/9254/Article/476661/materials-testing-center.aspx, the American Association for Laboratory Accreditation (A2LA) program at http://www.a2la.org/, the Washington Association of Building Officials (WABO) at http://www.wabo.org/ (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) at https://www.wacel.org/lab-accreditation-and-inspection-agency-audit-programs/laboratory-accreditation-program/(Approval authority by WACEL is limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

1.11.3 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.11.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results must be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month, in accordance with paragraph INFORMATION FOR THE CONTRACTING OFFICER.

1.11.5 Test Reports and Monthly Summary Report of Tests

Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. Provide a copy of the signed test reports and certifications to the OMSI preparer for inclusion into the OMSI documentation, in accordance with Sections 01 78 23 OPERATION AND MAINTENANCE DATA and 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI).

1.12 QC CERTIFICATIONS

1.12.1 CQC Report Certification

Contain the following statement within the CQC Report: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.12.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current, coordinated and attesting that the work for which payment is requested, including stored material, is in compliance with Contract requirements.

1.12.3 Completion Certification

Upon completion of work under this Contract, the QC Manager must furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract." Provide a copy of this final QC Certification for completion to the preparer of the Operation & Maintenance (O&M) documentation.

1.13 COMPLETION INSPECTIONS

1.13.1 Punch-Out Inspection

Near the completion of all work or any increment thereof, established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract. Include in the punch list any remaining items on the "Rework Items List", which were not corrected prior to the Punch-Out Inspection. Include within the punch list the estimated date by which the deficiencies will be corrected. Provide a copy of the punch list to the Contracting Officer. The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government "Pre-Final Inspection".

1.13.2 Pre-Final Inspection

The Government and QC Manager will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" will be documented by the QC Manager as a result of this inspection. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled. Any items noted on the "Pre-Final" inspection must be corrected in a timely manner and be accomplished before the contract completion date for the work, or any particular increment thereof, if the project is divided into increments by separate completion dates.

1.13.3 Final Acceptance Inspection

Notify the Contracting Officer at least 14 calendar days prior to the date a final acceptance inspection can be held. State within the notice that all items previously identified on the pre-final punch list will be corrected and acceptable, along with any other unfinished Contract work, by the date of the final acceptance inspection. The Contractor must be represented by the QC Manager, the Project Superintendent and others deemed necessary. Attendees for the Government will include the Contracting Officer, other FEAD/ROICC personnel, and personnel representing the Client. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the

Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract Clause entitled "Inspection of Construction."

1.14 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.14.1 Construction Documentation

Reports are required for each day that work is performed and must be attached to the Contractor Quality Control Report prepared for the same day. Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER" will be used. Reports are required for each day work is performed. Account for each calendar day throughout the life of the Contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The Project Superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work must be identified by terminology consistent with the construction schedule. In the "remarks" sections of the reports, enter pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, meetings held. For each entry in the report(s), identify the Schedule Activity No. that is associated with the entered remark.

1.14.2 Quality Control Validation

Establish and maintain the following in an electronic folder. Divide folder into a series of tabbed sections as shown below. Ensure folder is updated at each required progress meeting.

a. All completed Preparatory and Initial Phase Checklists, arranged by specification section.

b. All milestone inspections, arranged by Activity Number.

c. An up-to-date copy of the Testing Plan and Log with supporting field test reports, arranged by specification section.

d. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.

e. An up-to-date copy of the Rework Items List.

f. Maintain up-to-date copies of all punch lists issued by the QC staff to the Contractor and Sub-Contractors and all punch lists issued by the Government.

g. Special inspection reports.

1.14.3 Reports from the QC Specialist(s)

Reports are required for each day that work is performed in their area of responsibility. QC Specialist reports must include the same documentation requirements as the CQC Report for their area of responsibility. QC Specialist reports are to be prepared, signed and dated by the QC Specialists and must be attached to the CQC Report prepared for the same day.

1.14.4 Testing Plan and Log

As tests are performed, the QC Manager will record on the "Testing Plan and Log" the date the test was performed and the date the test results were forwarded to the Contracting Officer. Attach a copy of the updated "Testing Plan and Log" to the last daily CQC Report of each month, per the paragraph "INFORMATION FOR THE CONTRACTING OFFICER". Provide a copy of the final "Testing Plan and Log" to the preparer of the Operation & Maintenance (O&M) documentation.

1.14.5 Rework Items List

The QC Manager must maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily CQC Report of each month. The Contractor is responsible for including those items identified by the Contracting Officer.

1.14.6 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by Section 01 78 00 CLOSEOUT SUBMITTALS are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager must initial each revision. Upon completion of work, the QC Manager will furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.15 NOTIFICATION ON NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected non-compliance with the Contract. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, is deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time for excess costs or damages by the Contractor.

1.16 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

Submit an IAQ Management Plan within 15 calendar days after Contract award and not less than 10 calendar days before the preconstruction meeting. Revise and resubmit Plan as required by the Contracting Officer. Make

copies of the final plan available to all workers on site. Include provisions in the Plan to meet the requirements specified below and to ensure safe, healthy air for construction workers and building occupants. Submit Final IAQ Management Plan for inclusion in the Sustainability eNotebook, in accordance with Section 01 33 29SUSTAINABILITY REQUIREMENTS AND REPORTING.

1.16.1 Requirements During Construction

Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of volatile organic compounds (VOCs) in indoor air in accordance with ASTM D6345. Use filters with a Minimum Efficiency Reporting Value (MERV) of 8 in permanently installed air handlers during construction.

1.16.1.1 Control Measures

Meet or exceed the requirements of ANSI/SMACNA 008, Chapter 3, to help minimize contamination of the building from construction activities. The five requirements of this manual which must be adhered to are described below:

a. HVAC protection: Isolate return side of HVAC system from surrounding environment to prevent construction dust and debris from entering the duct work and spaces.

b. Source control: Use low emitting paints and other finishes, sealants, adhesives, and other materials as specified. When available, cleaning products must have a low VOC content and be non-toxic to minimize building contamination. Utilize cleaning techniques that minimize dust generation. Cycle equipment off when not needed. Prohibit idling motor vehicles where emissions could be drawn into building. Designate receiving/storage areas for incoming material that minimize IAQ impacts.

c. Pathway interruption: When pollutants are generated use strategies such as 100 percent outside air ventilation or erection of physical barriers between work and non-work areas to prevent contamination.

d. Housekeeping: Clean frequently to remove construction dust and debris. Promptly clean up spills. Remove accumulated water and keep work areas dry to discourage the growth of mold and bacteria. Take extra measures when hazardous materials are involved.

e. Scheduling: Control the sequence of construction to minimize the absorption of VOCs by other building materials.

1.16.1.2 Moisture Contamination

a. Remove accumulated water and keep work dry.

b. Use dehumidification to remove moist, humid air from a work area.

c. Do not use combustion heaters or generators inside the building.

d. Protect porous materials from exposure to moisture.

e. Remove and replace items which remain damp for more than a few hours.

1.16.2 Requirements after Construction

After construction ends and prior to occupancy, conduct a building flush-out or test the indoor air contaminant levels. Flush-out must be a minimum two-weeks with MERV-13 filtration media as determined by ASHRAE 52.2at 100 percent outside air. Air contamination testing must be consistent with EPA's current Compendium of Methods for the Determination of Air Pollutants in Indoor Air. After building flush-out or testing and prior to occupancy, replace filtration media. Filtration media must have a MERV of 13 as determined by ASHRAE 52.2.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PREPARATION

Designate receiving/storage areas for incoming material to be delivered according to installation schedule and to be placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. Store and handle materials in a manner as to prevent loss from weather and other damage. Keep materials, products, and accessories covered and off the ground, and store in a dry, secure area. Prevent contact with material that may cause corrosion, discoloration, or staining. Protect all materials and installations from damage by the activities of other trades.

3.2 PRECONSTRUCTION STAKEOUT OF EARTH COVERED MAGAZINES

Prior to construction of the earth covered magazines, submit a construction stakeout plan to the Contracting Officer ensuring location, orientation, and spacing of the earth covered magazines comply with the design drawings. Construction of the earth covered magazines will not proceed until written approval of the stakeout plan is received from the Contracting Officer.

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SECTION 01 45 25

QUALITY ASSURANCE FIELD INSPECTION
02/20

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Quality Assurance Field Inspections are to be performed by a Government retained independent third party Quality Assurance Inspector and are intended to ensure that the work of the Contractor is in accordance with the Contract Documents and applicable building codes. Quality Assurance Field Inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.

Quality Assurance Field Inspections will be performed separately by the Government retained third party inspector. The Contractor must provide notification to the Contracting Officer, Government Design Manager, and Quality Assurance Inspector seven days prior to the following elements of construction to allow for Quality Assurance Field Inspections:

a. Rigid inclusion installation.

b. Rigid inclusion load testing.

c. Load transfer platform excavation and construction.

d. Magazine waterproofing application.

e. Magazine and retaining wall drainage system construction.

f. Magazine embankment construction.

g. Pavement subgrade, fill and aggregate base construction.

h. Shallow foundation excavation.

i. Rock mass and trench excavation.

j. Rock crushing and processing.

1.2 DEFINITIONS

1.2.1 Continuous Inspections

Continuous Inspection is the constant monitoring of specific tasks by the independent Quality Assurance Inspector. These inspections must be carried out continuously over the duration of the particular tasks. Perform continuous inspections during the rigid inclusion installation, rigid inclusion load testing, load transfer platform construction, and magazine embankment construction.

1.2.2 Observe

Observe is inspection of items on a periodic daily basis. Operations need not be delayed pending these inspections. Perform periodic inspections

during the final load transfer platform excavation, shallow foundation excavation, magazine waterproofing application, magazine and retaining wall drainage system construction, pavement subgrade fill and aggregate base construction, rock mass and trench excavation, and rock crushing and processing.

1.2.3 Quality Assurance Inspector (QAI)

A qualified person, team or firm retained by the Government as having the competence necessary to inspect a particular type of construction requiring Quality Assurance Inspections. The QAI will be an independent third party hired by the Government.

1.2.4 Third Party

QAI must not be an employee of, nor have any other contractual relationship with the Contractor.

1.2.5 Contracting Officer

The Government official having overall authority for administrative contracting actions. Certain contracting actions may be delegated to the Contracting Officer's Representative (COR).

1.2.6 Contractor's Quality Control (QC) Manager

An individual retained by the Prime Contractor and qualified in accordance with the Section 01 45 00.00 20 QUALITY CONTROL having the overall responsibility for the Contractor's QC organization.

1.2.7 Engineer of Record (EOR)

Registered design professionals retained by the Government and responsible for the overall design and review of submittal documents prepared by others. The EOR is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in state in which the design professional works. The EOR is also referred to as the Designer of Record (DOR).

1.2.8 Definable Feature of Work (DFOW)

An inspection group that is separate and distinct from other inspection groups, having inspection requirements and/or inspectors that are unique.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Quality Assurance Inspections Daily Reports

Quality Assurance Inspections Biweekly Reports

SD-07 Certificates

Certificate of Compliance; G

SD-11 Closeout Submittals

Interim Report of Quality Assurance Inspections; G

Comprehensive Final Report of Quality Assurance Inspections; G

1.4 QUALITY ASSURANCE INSPECTOR QUALIFICATIONS

The Quality Assurance Inspector (QAI) shall be a Senior Construction Materials Inspector with a minimum of 10 years of relevant progressive technical experience and certified as an ICC Soils Special Inspector or NICET Soils Technician Level II, or approved equivalent.

Submit Certificate of Compliance documentation showing experience and qualifications of the QAI and complete inspection team to Government for review and approval at least 30 days prior to starting work. Provide resume indicating relevant education and training, listing of certifications/registrations including expiration date, and work history including project experience and relevancy to the type of construction work specified in this contract.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 RESPONSIBILITIES

3.1.1 Quality Assurance Inspector (QAI)

a. Attend Preconstruction meetings related to each item required to be inspected by the QAI. The specifications and plans for each construction task will reviewed to verify that all parties have a clear understanding of the testing and inspection provisions and the individual duties and responsibilities of each party.

b. Submit a copy of the daily reports to the Contracting Officer and Government Design Manager within 24 hours of performing inspections.

c. Discrepancies that are observed during Quality Assurance Inspections must be reported to the Contactor's QC Manager, Government Construction Manger and Engineering Technician, and Government Design Manager for correction. If discrepancies are not corrected before the QAI leaves the site, the observed discrepancies must be documented in the daily report.

d. Submit biweekly Quality Assurance Inspection reports until all work requiring Quality Assurance Inspections is complete. A report is required for each biweekly period in which Quality Assurance Inspections activity occurs, and must include the following:

   (1) A brief summary of the work performed during the reporting time frame.

   (2) Changes and/or discrepancies with the drawings, specifications that were observed during the reporting period.

   (3) Discrepancies which were resolved or corrected.

   (4) A list of nonconforming items requiring resolution.

   (5) All applicable test results.

e. At the completion of each Definable Feature of Work (DFOW) requiring Quality Assurance Inspections, submit an interim report that documents the Quality Assurance Inspections completed for that DFOW including corrections of all discrepancies noted in the daily reports. Interim reports of Quality Assurance Inspections must be signed and dated by the QAI.

f. At the completion of the project submit a comprehensive final report of Quality Assurance Inspections that documents the Quality Assurance Inspections completed for the project including corrections of all discrepancies noted in the daily reports. The comprehensive final report of Quality Assurance Inspections must be signed, dated, and sealed by a Professional Engineer employeed by the QAI firm.

3.1.2 Contractor

The Contractor must:

a. Be cognizant of work elements that require inspections by the QAI.

b. Notify the QAI two days in advance of starting work, restarting work, and reperforming work which require inspections by the QAI.

c. Provide the QAI with an updated construction schedule monthly, highlighting work elements that require inspections by the QAI.

d. Provide material samples for inspections or tests at its own expense.

e. Facilitate safe access to site and work areas requiring inspections or tests.

f. Remove or uncover completed work at its own expense to facilitate inspections or tests when insufficient notice is given.

3.2 DEFECTIVE WORK

Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Contracting Officer to accept such work.

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SECTION 01 45 35

SPECIAL INSPECTIONS
11/20

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019, with Change 1, 2022) Structural Engineering

1.2 GENERAL REQUIREMENTS

Perform Special Inspections in accordance with the Statement of Special Inspections, Schedule of Special Inspections, Chapter 17 of ICC IBC, and Structural Tests and Special Inspections of UFC 3-301-01. The Statement of Special Inspections and Schedule of Special Inspections are included as an attachment to this specification. Special Inspections are to be performed by an independent third party and are intended to ensure that the work of the Prime Contractor is in accordance with the Contract Documents and applicable building codes. Special inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.

For special inspection requirements for Earth Covered Magazines, refer to Section 01 45 36 SPECIAL INSPECTIONS - EARTH COVERED MAGAZINES.

1.3 DEFINITIONS

1.3.1 Continuous Special Inspections

Continuous Special Inspections is the constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks.

1.3.2 Perform

Perform these Special Inspections tasks for each welded joint or member.

1.3.3 Observe

Observe these Special Inspections items on a periodic daily basis. Operations need not be delayed pending these inspections.

1.3.4 Special Inspector (SI)

A qualified person retained by the Contractor and approved by the Contracting Officer as having the competence necessary to inspect a particular type of construction requiring Special Inspections. The SI must be an independent third party hired directly by the Prime Contractor.

1.3.5 Associate Special Inspector (ASI)

A qualified person who assists the SI in performing Special Inspections but must perform inspection under the direct supervision of the SI and cannot perform inspections without the SI on site.

1.3.6 Third Party

A Special inspector must not be an employee of the Contractor or of any Sub-Contractor performing the work to be inspected.

1.3.7 Contracting Officer

The Government official having overall authority for administrative contracting actions. Certain contracting actions may be delegated to the Contracting Officer's Representative (COR).

1.3.8 Contractor's Quality Control (QC) Manager

An individual retained by the Prime Contractor and qualified in accordance with the Section 01 45 00.00 20 QUALITY CONTROL having the overall responsibility for the Contractor's QC organization.

1.3.9 Structural Engineer of Record (SER)

A registered design professional contracted by the Government as an A/E responsible for the overall design and review of submittal documents prepared by others. The SER is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in the state in which the design professional works. The SER is also referred to as the Engineer of Record (EOR) in design code documents.

1.3.10 Statement of Special Inspections (SSI)

A document developed by the SER identifying the material, systems, components and work required to have Special Inspections. This statement is included at the end of this specification.

1.3.11 Schedule of Special Inspections (SSI)

A schedule which lists each of the required Special Inspections, the extent to which each Special Inspection is to be performed, and the required frequency for each in accordance with ICC IBC Chapter 17. This schedule is included at the end of this specification.

1.3.12 Definable Feature of Work (DFOW)

An inspection group that is separate and distinct from other inspection groups, having inspection requirements or inspectors that are unique.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Special Inspections Daily Reports

Special Inspections Biweekly Reports

SD-07 Certificates

AISC Certified Steel Fabricator

Steel Joist Institute Membership

Certificate of Compliance

Special Inspector Qualifications; G

SD-11 Closeout Submittals

Comprehensive Final Report of Special Inspections; G

1.5 SPECIAL INSPECTOR QUALIFICATIONS

Submit qualifications for each special inspector.

1.5.1 Steel Construction and High Strength Bolting

1.5.1.1 Special Inspector

a. ICC Structural Steel and Bolting Special Inspector certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

1.5.1.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.2 Welding Structural Steel

1.5.2.1 Special Inspector

a. ICC Structural Welding Special Inspector certificate with one year of related experience, or

b. AWS Certified Welding Inspector

1.5.2.2 Associate Special Inspector

AWS Certified Associate Welding Inspector

1.5.3 Nondestructive Testing of Welds

1.5.3.1 Special Inspector

NDT Level III Certificate

1.5.3.2 Associate Special Inspector

NDT Level II Certificate plus one year of related experience

1.5.4 Concrete Construction

1.5.4.1 Special Inspector

a. ICC Reinforced Concrete Special Inspector Certificate with one year of related experience, or

b. ACI Concrete Construction Special Inspector, or

c. Registered Professional Engineer with three years of related experience

1.5.4.2 Associate Special Inspector

a. ACI Concrete Construction Special Inspector in Training, or

b. Engineer-In-Training with one year of related experience

1.5.5 Masonry Construction

1.5.5.1 Special Inspector

a. ICC Structural Masonry Special Inspector Certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

1.5.5.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.6 Verification of Site Soil Condition, Fill Placement and Load-Bearing Requirements

1.5.6.1 Special Inspector

a. ICC Soils Special Inspector Certificate with one year of related experience, or

b. NICET Soils Technician Level II Certificate in Construction Material Testing, or

c. Geologist-In-Training with three years of related experience, or

d. Registered Professional Engineer with three years of related experience

1.5.6.2 Associate Special Inspector

a. NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or

b. Engineer-In-Training with one year of related experience

PART 2 PRODUCTS

2.1 FABRICATOR SPECIAL INSPECTIONS

Special Inspections of fabricator's work performed in the fabricator's shop is required to be inspected in accordance with the Statement of Special Inspections and the Schedule of Special Inspections unless the fabricator is certified by the approved agency to perform such work without Special Inspections. Submit the following certifications to the Contracting Officer for information to allow work performed in the fabricator's shop to not be subjected to Special Inspections.

AISC Certified Steel Fabricator.

Steel Joist Institute Membership

At the completion of fabrication, submit a certificate of compliance, to be included with the comprehensive final report of Special Inspections, stating that the materials supplied and work performed by the fabricator are in accordance with the construction documents.

PART 3 EXECUTION

3.1 RESPONSIBILITIES

3.1.1 Quality Control Manager

a. Supervise all Special Inspectors required by the Contract Documents and the IBC.

b. Verify the qualifications of all of the Special Inspectors.

c. Verify the qualifications of fabricators.

d. Maintain a 3-ring binder for the Special Inspector's daily and biweekly reports. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the SER.

e. Maintain a rework items list that includes discrepancies noted on the Special Inspectors daily report.

3.1.2 Special Inspectors

a. Inspect all elements of the project for which the special inspector is qualified to inspect and are identified in the Schedule of Special Inspections.

b. Attend preparatory phase meetings related to the Definable Feature of Work (DFOW) for which the special inspector is qualified to inspect.

c. Submit a copy of the daily reports to the QC Manager.

d. Report discrepancies that are observed during Special Inspections to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed

discrepancies must be documented in the daily report.

e. Submit a biweekly Special Inspection Report until all inspections are complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following:

(1) A brief summary of the work performed during the reporting time frame.

(2) Changes and discrepancies with the drawings, specifications that were observed during the reporting period.

(3) Discrepancies which were resolved or corrected.

(4) A list of nonconforming items requiring resolution.

(5) All applicable test result including nondestructive testing reports.

f. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project and corrections of all discrepancies noted in the daily reports. The comprehensive final report of Special Inspections must be signed, dated and indicate the certification of the special inspector qualifying them to conduct the inspection.

3.2 DEFECTIVE WORK

Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Contracting Officer to accept such work.

-- End of Section --

Project:	P-1102
Location:	Groton Conneticut
Project #:	
Date:	2/17/2023

STATEMENT OF SPECIAL INSPECTIONS

Project Seismic Design Category:	B
Project Risk Category:	II
Project Design Wind Speed (mph):	128
Number of Stories:	1
Structure Height Above Grade (ft):	20
Hazardous Occupancy or attached to such?	No Group H Occupancies

Special Inspector of Record (SIOR)

A Special Inspector of Record (SIOR) **IS NOT** required (per UFGS 01 45 35, Section 1.3.8)

Lateral Force Resisting System (LFRS)

2018 IBC 1704.3.2 and 1704.3.3

Following is a listing of critical main wind/seismic force resisting systems for this structure. Carefully inspect these elements as part of the roles and responsiblities of the Special Inspector (reference the Schedule of Special Inspections for inspection checklists).

Vertical LFRS Elements (Ops & Sentry Buildings)	Notes
Ordinary Reinforced Concrete Shear Walls	North - South Direction Only, See Plan
Horizontal LFRS Elements (Ops & Sentry Buildings)	**Notes**
Metal Roof Deck & Related Fastening System	See Roof Plan
Collector Elements	Identified on plan with key notes
Out of Plane Wall Connections	See Structural Details

Project: P-1102
Location: Groton Conneticut
Project #: 0
Date: 2/17/2023

Designated Seismic Systems (DSS)

(2018 IBC 1705.13.3) (ASCE 7-16, 13.2.2, C13.2.2) (UFC 3-301-1, 2-5.3)

DESIGNATED SEISMIC SYSTEMS DO NOT APPLY TO THIS PROJECT, due to the Seismic Design Category being less than C.

ELECTRICAL Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A

If additional space is required, append an additional sheet listing the remaining DSS

MECHANICAL/PLUMBING Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A
N/A

If additional space is required, append an additional sheet listing the remaining DSS

OTHER Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A
N/A

Final Walk Down Inspection and Report

(UFC 3 301 01 SECTION 2-5.4)

Final Walk Down Inspection of non-structural Designated Seismic Systems does not apply to this project (no Designated Seismic Systems)

SCHEDULE OF SPECIAL INSPECTIONS

Reference UFGS 01 45 35 for all requirements not noted as part of this schedule.

INSPECTION DEFINITIONS:

PERFORM: Perform these tasks for each weld, fastener or bolted connection, and noted verification.

OBSERVE: Observe these items randomly during the course of each work day to insure that applicable requirements are being met. Operations need not be delayed pending these inspections at contractor's risk.

DOCUMENT: Document, with a report, that the work has been performed in accordance with the contract documents. This is in addition to any other reports required in the Special Inspections guide specification.

CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

The Seismic Design Category for this project is: ☐ A, ☒ B, ☐ C, ☐ D, ☐ E, ☐ F (check appropriate box)

STRUCTURAL - STEEL – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION PRIOR TO WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify that the welding procedures specification (WPS) is available	**PERFORM**	
2. Verify manufacturer certifications for welding consumables are available	**PERFORM**	
3. Verify material identification	**PERFORM**	Type and grade.
4. Welder Identification System	**PERFORM**	The fabricator or erector, as applicable, shall maintain a system by which a welder who has welded a joint or member can be identified. Stamps, if used, shall be the low-stress type.
5. Fit-up of groove welds (including joint geometry)	OBSERVE	✓ Joint preparation ✓ Dimensions (alignment, root opening, root face, bevel) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location) ✓ Backing type and fit (if applicable)
6. Configuration and finish of access holes	OBSERVE	
7. Fit-up of fillet welds	OBSERVE	✓ Dimensions (alignment, gaps at root) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location)
STEEL INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-2		
TASK	INSPECTION TYPE	DESCRIPTION
8. Use of qualified welders	**PERFORM**	Welding by welders, welding operators, and tack welders who are qualified in conformance with requirements.
9. Control and handling of welding consumables	OBSERVE	✓ Packaging ✓ Electrode atmospheric exposure control
10. No welding over cracked tack welds	OBSERVE	
11. Environmental conditions	OBSERVE	✓ Wind speed within limits ✓ Precipitation and temperature
12. Welding Procedures Specification followed	OBSERVE	✓ Settings on welding equipment ✓ Travel speed ✓ Selected welding materials ✓ Shielding gas type/flow rate ✓ Preheat applied ✓ Interpass temperature maintained (min./max.) ✓ Proper position (F, V, H, OH) ✓ Intermix of filler metals avoided
13. Welding techniques	OBSERVE	✓ Interpass and final cleaning ✓ Each pass within profile limitations ✓ Each pass meets quality requirements

STRUCTURAL - STEEL – WELDING SECTION (CONTINUED)

STEEL INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-3		
TASK	INSPECTION TYPE	DESCRIPTION
14. Welds cleaned	OBSERVE	
15. Size, length, and location of all welds	**PERFORM**	Size, length, and location of all welds conform to the requirements of the detail drawings.
16. Welds meet visual acceptance criteria	**PERFORM AND DOCUMENT**	✓ Crack prohibition ✓ Weld/base-metal fusion ✓ Crater cross section ✓ Weld profiles ✓ Weld size ✓ Undercut ✓ Porosity
17. Arc strikes	**PERFORM**	
18. k-area	**PERFORM**	When welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, visually inspect the web k-area for cracks.
19. Backing removed, weld tabs removed and finished, and fillet welds added where required	**PERFORM**	
20. Repair activities	**PERFORM AND DOCUMENT**	
21. Document acceptance or rejection of welded joint or member	**PERFORM**	

END SECTION

STRUCTURAL - STEEL – BOLTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION TASKS PRIOR TO BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Manufacture's certifications available for fastener materials	**PERFORM**	
2. Fasteners marked in accordance with ASTM requirements	OBSERVE	
3. Proper fasteners selected for joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	OBSERVE	
4. Proper bolting procedure selected for joint detail	OBSERVE	
5. Connecting elements, including appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	OBSERVE	
6. Proper storage provided for bolts, nuts, washers, and other fastener components	OBSERVE	
STEEL INSPECTION TASKS DURING BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-2		
TASK	INSPECTION TYPE	DESCRIPTION
7. Fastener assemblies of suitable condition, placed in all holes and washers (if required) are positioned as required	OBSERVE	
8. Joint brought to the snug-tight condition prior to pretensioning operation	OBSERVE	
9. Fastener component not turned by the wrench prevented from rotating	OBSERVE	
10. Bolts are pretensioned in accordance with RCSC Specification, progressing systematically from the most rigid point toward the free edges	OBSERVE	
STEEL INSPECTION TASKS AFTER BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.1, AISC 360-10: Table C-N5.6-3		
TASK	INSPECTION TYPE	DESCRIPTION
11. Document acceptance or rejection of all bolted connections	**DOCUMENT**	

END SECTION

STRUCTURAL - STEEL - NON DESTRUCTIVE TESTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Section N5.5		
TASK	INSPECTION TYPE	DESCRIPTION
1. Use of qualified nondestructive testing personnel	**PERFORM**	Visual weld inspection and nondestructive testing (NDT) shall be conducted by personnel qualified in accordance with AWS D1.8 clause 7.2
2. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 20% of CJP groove welds for materials greater than 5/16" (8mm) thick. Testing rate must be increased to 100% if greater than 5% of welds tested have unacceptable defects.
3. Welded joints subject to fatigue	OBSERVE	Dye penetrant testing (DT) and Ultrasonic testing (UT) shall be performed on 100% of welded joints identified on contract drawings as being subject to fatigue.
4. Weld tab removal sites	OBSERVE	At the end of welds where weld tabs have been removed, magnetic particle testing shall be performed on the same beam-to-column joints receiving UT

END SECTION

STRUCTURAL - STEEL – AISC 341 REQUIREMENTS (SEISMIC PROVISIONS) SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Section J6.2		
TASK	INSPECTION TYPE	DESCRIPTION
1. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 100% of CJP groove welds for materials greater than 5/16" thick (8mm).
2. Beam cope and access hole.	OBSERVE	At welded splices and connections, thermally cut surfaces of beam copes and access holes shall be tested using magnetic particle testing (MT) or dye penetrant testing (DT), when the flange thickness exceeds 1 1/2 in. for rolled shapes, or when the web thickness exceeds 1 1/2 in. for built-up shapes.
3. K-area NDT (AISC 341)	**PERFORM**	Where welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, the web shall be tested for cracks using magnetic particle testing (MT). The MT inspection area shall include the k-area base metal within 3-inches of the weld. The MT shall be performed no sooner than 48 hours following completion of the welding.
4. Placement of reinforcing or contouring fillet welds	**DOCUMENT**	

END SECTION

STRUCTURAL - STEEL - COMPOSITE CONSTRUCTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

COMPOSITE CONSTRUCTION PRIOR TO PLACING CONCRETE – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table N6.1, AISC 341-16: Table J9.1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Placement and installation of steel headed stud anchors	**PERFORM**	
2. Material identification of reinforcing steel (Type/Grade)	OBSERVE	
3. Determination of carbon equivalent for reinforcing steel other than ASTM A706	OBSERVE	
4. Proper reinforcing steel size, spacing, clearances, support, and orientation	OBSERVE	
5. Reinforcing steel has not been re-bent in the field	OBSERVE	
6. Reinforcing clearances have been provided	OBSERVE	
7. Reinforcing steel has been tied and supported as required	OBSERVE	
8. Composite member has required size	OBSERVE	

END SECTION

STRUCTURAL - STEEL - OTHER INSPECTIONS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

OTHER STEEL INSPECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Tables J8.1 & J10.1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Anchor rods and other embedments supporting structural steel	**PERFORM**	Verify the diameter, grade, type, and length of the anchor rod or embedded item, and the extent or depth of embedment prior to placement of concrete.
2. Fabricated steel or erected steel frame	OBSERVE	Verify compliance with the details shown on the construction documents, such as braces, stiffeners, member locations and proper application of joint details at each connection.
3. Reduced beam sections (RBS) where/if occurs	**DOCUMENT**	✓ Contour and finish ✓ Dimensional tolerances
4. Protected zones	**DOCUMENT**	No holes or unapproved attachments made by fabricator or erector
5. H-piles where/if occurs	**DOCUMENT**	No holes or unapproved attachments made by the responsible contractor

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK - PLACEMENT SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

METAL DECK INSPECTION PRIOR TO DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness	**PERFORM**	
2. Document acceptance or rejection of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION DURING DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.2		
TASK	INSPECTION TYPE	DESCRIPTION
3. Verify compliance of deck and all deck accessories installation with construction documents	**PERFORM**	
4. Verify deck materials are represented by the mill certifications that comply with the construction documents	**PERFORM**	
5. Document acceptance or rejection of installation of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION AFTER DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.3		
TASK	INSPECTION TYPE	DESCRIPTION
6. Welding procedure specification (WPS) available	**PERFORM**	
7. Manufactures certifications for welding consumables available	OBSERVE	
8. Material identification (type/grade)	OBSERVE	
9. Check welding equipment	OBSERVE	

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

METAL DECK INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.4		
TASK	INSPECTION TYPE	DESCRIPTION
1. Use of qualified welders	OBSERVE	
2. Control and handling of welding consumables	OBSERVE	
3. Environmental conditions (wind speed, moisture, temperature)	OBSERVE	
4. WPS followed	OBSERVE	
METAL DECK INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.5		
TASK	INSPECTION TYPE	DESCRIPTION
5. Verify size and location of welds, including support, sidelap, and perimeter welds.	**PERFORM**	
6. Welds meet visual acceptance criteria	**PERFORM**	
7. Verify repair activities	**PERFORM**	
8. Document acceptance or rejection of welds	**DOCUMENT**	

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK – FASTENING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

METAL DECK INSPECTION BEFORE MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.6		
TASK	INSPECTION TYPE	DESCRIPTION
1. Manufacturer installation instructions available for mechanical fasteners	OBSERVE	
2. Proper tools available for fastener installation	OBSERVE	
METAL DECK INSPECTION DURING MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.7		
TASK	INSPECTION TYPE	DESCRIPTION
3. Fasteners are positioned as required	OBSERVE	
4. Fasteners are installed in accordance with manufacturer's instructions	OBSERVE	
METAL DECK INSPECTION AFTER MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.8		
TASK	INSPECTION TYPE	DESCRIPTION
5. Check spacing, type, and installation of support fasteners	**PERFORM**	
6. Check spacing, type, and installation of sidelap fasteners	**PERFORM**	
7. Check spacing, type, and installation of perimeter fasteners	**PERFORM**	
8. Verify repair activities	**PERFORM**	
9. Document acceptance or rejection of mechanical fasteners	**DOCUMENT**	

END SECTION

STRUCTURAL - LIGHT GAUGE STEEL FRAMING AND/OR LIGHT GAUGE TRUSSES SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

LIGHT GAUGE STEEL CONSTRUCTION AND CONNECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.2, 1705.11.2, 1705.11.3, UFC 4 023 03		
TASK	INSPECTION TYPE	DESCRIPTION
1. Trusses spanning 60-feet or greater where/if applies	**PERFORM**	Verify that temporary and permanent truss restraint/bracing is installed in accordance with approved truss submittal package.
2. Welded connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all welds composing part of the main wind or seismic force resisting system, including shearwalls, braces, collectors (drag struts), and hold-downs.
3. Connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all screw attachment, bolting, anchoring and other fastening of components within the main wind or seismic force resisting system, including roof deck, roof framing, exterior wall covering, wall to roof/floor connections, braces, collectors (drag struts) and hold-downs.
4. Cold-formed steel (progressive collapse resisting system where/if applies)	OBSERVE	Verify proper welding operations, screw attachment, bolting, anchoring and other fastening of components within the progressive collapse resisting system, including horizontal tie force elements, vertical tie force elements and bridging elements (UFC 4 023 03).

END SECTION

STRUCTURAL - OPEN-WEB STEEL JOISTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

OPEN-WEB STEEL JOISTS AND JOIST GIRDERS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.2.3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Installation of open-web steel joists and joist girders	OBSERVE	✓ End connections – welded or bolted ✓ Bridging – horizontal and diagonal

END SECTION

STRUCTURAL - CONCRETE CONSTRUCTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect reinforcement, including prestressing tendons, and verify placement.	OBSERVE	Verify prior to placing concrete that reinforcing is of specified type, grade and size; that it is free of oil, dirt and unacceptable rust; that it is located and spaced properly; that hooks, bends, ties, stirrups and supplemental reinforcement are placed correctly; that lap lengths, stagger and offsets are provided; and that all mechanical connections are installed per the manufacturer's instructions and/or evaluation report.
2. Reinforcing bar welding	OBSERVE	✓ Verify weldability of reinforcing bars other than ASTM A 706 ✓ Inspect single-pass fillet welds, maximum 5/16" in accordance with AWS D1.4
3. All other welding	**CONTINUOUS**	Visually inspect all welds in accordance with AWS D1.4
4. Cast in place anchors and post installed drilled anchors (downward inclined)	OBSERVE	Verify prior to placing concrete that cast in place anchors and post installed drilled anchors have proper embedment, spacing and edge distance.
5. Post-installed adhesive anchors in horizontal or upward inclined orientations	**CONTINUOUS AND DOCUMENT**	✓ Inspect as required per approved ICC-ES report ✓ Verify that installer is certified for installation of horizontal and overhead installation applications ✓ Inspect proof loading as required by the contract documents
6. Verify use of required mix design	OBSERVE	Verify that all mixes used comply with the approved construction documents
7. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete	**CONTINUOUS**	At the time fresh concrete is sampled to fabricate specimens for strength test verify these tests are performed by qualified technicians.
8. Inspect concrete and/or shotcrete placement for proper application techniques	**CONTINUOUS**	Verify proper application techniques are used during concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.
9. Verify maintenance of specified curing temperature and technique	OBSERVE	Inspect curing, cold weather protection, and hot weather protection procedures.
10. Pre-stressed concrete	**CONTINUOUS**	Verify application of prestressing forces and grouting of bonded prestressing tendons.

CONTINUED ON FOLLOWING PAGE

STRUCTURAL - CONCRETE CONSTRUCTION (CONTINUED)

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE	DESCRIPTION
11. Inspect erection of precast concrete members	OBSERVE	
12. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	OBSERVE	
13. Inspect formwork for shape, location and dimensions of the concrete member being formed.	OBSERVE	

END SECTION

STRUCTURAL - MASONRY CONSTRUCTION SECTION (ALL RISK CATEGORIES)

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE AT START OF CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE	DESCRIPTION
1. Compliance with approved submittals prior to start	OBSERVE	
2. Proportions of site-mixed mortar.	OBSERVE	
3. Grade and type of reinforcement, anchor bolts, and prestressing tendons and anchorages	OBSERVE	
4. Prestressing technique	OBSERVE	
5. Properties of thin bed mortar for AAC masonry	OBSERVE	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE PRIOR TO GROUTING IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
6. Grout space	OBSERVE	
7. Proportions of site-prepared grout and prestressing grout for bonded tendons	OBSERVE	
8. Proportions of site-mixed grout and prestressing grout for bonded tendons	OBSERVE	
9. Placement of masonry units and mortar joints	OBSERVE	
10. Welding of reinforcement	**CONTINUOUS**	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE DURING CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Size and location of structural elements is in compliance	OBSERVE	
12. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F (4.4°c) or hot weather (temp above 90°F (32.2°C))	OBSERVE	
13. Application and measurement of prestressing force	**CONTINUOUS**	
14. Placement of grout and prestressing grout for bonded tendons	**CONTINUOUS**	
15. Placement of AAC masonry units and construction of thin bed mortar joints	**CONTINUOUS**	Continuous for first 5000 square feet only (465 square meters).
16. Observe preparation of grout specimens, mortar specimens, and/or prisms	OBSERVE	
17. Type, size and placement of reinforcement, connectors, anchor bolts and prestressing tendons and anchorages, including details of anchorage of masonry to structural members, frames, or other construction	OBSERVE	

END SECTION

STRUCTURAL - WOOD CONSTRUCTION – SPECIALTY ITEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

WOOD CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.5		
TASK	INSPECTION TYPE	DESCRIPTION
1. High-load diaphragms where applicable	OBSERVE	Verify thickness and grade of sheathing, size of framing members at panel edges, nail diameters and length, and the number of fastener lines and that fastener spacing is per approved contract documents.
2. Metal-plate connected wood trusses spanning 60 feet or greater	OBSERVE	Verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package

END SECTION

STRUCTURAL - WOOD CONSTRUCTION - SEISMIC & WIND SECTION

THIS SECTION IS APPLICABLE IF BOX IS CHECKED: ☐

WOOD CONSTRUCTION SEISMIC AND WIND – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.11 & 1705.12.2		
TASK	INSPECTION TYPE	DESCRIPTION
1. Nailing, bolting, anchoring and other fastening of elements of the main wind/seismic force-resisting system	OBSERVE (CONTINUOUS FOR GLUING)	Includes connectors for: shearwall sheathing, roof/floor sheathing, drag struts/collectors (double top plates), braces, hold downs, roof connections to exterior walls.

END SECTION

STRUCTURAL – ISOLATION AND ENERGY DISSIPATION SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

ISOLATION AND ENERGY DISSIPATION SYSTEMS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC TABLE 1705.12.8		
TASK	INSPECTION TYPE	DESCRIPTION
1. Fabrication and installation	OBSERVE	Verify that fabrication and installation of isolator units and energy dissipation devices conform to manufacturer's recommendations and approved construction documents
2. Testing of seismic isolation Systems in seismically isolated structures		Seismic Isolation Systems in seismically isolated structures shall be tested accordance with ASCE 7, Section 17.8

END SECTION

GEOTECHNICAL - SOILS INSPECTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

SOILS INSPECTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.6		
TASK	INSPECTION TYPE	DESCRIPTION
1. Materials below shallow foundations are adequate to achieve the design bearing capacity.	OBSERVE	
2. Excavations are extended to proper depth and have reached proper material	OBSERVE	
3. Perform classification and testing of compacted fill materials	**OBSERVE**	
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill	**CONTINUOUS**	
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	OBSERVE	During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report

END SECTION

GEOTECHNICAL - DRIVEN DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

DEEP DRIVEN FOUNDATION CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.7		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify element materials, sizes and lengths comply with requirements	**CONTINUOUS**	
2. Inspect driving operations and maintain complete and accurate records for each element	**CONTINUOUS**	
3. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achiever design capacity, record tip and butt elevations and document any damage to foundation element	**CONTINUOUS**	
4. Determine capacities of test elements and conduct additional load tests if required.	**CONTINUOUS**	
5. For steel or concrete elements, perform additional special inspections in accordance with the Steel and Concrete sections in this schedule		

END SECTION

GEOTECHNICAL - HELICAL PILE FOUNDATIONS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

HELICAL PILE FOUNDATIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.9		
TASK	INSPECTION TYPE	DESCRIPTION
1. Record installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required. The approved geotechnical report and the contract documents shall be used to determine compliance	**CONTINUOUS**	

END SECTION

GEOTECHNICAL - CAST IN PLACE DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

CAST IN PLACE DEEP FOUNDATION ELEMENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.8		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	**CONTINUOUS**	
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	**CONTINUOUS**	For concrete elements, perform additional special inspections in accordance with the Concrete section in this schedule

END SECTION

GEOTECHNICAL – GROUND IMPROVEMENT ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

GROUND IMPROVEMENT ELEMENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect installation operations, materials used, and maintain compete and accurate records for each element.	**CONTINUOUS**	
2. Verify placement locations and plumbness, confirm element diameters, lengths, and planned vs. actual top and bottom elevations, Record depth and diameter of pre-augering (if applicable),material volumes used, and observed soil and ground water conditions.	**CONTINUOUS**	
3. Verify load transfer platform or cushion layer is of proper materials, dimensions and thickness.	**OBSERVE**	

END SECTION

FIRE PROTECTION - SPRAYED FIRE-RESISTANT MATERIALS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

SPRAYED FIRE RESISTANT MATERIALS (SFRM) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.14		
TASK	INSPECTION TYPE	DESCRIPTION
1. Substrate condition	OBSERVE	Prior to application, confirm that surfaces have been prepared according to the approved fire-resistance design and manufacturer's instructions.
2. Material thickness	OBSERVE	Verify SFRM thickness according to 2018 IBC 1705.14.4
3. Material density	OBSERVE	Verify SFRM density according to 2018 IBC 1705.14.5
4. Bond strength	OBSERVE	Verify bond strength of cured SFRM according to IBC 1705.14.6

END SECTION

FIRE PROTECTION - MASTIC AND INTUMESCENT COATINGS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.15		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect according to AWCI 12-B and the contract documents	OBSERVE	Inspections shall be performed in accordance with AWCI 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials.

END SECTION

FIRE PROTECTION – FIRE RESISTANT PENETRATIONS AND JOINTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

FIRE RESISTANT PENETRATIONS AND JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.17		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspections of penetration firestop systems conducted in accordance with ASTM E 2174.	OBSERVE	
2. Inspections of fire-resistant joint systems conducted in accordance with ASTM E 2393	OBSERVE	

END SECTION

FIRE PROTECTION – SMOKE CONTROL SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

SMOKE CONTROL – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.18		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify device locations and perform leakage testing	OBSERVE	Perform during erection of ductwork and prior to concealment
2. Pressure difference testing, flow measurements and detection and control verification	OBSERVE	Perform prior to occupancy and after sufficient completion

END SECTION

ARCHITECTURAL - EXTERIOR INSULATION AND FINISH SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.16		
TASK	INSPECTION TYPE	DESCRIPTION
1. Water resistive barrier coating applied over a sheathing substrate.	OBSERVE	Verify that water resistive barrier coating complies with ASTM E 2570.

END SECTION

ARCHITECTURAL – ARCHITECTURAL COMPONENTS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

ARCHITECTURAL COMPONENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.12.5, 1705.12.7		
TASK	INSPECTION TYPE	DESCRIPTION
1. Erection and fastening of exterior cladding and interior and exterior veneer.	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if height is less than 30 feet or weight is less than 5psf**
2. Interior and exterior non-load bearing walls	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if interior non-load bearing walls weigh less than 15psf**
3. Access floors	OBSERVE	Verify that anchorage complies with approved construction documents.
4. Storage racks	OBSERVE	Verify that anchorage complies with approved construction documents. Inspection of post-installed anchors shall comply with approved ICC-ES report. **Inspector Note: Not required for racks less than 8 feet in height**

END SECTION

PLUMBING/MECHANICAL/ELECTRICAL DESIGNATED SEISMIC SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

PLUMBING, MECHANICAL AND ELECTRICAL IBC 1705.12.6		
TASK	INSPECTION TYPE	DESCRIPTION
1. Anchorage of electrical equipment for emergency and standby power systems	OBSERVE	✓ Check for general conformance
2. Anchorage of all other electrical equipment in Seismic Design Categories E and F only (See first page of this schedule for Seismic Design Category)	OBSERVE	✓ Check for general conformance
3. Installation and anchorage of piping designed to carry hazardous materials and their associated mechanical units.	OBSERVE	✓ Check for general conformance
4. Installation and anchorage of vibration isolation systems where the construction documents require a nominal clearance of ¼" or less between support framing and restraint.	OBSERVE	✓ Check for general conformance
5. Verification of clearance between fire sprinkler piping and surrounding mechanical and electrical equipment, including ductwork, piping and their structural supports.	OBSERVE	✓ Check for minimum clearances noted in ASCE7 13.2.3 or a nominal clearance of not less than 3 inches

END SECTION

SECTION 01 45 36

SPECIAL INSPECTIONS - EARTH COVERED MAGAZINES
06/23

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019, with Change 1, 2022) Structural Engineering
UFC 4-420-01	(2015, with Change 1, 2022) Ammunition And Explosives Storage Magazines

1.2 GENERAL REQUIREMENTS

Perform Special Inspections in accordance with the Statement of Special Inspections, Schedule of Special Inspections, Chapter 17 of ICC IBC, Structural Tests and Special Inspections of UFC 3-301-01, and Chapter 3 and Appendix C of UFC 4-420-01. The Statement of Special Inspections and Schedule of Special Inspections are included as an attachment to this specification. Special Inspections are to be performed by an independent third party and are intended to ensure that the work of the Prime Contractor is in accordance with the Contract Documents and applicable building codes. Special inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.

The Government anticipates performing at a minimum, structural observations for the following: Soils - Ground Improvements - Rigid Inclusions, Soils - Ground Improvement - Load Transfer Platforms, Shallow Foundations, Retaining Walls, Concrete Construction, Concrete Roof Framing, Blast Door Installation and Earth Cover Compliance

Engineer of record shall perform at a minimum, structural observations for the following: Soils - Ground Improvements - Rigid Inclusions, Soils - Ground Improvement - Load Transfer Platforms, Shallow Foundations, Retaining Walls, Concrete Construction, Concrete Roof Framing, Blast Door Installation and Earth Cover Compliance.

1.3 DEFINITIONS

1.3.1 Continuous Special Inspections

Continuous Special Inspections is the constant monitoring of specific tasks by a special inspector. These inspections must be carried out

continuously over the duration of the particular tasks.

1.3.2 Perform

Perform these Special Inspections tasks for each welded joint or member.

1.3.3 Observe

Observe these Special Inspections items on a periodic daily basis. Operations need not be delayed pending these inspections.

1.3.4 Special Inspector (SI)

A qualified person retained by the Contractor and approved by the Contracting Officer as having the competence necessary to inspect a particular type of construction requiring Special Inspections. The SI must be an independent third party hired directly by the Prime Contractor.

1.3.5 Associate Special Inspector (ASI)

A qualified person who assists the SI in performing Special Inspections but must perform inspection under the direct supervision of the SI and cannot perform inspections without the SI on site.

1.3.6 Third Party

A Special inspector must not be an employee of the Contractor or of any Sub-Contractor performing the work to be inspected.

1.3.7 Special Inspector of Record (SIOR)

A licensed engineer in responsible charge of supervision of all special inspectors for the project and approved by the Contracting Officer. The SIOR must be an independent third party entity hired directly by the Prime Contractor.

1.3.8 Contracting Officer

The Government official having overall authority for administrative contracting actions. Certain contracting actions may be delegated to the Contracting Officer's Representative (COR).

1.3.9 Contractor's Quality Control (QC) Manager

An individual retained by the Prime Contractor and qualified in accordance with the Section 01 45 00.00 20 QUALITY CONTROL having the overall responsibility for the Contractor's QC organization.

1.3.10 Structural Engineer of Record (SER)

A registered design professional contracted by the Government as an A/E responsible for the overall design and review of submittal documents prepared by others. The SER is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in the state in which the design professional works. The SER is also referred to as the Engineer of Record (EOR) in design code documents.

1.3.11 Statement of Special Inspections (SSI)

A document developed by the SER identifying the material, systems, components and work required to have Special Inspections. This statement is included at the end of this specification.

1.3.12 Schedule of Special Inspections (SSI)

A schedule which lists each of the required Special Inspections, the extent to which each Special Inspection is to be performed, and the required frequency for each in accordance with ICC IBC Chapter 17 and UFC 4-420-01 Appendix C. These schedules are included herein for electrical and at the end of this specification.

1.3.13 Definable Feature of Work (DFOW)

An inspection group that is separate and distinct from other inspection groups, having inspection requirements or inspectors that are unique.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

SIOR Letter of Acceptance; G

Special Inspections Project Manual; G

Ordnance Magazine Electrical Inspection Plan

Visual Inspection Checklist

Electrical Construction Special Inspections Report

SD-06 Test Reports

Special Inspections Daily Reports

Special Inspections Biweekly Reports

SD-07 Certificates

AISC Certified Steel Fabricator

Certificate of Compliance

Special Inspector of Record Qualifications; G

Special Inspector Qualifications; G

SD-11 Closeout Submittals

Interim Report of Special Inspections for Each DFOW; G

Comprehensive Final Report of Special Inspections; G

Electrical Construction Special Inspections Report; G

1.5 SPECIAL INSPECTOR QUALIFICATIONS

Submit qualifications for each special inspector and the special inspector of record.

1.5.1 Steel Construction and High Strength Bolting

1.5.1.1 Special Inspector

a. ICC Structural Steel and Bolting Special Inspector certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

1.5.1.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.2 Welding Structural Steel

1.5.2.1 Special Inspector

a. ICC Structural Welding Special Inspector certificate with one year of related experience, or

b. AWS Certified Welding Inspector

1.5.2.2 Associate Special Inspector

AWS Certified Associate Welding Inspector

1.5.3 Nondestructive Testing of Welds

1.5.3.1 Special Inspector

NDT Level III Certificate

1.5.3.2 Associate Special Inspector

NDT Level II Certificate plus one year of related experience

1.5.4 Cold Formed Steel Framing

1.5.4.1 Special Inspector

a. ICC Reinforced Concrete Special Inspector Certificate with one year of related experience, or

b. ACI Concrete Construction Special Inspector, or

c. Registered Professional Engineer with three years related experience

1.5.4.2 Associate Special Inspector

a. ACI Concrete Construction Special Inspector in Training, or

b. Engineer-In-Training with one year of related experience

1.5.5 Masonry Construction

1.5.5.1 Special Inspector

a. ICC Structural Masonry Special Inspector Certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

1.5.5.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.6 Verification of Site Soil Condition, Fill Placement and Load-Bearing Requirements

1.5.6.1 Special Inspector

a. ICC Soils Special Inspector Certificate with one year of related experience, or

b. NICET Soils Technician Level II Certificate in Construction Material Testing, or

c. Geologist-In-Training with three years of related experience, or

d. Registered Professional Engineer with three years of related experience

1.5.6.2 Associate Special Inspector

a. NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or

b. Engineer-In-Training with one year of related experience

1.5.7 Special Inspector of Record (SIOR)

Registered Professional Engineer with five years of related experience.

1.5.8 Ordnance Magazine Electrical Special Inspections

1.5.8.1 Special Inspectors

a. Contractor’s Quality Control Manager, and

b. Government’s representative, such as the Project’s ET or Electrical Engineer

PART 2 PRODUCTS

2.1 FABRICATOR SPECIAL INSPECTIONS

Special Inspections of fabricator's work performed in the fabricator's shop is required to be inspected in accordance with the Statement of Special Inspections and the Schedule of Special Inspections unless the fabricator is certified by the approved agency to perform such work without Special Inspections. Submit the following certification to the

Contracting Officer for information to allow work performed in the fabricator's shop to not be subjected to Special Inspections.

AISC Certified Steel Fabricator.

At the completion of fabrication, submit a certificate of compliance, to be included with the comprehensive final report of Special Inspections, stating that the materials supplied and work performed by the fabricator are in accordance with the construction documents.

PART 3 EXECUTION

3.1 RESPONSIBILITIES

3.1.1 Special Inspector of Record

a. Supervise all Special Inspectors required by the Contract Documents and the ICC IBC and UFC 4-420-01.

b. Submit a SIOR Letter of Acceptance to the Contracting Officer attesting to acceptance of the duties of SIOR, signed and sealed by the SIOR.

c. Verify the qualifications of all of the Special Inspectors.

d. Verify the qualifications of fabricators.

e. Prepare a Special Inspections Project Manual, which must cover the following:

(1) Roles and responsibilities of the following individuals during Special Inspections: SIOR, SI, ASI, General Contractor's QC Manager and SER.

(2) Organizational chart or communication plan, indicating lines of communication.

(3) Contractor's internal plan for scheduling inspections. Address items such as timeliness of inspection requests, who to contact for inspection requests, and availability of alternate inspectors.

(4) Indicate the Government reporting requirements.

(5) Propose forms or templates to be used by SI and SIOR to document inspections.

(6) Indicate procedures for tracking nonconforming work and verification that corrective work is complete.

(7) Indicate how the SIOR and SI will participate in weekly QC meetings.

(8) Indicate how Special Inspections of shop fabricated items will be handled when the fabricator's shop is not certified in accordance with paragraph FABRICATOR SPECIAL INSPECTIONS.

(9) Include a section in the manual that covers each specific item requiring Special Inspections that is indicated on the Schedule of Special Inspections. Provide names and qualifications of each

special inspector who will be performing the Special Inspections for each specific item. Provide detail on how the Special Inspections are to be carried out for each item so that the expectations are clear for the General Contractor and the Subcontractor performing the work.

(10) Make a copy of the Special Inspections Project Manual available on the job site during construction. Submit a copy of the Special Inspections Project Manual for approval.

f. Attend coordination and mutual understanding meeting where the information in the Special Inspections Project Manual will be reviewed to verify that all parties have a clear understanding of the Special Inspections provisions and the individual duties and responsibilities of each party.

g. Maintain a 3-ring binder for the Special Inspector's daily and biweekly reports and the Special Inspections Project Manual. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the SER.

h. Submit a copy of the Special Inspector's daily reports to the QC Manager.

i. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report.

j. Submit a biweekly Special Inspections report until all work requiring Special Inspections is complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following:

(1) A brief summary of the work performed during the reporting time frame.

(2) Changes and discrepancies with the drawings, specifications that were observed during the reporting period.

(3) Discrepancies which were resolved or corrected.

(4) A list of nonconforming items requiring resolution.

(5) All applicable test results including nondestructive testing reports.

k. At the completion of each Definable Feature of Work (DFOW) requiring Special Inspections, submit an interim report that documents the Special Inspections completed for that DFOW including corrections of all discrepancies noted in the daily reports. Interim reports of Special Inspections must be signed and dated by the SIOR.

l. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project including corrections of all discrepancies noted in the daily reports. The comprehensive final report of Special Inspections must be signed, dated and bear the seal of the SIOR.

3.1.2 Quality Control Manager

a. Maintain a rework items list that includes discrepancies noted on the Special Inspectors daily report.

b. Perform inspections and witness all electrical testing required for Electrical Construction Special Inspections and maintain electronic files and a 3-ring binder for the documentation of these inspections. Documentation for Electrical Construction Special Inspections is detailed in paragraph 3.2 ELECTRICAL SPECIAL INSPECTIONS FOR ORDNANCE MAGAZINES.

3.1.3 Special Inspectors

a. Inspect all elements of the project for which the special inspector is qualified to inspect and are identified in the Schedule of Special Inspections.

b. Attend preparatory phase meetings related to the Definable Feature of Work (DFOW) for which the special inspector is qualified to inspect.

c. Submit daily reports to the SIOR

3.2 ELECTRICAL SPECIAL INSPECTION FOR ORDNANCE MAGAZINES

Electrical special inspections for ordnance magazines are listed within the attached Schedule of Special Inspections for UFGS 01 45 35 SPECIAL INSPECTIONS and are described in the following paragraphs. All electrical inspections will be performed by the Contractor's QC Manager and the Government jointly. The Contractor will perform all electrical tests listed for Ordnance Magazines in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and in Section 26 41 00 LIGHTNING PROTECTION SYSTEM under the direct observation of the Contractor's QC Manager and Government. The Contractor will provide daily reports for each electrical test completed that day, including photographic documentation and continuity test results for each inspection point tested, to the Contractor's QC Manager. Discrepancies that are observed during Special Inspections must be reported by the QC Manager for correction. If discrepancies are not corrected, the observed discrepancies must be documented in the daily report.

Submit an Ordnance Magazine Electrical Inspection Plan to the Construction Manager prior to commencement of construction. The Electrical Inspection Plan must include the facility sketch, grounding system test points lists from the Ordnance Magazine Electrical Test Plan developed for Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, lightning protection system test points lists from the Lightning Protection and Grounding System Test Plan developed for Section 26 41 00 LIGHTNING PROTECTION SYSTEM, visual inspection checklist, and a preliminary inspection schedule.

3.2.1 Visual Inspection Checklist

Submit a Visual Inspection checklist of components requiring visual inspections. Separate the checklist into major grounding systems. On each major grounding system section of the checklist provide fields to identify the inspection date, building inspected, inspectors, and grounding system group to be inspected. Provide a line item of each component and a description of the requirement for said component, a yes/no or pass/fail indicator, and a comment section.

3.2.2 Electrical Construction Special Inspections Report

The Contractor's QC Manager will maintain the reports submitted for each continuity test report. At the completion of the project, submit a written report including the continuity test reports of each inspection point, the visual inspection checklists and photographic documentation of the Special Inspections completed for the electrical construction of each Ordnance Magazine in electronic format. For each individual inspection performed the report must include the inspectors responsible, date of inspection, building inspected, grounding system group inspected, continuity test reports, visual inspection checklist, and photographic documentation including subject of photograph, date photograph was taken, location of photograph and key number of photograph. Identify the location of each photograph on the facility sketch by key number. The submitted inspection report must be signed and dated by the Contractor's QC Manager.

3.2.3 Electrical Inspection Procedures

Provide written and photographic documentation of electrical physical and visual tests as described in listed in the attached Schedule of Special Inspections.

3.2.3.1 Reinforced Steel Bonding Connections

Visually inspect all components establishing the Faraday Shield: floor rebar mat, ceiling rebar mat, wall rebar, rebar in columns and at pilasters. Provide photographic documentation and continuity test results of the concrete reinforcing steel bonding connections (metal ties, brazed or welded) at 10 foot intervals.

a. Inspect all concrete reinforcing steel bonding connections for positive contact between individual bars.

b. Confirm there are no isolated structural components.

c. Verify conductor size and stranding of structural bonds is 1/0 AWG or greater.

d. Verify equipment bonding conductors are larger than #6 AWG

e. Verify only braided straps are installed on equipment that vibrates or is subject to significant movement.

f. Verify bonding points are free from paint or corrosion. If painted, perform pull test. Where paint or corrosion is found and determined to be sufficient to provide isolation, conduct electrical test to verify continuity.

3.2.3.2 Earth Covered Magazine (ECM) Grounding

Visually verify and document the following:

a. Secondary ground girdle conductor is a continuous loop buried no closer than 3 feet from the outside wall of a structure and at least 2 feet beyond drip line, burial depth as required by local ordinances and at least 30 inches below natural grade.

b. Conductor size is 1/0 AWG or greater with strands not less than #17 AWG.

c. Bond between the building structural steel and the secondary ground girdle. Confirm cable is copper and size is 1/0 AWG or greater with strands not less than #17 AWG.

d. Bonds between ground cross connect cable and secondary ground girdle.

e. Bonds between floor trench frame and rebar floor mat.

f. Interconnections between grounding take-up reels, grounding inserts, and auxiliary ground bars located in pilasters and ground cross connect cable.

g. All subsystem grounds are interconnected with the secondary ground girdle.

h. Bonds between column footings and secondary ground girdle.

i. All ground conductors above or below ground are free from painting or other coatings.

3.2.3.3 Earth Electrode System

a. Prior to burial, visually verify and document system conductors are not broken, damaged, or corroded.

b. As fill is added around the ECM, visually verify and document that all ground conductors and conduit from ordnance ground inserts installed up to test wells are run straight and are continuous, undamaged, and free from corrosion.

3.2.3.4 Lightning Protection Grounding System

Visually verify the following, if present:

a. All components of lightning projection system are properly supported.

b. Conductors are continuous where applicable and burial depth as required by local ordinances and at least 30 inches below grade.

c. Catenary mast systems used in conjunction with a secondary grounding system girdle uses a separate lightning protection ground loop located at least 3 feet outside of the secondary grounding system girdle.

d. No part of structure obviously outside of the zone-of protection.

e. No non-bonded items within sideflash distance of the lightning protection system or frame of structure.

f. All integral lightning protection system components (air terminals and down conductors) are present, undamaged, and free of corrosion.

g. No loose connections are present.

h. The connections to the secondary ground girdle are intact.

3.2.3.5 Other Bonds

3.2.3.5.1 Power System Ground

Visually verify the following:

a. The ground attachment point is free of corrosion and is tightly connected.

b. There are no obvious breaks in bonding cables to the ground rod or secondary grounding system girdle.

3.2.3.5.2 Ordnance Grounds

Visually verify the following, if present:

a. Ordnance grounding receptacle are free from debris.

b. Ground interfaces, ball studs, bus bars and/or inspections boxes are free from corrosion and broken connections.

c. The ordnance ground is clearly marked and legible.

d. The ordnance ground is free from paint, corrosion, or foreign materials.

e. The ordnance ground is isolated from other grounding systems internally.

f. The connection to the secondary ground girdle is intact.

g. The ordnance ground is sufficiently supported.

h. The ground reels are isolated from structure.

i. The attachment to connector is adequate.

j. The conductor size and stranding requirements are met.

Conduct a tug-test at the connection between the ground girdle and test rods.

3.2.3.5.3 Static Grounds

Visually verify the following, if present:

a. The static grounds are free from paint, corrosion, or foreign materials.

b. The static grounds are not directly connected to gas, steam, or air lines, dry sprinkler system piping, or lightning down conductors.

c. Bonding and grounding cables are continuous.

d. Conductive floors, mats, and table tops are clean, smooth, and free of cracks.

e. Grab bars are securely supported and not painted and installed outside at entrance to areas with conductive floors.

f. Conductive chairs, carts, and workstations are clearly labeled as conductive/anti-static.

3.2.3.6 Electrical Continuity Tests for Ordnance Magazines

Observe and photographically document all electrical continuity tests listed in the Electrical Test Plan. Review and approve written electrical test reports. Provide photographic documentation and continuity test results of a random sample of bonding connections between structural elements. The sample must include a minimum of 10 percent of the connections.

3.3 DEFECTIVE WORK

Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Contracting Officer to accept such work.

-- End of Section --

Project: P-1102
Location: Groton Conneticut
Project #:
Date: 2/17/2023

STATEMENT OF SPECIAL INSPECTIONS - MAGAZINES

Project Seismic Design Category: B
Project Risk Category: III
Project Design Wind Speed (mph): 136
Number of Stories: 1
Structure Height Above Grade (ft): 15
Hazardous Occupancy or attached to such? No Group H Occupancies

Special Inspector of Record (SIOR)

A Special Inspector of Record (SIOR) **IS** required (per UFGS 01 45 36, Section 1.3.8)

SIOR Name (Registered Professional): Contractor to provide prior to construction start
Professional Registration Number:
Consulting Firm Name (if any):
SIOR Office AND Mobile Phone Number:

Lateral Force Resisting System (LFRS)

2018 IBC 1704.3.2 and 1704.3.3

Following is a listing of critical main wind/seismic force resisting systems for this structure. Carefully inspect these elements as part of the roles and responsiblities of the Special Inspector (reference the Schedule of Special Inspections for inspection checklists).

Vertical LFRS Elements	Notes
Ordinary Reinforced Concrete Shear Walls	

Horizontal LFRS Elements	Notes
Reinforced Concrete Slab	
Out of Plane Wall Connections	See Structural Details

Project: P-1102
Location: Groton Conneticut
Project #: 0
Date: 2/17/2023

Designated Seismic Systems (DSS)

(2018 IBC 1705.13.3) (ASCE 7-16, 13.2.2, C13.2.2) (UFC 3-301-1, 2-5.3)

DESIGNATED SEISMIC SYSTEMS DO NOT APPLY TO THIS PROJECT, due to the Seismic Design Category being less than C.

ELECTRICAL Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A

If additional space is required, append an additional sheet listing the remaining DSS

MECHANICAL/PLUMBING Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A
N/A

If additional space is required, append an additional sheet listing the remaining DSS

OTHER Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A
N/A

Final Walk Down Inspection and Report

(UFC 3 301 01 SECTION 2-5.4)

Final Walk Down Inspection of non-structural Designated Seismic Systems does not apply to this project (no Designated Seismic Systems)

SCHEDULE OF SPECIAL INSPECTIONS

Reference UFGS 01 45 36 for all requirements not noted as part of this schedule.

INSPECTION DEFINITIONS:

PERFORM: Perform these tasks for each weld, fastener or bolted connection, and noted verification.

OBSERVE: Observe these items randomly during the course of each work day to insure that applicable requirements are being met. Operations need not be delayed pending these inspections at contractor's risk.

DOCUMENT: Document, with a report, that the work has been performed in accordance with the contract documents. This is in addition to any other reports required in the Special Inspections guide specification.

CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

The Seismic Design Category for this project is: ☐ A, ☒ B, ☐ C, ☐ D, ☐ E, ☐ F (check appropriate box)

STRUCTURAL - STEEL – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION PRIOR TO WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify that the welding procedures specification (WPS) is available	**PERFORM**	
2. Verify manufacturer certifications for welding consumables are available	**PERFORM**	
3. Verify material identification	**PERFORM**	Type and grade.
4. Welder Identification System	**PERFORM**	The fabricator or erector, as applicable, shall maintain a system by which a welder who has welded a joint or member can be identified. Stamps, if used, shall be the low-stress type.
5. Fit-up of groove welds (including joint geometry)	OBSERVE	✓ Joint preparation ✓ Dimensions (alignment, root opening, root face, bevel) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location) ✓ Backing type and fit (if applicable)
6. Configuration and finish of access holes	OBSERVE	
7. Fit-up of fillet welds	OBSERVE	✓ Dimensions (alignment, gaps at root) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location)
STEEL INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-2		
TASK	INSPECTION TYPE	DESCRIPTION
8. Use of qualified welders	**PERFORM**	Welding by welders, welding operators, and tack welders who are qualified in conformance with requirements.
9. Control and handling of welding consumables	OBSERVE	✓ Packaging ✓ Electrode atmospheric exposure control
10. No welding over cracked tack welds	OBSERVE	
11. Environmental conditions	OBSERVE	✓ Wind speed within limits ✓ Precipitation and temperature
12. Welding Procedures Specification followed	OBSERVE	✓ Settings on welding equipment ✓ Travel speed ✓ Selected welding materials ✓ Shielding gas type/flow rate ✓ Preheat applied ✓ Interpass temperature maintained (min./max.) ✓ Proper position (F, V, H, OH) ✓ Intermix of filler metals avoided
13. Welding techniques	OBSERVE	✓ Interpass and final cleaning ✓ Each pass within profile limitations ✓ Each pass meets quality requirements

STRUCTURAL - STEEL – WELDING SECTION (CONTINUED)

STEEL INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-3		
TASK	INSPECTION TYPE	DESCRIPTION
14. Welds cleaned	OBSERVE	
15. Size, length, and location of all welds	**PERFORM**	Size, length, and location of all welds conform to the requirements of the detail drawings.
16. Welds meet visual acceptance criteria	**PERFORM AND DOCUMENT**	✓ Crack prohibition ✓ Weld/base-metal fusion ✓ Crater cross section ✓ Weld profiles ✓ Weld size ✓ Undercut ✓ Porosity
17. Arc strikes	**PERFORM**	
18. k-area	**PERFORM**	When welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, visually inspect the web k-area for cracks.
19. Backing removed, weld tabs removed and finished, and fillet welds added where required	**PERFORM**	
20. Repair activities	**PERFORM AND DOCUMENT**	
21. Document acceptance or rejection of welded joint or member	**PERFORM**	

END SECTION

STRUCTURAL - STEEL – BOLTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION TASKS PRIOR TO BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Manufacture's certifications available for fastener materials	**PERFORM**	
2. Fasteners marked in accordance with ASTM requirements	OBSERVE	
3. Proper fasteners selected for joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	OBSERVE	
4. Proper bolting procedure selected for joint detail	OBSERVE	
5. Connecting elements, including appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	OBSERVE	
6. Proper storage provided for bolts, nuts, washers, and other fastener components	OBSERVE	
STEEL INSPECTION TASKS DURING BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-2		
TASK	INSPECTION TYPE	DESCRIPTION
7. Fastener assemblies of suitable condition, placed in all holes and washers (if required) are positioned as required	OBSERVE	
8. Joint brought to the snug-tight condition prior to pretensioning operation	OBSERVE	
9. Fastener component not turned by the wrench prevented from rotating	OBSERVE	
10. Bolts are pretensioned in accordance with RCSC Specification, progressing systematically from the most rigid point toward the free edges	OBSERVE	
STEEL INSPECTION TASKS AFTER BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.1, AISC 360-10: Table C-N5.6-3		
TASK	INSPECTION TYPE	DESCRIPTION
11. Document acceptance or rejection of all bolted connections	**DOCUMENT**	

END SECTION

STRUCTURAL - STEEL - NON DESTRUCTIVE TESTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Section N5.5		
TASK	INSPECTION TYPE	DESCRIPTION
1. Use of qualified nondestructive testing personnel	**PERFORM**	Visual weld inspection and nondestructive testing (NDT) shall be conducted by personnel qualified in accordance with AWS D1.8 clause 7.2
2. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 20% of CJP groove welds for materials greater than 5/16" (8mm) thick. Testing rate must be increased to 100% if greater than 5% of welds tested have unacceptable defects.
3. Welded joints subject to fatigue	OBSERVE	Dye penetrant testing (DT) and Ultrasonic testing (UT) shall be performed on 100% of welded joints identified on contract drawings as being subject to fatigue.
4. Weld tab removal sites	OBSERVE	At the end of welds where weld tabs have been removed, magnetic particle testing shall be performed on the same beam-to-column joints receiving UT

END SECTION

STRUCTURAL - STEEL – AISC 341 REQUIREMENTS (SEISMIC PROVISIONS) SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Section J6.2		
TASK	INSPECTION TYPE	DESCRIPTION
1. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 100% of CJP groove welds for materials greater than 5/16" thick (8mm).
2. Beam cope and access hole.	OBSERVE	At welded splices and connections, thermally cut surfaces of beam copes and access holes shall be tested using magnetic particle testing (MT) or dye penetrant testing (DT), when the flange thickness exceeds 1 1/2 in. for rolled shapes, or when the web thickness exceeds 1 1/2 in. for built-up shapes.
3. K-area NDT (AISC 341)	**PERFORM**	Where welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, the web shall be tested for cracks using magnetic particle testing (MT). The MT inspection area shall include the k-area base metal within 3-inches of the weld. The MT shall be performed no sooner than 48 hours following completion of the welding.
4. Placement of reinforcing or contouring fillet welds	**DOCUMENT**	

END SECTION

STRUCTURAL - STEEL - COMPOSITE CONSTRUCTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

COMPOSITE CONSTRUCTION PRIOR TO PLACING CONCRETE – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table N6.1, AISC 341-16: Table J9.1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Placement and installation of steel headed stud anchors	**PERFORM**	
2. Material identification of reinforcing steel (Type/Grade)	OBSERVE	
3. Determination of carbon equivalent for reinforcing steel other than ASTM A706	OBSERVE	
4. Proper reinforcing steel size, spacing, clearances, support, and orientation	OBSERVE	
5. Reinforcing steel has not been re-bent in the field	OBSERVE	
6. Reinforcing clearances have been provided	OBSERVE	
7. Reinforcing steel has been tied and supported as required	OBSERVE	
8. Composite member has required size	OBSERVE	

END SECTION

STRUCTURAL - STEEL - OTHER INSPECTIONS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

OTHER STEEL INSPECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Tables J8.1 & J10.1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Anchor rods and other embedments supporting structural steel	**PERFORM**	Verify the diameter, grade, type, and length of the anchor rod or embedded item, and the extent or depth of embedment prior to placement of concrete.
2. Fabricated steel or erected steel frame	OBSERVE	Verify compliance with the details shown on the construction documents, such as braces, stiffeners, member locations and proper application of joint details at each connection.
3. Reduced beam sections (RBS) where/if occurs	**DOCUMENT**	✓ Contour and finish ✓ Dimensional tolerances
4. Protected zones	**DOCUMENT**	No holes or unapproved attachments made by fabricator or erector
5. H-piles where/if occurs	**DOCUMENT**	No holes or unapproved attachments made by the responsible contractor

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK - PLACEMENT SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

METAL DECK INSPECTION PRIOR TO DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.1		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness	**PERFORM**	
2. Document acceptance or rejection of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION DURING DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.2		
TASK	INSPECTION TYPE	DESCRIPTION
3. Verify compliance of deck and all deck accessories installation with construction documents	**PERFORM**	
4. Verify deck materials are represented by the mill certifications that comply with the construction documents	**PERFORM**	
5. Document acceptance or rejection of installation of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION AFTER DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.3		
TASK	INSPECTION TYPE	DESCRIPTION
6. Welding procedure specification (WPS) available	**PERFORM**	
7. Manufactures certifications for welding consumables available	OBSERVE	
8. Material identification (type/grade)	OBSERVE	
9. Check welding equipment	OBSERVE	

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

METAL DECK INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.4		
TASK	INSPECTION TYPE	DESCRIPTION
1. Use of qualified welders	OBSERVE	
2. Control and handling of welding consumables	OBSERVE	
3. Environmental conditions (wind speed, moisture, temperature)	OBSERVE	
4. WPS followed	OBSERVE	
METAL DECK INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.5		
TASK	INSPECTION TYPE	DESCRIPTION
5. Verify size and location of welds, including support, sidelap, and perimeter welds.	**PERFORM**	
6. Welds meet visual acceptance criteria	**PERFORM**	
7. Verify repair activities	**PERFORM**	
8. Document acceptance or rejection of welds	**DOCUMENT**	

END SECTION

STRUCTURAL - COLD-FORMED METAL DECK – FASTENING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

METAL DECK INSPECTION BEFORE MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.6		
TASK	INSPECTION TYPE	DESCRIPTION
1. Manufacturer installation instructions available for mechanical fasteners	OBSERVE	
2. Proper tools available for fastener installation	OBSERVE	
METAL DECK INSPECTION DURING MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.7		
TASK	INSPECTION TYPE	DESCRIPTION
3. Fasteners are positioned as required	OBSERVE	
4. Fasteners are installed in accordance with manufacturer's instructions	OBSERVE	
METAL DECK INSPECTION AFTER MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.8		
TASK	INSPECTION TYPE	DESCRIPTION
5. Check spacing, type, and installation of support fasteners	**PERFORM**	
6. Check spacing, type, and installation of sidelap fasteners	**PERFORM**	
7. Check spacing, type, and installation of perimeter fasteners	**PERFORM**	
8. Verify repair activities	**PERFORM**	
9. Document acceptance or rejection of mechanical fasteners	**DOCUMENT**	

END SECTION

STRUCTURAL - LIGHT GAUGE STEEL FRAMING AND/OR LIGHT GAUGE TRUSSES SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

LIGHT GAUGE STEEL CONSTRUCTION AND CONNECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.2, 1705.11.2, 1705.11.3, UFC 4 023 03		
TASK	INSPECTION TYPE	DESCRIPTION
1. Trusses spanning 60-feet or greater where/if applies	**PERFORM**	Verify that temporary and permanent truss restraint/bracing is installed in accordance with approved truss submittal package.
2. Welded connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all welds composing part of the main wind or seismic force resisting system, including shearwalls, braces, collectors (drag struts), and hold-downs.
3. Connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all screw attachment, bolting, anchoring and other fastening of components within the main wind or seismic force resisting system, including roof deck, roof framing, exterior wall covering, wall to roof/floor connections, braces, collectors (drag struts) and hold-downs.
4. Cold-formed steel (progressive collapse resisting system where/if applies)	OBSERVE	Verify proper welding operations, screw attachment, bolting, anchoring and other fastening of components within the progressive collapse resisting system, including horizontal tie force elements, vertical tie force elements and bridging elements (UFC 4 023 03).

END SECTION

STRUCTURAL - OPEN-WEB STEEL JOISTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

OPEN-WEB STEEL JOISTS AND JOIST GIRDERS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.2.3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Installation of open-web steel joists and joist girders	OBSERVE	✓ End connections – welded or bolted ✓ Bridging – horizontal and diagonal

END SECTION

STRUCTURAL - CONCRETE CONSTRUCTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect reinforcement, including prestressing tendons, and verify placement.	OBSERVE	Verify prior to placing concrete that reinforcing is of specified type, grade and size; that it is free of oil, dirt and unacceptable rust; that it is located and spaced properly; that hooks, bends, ties, stirrups and supplemental reinforcement are placed correctly; that lap lengths, stagger and offsets are provided; and that all mechanical connections are installed per the manufacturer's instructions and/or evaluation report.
2. Reinforcing bar welding	OBSERVE	✓ Verify weldability of reinforcing bars other than ASTM A 706 ✓ Inspect single-pass fillet welds, maximum 5/16" in accordance with AWS D1.4
3. All other welding	**CONTINUOUS**	Visually inspect all welds in accordance with AWS D1.4
4. Cast in place anchors and post installed drilled anchors (downward inclined)	OBSERVE	Verify prior to placing concrete that cast in place anchors and post installed drilled anchors have proper embedment, spacing and edge distance.
5. Post-installed adhesive anchors in horizontal or upward inclined orientations	**CONTINUOUS AND DOCUMENT**	✓ Inspect as required per approved ICC-ES report ✓ Verify that installer is certified for installation of horizontal and overhead installation applications ✓ Inspect proof loading as required by the contract documents
6. Verify use of required mix design	OBSERVE	Verify that all mixes used comply with the approved construction documents
7. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete	**CONTINUOUS**	At the time fresh concrete is sampled to fabricate specimens for strength test verify these tests are performed by qualified technicians.
8. Inspect concrete and/or shotcrete placement for proper application techniques	**CONTINUOUS**	Verify proper application techniques are used during concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.
9. Verify maintenance of specified curing temperature and technique	OBSERVE	Inspect curing, cold weather protection, and hot weather protection procedures.
10. Pre-stressed concrete	**CONTINUOUS**	Verify application of prestressing forces and grouting of bonded prestressing tendons.

CONTINUED ON FOLLOWING PAGE

STRUCTURAL - CONCRETE CONSTRUCTION (CONTINUED)

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE	DESCRIPTION
11. Inspect erection of precast concrete members	OBSERVE	
12. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	OBSERVE	
13. Inspect formwork for shape, location and dimensions of the concrete member being formed.	OBSERVE	

END SECTION

STRUCTURAL - MASONRY CONSTRUCTION SECTION (ALL RISK CATEGORIES)

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE AT START OF CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE	DESCRIPTION
1. Compliance with approved submittals prior to start	OBSERVE	
2. Proportions of site-mixed mortar.	OBSERVE	
3. Grade and type of reinforcement, anchor bolts, and prestressing tendons and anchorages	OBSERVE	
4. Prestressing technique	OBSERVE	
5. Properties of thin bed mortar for AAC masonry	OBSERVE	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE PRIOR TO GROUTING IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
6. Grout space	OBSERVE	
7. Proportions of site-prepared grout and prestressing grout for bonded tendons	OBSERVE	
8. Proportions of site-mixed grout and prestressing grout for bonded tendons	OBSERVE	
9. Placement of masonry units and mortar joints	OBSERVE	
10. Welding of reinforcement	**CONTINUOUS**	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE DURING CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Size and location of structural elements is in compliance	OBSERVE	
12. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F (4.4°c) or hot weather (temp above 90°F (32.2°C))	OBSERVE	
13. Application and measurement of prestressing force	**CONTINUOUS**	
14. Placement of grout and prestressing grout for bonded tendons	**CONTINUOUS**	
15. Placement of AAC masonry units and construction of thin bed mortar joints	**CONTINUOUS**	Continuous for first 5000 square feet only (465 square meters).
16. Observe preparation of grout specimens, mortar specimens, and/or prisms	OBSERVE	
17. Type, size and placement of reinforcement, connectors, anchor bolts and prestressing tendons and anchorages, including details of anchorage of masonry to structural members, frames, or other construction	OBSERVE	

END SECTION

STRUCTURAL - WOOD CONSTRUCTION – SPECIALTY ITEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

WOOD CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.5		
TASK	INSPECTION TYPE	DESCRIPTION
1. High-load diaphragms where applicable	OBSERVE	Verify thickness and grade of sheathing, size of framing members at panel edges, nail diameters and length, and the number of fastener lines and that fastener spacing is per approved contract documents.
2. Metal-plate connected wood trusses spanning 60 feet or greater	OBSERVE	Verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package

END SECTION

STRUCTURAL - WOOD CONSTRUCTION - SEISMIC & WIND SECTION

THIS SECTION IS APPLICABLE IF BOX IS CHECKED: ☐

WOOD CONSTRUCTION SEISMIC AND WIND – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.11 & 1705.12.2		
TASK	INSPECTION TYPE	DESCRIPTION
1. Nailing, bolting, anchoring and other fastening of elements of the main wind/seismic force-resisting system	OBSERVE (CONTINUOUS FOR GLUING)	Includes connectors for: shearwall sheathing, roof/floor sheathing, drag struts/collectors (double top plates), braces, hold downs, roof connections to exterior walls.

END SECTION

STRUCTURAL – ISOLATION AND ENERGY DISSIPATION SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

ISOLATION AND ENERGY DISSIPATION SYSTEMS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC TABLE 1705.12.8		
TASK	INSPECTION TYPE	DESCRIPTION
1. Fabrication and installation	OBSERVE	Verify that fabrication and installation of isolator units and energy dissipation devices conform to manufacturer's recommendations and approved construction documents
2. Testing of seismic isolation Systems in seismically isolated structures		Seismic Isolation Systems in seismically isolated structures shall be tested accordance with ASCE 7, Section 17.8

END SECTION

GEOTECHNICAL - SOILS INSPECTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

SOILS INSPECTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.6		
TASK	INSPECTION TYPE	DESCRIPTION
1. Materials below shallow foundations are adequate to achieve the design bearing capacity.	OBSERVE	
2. Excavations are extended to proper depth and have reached proper material	OBSERVE	
3. Perform classification and testing of compacted fill materials	**OBSERVE**	
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill	**CONTINUOUS**	
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	OBSERVE	During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report

END SECTION

GEOTECHNICAL - DRIVEN DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

DEEP DRIVEN FOUNDATION CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.7		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify element materials, sizes and lengths comply with requirements	**CONTINUOUS**	
2. Inspect driving operations and maintain complete and accurate records for each element	**CONTINUOUS**	
3. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achiever design capacity, record tip and butt elevations and document any damage to foundation element	**CONTINUOUS**	
4. Determine capacities of test elements and conduct additional load tests if required.	**CONTINUOUS**	
5. For steel or concrete elements, perform additional special inspections in accordance with the Steel and Concrete sections in this schedule		

END SECTION

GEOTECHNICAL - HELICAL PILE FOUNDATIONS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

HELICAL PILE FOUNDATIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.9		
TASK	INSPECTION TYPE	DESCRIPTION
1. Record installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required. The approved geotechnical report and the contract documents shall be used to determine compliance	**CONTINUOUS**	

END SECTION

GEOTECHNICAL - CAST IN PLACE DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

CAST IN PLACE DEEP FOUNDATION ELEMENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.8		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	**CONTINUOUS**	
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	**CONTINUOUS**	For concrete elements, perform additional special inspections in accordance with the Concrete section in this schedule

END SECTION

GEOTECHNICAL – GROUND IMPROVEMENT ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

GROUND IMPROVEMENT ELEMENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect installation operations, materials used, and maintain compete and accurate records for each element.	**CONTINUOUS**	
2. Verify placement locations and plumbness, confirm element diameters, lengths, and planned vs. actual top and bottom elevations, Record depth and diameter of pre-augering (if applicable),material volumes used, and observed soil and ground water conditions.	**CONTINUOUS**	
3. Verify load transfer platform or cushion layer is of proper materials, dimensions and thickness.	**OBSERVE**	

END SECTION

FIRE PROTECTION - SPRAYED FIRE-RESISTANT MATERIALS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

SPRAYED FIRE RESISTANT MATERIALS (SFRM) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.14		
TASK	INSPECTION TYPE	DESCRIPTION
1. Substrate condition	OBSERVE	Prior to application, confirm that surfaces have been prepared according to the approved fire-resistance design and manufacturer's instructions.
2. Material thickness	OBSERVE	Verify SFRM thickness according to 2018 IBC 1705.14.4
3. Material density	OBSERVE	Verify SFRM density according to 2018 IBC 1705.14.5
4. Bond strength	OBSERVE	Verify bond strength of cured SFRM according to IBC 1705.14.6

END SECTION

FIRE PROTECTION - MASTIC AND INTUMESCENT COATINGS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.15		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspect according to AWCI 12-B and the contract documents	OBSERVE	Inspections shall be performed in accordance with AWCI 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials.

END SECTION

FIRE PROTECTION – FIRE RESISTANT PENETRATIONS AND JOINTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

FIRE RESISTANT PENETRATIONS AND JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.17		
TASK	INSPECTION TYPE	DESCRIPTION
1. Inspections of penetration firestop systems conducted in accordance with ASTM E 2174.	OBSERVE	
2. Inspections of fire-resistant joint systems conducted in accordance with ASTM E 2393	OBSERVE	

END SECTION

FIRE PROTECTION – SMOKE CONTROL SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

SMOKE CONTROL – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.18		
TASK	INSPECTION TYPE	DESCRIPTION
1. Verify device locations and perform leakage testing	OBSERVE	Perform during erection of ductwork and prior to concealment
2. Pressure difference testing, flow measurements and detection and control verification	OBSERVE	Perform prior to occupancy and after sufficient completion

END SECTION

ARCHITECTURAL - EXTERIOR INSULATION AND FINISH SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.16		
TASK	INSPECTION TYPE	DESCRIPTION
1. Water resistive barrier coating applied over a sheathing substrate.	OBSERVE	Verify that water resistive barrier coating complies with ASTM E 2570.

END SECTION

ARCHITECTURAL – ARCHITECTURAL COMPONENTS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

ARCHITECTURAL COMPONENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.12.5, 1705.12.7		
TASK	INSPECTION TYPE	DESCRIPTION
1. Erection and fastening of exterior cladding and interior and exterior veneer.	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if height is less than 30 feet or weight is less than 5psf**
2. Interior and exterior non-load bearing walls	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if interior non-load bearing walls weigh less than 15psf**
3. Access floors	OBSERVE	Verify that anchorage complies with approved construction documents.
4. Storage racks	OBSERVE	Verify that anchorage complies with approved construction documents. Inspection of post-installed anchors shall comply with approved ICC-ES report. **Inspector Note: Not required for racks less than 8 feet in height**

END SECTION

PLUMBING/MECHANICAL/ELECTRICAL DESIGNATED SEISMIC SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

PLUMBING, MECHANICAL AND ELECTRICAL IBC 1705.12.6		
TASK	INSPECTION TYPE	DESCRIPTION
1. Anchorage of electrical equipment for emergency and standby power systems	OBSERVE	✓ Check for general conformance
2. Anchorage of all other electrical equipment in Seismic Design Categories E and F only (See first page of this schedule for Seismic Design Category)	OBSERVE	✓ Check for general conformance
3. Installation and anchorage of piping designed to carry hazardous materials and their associated mechanical units.	OBSERVE	✓ Check for general conformance
4. Installation and anchorage of vibration isolation systems where the construction documents require a nominal clearance of ¼" or less between support framing and restraint.	OBSERVE	✓ Check for general conformance
5. Verification of clearance between fire sprinkler piping and surrounding mechanical and electrical equipment, including ductwork, piping and their structural supports.	OBSERVE	✓ Check for minimum clearances noted in ASCE7 13.2.3 or a nominal clearance of not less than 3 inches

END SECTION

SPECIAL ITEMS RELATED TO EXPLOSIVES SAFETY

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

Concrete Construction – UFC 4-420-01			
TASK	**INSPECTION TYPE**	**DESCRIPTION**	**REFERENCE**
1. Reinforcing steel placement	OBSERVE	Inspect size, spacing, cover, positioning and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters.	ACI 318: 3.5, 26.6.2
2. Concrete Placement	CONTINUOUS	Inspect placement of concrete. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.	AC1 318: 26.5.2
3. Sampling and testing of concrete	CONTINUOUS	Test concrete compressive strength, slump, air-content and temperature.	ASTM C 172 ASTM C 31 ACI 318: 26.12
4. Curing and protection	OBSERVE	Inspect curing, cold weather protections and hot weather protection procedures.	ACI 318: 26.5.3 -26.5.5
5. Formwork	OBSERVE	Inspect flatwork for shape, location and dimensions of the concrete member being formed.	ACI 318: 26.11
Door Construction - UFC 4-420-01			
TASK	**INSPECTION TYPE**	**DESCRIPTION**	
1. Fabricator certification and quality control procedures	**DOCUMENT**	Review of fabricator's quality control procedures or AISC certification	
1. Shop demonstration	CONTINUOUS	See Blast Door Notes on Drawings	
2. Fabrication inspection	OBSERVE	Inspect in-place fabrication, or review fabricator's approved independent inspection agency's reports.	
Electrical and Miscellaneous Construction			
TASK	**INSPECTION TYPE**	**DESCRIPTION**	
2. Rebar faraday-shield	OBSERVE & **DOCUMENT**	Inspect reinforcing steel to ensure electrical continuity between the cap, walls, slab and foundation through crimped connections. Document connections with photos and continuity test. All crimped connections must be inspected prior to concrete placement	NFPA 780, DoD 6055.09-M, V2.E4.3

CONTINUED ON FOLLOWING PAGE

SPECIAL ITEMS RELATED TO EXPLOSIVES (CONTINUED)

Electrical and Miscellaneous Construction (continued)			
TASK	**INSPECTION TYPE**	**DESCRIPTION**	
3. ECM grounding	OBSERVE & **DOCUMENT**	Visually inspect to ensure ECM foundation is bonded to the grounding system. Document with photos.	NFPA 780, DoD 6055.09-M, V2.E4.3
4. Grounding system	OBSERVE & **DOCUMENT**	Visually inspect grounding system conductors to ensure no damage, breakage, or corrosion has occurred to the conductors during install and before earth burial. Document with photos.	NFPA 780, DoD 6055.09-M, V2.E4.3NFPA 780, DoD 6055.09-M, V2.E4.3 DA PAM 385-64, 17-27.
5. Individual bonds	OBSERVE	Inspect all bonds for loose connections that might result in high-resistance connections.	NFPA 780,8.9 DoD 6055.09-M, V2.E4.3 DA PAM 385-64, 17-27
6. LPS components	OBSERVE	Inspect LPS components for secure mounting and protection against accidental mechanical displacement.	NFPA 780, 8.9, DoD 6055.09-M, V2.E4.3 DA PAM 385-64, 17-27
7. LPS testing	**DOCUMENT**	Perform bonding test across each bond and an earth electrode test of the LPS.	NFPA 780 , 8.9, DoD 6055.09-M, V2.E4.3 DA PAM 385-64, 17-28
8. Continuity testing	OBSERVE	Witness continuity testing	NFPA 780, DoD 6055.09-M, V2.E4.3
9. Earth cover	OBSERVE	Inspect depth gauges on roof prior to earth cover placement for size and stability. Inspect earth cover depth and slope to ensure a 2’-0” minimum is provided above structure.	
10. Door laps	CONTINUOUS	Inspect door laps at top and bottom of door frame.	
11. Miscellaneous embedded and attached items (doors, frames, trenches, etc)	OBSERVE & **DOCUMENT**	Inspect embedded and attached items to ensure they are bonded to the grounding system. Document with photos.	

END SECTION

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
11/20, CHG 2: 08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511	(2017) Reduced-Pressure Principle Backflow Prevention Assembly

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023) National Electrical Code
NFPA 241	(2022) Standard for Safeguarding Construction, Alteration, and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Site Plan; G

Traffic Control Plan; G

Haul Road Plan; G

Contractor Computer Cybersecurity Compliance Statements; G

Contractor Temporary Network Cybersecurity Compliance Statements; G

SD-03 Product Data

Backflow Preventers; G

SD-06 Test Reports

Backflow Preventer Tests

SD-07 Certificates

Backflow Tester Certification

Backflow Preventers Certificate of Full Approval

1.3 CONSTRUCTION SITE PLAN

Prior to the start of work, submit for Government approval a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

1.4 BACKFLOW PREVENTERS CERTIFICATE

1.4.1 Backflow Tester Certificate

Prior to testing, submit to the Contracting Officer certification issued by the State or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester must not be affiliated with a company participating in other phases of this Contract.

1.4.2 Backflow Prevention Training Certificate

Submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

1.5 DOD CONDITION OF READINESS (COR)

DOD will set the Condition of Readiness (COR) based on the weather forecast for sustained winds 50 knots (58 mph) or greater. Contact the Contracting Officer for the current COR setting.

Monitor weather conditions a minimum of twice a day and take appropriate actions according to the approved Emergency Plan in the accepted Accident Prevention Plan, EM 385-1-1 Section 01 Emergency Planning and the instructions below.

Unless otherwise directed by the Contracting Officer, comply with:

a. Condition FOUR (Sustained winds of 58 mph or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 3.3 feet high. Remove all debris, trash, or objects

that could become missile hazards. Review requirements pertaining to "Condition THREE" and continue action as necessary to attain "Condition FOUR" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.

b. Condition THREE (Sustained winds of 58 mph or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Reinforce or remove formwork and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and COR updates and completion of required actions. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness.

c. Condition TWO (Sustained winds of 58 mph or greater expected within 24 hours): Secure the jobsite, and leave Government premises.

d. Condition ONE. (Sustained winds of 58 mph or greater expected within 12 hours): Contractor access to the jobsite and Government premises is prohibited.

1.6 CYBERSECURITY DURING CONSTRUCTION

Meet the following requirements throughout the construction process.

1.6.1 Contractor Computer Equipment

Contractor owned computers may be used for construction. When used, contractor computers must meet the following requirements:

1.6.1.1 Operating System

The operating system must be an operating system currently supported by the manufacturer of the operating system. The operating system must be current on security patches and operating system manufacturer required updates.

1.6.1.2 Anti-Malware Software

The computer must run anti-malware software from a reputable software manufacturer. Anti-malware software must be a version currently supported by the software manufacturer, must be current on all patches and updates, and must use the latest definitions file. All computers used on this project must be scanned using the installed software at least once per day.

1.6.1.3 Passwords and Passphrases

The passwords and passphrases for all computers must be changed from their default values. Passwords must be a minimum of eight characters with a minimum of one uppercase letter, one lowercase letter, one number and one special character.

1.6.1.4 Contractor Computer Cybersecurity Compliance Statements

Provide a single submittal containing completed Contractor Computer Cybersecurity Compliance Statements for each company using contractor owned computers. Contractor Computer Cybersecurity Compliance Statements must use the template published at http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables. Each Statement must be signed by a cybersecurity representative for the relevant company.

1.6.2 Temporary IP Networks

Temporary contractor-installed IP networks may be used during construction. When used, temporary contractor-installed IP networks must meet the following requirements:

1.6.2.1 Network Boundaries and Connections

The network must not extend outside the project site and must not connect to any IP network other than IP networks provided under this project or Government furnished IP networks provided for this purpose. Any and all network access from outside the project site is prohibited.

1.6.3 Government Access to Network

Government personnel, as defined, prescribed, and identified by the Contracting Officer, must be allowed to have complete and immediate access to the network at any time in order to verify compliance with this specification. Or if there is a Government agency that's responsible, identify that agency.

1.6.4 Temporary Wireless IP Networks

In addition to the other requirements on temporary IP networks, temporary wireless IP (WiFi) networks must not interfere with existing wireless network and must use WPA2 security. Network names (SSID) for wireless networks must be changed from their default values.

1.6.5 Passwords and Passphrases

The passwords and passphrases for all network devices and network access must be changed from their default values. Passwords must be a minimum 8 characters with a minimum of one uppercase letter, one lowercase letter, one number and one special character.

1.6.6 Contractor Temporary Network Cybersecurity Compliance Statements

Provide a single submittal containing completed Contractor Temporary Network Cybersecurity Compliance Statements for each company implementing a temporary IP network. Contractor Temporary Network Cybersecurity Compliance Statements must use the template published at http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables. Each Statement must be signed by a cybersecurity representative for the relevant company. If no temporary IP networks will be used, provide a single copy of the Statement indicating this.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Prior to the commencement of work activities, provide a clear weatherproof covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the Contract, Wage Rate Information poster, Safety and Health Information as required by EM 385-1-1 Section 01 and other information approved by the Contracting Officer. Coordinate requirements herein with 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, and in location as approved by the Contracting Officer.

2.1.2 Project Identification Signs

The requirements for the signs, their content, and location are as specified in Section 01 58 00 PROJECT IDENTIFICATION. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.1.3 Warning Signs

Post temporary signs, tags, and labels to give workers and the public adequate warning and caution of construction hazards according to the EM 385-1-1 Section 04. Attach signs to the perimeter fencing every 150 feet warning the public of the presence of construction hazards. Signs must require unauthorized persons to keep out of the construction site. Correct the data required by safety signs daily. Post signs at all points of entry designating the construction site as a hard hat area.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Haul Roads

Construct access and haul roads necessary for proper prosecution of the work under this Contract in accordance with EM 385-1-1 Section 04. Construct with suitable grades and widths; avoid sharp curves, blind corners, and dangerous cross traffic. Submit haul road plan for approval. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and haul roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades are required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of

the hazard during both day and night.

2.3 FENCING

Provide fencing along the construction site and at all open excavations and tunnels to control access by unauthorized personnel. Safety fencing must be highly visible to be seen by pedestrians and vehicular traffic. All fencing must meet the requirements of EM 385-1-1. Remove the fence upon completion and acceptance of the work.

To block public view of the construction, enclose the project work area and Contractor lay-down area with a 8 ft high chain link fence and gates with brown, UV light resistant, plastic fabric mesh netting (similar to tennis court or other screening).

2.3.1 Polyethylene Mesh Safety Fencing

Temporary safety fencing must be a high visibility orange colored, high density polyethylene grid, a minimum of 48 inches high and maximum mesh size of 2 inches. Fencing must extend from the grade to a minimum of 48 inches above the grade and be tightly secured to T-posts spaced as necessary to maintain a rigid and taut fence. Fencing must remain rigid and taut with a minimum of 200 pounds of force exerted on it from any direction with less than 4 inches of deflection.

2.3.2 Chain Link Panel Fencing

Temporary panel fencing must be galvanized steel chain link panels 8 feet high. Multiple fencing panels may be linked together at the bases to form long spans as needed. Each panel base must be weighted down using sand bags or other suitable materials in order for the fencing to withstand anticipated winds while remaining upright. Fencing must remain rigid and taut with a minimum of 200 pounds of force exerted on it from any direction with less than 4 inches of deflection.

2.3.3 Post-Driven Chain Link Fencing

Temporary post-driven fencing must be galvanized chain link fencing 8 feet high supported by an tightly secured to galvanized steel posts driven below grade. Fence posts must be located on minimum 10 foot centers. Posts may be set in various surfaces such as sand, soil, asphalt or concrete as necessary. Chain link fencing must remain rigid and taut with a minimum of 200 pounds of force exerted on it from any direction with less than 4 inches of deflection. Completely remove fencing and posts at the completion of construction and restore surfaces disturbed or damaged to its original condition. Locate and identify underground utilities prior to setting fence posts. Equip fence with a lockable gate. Gate must remain locked when construction personnel are not present.

2.4 TEMPORARY WIRING

Provide temporary wiring in accordance with EM 385-1-1 Section 11, NFPA 241 and NFPA 70. Include monthly inspection and testing of all equipment and apparatus.

2.5 BACKFLOW PREVENTERS

Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow

preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval. Certificate of Provisional Approval is not acceptable.

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron mounted gate valve and strainer, 304 stainless steel or bronze, internal parts.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Construction Contract employees must park privately owned vehicles in an area designated by the Contracting Officer. Employee parking must not interfere with existing and established parking requirements of the Government installation.

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

3.2.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.2.2 Payment for Utility Services

a. The Government will make all reasonably required utilities available from existing outlets and supplies, as specified in the Contract. Unless otherwise provided in the Contract, the amount of each utility service consumed will be charged to or paid at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. Carefully conserve utilities furnished without charge.

b. Reasonable amounts of the following utilities will be made available at the prevailing rates.

c. The point at which the Government will deliver such utilities or services and the quantity available must be coordinated with the Contracting Officer. Pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines; providing meters; and providing transformers; and make disconnections. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

d. The Contractor must provide their own utilities.

3.2.3 Meters and Temporary Connections

Provide and maintain necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. Notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary

wiring installation. Do not make the final electrical connection.

3.2.4 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed prior to the end of the current fiscal year.

3.2.5 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated appurtenances. Pay all outstanding utility bills before final acceptance of the work by the Government.

3.2.6 Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities in accordance with EM 385-1-1 Section 02. Locate the facilities behind the construction fence or out of the public view. Clean units and empty wastes at least once a week or more frequently into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into a municipal, district, or commercial sanitary sewer system. Penalties or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

3.2.7 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.8 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

3.3 STATION OPERATION AFFECT ON CONTRACTOR OPERATIONS

The Government access to active magazines during construction. The contractor will ensure that the Government access to active magazines is maintained independent of construction access to the construction site..

3.3.1 Restricted Access Areas

The Government will monitor work in areas listed below. Notify Contracting Officer at least 14 calendar days prior to starting work in these areas.

Weapons and Magazine Compound.

3.4 TRAFFIC PROVISIONS

3.4.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close a thoroughfare or interfere with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan for Government approval detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. Make all notifications and obtain all permits required for modification to traffic movements outside Station's jurisdiction. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at Contractor's expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

d. Provide cones, signs, barricades, lights, or other traffic control devices and personnel required to control traffic. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

3.4.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Provide self-illuminated (lighted) barricades during hours of darkness. Brightly-colored (orange) vests are required for all personnel working in roadways. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of damage to roads caused by construction operations.

3.4.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

3.4.4 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer. Coordinate dust control methods with 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

3.5 REDUCED PRESSURE BACKFLOW PREVENTERS

Provide an approved reduced pressure backflow prevention assembly at each location where the Contractor taps into the Government potable water supply.

Perform backflow preventer tests using test equipment, procedures, and certification forms conforming to those outlined in the latest edition of the Manual of Cross-Connection Control published by the FCCCHR Manual. Test and tag each reduced pressure backflow preventer upon initial installation (prior to continued water use) and monthly thereafter. Tag must contain the following information: make, model, serial number, dates of tests, results, maintenance performed, and signature of tester. Record test results on certification forms conforming to requirements cited earlier in this paragraph.

3.6 CONTRACTOR'S TEMPORARY FACILITIES

Contractor-owned or -leased trailers must be identified by Government assigned numbers. Size and location of the number will comply with the Installation Appearance Plan. Apply the number to the trailer within 14 calendar days of notification, or sooner, if directed by the Government. Temporary facilities must meet requirements as identified in EM 385-1-1 Section 04.

Contractor is responsible for security of their property. Provide adequate outside security lighting at the temporary facilities. Trailers must be anchored to resist high winds and meet applicable state or local standards for anchoring mobile trailers. Coordinate anchoring with EM 385-1-1 Section 04. The Contract Clause entitled "FAR 52.236-10, Operations and Storage Areas" and the following apply:

3.6.1 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

In the event a new building is constructed for the temporary project field office, it must be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. Equip the building with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. Provide a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building must be waterproof, supplied with a heater, have a minimum of two doors, electric lights, a telephone, a battery-operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Provide approved sanitary facilities. Screen the windows and doors and provide the doors with deadbolt type locking devices or a padlock and heavy-duty hasp bolted to the door. Door hinge pins must be non-removable. Arrange the windows to open and to be securely fastened from the inside. Protect glass panels in windows by bars or heavy mesh

screens to prevent easy access. In warm weather, provide air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F. Unless otherwise directed by the Contracting Officer, remove the building from the site upon completion and acceptance of the work.

3.6.2 Quality Control Manager Records and Field Office

Provide on the jobsite an office with approximately 100 square feet of useful floor area for the exclusive use of the QC Manager. Provide a weathertight structure with adequate heating and cooling, toilet facilities, lighting, ventilation, a 4 by 8 foot plan table, a standard size office desk and chair, computer station, and working communications facilities. Provide a door with a cylinder lock and windows with locking hardware. Make utility connections. Locate as directed. File quality control records in the office and make available at all times to the Government. After completion of the work, remove the entire structure from the site.

3.6.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on the current day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

Keep fencing in a state of good repair and proper alignment. If the Contractor elects to traverse grassed or unpaved areas which are not established roadways with construction equipment or other vehicles, cover the grassed or unpaved areas with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation must be at the Contractor's discretion.. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, structures, under trailers, and in areas not accessible to mowers must be edged or trimmed neatly.

3.6.4 Supplemental Storage Area

Upon request, and pending availability, the Contracting Officer will designate another or supplemental area for the use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Maintain the area in a clean and orderly fashion and secured if needed to protect supplies and equipment. Utilities will not be provided to this area by the Government.

3.6.5 Appearance of Trailers

a. Trailers must be roadworthy and comply with all appropriate state and local vehicle requirements. Trailers which are rusted, have peeling paint or are otherwise in need of repair will not be allowed on Installation property. Trailers must present a clean and neat exterior appearance and be in a state of good repair.

b. Maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal at the Contractor's expense.

3.6.6 Trailers or Storage Buildings

a. Trailers or storage buildings will be permitted, where space is available, subject to the approval of the Contracting Officer.

b. Mount a sign not smaller than 24 by 24 inches on the trailer or building that shows the company name, business phone number, emergency phone number and conforms to the following requirements and sketch:

Graphic panel	Aluminum, painted blue
Copy	Screen painted or vinyl die-cut, white
Typeface	Univers 65 u/lc
See Sketch No. 01500 (graphic).	

3.6.7 Safety Systems

Protect the integrity of all installed safety systems or personnel safety devices. Obtain prior approval from the Contracting Officer if entrance into systems serving safety devices is required. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish Contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.6.8 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.6.8.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

3.7 PLANT COMMUNICATIONS

Whenever the individual elements of the plant are located so that operation by normal voice between these elements is not satisfactory, install a satisfactory means of communication, such as telephone or other suitable devices and make available for use by Government personnel.

3.8 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the Contract and, upon completion and acceptance of the work, remove from the work site.

3.9 DUMPSTERS

Equip dumpsters with a secure cover and paint the standard installation color. Keep dumpster closed, except when being loaded with trash and debris. Locate dumpsters behind the construction fence and out of the public view. Empty site dumpsters at least once a week, or as needed to keep the site free of debris and trash. If necessary, provide 55 gallon trash containers painted the darker installation color to collect debris in the construction site area. For large demolitions, large dumpsters without lids are acceptable, but must not have debris higher than the sides before emptying.

3.10 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store all salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

3.11 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haul roads, and all other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence. Restore areas used during the performance of the Contract to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

-- End of Section --

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SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS
08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1053	Respirable Crystalline Silica
29 CFR 1910.1200	Hazard Communication
29 CFR 1926.1153	Respirable Crystalline Silica
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories
40 CFR 64	Compliance Assurance Monitoring
40 CFR 82	Protection of Stratospheric Ozone
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 262	Standards Applicable to Generators of Hazardous Waste

40 CFR 262.11	Hazardous Waste Determination and Recordkeeping
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards for Universal Waste Management
40 CFR 273.2	Standards for Universal Waste Management - Batteries
40 CFR 273.4	Standards for Universal Waste Management - Mercury Containing Equipment
40 CFR 273.5	Standards for Universal Waste Management - Lamps
40 CFR 273.6	Applicability - Aerosol Cans
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 300.125	National Oil and Hazardous Substances Pollution Contingency Plan - Notification and Communications
40 CFR 355	Emergency Planning and Notification
40 CFR 403	General Pretreatment Regulations for Existing and New Sources of Pollution
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials

	Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Class I and II Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act. A list of Class I ODS can be found on the EPA website at the following weblink. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances.

Class II ODS is defined in Section 602(s) of The Clean Air Act. A list of Class II ODS can be found on the EPA website at the following weblink. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances.

1.2.2 Contractor Generated Hazardous Waste

Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e., methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water.

1.2.3 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.2.4 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

1.2.5 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.6 Hazardous Debris

As defined in paragraph SOLID WASTE, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes

debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

1.2.7 Hazardous Materials

Hazardous material is any material that: Is defined in 49 CFR 171, listed in 49 CFR 172, regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.1200; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

1.2.8 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibits a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D, or meets a state, local, or host nation definition of a hazardous waste.

1.2.9 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

1.2.10 Municipal Separate Storm Sewer System (MS4) Permit

MS4 permits are those held by municipalities or installations to obtain NPDES permit coverage for their stormwater discharges.

1.2.11 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2.12 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land

filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.13 Regulated Waste

Regulated waste are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

1.2.14 Sediment

Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.15 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include, but not limited to, surplus soil, soil aggregate, contaminant impacted concrete, contaminant impacted materials, concrete, utility debris, and dewatering treatment system media.

1.2.15.1 Debris

Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may not be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.15.2 Green Waste

Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

1.2.15.3 Material Not Regulated As Solid Waste

Material not regulated as solid waste is nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas

or crude oil exploration or production.

1.2.15.4 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 261.

1.2.15.5 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, wiring, insulated/non-insulated copper wire cable, wire rope, and structural components. It also includes commercial-grade refrigeration equipment with Freon removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.2.15.6 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Surplus soil is not a salvageable material. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with paragraph HAZARDOUS MATERIAL MANAGEMENT.

1.2.15.7 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.2.15.8 Wood

Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

1.2.16 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, sanitary sewers, vegetated surfaces, or creeks meeting the definition of "waters of the United States". Surface discharges from construction sites are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.2.17 Wastewater

Wastewater is the used water and solids that flow through a sanitary sewer to a treatment plant or generated by construction activities. Any wastewater generated by construction activities must be containerized, characterized, and taken offsite site to a permitted facility.

1.2.17.1 Stormwater

Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

1.2.18 Waters of the United States

Waters of the United States means Federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.2.19 Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

1.2.20 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at 40 CFR 273.

1.2.21 Location Specific Universal Waste

Any of the following dangerous waste that are subject to the universal waste requirements of Connecticut State Code; Universal waste and/or special waste may inclue, but not limited to, Batteries ; Lamps ; PFAS impacted materials, and Mercury-containing equipment .

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control and/or closeout approval. The Contracting Officer must assign the Installation Environmental Department representatives and Government Environmental Design Specialist within eCMS as Step 1 reviewers for the Environmental related submittals listed within this Specification. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey

Regulatory Notifications; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Environmental Manager Qualifications; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Employee Training Records; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Environmental Protection Plan; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Dirt and Dust Control Plan; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Solid Waste Management Permit; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Stormwater Pollution Control Plan (SWPCP); G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Stormwater Notice of Intent (for NPDES coverage under the general permit for construction activities); G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Spill Prevention Control And Countermeasure (SPCC) Plan; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Post-construction Stormwater Management General Permit; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Wastewater Collection System; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Inland Wetlands and Watercourse; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Water Quality; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Water Distribution System; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Hazardous Waste Treatment, Storage, Disposal, and Handling; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental

Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Clearing; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Endangered Species/Critical Habitat - Habitat Protection Plan related to the Eastern Ribbon Snake; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal. Refer to the Eastern Ribbon Snake Construction Impact Protection Plan included as an attachment to 01 14 00 WORK RESTRICTIONS.

Payment of Standing Timber Removal to Real Property; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Pollution Generating Equipment; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Stationary Internal Combustion Engines; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Soil Management Plan; G

Imported Fill Management Plan; G

Imported Fill Summary Report; G

Dewatering Plan for OU 2 and 3; G

SD-06 Test Reports

Monthly Solid Waste Disposal Report; G
Submit copies for review and approval to the Government

Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Inspection Reports

Laboratory Analysis Results

Submit copies of groundwater sampling PFAS testing results to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

SD-07 Certificates

ECATTS Certificate Of Completion; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Employee Training Records; G

Erosion and Sediment Control Inspector Qualifications

Laboratory Certifications and Accreditations

Submit copies of groundwater sampling PFAS testing laboratory certifications and accreditations to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

SD-11 Closeout Submittals

Regulatory Notifications; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Assembled Employee Training Records; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation

Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Solid Waste Management Permit; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Stormwater Pollution Control Plan Compliance Notebook; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Stormwater Notice of Termination (for NPDES coverage under the general permit for construction activities); G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Eastern Ribbon Snake Protection Plan Report; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal. Refer to the Eastern Ribbon Snake Construction Impact Protection Plan included as an attachment to Section 01 14 00 WORK RESTRICTIONS.

As-Built Topographic Survey

Waste Determination Documentation; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Project Solid Waste Disposal Documentation Report; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Sales Documentation; G

Submit copies for review and approval to the Government

Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Hazardous Waste/Debris Management; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Disposal Documentation for Hazardous and Regulated Waste; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

Contractor Hazardous Material Inventory Log; G

Submit copies for review and approval to the Government Environmental Design Specialist and the Installation Environmental Department. The Contracting Officer must assign the Installation Environmental Department representatives within eCMS as Step 1 reviewers for this submittal.

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Tests and procedures assessing whether construction operations comply with Applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

1.4.1 Training in Environmental Compliance Assessment Training and Tracking System (ECATTS)

1.4.1.1 Personnel Requirements

The Environmental Manager is responsible for environmental compliance on projects. The Environmental Manager and other staff, must complete applicable ECATTS training modules (installation specific or general) prior to starting respective portions of on-site work under this Contract. If personnel changes occur for any of these positions after starting work, replacement personnel must complete applicable ECATTS

training within 14 days of assignment to the project.

1.4.1.2 Certification

Submit an ECATTS certificate of completion for personnel who have completed the required ECATTS training. This training is web-based and can be accessed from any computer with Internet access using the following instructions.

Register for NAVFAC Environmental Compliance Assessment, Training, and Tracking System, by logging on to https://environmentaltraining.ecatts.com/. Obtain the password for registration from the Contracting Officer.

1.4.1.3 Refresher Training

This training has been structured to allow contractor personnel to receive credit under this contract and to carry forward credit to future contracts. Ensure the Environmental Manager review their training plans for new modules or updated training requirements prior to beginning work. Some training modules are tailored for specific state regulatory requirements; therefore, Contractors working in multiple states will be required to retake modules tailored to the state where the contract work is being performed.

1.4.2 Conformance with the Environmental Management System

Perform work under this contract consistent with the policy and objectives identified in the installation's Environmental Management System (EMS). Perform work in a manner that conforms to objectives and targets of the environmental programs and operational controls identified by the EMS. Support Government personnel when environmental compliance and EMS audits are conducted by escorting auditors at the Project site, answering questions, and providing proof of records being maintained. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the installation EMS and of how these EMS roles and responsibilities affect work performed under the contract.

Coordinate with the installation's EMS coordinator to identify training needs associated with environmental aspects and the EMS and arrange training or take other action to meet these needs. Provide training documentation to the Contracting Officer. The Installation Environmental Office will retain associated environmental compliance records. Make EMS Awareness training completion certificates available to Government auditors during EMS audits and include the certificates in the Employee Training Records. See paragraph EMPLOYEE TRAINING RECORDS.

1.5 SPECIAL ENVIRONMENTAL REQUIREMENTS

Comply with the special environmental requirements listed within project permits (Stormwater management permit, general construction permit, utility permits, Installation specific Management Plans, Construction Worker Authorization, project specific NEPA documentation (signed Environmental Checklist and Site approval documentation), project specific wetland permit, and demolition permits) and standards of care. See the

Permit Record of Decision Form attached to this Specification for additional information.

Due to the presence of known residual contamination within soil and groundwater at the site, all site workers who come in contact with contaminated soil and groundwater must be 29 CFR 1910.120 HAZWOPER certified personnel with current 8-hr HAZWOPER refreser certificates. All certificates of site workers must be kept onsite within the Environmental Manager documentation and submitted as an Appendix within the Environmental Protection Plan.

The publicly accessible DENIX database should be used as a starting point when selecting a laboratory for a project. It does not provide all information needed (e.g., version of method or requirements and list of analyte lists under accreditation). To ensure the laboratory you select is accredited for your project analytes, the project manager/chemist must review the laboratory's scope of accreditation, which is found on their accreditation body's website.

To find a DoD-ELAP accredited laboratory, use the following link under the heading "Search Accredited Labs" on the EDQW page on the DENIX website:https://www.denix.osd.mil/edqw/accreditation/accreditedlabs/index.html

To determine the version of EPA Method the laboratory is accredited for, the laboratory's DoD-ELAP Scope of Accreditation Certificate must be reviewed and approved by Installation Environmental Department through the Contracting Officer.

All site environmental monitoring wells must be protected throughout construction. Any damage to the site environmental monitoring wells is the sole responsibility of the construction contractor. Any repairs, replacement, and/or abandonment must meet all State of Connecticut and Environmental Restoration Program requirements.

1.5.1 Mid-Atlantic

Comply with the following state, regional, and local requirements.

1.5.1.1 Naval Submarine Base New London, Connecticut

Comply with all Installation specific and applicable State and Local Requirements.

1.5.1.1.1 Dig Permit

A "Request for Permit to Excavate" form, also known as a dig permit, is required to be submitted to and approved by the Public Works Department (PWD) prior to initiating any ground-disturbing activities. Excavation work shall be performed in accordance with the site excavation procedures identified in the dig permit and shall be recorded on the soil tracking form (Attachment 1).

1.5.1.1.2 Excavation

Discrete soil samples for the project site were collected and the analytical test results and a sampling location plan are provided as Attachments to this specification.

The contractor must develop and submit a Soil Management Plan for review

and approval by the Installation Environmental Department and the NAVFAC Environmental Design Specialist. This plan must specify any pre-characterization/in-situ sample analysis, identifying the sample locations, depths, analysis, accredited laboratory (please note, the contracted laboratories must be accredited for every analyte/test method listed below), evaluation of representative of soils to be excavated in accordance with RCRA, worker safety requirements, stockpile and storage areas, appropriate containment, etc.

The contractor must expect that all excavated soils at the site are assumed to be impacted by contaminants within the Operable Unit 02 and 03 areas (including but not limited to petroleum, VOCs, PFAS, and metals) and considered characteristic non-hazardous solid waste. All excavated soils must be disposed of at a permitted, lined landfill with an active leachate and gas collection system that accepts co-mingled (including metals, VOCs, petroleum, and PFAS) impacted materials. Please note, at the time of editing this specification, no landfills within Connecticut are permitted to receive PFAS impacted materials. All excavated soils must be documented within a waste characterization form and manifest as part of the waste determination documentation. Due to the presence of petroleum, TPH (GRO and DRO) samples must be collected every 250 cubic yards for offsite disposal. All other waste characterization samples must be collected for every 1,000 cubic yards; the actual frequency of disposal will depend on the offsite receiving facility. Typical analysis includes ignitability, corrosivity, reactivity, toxicity based on TCLP (metals, VOCs, SVOCs, pesticides and herbicides) results, PCBs, BTEX, TOX, PFAS, and paint filter per validated EPA methods and in accordance with the most recent version of the Department of Defense Quality Systems Manual. All analysis must be completed by a ELAP accredited laboratory for each analysis conducted by that lab and all laboratory certifications and accreditations must be current and submitted to the government for review and approval. All laboratory analysis results must be submitted to the Government for review and approval. The only authorized department who may sign the waste manifest is a representative from the New London Environmental Department. The only allowable PFAS analytical method for sampling is EPA Method 1633 by a ELAP laboratory accredited for that method.

Soils outside of Operable Unit boundaries must be sampled to determine if reuse is an option. If results for all analytes are below current Connecticut Remediation Standard Regulations (RSRs) direct exposure criteria for residential soil and GA pollutant mobility criteria (RCSA §§22a-133k-1—22a-133k-3), the excess soil meets the State requirements for reuse. Soil eligible for reuse may be placed at a location within the SUBASE main installation, pending submission to the EV IR Program Manager of the analytical results, a map denoting the project location and the proposed location for reuse, and an estimate of the volume of soil to be relocated. All this information must be included within the Imported Fill Management Plan and Summary Report. Excess soil must be reused within 60 days of the excavation date.

Excavated soil must be stored in a manner that prevents rain from infiltrating the soil matrix and preventing any runoff into the surrounding soil or pavement or in lined, covered dumpsters. A single contaminated soil stockpile should not contain more than 250 cubic yards. Excavated soil may not be stored on-site for more than 60 days.

1.5.1.1.3 Imported Fill

An Imported Fill Management Plan must be reviewed and approved by

Installation Environmental through the contracting office; in addition to requirements listed within the Earthwork specification and applicable CIVIL and LANDSCAPE ARCHITECTURE specifications for this project. The Imported Fill Management Plan must include the following information:

- Fill source location/history (Phase I if available, current aerials, etc.)
- Sampling and Analysis plan
- Analytical lab certifications (lab must be ELAP accredited for each analysis)
- Sample frequency for each analysis
- Resumes of field sampling team
- A table designating screening criteria (Current CT Clean Fill Requirements; all PFAS constituent goals are the detection limit of the laboratory selected for EPA Method 1633)

Soil Import Sampling Requirements:
At least one REPRESENTATIVE 3-point composite sample from EACH area of planned import must be provided to Installation Environmental for review and approval through the Contracting Officer. If the area of planned import changes, another sample must be collected and provided to Installation Environmental for review and approval. Clean fill borrow source samples must be collected within 3 month of borrow source use.

Sample Analysis required by the State of Connecticut for clean fill as defined in the Regulations of Connecticut State Agencies (RCSA) §§ 22a-209-1; screening criteria are the GA pollutant mobility criteria and direct exposure criteria for residential soil established in the RSRs:

Target Analyte List (TAL) Inorganics (total metals)
Target Compound List (TCL) Volatile Organic Compounds (VOCs), including benzene, toluene, ethylbenzene, and xylene
TCL Semi-Volatile Organic Compounds (SVOCs)
TCL Polychlorinated Biphenyl's (PCBs)
TCL Pesticides
Chlorinated Dioxins
Total Petroleum Hydrocarbons (TPH)
Total Organic Halogen/Halide (TOX)
Per and Polyfluoroakyl Substances (PFAS)

*** Additional analysis and reporting is required by the project specific wetland permit. It is the sole responsibility of the contractor to ensure the fill material used to fill in permitted wetland areas meets the criteria listed within the wetland permit ***

All analysis, methods, and sample collection must be conducted in accordance with EPA SW-846 test methods for evaluating Physical/Chemical methods. PFAS must be analyzed and collected via EPA Method 1633 standard operating procedures and in accordance with the DoD QSM. Analytical laboratories must be ELAP certified/accredited and provided to the Installation Environmental Hazardous Waste program manager for approval prior to sample collection.

PFAS sampling protocols have stringent requirements, very low detection levels, and cross contamination is a concern. PFAS samples must be collected by experienced professional with at least 5 years of experience collecting samples for this extremely sensitive analysis. The resumes of the sampling technicians that collect these samples must be provided within the Imported Fill Management Plan will be reviewed in detail by the

Navy.

Imported Fill Summary Report must be reviewed and approved by Installation Environmental through the contracting officer prior to any imported material onto the Installation. A minimum of 14 days is required to review and approve results. If imported fill results do not achieve the approved screening criteria provided within the Imported Fill Management Plan, another borrow source must be identified, sampled, and submitted for review. This process will continue until a borrow source that meets the clean fill criteria is met.

The Imported Fill Summary Report must include, but not limited to, the following information:

- Fill source location/history (Phase I if available, current aerials, etc.)
- Field Sampling summary (including sample location plan, observations when in the field, COCs, etc)
- Analytical lab report
- Sample frequency for each analysis
- Confirmation of approved sampling team members
- A table screening fill results to approved screening criteria
- Schedule of delivery
- Estimated volume of fill material
- Management of material (including best management of practices to PREVENT cross contamination, on Installation laydown/stockpile area, etc)
- A PE/PG recommendation of import

NO MATERIAL is permitted to come onto Installation property without Installation Environmental approval through the Contracting officer.

1.5.1.1.4 Construction Site Stormwater

Construction site stormwater runoff must be treated using proper erosion control measures or stormwater management practices prior to release from the construction site. Pollutants, including but not limited to chemicals, fuels, lubricants, sewage, paints, sedimentation, and other harmful materials must not be discharged into or alongside any river, stream, or impoundment, or into any channels leading to them. Implement appropriate erosion and sediment control measures to all disturbed areas or bare soils to prevent unauthorized offsite sedimentation. Apply stabilization measures to denuded portions of a project that are at final grade or where work has temporarily ceased within 7 days.

1.5.1.1.5 Construction Dewatering

The dewatering requirements reflected in the project General Construction Permit do not apply to work within Operable Units 2 and 3 (OU 2 and 3) (see attached Operable Units graphic included at the end of this section) due to the presence of contaminant impacts in shallow groundwater (including, but not limited to, petroleum, VOCs, metals, and PFAS). The contractor must implement all necessary means and methods to limit the inflow of groundwater and stormwater into the excavation cavity when working within Operable Units 2 and 3. This includes physical or engineered controls such as well points, cutoff walls, sump management, perimeter sealing, and efficient sequencing, as well as secondary containments, dikes, curbs, and other barriers to prevent water from entering the excavation cavity.

The contractor must submit a Dewatering Plan for OU 2 and 3 specific to work in Operable Units 2 and 3 that addresses the management of contaminated groundwater pursuant to the requirements in this section.

The contractor must profile the groundwater based on laboratory analysis, documented it within a waste characterization form, and manifest as part of the waste determination documentation. All analysis must be completed by a ELAP accredited laboratory for each analysis conducted by that lab and all laboratory certifications and accreditations must be current and submitted to the government for review and approval. All laboratory analysis results must be submitted to the Government for review and approval. The only authorized department who may sign the waste manifest is a representative from the New London Environmental Department. The only allowable PFAS analytical method for sampling is EPA Method 1633 by a ELAP laboratory accredited for that method.

If the laboratory analysis results indicate the presence of PFAS in the groundwater sample, all groundwater removed through dewatering must be considered contaminated with PFAS and containerized for off-site disposal. All PFAS data must be collected per EPA standard operating procedures, analyzed by an ELAP certified lab for that method, and in accordance with the latest version of the DoD QSM. Only EPA Method 1633 is permitted for this type of sampling. Discussion and approval of appropriate sample methods, sampling staff, analytical laboratory, and distribution of data must be clearly documented within the Environmental Protection Plan and Dewatering Plans for approval by the Installation Environmental Staff and Environmental Design Specialist.

All containerized groundwater must be documented within a waste characterization form and manifest as part of the waste determination documentation. The waste characterization analysis is dependent on receiving facility requirements and must meet the minimal sampling required by SUBBASE New London; in accordance with the most recent version of the Department of Defense Quality Systems Manual and in accordance with SUBASENLONINST 5090.27A Hazardous Waste Management Plan
Transport and dispose of contaminant impacted groundwater at a licensed off-site PFAS-accepting treatment or disposal facility.

1.6 QUALITY ASSURANCE

1.6.1 Preconstruction Survey and Protection of Features

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, perform a Preconstruction Survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs, and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the Contracting Officer will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that

their preservation may cause to the work under the Contract.

1.6.2 Regulatory Notifications

Provide regulatory notification requirements in accordance with Federal, State and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer at least 30 days prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all-inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.6.3 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the installation; and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the Contracting Officer and installation Environmental Office to discuss the proposed Environmental Protection Plan (EPP) or equipment local requirement. Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.6.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, local, and installation requirements. The Environmental Manager must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out. Submit Environmental Manager Qualifications to the Contracting Officer.

1.6.5 Employee Training Records

Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Provide Employee Training Records in the Environmental Records Binder. Submit these

Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

Train personnel to meet Connecticut requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area. Provide copy of the Erosion and Sediment Control Inspector Certification as required by Connecticut.

1.6.6 Non-Compliance Notifications

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. FAR 52.242-14 Suspension of Work provides that a suspension, delay, or interruption of work due to the fault or negligence of the Contractor allows for no adjustments to the contract for time extensions or equitable adjustments. In addition to a suspension of work, the Contracting Officer may use additional authorities under the contract or law.

1.7 ENVIRONMENTAL PROTECTION PLAN

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken. Meet with the Installation Environmental Department, Environmental Design Specialist, Construction manager, engineering technician, andContracting Officer or Contracting Officer Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within 15 days after Contractor award and not less than 10 days before the preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for review and approval any additional requirements to be included in the EPP. Maintain the current version onsite.

The EPP includes, but is not limited to, the following elements:

1.7.1 General Overview and Purpose

1.7.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution control plan, spill control plan, solid waste management plan, wastewater management plan, air pollution control plan, contaminant prevention plan, a historical, archaeological, cultural resources, biological resources, and wetlands plan, Hazardous, Toxic and Radioactive Waste (HTRW) Plan Non-Hazardous Solid Waste Disposal Plan and borrowing material plan, Dewatering Plan, Imported Fill Management Plan, Imported Fill Summary Report, Waste management Plan, Dewatering Plan, and Eastern Ribbon Snake Construction Impact Protection Plan.

1.7.1.2 Duties

The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site (if applicable), and who is responsible for training the Contractor's environmental protection personnel.

1.7.1.3 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.7.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.7.1.5 Contact Information

Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

1.7.2 General Site Information

1.7.2.1 Drawings

Drawings showing locations of proposed temporary excavations or embankments for haul roads, jurisdictional wetlands, material storage areas, structures, sanitary facilities, known areas of residual contamination and/or former spill locations, storm drains and conveyances, and stockpiles of excess soil.

1.7.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control

plan.

Show where any fuels, hazardous substances, solvents, or lubricants will be stored. Provide a spill plan to address any releases of those materials.

1.7.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager and stating that person is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

1.7.3 Management of Natural Resources

a. Land resources

b. Tree protection

Submit Clearing Plan. The trees surrounding the main site of construction are protected habitat for federally listed endangered and threatened species. Protective measures to only take trees required to complete the project are permitted. As the trees are considered a beneficial habitat to these protected species, trees may NOT be felled, cut, and/or prunned between APRIL 1-OCTOBER 31 of any given year.

Submit Payment of Standing Timber Removal to Real Property plan.All timber removed from the project site shall become the property of the Contractor. The Contractor shall reimburse the Government for the value of the timber. The Contractor shall submit payment to the Contracting Officer by cashier's or certified check in the amount of $760.00 made payable to the U.S. Treasury. Payment shall be made no less than five (5) days prior to the start of land clearing operations.

c. Replacement of damaged landscape features

d. Temporary construction

e. Fish and wildlife resources

Endangered and treatened species are documented to be present within and in the vicinity of the project site. All requirements from the Endangered Species consultation listed within the NEPA Categorical Exclusion must be followed in addition to the Endangered Species/Critical Habitat - Habitat Protection Plan related to the Eastern Ribbon Snake developed with the Stormwater Permit Application.

f. Wetland areas

Perform all required construction activities within wetlands and upland areas in accordance with the wetland permit requirements.

The contractor must sign onto the wetland permit as a co-permitee and assumes all liability for the permit. All required reporting, fees, and any natural resource damage claims are the sole responsibility of the contractor.

1.7.4 Protection of Historical and Archaeological Resources

a. Objectives

b. Methods

1.7.5 Stormwater Management and Control

a. Ground cover

b. Erodible soils

c. Temporary measures

(1) Structural Practices

(2) Temporary and permanent stabilization

d. Effective selection, implementation, and maintenance of Best Management Practices (BMPs).

e. Stormwater Pollution Control Plan (SWPCP).

1.7.6 Protection of the Environment from Waste Derived from Contractor Operations

Control and disposal of solid and sanitary waste.

Control and disposal of hazardous and nonhazardous waste.

This item consists of the management procedures for hazardous waste to be generated. The elements of those procedures will coincide with the Installation Hazardous Waste Management Plan when within an installation. The Contracting Officer will provide a copy of the Installation Hazardous Waste Management Plan as applicable.

As a minimum, include the following:

a. List of the types of hazardous wastes expected to be generated

b. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated

c. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications

d. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks or containers)

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted)

f. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268) and Hazardous Waste Treatment, Storage, Disposal, and Handling plan.

g. Management procedures for recyclable hazardous materials such as

lead-acid batteries, used oil, and similar

h. Used oil management procedures in accordance with 40 CFR 279; Hazardous waste minimization procedures

i. Plans for the disposal of hazardous waste by permitted facilities; and Procedures to be employed to ensure required employee training records are maintained.

1.7.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment including Wastewater Collection System and Water Distribution System.

Notifications in the event of a release to the environment.

1.7.8 Regulatory Notification and Permits

List what notifications and permit applications must be made. Some permits require up to 180 days to obtain. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.7.9 Clean Air Act Compliance

1.7.9.1 Haul Route and Rock Crushing/Processing

Submit truck and material haul routes along with a Dirt and Dust Control Plan for controlling dirt, debris, and dust on Installation roadways and from on-site rock crushing and processing activities. As a minimum, identify in the plan the subcontractor and equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways, and for controlling and limiting dust and debris from on-site rock crushing and processing operations.

1.7.9.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act. Determine requirements based on any current installation permits in coordination with the Installation Air Permit Manager and the impacts of the project. Provide a list of all fixed or mobile equipment, machinery or operations that could generate air emissions during the project to the Installation Environmental Office (Air Program Manager). Ensure required permits are obtained prior to installing and operating applicable equipment/processes.

1.7.9.3 Stationary Internal Combustion Engines

Identify portable and stationary internal combustion engines that will be supplied, used, or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine for review and approval prior to delivery of emission equipment to the Installation. Approval is expected to take a MINIMUM of 12 months to appropriately permit through CT DEEP. Maintain applicable records and log hours of operation and fuel use. Logs must include reasons for operation and delineate between

maintenance/testing, emergency, and non-emergency operation.

1.7.9.4 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the Installation Environmental Office to determine the appropriate turn in location.

1.7.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, rock crushing and processing, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.7.9.6 Compliant Materials

Provide the Government a list of SDSs for all hazardous materials proposed for use on site. Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter, or limit use of specific materials as needed to meet installation permit requirements for emissions.

1.8 LICENSES AND PERMITS

Obtain licenses and permits required for the construction of the project and in accordance with FAR 52.236-7 Permits and Responsibilities. Notify the Government of all equipment that may require permits or special approvals that the Contractor plans to use on site. This paragraph supplements the Contractor's responsibility under FAR 52.236-7 Permits and Responsibilities.

a. The following permits have been obtained by the Government:

(1) General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

(2) Post-Construction Stormwater Management General Permit

(3) Inland Wetlands and Watercourses Municipal Permit

(4) Authorization Application for Disposal of Special Waste (Including Asbestos

1.9 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

1.10 SOLID WASTE MANAGEMENT PERMIT

Provide the Contracting Officer with written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated to be generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

1.10.1 Monthly Solid Waste Disposal Report

Monthly, submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

1.11 FACILITY HAZARDOUS WASTE GENERATOR STATUS

Naval Submarine Base New London is designated as a Large Quantity Generator. Meet the regulatory requirements of this generator designation for any work conducted within the boundaries of this Installation. Comply with provisions of federal, state, and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of construction derived wastes.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the Installation Environmental Office as applicable, regarding rare species or sensitive habitats that need to be protected, and tree clearing and rock blasting restrictions that may be in effect. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility. The following species are known and could be affected within the construction area: Eastern ribbon snake, tricolored bat, and northern long-eared bat.

The project lies in or adjacent to the CT DEEP Natural Diversity Data Base (NDDB) area. Section 3(b) of the General Permit requires that the "…activity must not threaten the continued existence of any species listed pursuant to section 26-306 of the Connecticut General Statutes as endangered or threatened and must not result in the destruction or adverse modification of habitat designated as essential to such species."

Appendix A of the General Permit addresses methods for achieving compliance with endangered species. Appendix A states "If the site is entirely or partially within a shaded area for a listed species a registrant can only achieve compliance with section 3(b)(2) of the General Permit by obtaining a limited two-year determination under Section 2, a safe harbor determination under Section 3, or an approved mitigation plan

under Section 5 of this Appendix from the Department's Wildlife Division".

A letter from the Connecticut Department of Energy & Environmental Protection dated February 2, 2024, outlines the requirements for protecting the habitat of the Eastern ribbon snake. Land disturbance activities must consider local habitat features and apply fencing and/or time of year restrictions as appropriate.

As part of the habitat protection, provide a protection plan detailing the application of methods described in the Eastern Ribbon Snake Construction Impact Protection Plan within the project area. The Eastern Ribbon Snake Construction Impact Protection Plan is included as an attachment to Section 01 14 00 WORK RESTRICTIONS. Following the completion of construction activities, provide Eastern Ribbon Snake Protection Plan Report documenting the monitoring and maintenance of exclusionary barriers and other aspects of the protection plan.

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work that is consistent with the requirements of the Installation Environmental Office or as otherwise specified. Confine construction activities to within the limits of the work indicated or specified.

3.1.1 Flow Ways

Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as specified and permitted.

3.1.2 Vegetation

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the Contracting Officer and Installation Environmental Office to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.2 STORMWATER

Do not discharge stormwater from construction sites to the sanitary sewer. Stormwater that has collected in excavation and comingled with groundwater in Operable Unit 2 and 3 is considered to be contaminated and must be containerized and transported off-site for disposal as described in 1.5.1.1.5. If the water from areas other than OU 2 and 3 is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization in advance from the Installation Environmental Office for any release of contaminated water.

3.2.1 Construction General Permit

Provide an updated Construction General Permit as required by 40 CFR 122.26 or the State of Connecticut General Permit. Under the terms and conditions of the permit, install, inspect, maintain BMPs, prepare stormwater erosion and sediment control inspection reports, and submit SWPCP inspection reports. Maintain construction operations and management in compliance with the terms and conditions of the general permit for stormwater discharges from construction activities.

3.2.1.1 Stormwater Pollution Control Plan

Submit an updated project-specific Stormwater Pollution Control Plan (SWPCP) to the Contracting Officer for approval, within 30 days of Contract Award and prior to the commencement of work. The SWPCP must meet the requirements of 40 CFR 122.26 and the Connecticut State General Permit for Stormwater Discharges from Construction Activities.

Include the following:

a. Comply with terms of the Connecticut State General Permit for Stormwater Discharges from Construction Activities. Prepare SWPCP in accordance with Connecticut requirements.

b. Select applicable BMPs from EPA Fact Sheets located at https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr or in accordance with applicable state or local requirements.

c. Include a completed copy of the Notice of Intent, BMP Inspection Report Template, and Stormwater Notice of Termination, except for the effective date.

3.2.1.2 Stormwater Notice of Intent for Construction Activities

Prepare and submit an updated the Notice of Intent for NPDES coverage under the general permit for construction activities to the Contracting Officer for review.

Submit the updated approved NOI and appropriate permit fees onto the appropriate federal or state agency for approval. No land disturbing activities may commence without permit coverage. Maintain an approved copy of the SWPCP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

Comply with additional state and local requirements.

3.2.1.3 Inspection Reports

Submit "Inspection Reports" to the Contracting Officer in accordance with the State of Connecticut Construction General Permit.

3.2.1.4 Stormwater Pollution Control Plan Compliance Notebook

Create and maintain a three-ring binder of documents that demonstrate compliance with the Construction General Permit. Include a copy of the permit Notice of Intent, proof of permit fee payment, SWPCP and SWPCP update amendments, inspection reports and related corrective action records, copies of correspondence with the Connecticut State Permitting

Agency, and a copy of the permit Notice of Termination in the binder. At project completion, the notebook becomes property of the Government. Provide the compliance notebook to the Contracting Officer.

3.2.1.5 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the Contracting Officer for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the appropriate state or federal agency. Prepare as-built topographic survey information required by the permitting agency for certification of the stormwater management system and provide to the Contracting Officer.

3.2.2 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable.

Erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports.

3.2.2.1 Erosion Control

Prevent erosion by mulching, erosion control blankets, Geotextiles, temporary slope drains, fiber rolls, and construction entrances as indicated on Drawings. Stabilize slopes by chemical stabilization, seeding, erosion control blankets, or such combination of these methods necessary for effective erosion control. Use of hay bales is prohibited.

Provide seeding in accordance with Section 32 92 19 SEEDING.

3.2.2.2 Sediment Control Practices

Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment laden runoff. Include the following devices: silt fence, temporary diversion dikes, storm drain inlet protection, and check dams. Location and details of installation and construction are indicated on the drawings.

3.2.3 Work Area Limits

Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, all markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.2.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the

Contracting Officer. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.2.5 Municipal Separate Storm Sewer System (MS4) Management

Comply with the Installation's MS4 permit requirements. Comply with local and Connecticut requirements.

3.3 SURFACE AND GROUNDWATER

3.3.1 Cofferdams, Diversions, and Dewatering

Construction operations for dewatering must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body. Comply with the State of Connecticut water quality standards and anti-degradation provisions. Do not discharge excavation ground water to the sanitary sewer, storm drains, or to surface waters without prior specific authorization in writing from the Installation Environmental Office or Contracting Officer and CT DEEP. Discharge of hazardous substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

If the construction dewatering is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization for any contaminated groundwater release in advance from the Installation Environmental Officer and the federal or state authority, as applicable. Discharge of hazardous substances will not be permitted under any circumstances.

Construction dewatering in Operable Units 2 and 3 must be containerized for off-site disposal. See additional requirements listed within Section 1.5.1.1.5 of this Specification.

3.3.2 Waters of the United States

Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States except as authorized herein. The protection of waters of the United States shown on the drawings in accordance with paragraph LICENSES AND PERMITS is the Contractor's responsibility. Authorization to enter specific waters of the United States identified does not relieve the Contractor from any obligation to protect other waters of the United States within, adjacent to, or in the vicinity of the construction site and associated boundaries.

3.4 PROTECTION OF CULTURAL RESOURCES

3.4.1 Archaeological Resources

If, during excavation or other construction activities, any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, activities that may damage or alter such resources will be suspended. Resources covered by this paragraph include but are not limited to any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral

alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the Contracting Officer so that the appropriate authorities may be notified, and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological resources.

3.5 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with 40 CFR 64 and state air emission and performance laws and standards.

3.5.1 Preconstruction Air Permits

Notify the Air Program Manager, through the Contracting Officer, at least 6 months prior to bringing equipment, assembled or unassembled, onto the Installation, so that air permits can be secured. Necessary permitting time must be considered in regard to construction activities. Clean Air Act (CAA) permits must be obtained prior to bringing equipment, assembled or unassembled, onto the Installation.

Confirm that these permits have been obtained.

3.5.2 Oil or Dual-fuel Boilers and Furnaces

Provide product data and details for new, replacement, or relocated fuel fired boilers, heaters, or furnaces to the Installation Environmental Office (Air Program Manager) through the Contracting Officer. Data to be reported include equipment purpose (water heater, building heat, process), manufacturer, model number, serial number, fuel type (oil type, gas type) size (MMBTU heat input). Provide in accordance with paragraph PRECONSTRUCTION AIR PERMITS.

3.5.3 Burning

Burning is prohibited on the Government premises.

3.5.4 Class I and II ODS Prohibition

Class I and II ODS are Government property and must be returned to the Government for appropriate management. Coordinate with the Installation Environmental Office to determine the appropriate location for turn in of all reclaimed refrigerant.

3.5.5 Venting of Refrigerant

Accidental venting of a refrigerant is a release and must be reported immediately to the Contracting Officer. Intentional venting of refrigerants (including most Non-ODS substitute refrigerants) is prohibited per 40 CFR 82.

3.5.6 EPA Certification Requirements

Heating and air conditioning technicians must be certified through an EPA-approved program. Maintain copies of certifications at the employees'

places of business; technicians must carry certification wallet cards, as provided by environmental law.

3.5.7 Dust Control

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster. Since these products contain Crystalline Silica, comply with the applicable OSHA standard, 29 CFR 1910.1053 or 29 CFR 1926.1153 for controlling exposure to Crystalline Silica Dust.

3.5.7.1 Particulates

Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators, or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with state and local visibility regulations.

3.5.7.2 Abrasive Blasting

Blasting operations cannot be performed without prior approval of the Installation Air Program Manager. The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive agent, paint chips, and other debris. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.5.8 Odors

Control odors from construction activities. The odors must be in compliance with state regulations and local ordinances and may not constitute a health hazard.

3.6 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Pollution Prevention/Hazardous Waste Minimization Plan

for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

3.6.1 Salvage, Reuse and Recycle

Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, resale or recycling. To the extent practicable, all scrap metal must be sent for reuse or recycling and will not be disposed of in a landfill.

Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.6.2 Nonhazardous Solid Waste Diversion Report

Maintain an inventory of nonhazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to the Installation Environmental HW Program Manager through the Contracting Officer on the first working day after each month, starting the first month that nonhazardous solid waste has been generated. Include the following in the report:

Construction and Demolition (C&D) Debris Disposed	Disposal location	cubic yards or tons as appropriate
C&D Debris Recycled	Disposal location	cubic yards or tons as appropriate
C&D Debris Composted	Disposal location	cubic yards or tons as appropriate
Total C&D Debris Generated		cubic yards or tons as appropriate
Surplus Soils used as daily cover at RCRA D Landill	Disposal location	cubic yards or tons as appropriate
Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount)	Disposal location	cubic yards or tons as appropriate
Surplus Soil disposed within landfill liner	Disposal location	cubic yards or tons as appropriate

3.7 WASTE MANAGEMENT AND DISPOSAL

3.7.1 Waste Determination Documentation

Complete a Waste Determination form (provided at the pre-construction conference) for Contractor-derived wastes to be generated. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g., scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 262.11 or corresponding

applicable state or local regulations. Base waste determination on user knowledge of the processes and materials used, and analytical data when necessary. Consult with the Installation environmental staff for guidance on specific requirements. Attach support documentation (waste characterization form, analytical lab reports, detection summary table) to the Waste Determination form. As a minimum, provide a Waste Determination form for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, surplus soils, spent treatment media, and containers of the original materials.

3.7.2 Solid Waste Management

3.7.2.1 Project Solid Waste Disposal Documentation Report

Provide copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the solid waste that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The sales documentation must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the solid waste disposal report. Prices paid or received do not have to be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

3.7.2.2 Control and Management of Solid Wastes

Pick up solid wastes, and place in covered containers that are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill with an active landfill leachate and gas collection treatment system is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Segregate and separate treated wood components disposed at a lined landfill approved to accept this waste in accordance with local and state regulations. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

Manage hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, in accordance with 49 CFR 173.

3.7.3 Control and Management of Hazardous Waste and Nonhazardous

Do not dispose of hazardous waste and nonhazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, wetlands, vegetated surface, or to surface waters or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer and Installation Hazardous Waste Program Manager.

3.7.3.1 Hazardous Waste/Debris Management

Identify construction activities that will generate hazardous waste or debris. Provide a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, hazardous waste manifests must be signed by personnel from the Installation Environmental Office. Do not bring hazardous waste onto Government property. Provide the Contracting Officer with a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D.

3.7.3.2 Waste Storage/Satellite Accumulation/90 Day Storage Areas

Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or one quart for acutely hazardous wastes). If the Contractor expects to generate hazardous waste at a rate and quantity that makes satellite accumulation impractical, the Contractor may request a temporary 90-day or 180-day, as appropriate, accumulation point be established. Submit a request in writing to the Contracting Officer and provide the following information (Attach Site Plan to the Request):

Contract Number	
Contractor	
Haz/Waste or Regulated Waste POC	
Phone Number	
Type of Waste	
Source of Waste	
Emergency POC	
Phone Number	
Location of the Site	

Attach a Waste Determination form for the expected waste streams. Allow 2 0 working days for processing this request. Additional compliance requirements (e.g., training and contingency planning) required are the responsibility of the Contractor. Barricade the designated area where waste is being stored and post a sign identifying as follows:

"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.7.3.3 Hazardous Waste Disposal

3.7.3.3.1 Responsibilities for Contractor's Disposal

Provide hazardous waste manifest to the Installations Environmental Office for review, approval, and signature prior to shipping waste off Government property.

3.7.3.3.1.1 Services

Provide service necessary for the final treatment or disposal of the hazardous material or waste in accordance with 40 CFR 260 - 40 CFR 279, local, and state, laws and regulations, and the terms and conditions of the Contract within 60 days after the materials have been generated. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

3.7.3.3.1.2 Samples

Obtain a representative sample of the material generated for each job done to provide waste stream determination.

3.7.3.3.1.3 Analysis

Analyze each sample taken and provide analytical results to the Contracting Officer. See paragraph WASTE DETERMINATION DOCUMENTATION.

3.7.3.3.1.4 Labeling

During waste accumulation label all containers in accordance with 40 CFR 262. Prior to offering a waste for off-site transport, determine the Department of Transportation's (DOT's) proper shipping names for waste in accordance with 49 CFR 172 (each container requiring disposal) and demonstrate to the Contracting Officer how this determination is developed and supported by the sampling and analysis requirements contained herein. Label all containers of hazardous waste with the words "Hazardous Waste" or other words to describe the contents of the container in accordance with 40 CFR 262 and applicable state or local regulations.

3.7.3.4 Universal Waste Management

Manage the following categories of universal waste in accordance with federal, state, and local requirements and installation instructions:

a. Batteries as described in 40 CFR 273.2

b. Lamps as described in 40 CFR 273.5

c. Mercury-containing equipment as described in 40 CFR 273.4

d. Aerosol cans as described in 40 CFR 273.6

e. Installation specific

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices

such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

3.7.3.5 Electronics End-of-Life Management

Recycle or dispose of electronics waste, including, but not limited to, used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements, and installation instructions.

3.7.3.6 Disposal Documentation for Hazardous and Regulated Waste

Contact the Contracting Officer or designated representative for the facility RCRA identification number that is to be used on each manifest.

Submit a copy of the applicable EPA and or state permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Hazardous or toxic waste manifests must be reviewed, signed, and approved by the Contracting Officer before the Contractor may ship waste. To obtain specific disposal instructions, coordinate with the Installation Environmental Office. Refer to location special requirements for the Installation Point of Contact information.

3.7.4 Releases/Spills of Oil and Hazardous Substances

3.7.4.1 Response and Notifications

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Installation Fire Department, the Installation Command Duty Officer, the Installation Environmental Office, the Contracting Officer and the state or local authority.

Submit verbal and written notifications as required by the federal (40 CFR 300.125 and 40 CFR 355), state, local regulations, and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government.

3.7.4.2 Clean Up

Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate, and the spill remains a threat to human health or the

environment.

3.7.5 Mercury Materials

Immediately report to the Environmental Office and the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

Do not recycle a mercury spill cleanup; manage it as a hazardous waste for disposal.

3.7.6 Wastewater

3.7.6.1 Disposal of Wastewater

Disposal of wastewater must be as specified below.

3.7.6.1.1 Treatment

Do not allow wastewater from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction- related wastewater off-Government property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

3.7.6.1.2 Surface Discharge

Surface discharge in accordance with the requirements of the NPDES or state STORMWATER DISCHARGES FROM CONSTRUCTION SITES permit.

3.7.6.1.3 Land Application

Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing must be discharged into the sanitary sewer with prior approval and notification to the Wastewater Treatment Plant's Operator.

3.8 HAZARDOUS MATERIAL MANAGEMENT

Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract. Submit an SDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on the installation. Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Containers of hazardous materials must have National Fire Protection Association labels or their equivalent. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261 and state and installation requirements.

3.8.1 Contractor Hazardous Material Inventory Log

Submit the "Contractor Hazardous Material Inventory Log"(found at: https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables), which provides information required by (EPCRA Sections 312 and 313) along with corresponding SDS, to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Keep copies of the SDSs for hazardous materials onsite. At the end of the project, provide the Contracting Officer with copies of the SDSs, and the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used.

The Contracting Officer may request documentation for any spills or releases, environmental reports, or off-site transfers.

3.9 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.10 CONTROL AND MANAGEMENT OF ASBESTOS-CONTAINING MATERIAL (ACM)

Manage and dispose of asbestos- containing waste in accordance with all applicable federal, state, and local (or Host Nation) requirements. Refer to Section 02 82 00 ASBESTOS REMEDIATION. Manifest asbestos-containing waste and provide the manifest to the Contracting Officer. Notifications to the regulatory authorities and Installation Air Program Manager are required before starting any asbestos work.

3.11 CONTROL AND MANAGEMENT OF LEAD-BASED PAINT (LBP)

Manage and dispose of lead-contaminated waste in accordance with 40 CFR 745 and Section 02 83 00 LEAD REMEDIATION. Manifest any lead-contaminated waste and provide the manifest to the Contracting Officer.

3.12 CONTROL AND MANAGEMENT OF POLYCHLORINATED BIPHENYLS (PCBs)

Manage and dispose of PCB-contaminated waste in accordance with 40 CFR 761 and Section 02 84 33 REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs).

3.13 CONTROL AND MANAGEMENT OF LIGHTING BALLAST AND LAMPS CONTAINING PCBs

Manage and dispose of contaminated waste in accordance with 40 CFR 761. Refer to Section 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY.

3.14 MILITARY MUNITIONS

In the event military munitions, as defined in 40 CFR 260, are discovered, or uncovered, immediately stop work in that area and immediately inform the Contracting Officer.

3.15 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided.

3.15.1 Used Oil Management

Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

3.15.2 Oil Storage Including Fuel Tanks

Provide secondary containment and overfill protection for oil storage tanks. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks. If tanks and containers with an aggregate aboveground capacity greater than 1320 gallons will be used onsite (only containers with a capacity of 55 gallons or greater are counted), provide and implement a Spill Prevention Control and Countermeasure (SPCC) plan meeting the requirements of 40 CFR 112. No individual container may contain more than 660 gallons. Do not bring underground storage tanks to the installation for Contractor use during a project. Submit the SPCC plan to the Contracting Officer for approval.

Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.

3.16 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

If petroleum-contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the Contracting Officer. Do not disturb this material until authorized by the Contracting Officer.

3.17 CHLORDANE

Evaluate excess soils and concrete foundation debris generated during the demolition of housing units or other wooden structures for the presence of chlordane or other pesticides prior to reuse or final disposal.

3.18 SOUND INTRUSION

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives are not permitted without written permission from the Contracting Officer, and then only during the designated times.

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of Connecticut rules.

Keep construction activities under surveillance and control to minimize environment damage by noise.

3.19 POST CONSTRUCTION CLEANUP

Clean up areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform with surrounding contours.

-- End of Section --

DEPARTMENT OF THE NAVY
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT 06349-5000

SUBASENLONINST 5090.27A
N4
OCT 08 2019

SUBASE NEW LONDON INSTRUCTION 5090.27A

From: Commanding Officer, Naval Submarine Base New London

Subj: HAZARDOUS WASTE MANAGEMENT PLAN (HWMP)

Ref: (a) OPNAVINST 5090.lC

Encl: (1) Hazardous Waste Management Plan

1. Purpose. To implement a comprehensive Hazardous Waste Management Plan for Naval Submarine Base New London (SUBASENLON) and its tenant commands.

2. Cancellation. SUBASENLONINST 5090.27

3. Discussion. Enclosure (1) was prepared per reference (a), which establishes the Navy Environmental Protection Program and specifically requires Navy shore activities to develop hazardous waste management plans in compliance with all applicable federal, state, and local regulations. Enclosure (1) assigns responsibility and provides instruction for appropriate waste management to ensure compliance with U.S. Environmental Protection Agency and State of Connecticut Department of Energy and Environmental Protection hazardous waste regulations.

4. Applicability. This instruction is applicable to all SUBASENLON departments and tenant activities located on the SUBASENLON complex.

5. Action. All SUBASENLON departments and tenant commands shall implement and comply with the provisions of enclosure (1).

T. D. MOORE

Distribution: Electronic only, via G2
https://g2.cnic.navy.mil/SUBASENEWLONDONCT/Pages/default

SUBASENLONINST 5090.27A
8 Oct 19

HAZARDOUS WASTE MANAGEMENT PLAN

NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT

October 2019

CHANGES AND UPDATES TO NAVAL SUBMARINE BASE NEW LONDON HAZARDOUS WASTE MANAGEMENT PLAN

Change Date	Changes/Notes

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Section 1.0 - INTRODUCTION

1.1 Hazardous Waste Management Plan

This Hazardous Waste Management Plan (HWMP) is designed to provide guidance in the operation of hazardous waste generation and storage facilities on Naval Submarine Base New London (SUBASENLON). The HWMP covers hazardous waste management operating procedures for collection, containerization, labeling, marking, recordkeeping, storage, transfer, disposal, and training.

1.2 Authority

The HWMP for SUBASENLON has been prepared in accordance with OPNAVINST 5090.1D, which requires all Navy shore activities that generate hazardous waste to have a HWMP. The HWMP shall identify hazardous waste generated and handled by the facility, determine applicable federal, state, and local requirements, and describe how to comply with these requirements. The HWMP shall be kept up-to-date to reflect changes in hazardous waste generation and applicable federal, state, and local regulations. This plan applies to all commands, tenants, and activities on SUBASENLON. The receiving shore facility shall be considered the generator for Navy ships and submarines.

1.3 Naval Submarine Base New London Description

SUBASENLON is located in both the townships of Groton and Ledyard, Connecticut, on the east bank of the Thames River Estuary approximately six miles from Long Island Sound.

The military and civilian personnel assigned to SUBASENLON support the base's mission of serving as the operating and support base for submarines in the North Atlantic. SUBASENLON and its tenant activities provide four major services to the fleet: 1) home-porting of submarines and their crews, 2) maintenance and repairs of submarines, 3) submarine basic, advance, and refresher training, and 4) medical care, research, and training in the field of submarine medicine.

As a result of these activities, hazardous wastes and Connecticut-regulated wastes are generated, stored temporarily on-site, and/or treated on site. Ultimately, all hazardous

wastes and Connecticut-regulated wastes which cannot be recycled are removed from the site by certified waste haulers and disposed of at permitted waste disposal facilities.

The major tenant activities include the Naval Submarine Support Facility, Naval Submarine School, Naval Branch Health Clinic Groton, Naval Medical Research Laboratory, Naval Submarine Support Command, Naval Facilities Engineering Command Mid-Atlantic Public Works Department, Coastal Riverine Squadron 8 and Electric Boat.

Section 2.0 - REGULATIONS

2.1 Overview

SUBASENLON military and civilian personnel shall be aware of the environmental laws and regulations which pertain to their specific process or operation which generates, stores, treats or disposes of hazardous wastes. These requirements have been established and mandated by Federal, State, or local law and are not discretionary. Cited below are the federal, state and local environmental laws or requirements that outline the major components of overall hazardous waste management program.

2.2 Resource Conservation and Recovery Act (RCRA)

RCRA is the 1976 amendment to the first federal solid waste legislation, the Solid Waste Disposal Act of 1965. RCRA regulations are located in Part 40, Code of Federal Regulations (CFR) Parts 260-270. In RCRA, Congress established initial directives and guidelines for the United States Environmental Protection Agency (EPA) to regulate and manage solid waste, including hazardous waste. RCRA established a regulatory system to track hazardous substances from the time of generation to final disposal. The law requires safe and secure procedures to be used in treating, transporting, storing and disposing of hazardous wastes. RCRA also addresses "cradle to grave" hazardous waste management, establishes the duties and responsibilities of hazardous waste generators regarding the storage, treatment and disposal of hazardous waste, and authorizes the EPA to issue corrective action clean-up orders for hazardous waste releases.

2.3 Comprehensive Environmental Response, Compensation & Liability Act (CERCLA)

Federal Law authorizes EPA to manage and respond directly to releases of hazardous substances that may endanger public health or the environment, imposes strict liability for environmental clean-up on persons whose actions caused the release, and requires immediate reporting to the National Response Center on hazardous substances or chemical releases exceeding the Reportable Quantity (RQ) limitations. These regulations hold hazardous waste generators responsible for wastes disposed of in

the past, as long as they exist, and regardless of where they are currently located.

2.4 Superfund Amendments and Reauthorization Act (SARA)

SARA was enacted in 1986 to amend the provisions of CERCLA. This act establishes standards for clean-up activities and also stipulates the conditions for off-site disposal of wastes.

2.5 Emergency Planning and Community Right-to-Know Act of 1986, SARA Title III (EPCRA)

EPCRA provides local governments with information about possible chemical hazards in the community and requires generators to account for the use of hazardous substances in their facility.

2.6 Federal Facilities Compliance Act

Enacted by presidential proclamation in 1992, this law expands the enforcement authority of Federal, State, and local regulators with respect to hazardous waste management and other relevant areas of environmental compliance at federal facilities. The act requires the payment of fees for service, assessed in connection with hazardous waste regulatory inspection programs, or for the amount of hazardous waste generated at the facility. The act waives government sovereign immunity, allowing regulatory agencies to issue fines and penalties for violations on issues of non-compliance.

2.7 Toxic Substances Control Act (TSCA)

TSCA regulations located in 40 CFR Part 761, Polychlorinated Biphenyls (PCBs), prohibit PCB manufacture, processing, distribution in commerce, and use; provide rules for PCB use in electrical equipment; and include requirements for inspections and maintenance.

2.8 Hazardous Materials Transportation Act (HMTA)

HMTA regulations are located in 49 CFR Parts 170 - 179 and are overseen and enforced by the United States Department of Transportation (DOT). These regulations establish requirements for the transportation of hazardous material.

2.9 Clean Water Act (CWA)

Regulations located in 40 CFR Part 117 establish quantity limits for reporting regulated spills of hazardous material.

2.10 Clean Air Act (CAA)

Regulations located in 40 CFR Parts 49-97 establish limits of emissions of volatile organic compounds (VOCs) from hazardous waste.

2.11 Connecticut Department of Energy and Environmental Protection (CTDEEP) Regulations

Regulations located in CTDEEP, Hazardous Waste Management Regulations, Title 22a-449(c)-100 through 110 and 22a-449(c)-11, control the treatment, storage, transportation, and disposal of hazardous waste. Normally, the CTDEEP regulations extend the EPA RCRA regulations. Where the state and federal regulations differ, the most stringent applies.

CTDEEP regulates certain wastes which are not listed under RCRA as they do not meet the definition of hazardous waste as specified. These wastes include:

CR01	Waste PCBs
CR02	Waste Oil
CR03	Waste Water Soluble Oil
CR04	Waste Chemical Liquid
CR05	Waste Chemical Solid

Section 3.0 - DEFINITIONS AND ENVIRONMENTAL TERMS

ACCUMULATION AREA (90 DAY) - A specific location authorized by the SUBASENLON Hazardous Waste Program Manager, where hazardous waste containers are held for up to 90 days while awaiting removal. 90 day accumulation areas are subject to the requirements specified in 40 CFR 262.34.

ACCUMULATION START DATE (ASD) - The date on which a hazardous waste container becomes full in a Satellite Accumulation Area, OR the date the first drop of hazardous waste is placed into the hazardous waste container in a 90-day Accumulation Area or the Treatment Storage and Disposal Facility (TSDF).

ACUTELY HAZARDOUS WASTE - Wastes that have an immediate and substantial adverse health effect.

AQUEOUS - Refers to a water-based or liquid substance.

COMPATIBILITY - Ability of two or more substances to remain chemically or physically stable when stored or mixed together.

CONTAINER - Any portable device, in which a material is stored, handled, transported, or disposed of.

CONTAINMENT - Enclosing or containing hazardous substances in a structure to prevent the migration of contaminants into the environment.

CORROSIVITY - A characteristic of acidic and basic hazardous wastes. The characteristic is defined by a waste's pH and its ability to corrode steel. A waste is corrosive if it is aqueous and has a pH less than or equal to 2.0 (acidic) or greater than or equal to 12.5 (basic) or is a liquid that corrodes steel at a rate greater than 6.35 mm per year at a test temperature of 130 degrees F. A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number D002.

CRADLE-TO-GRAVE - A phrase used to describe the entire cycle of hazardous waste management activities, from the initial hazardous waste generation to final disposal.

DISCHARGE - The accidental or intentional spilling, leaking, pumping, emitting, or emptying a hazardous waste into the environment.

EPISODIC GENERATION - The irregular generation of hazardous waste by command/tenant activities. Episodic hazardous waste shall be turned in to the TSDF, and shall not be stored without the permission of the SUBASENLON Hazardous Waste Program Manager.

FLAMMABLES - A class of compounds that ignite easily and burn rapidly.

FLASH POINT - The lowest temperature at which a liquid generates enough vapor to ignite in air. If a waste has a flash point of less than 140 degrees F, then it is an ignitable hazardous waste.

FREE LIQUIDS - Any liquid, which readily separates from the solid portion of a waste under ambient temperature and pressure.

GENERATOR - The producer or person by site whose act, process, or operation first causes a hazardous waste to be subject to regulation. SUBASENLON is the "generator" for regulatory purposes.

HAZARDOUS MATERIAL - Any material designated by the U.S. DOT as posing a potential threat while being transported. Hazardous material is defined in 49 CFR 171.8 and includes hazardous substances and hazardous waste.

HAZARDOUS SUBSTANCE - A material included in a specific list of chemicals designated by EPA in 40 CFR 116 - 117 which poses a threat to the environment when discharged or spilled.

HAZARDOUS WASTE - Waste substances that can pose a substantial or potential hazard to human health or the environment when improperly managed. A hazardous waste is any solid, liquid, semisolid, or contained gaseous material designated as waste for disposal as defined or identified in 40 CFR Part 261.

IGNITABILITY - A waste is ignitable if it is a liquid (containing less than 24% alcohol), and has a flash point less than 140 degrees F; it is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical

changes, and when ignited, burns so vigorously and persistently that it creates a hazard; it is a compressed gas as listed by 49 CFR 173.115; or is an oxidizer as listed by 49 CFR 173.127. A solid waste that exhibits the characteristic of ignitability has the EPA Hazardous Waste Number D001.

OUTAGE - The amount of free space in a container between the top of the material and the container top. Outage shall be at least five percent (5%) of the container volume.

REACTIVITY - A class of compounds which are normally unstable and readily undergo violent change, react violently with water, can produce toxic gases with water, or possess other similar properties. A solid waste which exhibits the characteristic of reactivity has the EPA Hazardous Waste Number of D003.

SATELLITE ACCUMULATION - Accumulation of up to 55 gallons or a full container of each type of hazardous waste in containers at or near any point of generation, which is under the control of the operator of the process generating the waste.

SATELLITE ACCUMULATION AREA (SAA) - A specific location authorized by the SUBASENLON Hazardous Waste Program Manager, where hazardous waste is accumulated at or near the point of generation prior to being moved to a <90-day Accumulation Area or the SUBASENLON TSDF.

SECONDARY CONTAINMENT - A structure designed to capture spills or leaks, as from a container or tank.

SOLID WASTE - As defined in 40 CFR 261.2, solid waste is any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. There are three main categories of solid wastes: abandoned materials, recycled materials, and materials that are inherently waste-like. Before a material can be a hazardous waste, it shall first meet the criteria for being classified as a solid waste.

TOXICITY - A solid waste exhibits the characteristics of toxicity if, using specific testing methods as in 40 CFR 261.24,

the waste contains any of the contaminants listed in Table 1 of that section, at concentration equal to or greater than the given value. A solid waste which exhibits the characteristic of toxicity has the EPA Hazardous Waste Number specified in the table.

Section 4.0 - RESPONSIBILITIES

All personnel need to be cognizant of the general requirements and observant of potential violations. Any observation of potential violations shall be reported to the Activity Hazardous Waste Coordinator or the SUBASENLON Hazardous Waste Program Manager. For effective daily management and control of hazardous waste, specific personnel at SUBASENLON are assigned the following responsibilities:

4.1 SUBASENLON Commanding Officer (CO) shall:

a. Provide command attention and support to this HWMP to ensure compliance with RCRA laws and regulations.

b. Be responsible for signature on hazardous waste permit applications.

4.2 SUBASENLON Environmental Director shall:

a. Assist in obtaining funds to meet regulatory obligations. Request funding from higher echelon commands for hazardous waste disposal, permits, analysis, and generation fees.

b. Ensure that the SUBASENLON hazardous waste management program receives appropriate functional and managerial attention to ensure that the policies of the HWMP are implemented.

c. Notify the CO of any activities not in compliance with this instruction.

4.3 SUBASENLON Hazardous Waste Program Manager shall:

a. Provide guidance and technical expertise to implement the SUBASENLON HWMP.

b. Develop and administer a budget necessary for the proper operation of the hazardous waste program.

c. Sign manifests for the SUBASENLON Commanding Officer.

d. Define training requirements for all hazardous waste management personnel.

e. Administer Hazardous Waste Coordinator training.

f. Prepare hazardous waste reports and compliance documentation as required by EPA, CTDEEP, and Navy instructions.

g. Oversee operations at the TSDF in a safe manner that ensures compliance with federal, state, and local regulations.

h. Coordinate the pick-up, receipt and processing of all hazardous waste from SUBASENLON generators.

i. Provide technical waste stream classification via generator knowledge and/or sampling and analysis.

j. Maintain the site inspection program to ensure facility compliance.

k. Coordinate with disposal providers to ensure removal of the hazardous waste within the required timeframes.

4.4 SUBASENLON Consolidated Hazardous Material Reutilization and Inventory Management Program Manager (CHRIMP) shall:

a. Manage the Hazardous Material Program and operate a Hazardous Materials Minimization Center under CHRIMP for SUBASENLON departments and tenants.

b. Coordinate with other departments regarding hazardous material matters.

c. Manage hazardous material storage quantities and shelf-life programs to minimize hazardous waste generation due to material expiration.

4.5 NAVFAC Public Works Officer shall:

a. Ensure all contractors working on SUBASENLON comply with this HWMP.

b. Ensure all Public Works projects comply with this HWMP.

c. Ensure all Public Works shop personnel comply with this HWMP.

4.6 Department Directors, Tenant Activity Commanding Officers, and Officers-in-Charge shall:

a. Ensure compliance with this HWMP by all personnel.

b. Submit letter(s) to Hazardous Waste Program Manager to establish or deactivate waste accumulation areas. See Attachments 1 and 2.

c. Designate in writing a primary and alternate Hazardous Waste Coordinator, who shall be available at any time during working shifts, and available for inspections, waste turn-ins, and program operation. See Attachment 3.

d. In case of the absence of designated Hazardous Waste Coordinators, ensure multiple alternate coordinators are identified and trained in sufficient time to prevent program disruption. NOTE: Generating and managing wastes without a properly trained Hazardous Waste Coordinator is a known violation, potentially subjecting persons involved to criminal prosecution.

e. Provide support to the Hazardous Waste Management Program to ensure compliance with regulatory requirements at all times. This includes providing unrestricted access to the department/activity's Hazardous Waste Site.

4.7 Hazardous Waste Coordinators shall:

a. Oversee the waste management operations for their department/activity and take responsibility for compliance with laws and regulations controlling the accumulation and management of the wastes. The designated alternate Hazardous Waste Coordinator is responsible in the absence of the primary Hazardous Waste Coordinator.

b. Provide and document any personnel using the storage area with on-the-job training specific to their needs.

c. Properly accumulate, handle, collect, containerize, and label waste containers generated by their department/activity.

d. Prepare and implement a procedure to ensure that in the absence of the Hazardous Waste Coordinator (e.g., off-shift, weekends, out sick), a properly trained individual will perform

the Hazardous Waste Coordinator duties on a daily basis and report any problems to the Hazardous Waste Program Manager.

e. Ensure proper documentation is used for profiling new waste streams, reviewing profiled wastes on an annual basis, profiling excess/expired material, and turn-in of wastes for disposal.

f. Ensure site binder is always complete, up-to-date and stored at the Hazardous Waste Site at all times.

g. Maintain readiness of the department/activity storage areas and records.

h. Notify the chain of command and the Hazardous Waste Program Manager of any problems in maintaining compliance with the HWMP.

Section 5.0 - REQUIREMENTS FOR GENERATORS

5.1 Hazardous Waste Generation

Hazardous waste is generated through the use of hazardous material, by bringing non-hazardous materials into contact with hazardous material, and by various activities and processes managed by SUBASENLON departments, tenants, and contractors. As a result, hazardous and Connecticut regulated wastes are generated. Types and amounts of hazardous wastes generated may fluctuate depending upon workload. Continual close coordination between the Hazardous Waste Program Manager and the generating sites shall be maintained to support a compliant program. The hazardous waste management requirements outlined in this section apply to all hazardous waste generators. The requirements for generators are derived from regulations that are specific and detailed. The success of the Hazardous Waste Management Program is largely dependent on the generators' notification of all hazardous waste generated or stored, following the rules for identifying, profiling, and containerizing wastes, performing inspections, and maintaining the required records.

5.2 Hazardous Waste Storage Area General Requirements

There are three main types of storage areas on SUBASENLON that are regulated by EPA and CTDEEP. They are satellite accumulation areas, 90 day accumulation areas, and the permitted TSDF. In addition, requirements for universal waste, Connecticut regulated waste, episodic waste, and contractor waste are outlined in this section. Currently, no hazardous waste is stored in tanks at SUBASENLON and tanks are not covered in this instruction. Designation of an approved hazardous waste storage area will be made through the Hazardous Waste Program Manager, in conjunction with the responsible command.

5.2.1 Requirements Applicable to All Storage Areas

A Hazardous Waste Coordinator and at least one Alternate shall be designated for each site. Prior to assignment as Hazardous Waste Coordinator, the Hazardous Waste Program Manager shall be notified using the sample Hazardous Waste Coordinator Assignment Notification found as Attachment 3. Refer to Section 4.6 for additional information regarding this designation.

All Hazardous Waste Coordinators and Alternates are required to complete an initial training session followed by annual refresher training. Refer to Section 6.5 for addition information.

A 3-ring binder will be maintained at each storage area containing:

- Inspection forms with corrective actions indicated.
- Current List of Authorized Waste Stream Profiles and Basewide Profiles (no more than 12 months old).
- Copies of completed Forms B1.
- Training certificates for Primary and Alternate Coordinators, plus any others performing coordinator duties.
- OJT records from training provided by Coordinators.
- Copies of assignment letters for Primary and Alternate Coordinators (Attachment 3).
- Copy of Site Establishment Letter (Attachment 1).

Archive of all site records for at least three years.

Spill control equipment consisting of, at a minimum, broom, dustpan, plastic bag, and absorbent material that is appropriate for type of waste, shall be present and clearly marked.

5.2.2 Specific Requirements for Satellite Accumulation Areas

Generators may accumulate hazardous waste at an SAA without a RCRA hazardous waste permit and without complying with the accumulation time limits associated with <90 day accumulation areas if the following conditions are met:

- Accumulation is limited to 55 gallons of hazardous waste or one quart of acutely hazardous waste.
- An SAA may collect various types of wastes from the same process in separate containers as long as the total quantity of hazardous waste in the SAA does not exceed 55 gallons per waste stream.
- Only one container per profiled waste stream is allowed.
- SAA shall be located at or near the point of generation where wastes initially accumulate and which is under the control of the operator of the process generating the waste.

All SAAs shall be clearly identified by a satellite accumulation area sign or placard.

5.2.3 Specific Requirements for <90 Day Accumulation Areas

Generators may accumulate hazardous waste on-site for 90 days or less without a RCRA hazardous waste storage permit. There is no limit to the quantity of wastes stored on-site as long as they do not pass the 90 day time limit and adequate spill containment is provided for all liquid wastes. It is SUBASENLON policy that waste not be accumulated in a <90 day area for more than 60 days. Additional generator requirements for <90 day accumulation areas are listed below:

- Internal communications capable of providing immediate emergency instruction to facility personnel shall be present at the site. A telephone or pull-box at the site capable of summoning emergency assistance from the SUBASENLON Fire Department. Cell phones can be used for this type of communication.
- Provide portable fire extinguishers, fire control equipment, and spill control equipment.
- Display site contingency plan showing a site map with the location of the spill kit, phone, nearest fire alarm, fire extinguisher, and other emergency response information clearly marked.

All <90 day accumulation areas shall be clearly identified by a <90 day accumulation area sign or placard.

5.2.4 Specific Requirements for Permitted Treatment, Storage, and Disposal Facility (TSDF)

TSDFs are strictly regulated by state and federal regulations. Applicable regulatory requirements for TSDFs are located in 40 CFR 264. Detailed management practices for the TSDF located at B-562 are outlined in the RCRA Permit DEP/HWM-095-005, reissued September 2019 and expiring September 2029. Full permit copy is located at the TSDF.

5.2.5 Specific Requirements for Universal Waste

CTDEEP regulations for universal wastes are an alternative to following the full hazardous waste management rules by streamlining management regulations for "widely generated wastes". It is SUBASENLON policy that universal waste not be accumulated for more than six months without turning in to the TSDF. Universal wastes are generated on a routine basis at SUBASENLON and consist primarily of batteries and fluorescent bulbs.

Universal waste categories shall be hazardous waste before they can be designated as universal waste. Currently CTDEEP allows the following hazardous waste items to be managed as universal waste:

- Batteries - device consisting of electrically connected electrochemical cell designated to receive, store and deliver energy; and unbroken batteries where the electrolyte has been removed. Prior to turn-in, all batteries shall either have the battery poles taped or each individual battery placed into separate zip-lock bags.
- Pesticides - unused pesticides banned from use; damaged by temperature extremes; and recalled pesticides.
- Mercury Thermostats - temperature control devices containing varying amounts of elemental mercury.
- Lamps - unbroken bulb or tube portion of an electric lighting device; and exhibit toxicity characteristic for mercury or lead, such as fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide.

5.2.6 Specific Requirements for Connecticut Regulated Waste

Connecticut regulated waste does not need to be stored with other RCRA hazardous wastes in designated satellite accumulation areas or <90 day accumulation areas. However, the containers should be managed in the same manner as RCRA hazardous waste containers as discussed in Section 5.4. With the exception of the requirement for a Site Establishment Letter, all other requirements listed in Section 5.2.1 apply to Connecticut Regulated Waste storage.

5.2.7 Specific Requirements for Episodic Waste

Episodic wastes generated on SUBASENLON are normally generated by one-time projects or excess/shelf-life expired chemicals. Permanent designated storage areas will not be established for these waste generations. SUBASENLON departments and tenants shall consult with the Hazardous Waste Program Manager prior to generation of these wastes for management instruction.

5.2.8 Specific Requirements for Contractor Waste

Any hazardous waste generated by a contractor under federal or state environmental regulations shall be coordinated with the Hazardous Waste Program Manager. Instruction will be provided for compliant storage, testing, transport, and disposal under the scope of the contract. Long-term contractors will be required to attend the Hazardous Waste Coordinator training and establish <90 day accumulation areas or satellite accumulation areas if necessary. Short-term contractors will receive one-on-one instruction specific to the requirements of their contract.

5.3 Waste Stream Characterization and Profiling

5.3.1 New Waste Streams

The Hazardous Waste Coordinator shall submit a Form B1 (Attachment 4) for new waste not listed on the authorized profile lists, to the Hazardous Waste Program Manager prior to waste generation or as soon as first drop is generated. The form shall accurately identify the generator and generation point, explain the process in detail that generated the waste, and list all materials used in the generation of the waste. Materials shall be manufacturer specific and may be identified by providing a copy of the CHRIMP authorized user list with relevant SDSs marked, listing the materials by CHRIMP SDS number, or by providing a copy of the manufacturer's SDS. The following steps outline the specific responsibilities in the waste characterization process:

- Step 1: The Hazardous Waste Coordinator completes Part 1 and submits the Form B1 and any required Standard Operating Procedures, Preventive Maintenance cards, or SDSs to the Hazardous Waste Program Manager. The waste item will remain in the accumulation area with a copy of the Form B1 attached until the form is received back.

- Step 2: Each hazardous waste stream is assigned a unique profile number. The Hazardous Waste Program Manager reviews the Form B1 and all information submitted to determine if testing is required to characterize the waste per the Waste Analysis Plan (WAP). If the SDS and provided process information is insufficient to characterize the waste or if contamination is suspected, the required test(s) are ordered in accordance with the WAP. A preliminary waste characterization assessment is performed based on the known or suspected hazards and Part 2A of the form is completed. The form will be updated upon receipt of test results. If the information is sufficient to use generator knowledge, of after receiving the test results, Part 2B of the form is completed. The Hazardous Waste Program Manager will assign a label type, profile number, segregation code, waste description, and applicable waste codes. Copies of the completed hazardous waste profiles are maintained at the TSDF.
- Step 3: The Hazardous Waste Coordinator shall immediately place the required label on the waste container, ensuring the waste description and waste codes on the label exactly match the information provided on Form B1. Form B1 shall be maintained in the site binder for future reference.

5.3.2 Unidentified Waste

If an unidentified container is discovered, or when the specific contents are unknown or uncertain, the Hazardous Waste Coordinator shall segregate the container from all other wastes, notify the Hazardous Waste Program Manager, and submit a Form B1 at the time the waste was discovered. In this situation, a sample of the hazardous waste must undergo extensive chemical analysis. The need for chemical analysis is often avoidable if due care is exercised at the generator's level. The importance of keeping waste products segregated and clearly marked is essential. By knowing the exact contents of each waste and providing all the information requested on the Form B1, excessive costs can be avoided in the determination of the waste stream profile.

5.3.3 Waste Profile Review Process

Once every year or whenever a generation process changes in any way, waste streams shall be reviewed. Check the LAST REVIEW DATE column of the authorized profile lists.

After one year, profiles not reviewed will be dropped from the authorized profile list. A Form B1 shall be submitted, listing the waste profile number being reviewed on Page 1, explaining any changes in the process or materials used, and completing all sections thoroughly.

5.3.4 List of Authorized Waste Stream Profiles

Updated lists of authorized site-specific and base-wide waste stream profiles are distributed at all training classes and when profiles are added, removed, or changed. It is the responsibility of the Hazardous Waste Coordinator to ensure these updated profile lists are inserted into the site binder when received. Testing is repeated as necessary to ensure that profiles are up-to-date and accurate.

5.4 Container Management

Special requirements for use and management of containers are included in 40 CFR 264. All containers used for hazardous waste shall be:

- Authorized by DOT for transportation of the specific waste as shown in 49 CFR 172 prior to shipment from SUBASENLON.
- If the container capacity is greater than 26 gallons and the waste contains volatile organic compounds (VOCs), the container shall be DOT approved per 49 CFR 178 during storage.
- Always closed except when necessary to add or remove waste. Closed means bungs or lid rings with bolts are in place and securely tool-tightened so that no material will leak if container is tipped over.
- In good condition; that is, have no dents or corrosion.
- Made of or lined with a material which will not react with and is otherwise compatible with the hazardous waste to be stored.
- Opened, closed, and handled in a manner to prevent rupture or leakage from the containers.
- Stored so that all labels are visible for inspection and with adequate aisle space to allow unobstructed movement of personnel, fire protection equipment, and spill response

equipment to respond to an emergency. Guidance on required aisle space for a specific accumulation area can be obtained by contacting the Hazardous Waste Program Manager.

- Properly labeled as described in Section 5.5.
- If liquid, shall be stored in a secondary containment area which (a) is capable of holding 10% of the total waste volume or (b) is equal to the largest container capacity, whichever is greater.

5.5 Labeling of Containers

All wastes shall be labeled with the proper label as indicated on the List of Authorized Waste Stream Profiles or as indicated on the Form B2.

New waste streams may require analytical testing. If this is necessary, preliminary profile information for the labels will be provided on the Form B1 based on the known and suspected hazards are described in Section 5.3.1. After test results are received, the profile information may change and the Hazardous Waste Coordinator will be notified and required to make the necessary changes.

General Procedures:

- Select the proper label (Hazardous Waste (Attachment 6), State-Regulated Waste (Attachment 7), or Universal Waste (Attachment 8).
- Complete required information for each waste type and label.
- Write legibly and use permanent marker.
- Old labels shall be completely removed or obliterated.

5.5.1 Hazardous Waste Container Label Requirements

- Waste Description: Shall be exactly as written on profile list or as indicated on Form B2.
- Activity: Command/shop
- Site #: If designated accumulation area, provide assigned Site #. If not designated area, provide building number.

- HW Coordinator: Provide full name of coordinator or person turning in the waste.
- Telephone #: Provide contact phone number.
- Accumulation Date: For <90 day accumulation areas, provide the date the first drop was put into the container. For satellite accumulation areas, provide the date the container was full. All others, contact the Hazardous Waste Program Manager for guidance.
- Waste Profile #: Exactly as written on profile list or the SDS # as indicated on Form B2.
- EPA Waste Code: Exactly as written on profile list or as indicated on Form B2.

5.5.2 State (Connecticut)-Regulated Container Label Requirements

- Waste Description: Exactly as written on profile list or as indicated on Form B2.
- Waste Profile #: Exactly as written on profile list or the SDS # as indicated on Form B2.
- State Waste Code: Exactly as written on profile list or as indicated on Form B2.
- Activity: Command/shop.
- Site #: If designated accumulation area, provide assigned Site #. If not designated area, provide building number.
- HW Coordinator: Provide full name of coordinator or person turning in the waste.

5.5.3 Universal Waste Container Label Requirements

- Check appropriate box to indicate type of universal waste.
- Accumulation Start Date: Provide the date the first item was placed into the container.
- Provide the profile number and waste description exactly as written on the authorized base wide profile list. Provide the name and phone number of the person turning in the waste.

5.6 Waste Segregation

- Hazardous Waste shall be stored separately from hazardous material.

- Incompatible wastes shall be stored separated by a dike, berm, wall, separate secondary containments, or other device.
- Each waste stream will be evaluated by the Hazardous Waste Program Manager to determine an appropriate segregation code. This code will be listed for each profile on the List of Authorized Waste Stream Profiles or as indicated on Form B2.
- The Compatibility of Segregation Codes chart (Table 5-1) will be used to determine which waste streams can be safely stored together. Wastes with the same Segregation Code can be stored together. Wastes with different Segregation Codes may be stored together if a "YES" is listed on the chart.

TABLE 5-1: COMPATIBILITY OF SEGREGATION CODES

COMPATIBILITY OF SEGREGATION CODES CHART									
	ACID (A)	ALKALINE (B)	FLAMMABLE (F)	PCB (P)	OXIDIDIZER (O)	REACTIVE (R)	TOXIC (T)	CT REG (C)	UNKNOWN
ACID (A)	*YES*	NO	NO	NO	NO	NO	NO	NO	NO
ALKALINE (B)	NO	*YES*	*YES*	NO	NO	NO	NO	*YES*	NO
FLAMMABLE (F)	NO	*YES*	*YES*	NO	NO	NO	*YES*	*YES*	NO
PCB (P)	NO	NO	NO	*YES*	NO	NO	*YES*	*YES*	NO
OXIDIDIZER (O)	NO	NO	NO	NO	*YES*	NO	NO	NO	NO
REACTIVE (R)	NO	NO	NO	NO	NO	*YES*	NO	NO	NO
TOXIC (T)	NO	NO	*YES*	*YES*	NO	NO	*YES*	*YES*	NO
CT REG (C)	NO	*YES*	*YES*	*YES*	NO	NO	*YES*	*YES*	NO
UNKNOWN	NO	NO	NO	NO	NO	NO	NO	NO	NO
NO = CANNOT BE STORED TOGETHER					YES = CAN BE STORED TOGETHER				

5.7 Empty Containers

Empty container management policies apply to containers of any size, containing materials which if/when disposed become a hazardous or state regulated waste. Empty containers of acutely hazardous waste of any size shall be managed and disposed of as hazardous waste.

5.7.1 Definition of Empty

Empty containers are defined in the RCRA regulations in 40 CFR 261.7. Under these provisions, a container is empty if:

- All wastes have been removed that can be removed using the practices commonly employed to remove materials from that type of container, e.g. pouring, pumping, and aspirating; and
- There are no free flowing liquids; and
- No more than 3 percent by weight and no more than 3 percent by volume of the total capacity of the container remains in the container if the container is less than or equal to 110 gallons or no more than 0.3 percent if the container is greater than 110 gallons.
- It is a compressed gas cylinder that has reached atmospheric pressure. Aerosol cans are never considered empty until punctured at the TSDF.

The definition of empty provided by DOT in 49 CFR requires the container to be cleaned of residue and purged of vapors to remove any potential hazard and all labels and markings have been removed or obliterated.

While in storage, a container shall meet the RCRA definition of empty to avoid the hazardous waste management requirements.

5.7.2 Handling of Empty Containers

Each generator shall make every reasonable effort to ensure that all materials have been removed using the practices commonly employed to remove materials from containers, such as:

- Pouring out contents then turning container over and draining it until there is no free-flowing liquids.
- Pumping or aspirating of containers until there are no free-flowing liquids.

- Scraping with a spatula to remove all free-flowing liquids.

Empty containers (other than those used to store acutely hazardous wastes) will be transferred to the TSDF for reuse or off-site disposal.

When empty containers are received at the TSDF, they will be managed as described below.

- Empty containers 55 gallons or less are placed in a lined, 30-yard roll-off container for disposal as non-regulated waste.
- Empty containers less than 55 gallons which previously contained an acutely hazardous waste are labeled and disposed of as hazardous waste.
- Empty containers of 55 gallons or larger that are in good condition and have not previously contained a material which if/when disposed of becomes a hazardous waste are placed in the TSDF storage area designated for empty drum storage. These drums may be used throughout SUBASENLON.
- Empty containers of 55 gallons or larger that cannot be reused because they previously contained a hazardous waste or a material which if/when disposed of becomes a hazardous waste, or due to poor condition of the container, are disposed of as a non-regulated waste.

5.8 Special Program Procedures

5.8.1 Polychlorinated Biphenyl (PCB) Disposition

PCB regulations require that PCB waste reach final disposal within one year of being removed from service. To ensure this, all PCB waste shall be turned in to the TSDF within six months of the "out of service date". The "out of service date" shall be clearly marked on the waste label, the turn-in document, and the waste manifest/shipping documentation.

All suspect PCB items should be examined for labels or markings indicating presence or absence of PCBs. If there is no label or marking, the item may be traced back to the manufacturer using name plate data or may be tested by chemical analysis to determine PCB content. If no information is available, the item will be assumed to be a PCB item and managed accordingly.

5.8.2 Mixed Waste Disposition

Mixed waste is both radioactive and RCRA regulated hazardous waste, and is subject to the provisions of this HWMP while being stored on SUBASENLON. SUBASENLON, and the Nuclear Regional Maintenance Department (managed by Electric Boat Shipyard), share responsibility for the shipment of mixed waste which cannot be rendered non-hazardous or released from radiological controls. The Naval Submarine Base New London Mixed Waste Memorandum of Agreement (MOA), latest revision, addresses the proper management of mixed waste. A copy of this MOA is located at the TSDF.

5.8.3 Red Rags for Laundering

SUBASENLON has a program for the recycling and laundering of oily rags. All SUBASENLON departments and tenants should be using the red rag program when possible. The use of these rags is limited to oils and greases only. No paints, solvents, adhesives, gasoline, or any other flammable liquids can be used on these rags. Oily/greasy rags shall be placed in containers and labeled with a State-Regulated label with the specific information indicated for Profile P0541A on the base wide profile list. Dirty rags are counted and turned in to the TSDF, with the count indicated on the turn-in document. Clean rags may be picked up at the TSDF in bundles of 50.

5.8.4 Compressed Gas Cylinders

To properly dispose of compressed gas cylinders:

- If the cylinder has a label or marking indicating the cylinder provider (e.g. ABCO, BOC, etc.), contact the provider to pick up the cylinder. Compressed cylinders providers are required to collect their property; or

- If the cylinder is stamped USN or USGOVT Property, route through Material Turned Into Stores (MTIS), B-33, contact (860) 694-3601; or
- If the cylinder cannot be disposed of using the above two options, contact the Defense Logistics Agency to coordinate a pick up.

5.8.5 Excess/Expired Material

Turn in all excess material that is still usable to CHRIMP directly.

Contact CHRIMP for expired shelf-life material extension via e-mail using a material extension request form provided by CHRIMP. Attach a copy of request form to item and keep in the hazardous material locker pending CHRIMP response.

If refused by CHRIMP, complete Form B2 (Attachment 5) and e-mail to SUBASENLON Environmental Hazardous Waste Branch. List each excess/expired material by Safety Data Sheet (SDS) serial number (located on the CHRIMP label affixed to the container) and complete all applicable columns. If no CHRIMP label is affixed to the container, the manufacturer's SDS shall be submitted with the Form B2. SDS shall be specific to the item. Attach a copy of the e-mailed Form B2 to the waste material and move the item to the established waste storage area. When the Form B2 is e-mailed back with the information required to complete the turn-in documentation, immediately label the container and arrange for pick-up from the SUBASENLON Environmental Hazardous Waste Branch.

5.9 Waste Turn-In Procedures

Hazardous waste generated on SUBASENLON will be disposed of through the Defense Logistics Agency or SUBASENLON administered contracts. All waste turned in to the TSDF shall be accompanied by a DD Form 1348. It is the responsibility of the Hazardous Waste Coordinator to complete the required turn-in documentation before the hazardous waste is ready for pick-up.
The DD Form 1348 should be completed using the appropriate template developed by SUBASENLON Environmental Hazardous Waste Branch for this use. Templates and instruction for use are provided during Hazardous Waste Coordinator training. Template

form for completion by the Hazardous Waste Coordinator and completed DD Form 1348 are provided as Attachments 13 and 14.

5.10 Waste Pick-Up/Drop-Off Procedures

- Pick-ups of hazardous waste from submarines take place Monday through Friday starting at 0900 at Pier 2 and continuing past all piers, stopping at any pier with waste waiting for removal. Submarines with hazardous waste ready for pick-up should have personnel knowledgeable about the waste standing at the head of the pier at 0900 with the DD Form 1348 for the waste being turned in.
- All SUBASENLON authorized waste storage area HW Coordinators, department personnel, and tenants shall call the SUBASENLON Environmental Hazardous Waste Branch, (860) 694-4673, to schedule a pick-up. These pick-ups are scheduled for Mondays and Thursdays after the pier pick-ups. The person requesting the pick-up shall ensure someone is available at the site with completed documentation for the transfer of the waste at the appointed time.
- Empty containers and universal wastes may be dropped off at the TSDF, Monday through Friday between 1300 and 1500. A DD Form 1348 shall be presented for all drop-offs <u>except</u> empty containers and fluorescent bulbs.
- Hazardous waste shall not be transported in Privately Owned Vehicles.

Section 6.0 - PERSONNEL TRAINING REQUIREMENTS

6.1 General

Training of the personnel involved in hazardous waste management and handling is required by three regulatory agencies: EPA (RCRA), Occupational Safety and Health Administration (OSHA), and DOT. These requirements are summarized in Table 6-1 by job classification and are discussed below.

6.2 General requirements - RCRA

The RCRA regulations include personnel training requirements designed to reduce the potential for mistakes and accidents at hazardous waste facilities that might threaten human health or the environment. The purpose of these requirements is to ensure that workers are adequately prepared to properly manage hazardous waste and respond to any emergencies.

As a large quantity generator of hazardous waste and an operator of a permitted Hazardous Waste Storage Facility, SUBASENLON is required to have a written training plan for personnel involved with hazardous waste management that teaches them to perform their duties in a way than ensures compliance with the regulations as defined in 40 CFR 264.16(a). The SUBASENLON written plan is included in the RCRA Permit DEP/HWM-095-005.

All Hazardous Waste Coordinators receive RCRA training as part of the Hazardous Waste Coordinator training classes provided by SUBASENLON Environmental Department. The SUBASENLON Environmental Department personnel receive contractor provided RCRA training.

6.3 General requirements - OSHA

Specific requirements for training in compliance with the requirements of 29 CFR 1910.120(p) - TSDF operations, and 29 CFR 1910.120(q) - emergency response, are covered in the SUBASENLON Hazardous Waste Contingency Plan.

The Environmental Department Hazardous Waste Division shall complete training in compliance with 29 CFR 1910.120(p) requirements within six months of their assignment to a new position which involves hazardous waste handling. These personnel also function as members of the Emergency Response

Team and are required to receive training at the Hazardous Materials Technician Level (29 CFR 1910120(q)(6)(iii) and as Post Emergency Responders (29 CFR 1910.120(q)(3) and (q)(11)(ii).

All Hazardous Waste Coordinators are required to receive training at the First Responder - Awareness Level. This training is provided as part of the Hazardous Waste Coordinator annual training.

6.4 General Requirements - DOT

The DOT regulations, 49 CFR 172, specify that a HAZMAT employee who performs any function regulated under 49 CFR Subchapter C shall be instructed in the requirements that apply to that function. The Environmental Division Hazardous Waste Branch personnel are responsible for the shipment of hazardous waste and are therefore required to be trained in all aspects of Subpart C related to classification, description, packaging, marking, and labeling. SUBASENLON personnel are not authorized to transport hazardous waste on public roads.

The DOT regulations require refresher training at least every three years. Training is provided by contractors.

Environmental Department personnel who receive the required DOT training and are designated in writing by SUBASENLON Commanding Officer, are authorized to sign the Uniform Hazardous Waste Manifest that accompanies each hazardous waste shipment. All other personnel are forbidden to sign manifests for any waste leaving SUBASENLON. Manifest requirements are discussed in detail in Section 9.

6.5 Hazardous Waste Coordinator Training

Hazardous Waste Coordinators shall attend the Hazardous Waste Coordinator initial training prior to assuming duties, followed by annual refresher sessions on hazardous waste identification, segregation, containerization, generator requirements, emergency planning and response, and SUBASENLON hazardous waste policies. This training will be provided by the SUBASENLON Environmental Hazardous Waste Branch and applies to primary and alternate Hazardous Waste

Coordinators. Any personnel using the storage area are required to have on-the-job training provided and documented by the Hazardous Waste Coordinator.

6.6 Hazardous Waste Branch Personnel

Personnel involved with the SUBASENLON hazardous waste program require specific training depending on their duties and responsibilities. The responsibilities of the Hazardous Waste Program Manager are included in Section 4.3. Additional personnel are discussed below.

a. Hazardous Waste Branch Environmental Protection Specialists are responsible for pick-up of waste from the accumulation/satellite areas. Pick-up includes verification of proper labeling and that containers are in good condition. They deliver waste to the TSDF and store in proper segregation locations awaiting transfer by a contractor to the disposal site. They shall be aware of requirements governing proper packaging, spill response, and safety when working with hazardous waste. They also perform inspections of SUBASENLON waste accumulation areas.

b. Hazardous Waste Branch Environmental Engineering Technician maintains hazardous waste documentation, such as manifests, disposal certificates, and related information, in an organized fashion for use by the Hazardous Waste Program Manager in required reporting or auditing situations. The technician shall have an awareness of the safety, shipping, and management requirements of hazardous waste.

c. Hazardous Waste Coordinators are responsible for the collection and the proper storage of the hazardous waste at the shop level. Coordinators shall ensure proper containerization, labeling requirements, and time/quantity constraints are met. Coordinators shall be aware of the safety aspects, spill response, and management of the hazardous waste pertinent to their positions.

d. Shop personnel are responsible for delivering hazardous waste to the proper accumulation/satellite areas for storage until transfer to the TSDF. Shop personnel shall be able to provide pertinent waste content information to the Hazardous Waste Coordinator to properly identify and profile the waste.

Shop personnel shall be aware of the safety aspects and pertinent hazardous waste management relating to the use of their specific hazardous material.

TABLE 6-1: HAZARDOUS WASTE PERSONNEL TRAINING REQUIREMENTS

	HW Program Manager	HW Specialist	HW Technician	HW Coordinator
OSHA 29 CFR 1910.120 (p) HW OPERATION AND EMERGENCY RESPONSE COURSE: INITIAL (min 24 hrs) & ANNUAL REFRESHER (8 hrs)	X	X	X	
OSHA 29 CFR 1910.120 (q)(6) TRAINING: INITIAL & ANNUAL REFRESHER	X	X		
40 CFR 264.16(a) HW/RCRA REGULATIONS COURSE FOR TSDF: ANNUALLY	X	X	X	
40 CFR 264.16(a) TSDF SPECIFIC CONTINGENCY PLAN: ANNUALLY	X	X	X	
SUBASENLON HW COORDINATOR COURSE: ANNUALLY			X	X
49 CFR 172-177 DOT PACKAGING & TRANSPORTATION: EVERY 3 YEARS	X	X	X	

Section 7.0 - SPILL RESPONSE PROCEDURES

SUBASENLON Contingency Plans and Emergency Response Procedures are included in the SUBASENLON Hazardous Waste Contingency Plan. The ICP is located at various locations, both internal and external to SUBASENLON. To review the ICP, contact the Hazardous Waste Program Manager at the TSDF, B-562, EXT-4298.

The SUBASENLON Fire Department provides emergency response for all activities located at SUBASENLON.

7.1 Spill Event at Hazardous Waste Accumulation Area

In the event of a spill or leak of hazardous waste, the Hazardous Waste Coordinator for the accumulation area shall cease all operations and contain and cleanup the spill in accordance with the site specific spill contingency plan. All materials used in cleanup of the waste (i.e. absorbent material, rags) shall be considered hazardous waste and shall be containerized, labeled, and handled as hazardous waste. The Hazardous Waste Coordinator shall make an entry in the site log of the spill event.

Each accumulation area has a telephone, wall-mounted fire alarm box, or other means of contacting emergency help such as a cell phone. The SUBASENLON Emergency Notification phone numbers and evacuation routes are posted at each storage location. Hazardous Waste Coordinators maintain spill response kits at each storage location to clean up small spills that can be handled safely by the personnel involved.

SUBASENLON provides annual contingency plan training to all Hazardous Waste Coordinators assigned to manage accumulation areas. This training covers the following areas:

a. Communication and alarm systems

b. Response to fires, explosions and hazardous material releases

c. Shutdown of operations

e. ICP implementation

f. Hazardous waste identification

g. Hazardous waste management requirements

If containment of the spill or leak is beyond the capabilities of the Hazardous Waste Coordinator or there is a concern over personal safety, call the Fire Department at extension 3333 or 911 for assistance.
All necessary reports of the spill event will normally by prepared by the SUBASENLON Environmental Department.

Section 8.0 - HAZARDOUS WASTE MINIMIZATION

The Hazardous Waste Source Reduction and Management Review Act, requires generators of hazardous waste to reduce the waste they generate. Additionally, the Pollution Prevention Act established the national policy that states "pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled or treated in an environmentally safe manner, with disposal being the last option". Waste minimization results in lower disposal cost and fewer regulatory constraints. To reduce the amount of hazardous waste generated, commands need to evaluate which processes or operations cause the generation of waste and what steps, process changes, chemical substitutes or modifications can be implemented to reduce or eliminate the generation of hazardous waste.

Hazardous waste minimization is everyone's responsibility and is required by federal, state, and Navy regulations. The Generator's Certification on all hazardous waste manifests indicates the generator's commitment to have a program in place to reduce the volume and toxicity of waste generated.

8.1 Hazardous Waste Minimization Techniques

a. Material Substitution: Material substitution is the most effective means of reducing hazardous waste. This includes substituting non-hazardous or less hazardous materials for the hazardous materials currently used. Departments and tenant commands shall, in conjunction with the CHRIMP Manager, evaluate the possibility of making substitutions for hazardous materials used in non-critical areas.

b. Use of CHRIMP for Unused, Expired or Excess Material: The purchase of materials in quantities greater than what can be used in a timely manner results in materials exceeding their useful shelf life and becoming hazardous waste. Generation of hazardous waste via expiration of shelf life due to excess stocking levels can be reduced by coordinating with CHRIMP. The CHRIMP Manager and Hazardous Waste Manager shall work closely to ensure the management of hazardous material and reduction of hazardous waste generation to the maximum extent possible. CHRIMP shall make every effort to restock hazardous material that is no longer needed so that other departments and tenant

activities on SUBASENLON may use it. CHRIMP shall acquire hazardous material in a quantity that minimizes shelf life expiration and maintain a vigorous shelf life management program so that all hazardous material is reviewed and extended for its original purpose if possible prior to being declared expired shelf life and entering the waste stream.

c. Recovery and Recycling: Recovery and recycling efforts on SUBASENLON currently include oil, oil filters, antifreeze, batteries, fluorescent bulbs, dental amalgam, shop towel laundering service, concrete, plastics, wood and scrap metal.

d. Maintenance Procedures: The quantity of waste generated from maintenance activities can be reduced through proper maintenance procedures. The quantity of material prepared for a maintenance activity should be limited to the amount required to complete the work. All personnel are encouraged to consider waste management costs associated with current procedures and propose ways to minimize waste.

e. Treatment: Treating the hazardous waste to reduce the volume or to render it non-hazardous by neutralization, reclamation, detoxification, or other approved methods. This minimization technique shall only be utilized by the TSDF with approval by the Hazardous Waste Program Manager.

Section 9.0 - INSPECTIONS AND RECORDKEEPING

RCRA specifies certain reports and records that shall be maintained and made easily accessible for audit by federal or state officials. Hazardous Waste records are permanent records, and therefore entries shall be printed legible and with indelible ink.

Once made, these records will be carefully preserved and filed where they can be easily located in a filing system that will be used and understood by all personnel completing and using the records. Completed forms shall be filed promptly.

9.1 Inspections

Hazardous Waste Coordinators for <90 day accumulation areas are required by SUBASENLON to inspect their sites daily and when the shop is open for production. A sample inspection form is included as Attachment 9.

The SUBASENLON Environmental Hazardous Waste Branch will perform oversight inspections of all waste storage areas at least quarterly. More frequent inspections will be performed at any site with repeated or significant deficiencies. Inspections will include, but not limited to:

- Container condition
- Required labels and/or markings
- Secondary containment
- Compatibility/segregation of wastes
- Inspections/records
- Accumulation time/quantity limit compliance

All oversight inspections are entered into the Environmental Management System (EMS) database. If there are any findings, a Notice of Environmental Deficiency will be forwarded to the site's Hazardous Waste Coordinators and chain of command, with a discussion of the finding and suggested corrective action. The Hazardous Waste Coordinator has three working days to respond with the corrective and preventive actions taken. All findings are tracked in the EMS database and the information used to address problem areas.

Satellite accumulation and <90 day accumulation areas may be required to perform more frequent inspections as part of a preventive action for repeated deficiencies found during oversight inspections.

TSDF inspection procedures are specified in the RCRA Permit DEP/HWM-095-005, reissued 29 September 2009 and expiring 29 September 2019. Full permit copy is located at the TSDF.

9.2 Inspection Records

All TSDF inspection records will be permanently maintained at the TSDF. Inspection records for the accumulation areas will be maintained by the Hazardous Waste Coordinator at the site for three years. Older records and records from closed sites will be transferred for permanent storage at the TSDF.

9.3 Training Records

Records of hazardous waste training for current employees shall be kept until the hazardous waste accumulation area/satellite site in which the employee works is formally and permanently closed. Training records on former employees shall be kept for at least three years from the date the employee last worked at the facility. These records shall be made available to EPA and CTDEEP upon request.

The type and amount of required training for hazardous waste personnel is described in Section 6. The following information shall be maintained on-site at Bldg. 562 for TSDF personnel and Hazardous Waste Coordinators, at Bldg. 107 for Fire Department personnel, and at the specific commands for their area personnel:

a. The hazardous waste accumulation area/satellite site where the employee is authorized to work.

b. Job title and name of the employee filling the position.

c. Position description, including the requisite skills, education, other qualifications, and duties.

d. Documentation that the employee has successfully completed all training (including on-the-job training) required by the training plan in Section 6.

e. Any correspondence concerning training waivers.

9.4 Hazardous Waste Analysis/Determination Records

Results of laboratory analysis and other waste profile determination records will be kept permanently at the TSDF. These records shall be made available to EPA and CTDEEP upon request.

9.5 Hazardous Waste Turn-In/Storage Records

Copies of Generator Turn-In Documents shall be maintained on file for six years. The records shall specify the generator's name, waste description, waste quantities, and containers. Date of receipt into the TSDF, storage, and disposal action on all waste will be maintained in the TSDF Hazardous Waste Database.

9.6 Hazardous Waste Manifests

SUBASENLON Environmental is responsible for the management of the manifest system. All wastes shipped from SUBASENLON, including contractor wastes, shall be shipped using the SUBASENLON EPA identification number CT4170022020 and shall only be signed by TSDF personnel with the appropriate DOT training and SUBASE NLON Commanding Officer designation letter. The copy of the manifest which is returned and signed indicating its receipt for disposal or recycling shall be retained indefinitely.

9.7 Manifest Exception Reports

After a manifested hazardous waste has been initially accepted for transport off-base for ultimate disposal, a time clock starts. If SUBASENLON has not received a copy of the manifest with a written signature of the owner or operator of the designated TSDF within 35 days of the date the waste was accepted by the initial transporter, the Hazardous Waste Program Manager shall contact the transporter and/or the owner or operator of the designated disposal facility to determine the status of the hazardous waste. If SUBASENLON has not

received a copy of the signed manifest (as above) within 45 days, the Hazardous Waste Program Manager shall submit an exception report to CTDEEP. The exception report shall include:

a. A legible copy of the manifest for which confirmation or delivery has not been received.

b. A cover letter explaining the efforts taken to locate the hazardous waste and the results of those efforts.

Copies of any exception reports will be maintained with the associated manifest at the TSDF indefinitely.

9.8 Un-manifested Waste Report (40 CFR 264.76)

SUBASENLON does not accept hazardous waste from off-site. However, if hazardous waste is discovered to have been brought on-site without a Uniform Hazardous Waste Manifest, an Un-manifested Waste Report shall be submitted to CTDEEP within 15 days of receiving the waste.

9.9 Exports of Hazardous Waste

Normal operating procedure does not currently include export of any hazardous waste from SUBASENLON; however, some shipments have been required in the past and may take place in the future. In addition to the routine records required for hazardous waste shipments within the United States, other records and reports are required for export of hazardous waste:

a. Notification of intent to export (40 CFR 262.53) shall be submitted to EPA sixty days before the initial shipment is intended to be shipped off-site.

b. An annual report (40 CFR 262.56) summarizing the types, quantities, frequency, and ultimate destination of all hazardous waste exported during the previous calendar year shall be submitted to EPA no later than 1 March of each year.

9.10 Medical Surveillance Program Records

Records will be maintained by the Safety Office and Occupational Health Office for medical surveillance of the workers involved with hazardous waste activities. These records will be

maintained for each individual employee and shall include the following information:

a. Job title

b. Date of qualification physical examination

c. Dates of all periodic examinations

d. Any work restrictions based on individual's health

e. Date of check-out examination

Standard Operating Procedures (SOP) shall be developed and maintained by the Hazardous Waste Program Manager for all TSDF operations which require the use of Personal Protective Equipment (PPE).

9.11 Hazardous Waste Annual Reports

EPA requires biennial reporting of hazardous waste information (40 CFR 264.75). The Hazardous Waste Program Manager will file the report to CTDEEP by 1 March of every even numbered year for facility activities during the preceding calendar year. The report will be filed using the current EPA requirements and will include all information specified in 40 CFR 264-75(a)-(j).

The Navy requires an annual hazardous waste report submitted to the Naval Facilities Engineering Service Center (NFESC) for all hazardous waste accepted, treated, recycled, and disposed. This information is required in March of each year for facility activities during the preceding calendar year.

Copies of these reports will be retained and available for inspection at the TSDF for three years, and then archived.

Section 10.0 - FORMS AND SAMPLE DOCUMENTS

10/2/2019

MEMORANDUM

From: NAVFAC PWD Environmental Division, TSDF Director
To:

Subj: ESTABLISHMENT OF A HAZARDOUS WASTE LESS THAN 90 DAY ACCUMLATION AREA IN BLDG #

Ref: (a) SUBASENLONINST 5090.27

1. In accordance with reference(a), the establishment of a less than 90 day Accumulation Hazardous Waste (HW) Area in Building # has been approved.

2. The site was inspected on (Date). It meets all the requirements of reference (a), and it is ready to be utilized. The site has been assigned the HW less than 90 day Accumulation Site Identification Number A###.

3. My point of contact is David W. Carter, PWD Environmental Division, at extension 5559.

BRIAN HENDRICKSON
Hazardous Waste Program Manager

Cc: TSDF Files
Rev: 9-16-19

10/2/2019

MEMORANDUM

From: NAVFAC PWD Environmental Division, TSDF Director
To:

Subj: ESTABLISHMENT OF A HAZARDOUS WASTE SATELLITE ACCUMLATION AREA IN BLDG #

Ref: (a) SUBASENLONINST 5090.27

1. In accordance with reference(a), the establishment of a Satellite Accumulation Hazardous Waste (HW) Area in Building # has been approved.

2. The site was inspected on (Date). It meets all the requirements of reference (a), and it is ready to be utilized. The site has been assigned the HW Satellite Accumulation Site Identification Number S###.

3. My point of contact is David W. Carter, PWD Environmental Division, at extension 5559.

BRIAN HENDRICKSON
Hazardous Waste Program Manager

Cc: TSDF Files
Rev: 9-16-19

SUBASENLONINST 5090.27A
8 Oct 19

10/2/2019

MEMORANDUM

From: NAVFAC PWD Environmental Division, TSDF Director
To:

Subj: DEACTIVATION OF A HAZARDOUS WASTE LESS THAN 90 DAY ACCUMLATION AREA IN BLDG #

Ref: (a) SUBASENLONINST 5090.27

1. In accordance with reference(a), the deactivation of a less than 90 day Accumulation Hazardous Waste (HW) Area in Building # has been approved.

2. The site was inspected on (Date). It meets all the requirements of reference (a), and it is ready to be deactivated. All signs and HW accessories have been removed from the less than 90 day Accumulation Site Identification Number A###.

3. My point of contact is David W. Carter, PWD Environmental Division, at extension 5559.

BRIAN HENDRICKSON
Hazardous Waste Program Manager

Cc: TSDF Files
Rev: 9-17-19

10/2/2019

MEMORANDUM

From: NAVFAC PWD Environmental Division, TSDF Director
To:

Subj: DEACTIVATION OF A HAZARDOUS WASTE SATELLITE ACCUMLATION AREA IN BLDG #

Ref: (a) SUBASENLONINST 5090.27

1. In accordance with reference(a), the deactivation of a Satellite Accumulation Hazardous Waste (HW) Area in Building # has been approved.

2. The site was inspected on (Date). It meets all the requirements of reference (a), and it is ready to be deactivated. All signs and HW accessories have been removed from the Satellite Accumulation Site Identification Number S###.

3. My point of contact is David W. Carter, PWD Environmental Division, at extension 5559.

BRIAN HENDRICKSON
Hazardous Waste Program Manager

Cc: TSDF Files
Rev: 9-17-19

MEMORANDUM

From: **NAME**
To: Environmental Department, Naval Submarine Base Groton

Subj: HAZARDOUS WASTE COORDINATOR ASSIGNMENT NOTIFICATION

1. The following personnel have been assigned the duties as Hazardous Waste Coordinators for S# and or A# located in Bldg #

   Primary: Name
   Alternates: Name

2. The individuals have attended the Hazardous Waste Coordinator Initial Course taught by Naval Submarine Base Environmental Department. They also received on-the-job training for their designated sites, which included the following subjects:

   - Emergency Procedures (Site Specific Spill Contingency Plan).
   - Location of Communication and Alarm Equipment.
   - Proper Response to Fires or Explosions.
   - Proper Response to Spill Events.
   - Conducting Site Inspections.

3. This letter supersedes any previous letters for this site.

//Signed//

Cc: TSDF Files
Rev: 9-17-19

FORM B1: TURN-IN SHEET FOR
- PROFILE REVIEWS
- NEW/UNPROFILED WASTE

NOTE: IT IS ILLEGAL TO STORE HAZARDOUS WASTE THAT IS NOT PROPERLY IDENTIFIED AND LABELED!

COMPLETE: PART 1 ANSWER **ALL** QUESTIONS

GET HELP: CALL 5559 OR 4298 FOR HELP

SIGN: PAGE 2

EMAIL TO: **david.w.carter2@navy.mil** ***AND*** **brian.hendrickson@navy.mil**

WAIT: FORM WILL BE EMAILED BACK WITH PART 2 COMPLETED. USE THIS INFORMATION TO COMPLETE YOUR LABEL.

PART 1

DATE: _____ HW SITE: _____ PHONE #: _____

NAME: _____ BLDG#: _____ FAX #: _____

COMMAND _____ SHOP/DIV: _____

1. CHECK: ☐ NEW WASTE STREAM ☐ PROFILE REVIEW OLD # _____

ARE THERE ANY CHANGES IN THIS PROCESS OR THE MATERIALS USED IN THIS PROCESS SINCE THE LAST PROFILE REVIEW? ☐ YES ☐ NO

2. MAKE SURE YOU ARE USING THE CORRECT FORM:
   a. IS THE MATERIAL YOU ARE USING MIXED WITH ANOTHER INGREDIENT? ☐ YES ☐ NO
   b. IF NO, DO NOT USE THIS FORM. USE FORM B2 TURN IN SHEET FOR EXCESS MATERIAL.
3. DATE YOU WILL BEGIN (OR BEGAN) GENERATING WASTE: _____
4. IS THIS WASTE A : ☐ SOLID, NO FREE LIQUID ☐ LIQUID, FREE FLOWING
5. HOW OFTEN WILL THIS WASTE STREAM BE GENERATED? _____
   WHERE IS THE WASTE GENERATED?: BLDG: _____ SHOP: _____
   OTHER (I.E. BOAT NAME) _____
7. HOW WILL THE WASTE BE GENERATED? **(EXPLAIN IN AS MUCH DETAIL AS POSSIBLE. IF YOU HAVE A PM CARD OR SOP THAT DESCRIBES THE PROCESS, ATTACH IT.)**

B1 NEW / UNPROFILED WASTE PAGE 1 REV: 15 9-1-2016

8. IDENTIFY ALL OF THE MATERIALS USED:

a: ATTACH YOUR CURRENT **CHRIMP AUL** WITH ALL MATERIALS USED CIRCLED, OR

b: LIST MATERIALS ON **TABLE** BELOW BY THE HMIS MSDS SERIAL NUMBER, OR

c: LIST MATERIAL AND **ATTACH** A MANUFACTURERS MSDS SHEET.

MAKE SURE THAT THE MSDS REFERENCED OR INCLUDED EXACTLY MATCHES THE MATERIAL USED

USE ADDITIONAL SHEETS IF NECESSARY.

MSDS SERIAL#	STOCK #	DESCRIPTION	MANUFACTURER

9. LIST ALL INCIDENTAL ITEMS SUCH AS- RAGS, BRUSHES, ABSORBENTS, KIMWIPES ETC.:

10. IN ACCORDANCE WITH THE CODE OF FEDERAL REGULATIONS **40 CFR PART 262,**
"STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE"

_____ HEREBY CERTIFY THAT ALL THE INFORMATION
(PRINT OR TYPE NAME)

SUBMITTED IN THIS AND ALL ATTACHED DOCUMENTS IS TO THE BEST OF MY KNOWLEDGE AN ACCURATE REPRESENTATION OF THIS WASTE / MATERIAL. ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED.

_____
HAZARDOUS WASTE COORINATOR
(SIGNATURE REQUIRED)
TYPING NAME HERE CONSTITUTES A SIGNATURE

PART 2 **(TO BE COMPLETED BY SUBASE ENVIRONMENTAL)**

☐ A YOUR WASTE REQUIRES TESTING. THE FOLLOWING PROFILE INFORMATION IS PRELIMINARY AND MAY CHANGE UPON REVIEW OF THE TEST RESULTS.

LABEL: ☐ BLUE STATE LABEL (NON-REG) PROFILE #: _____
☐ WHITE HAZARDOUS WASTE SEGREGATION CODE: _____

WASTE DESCRIPTION: _____

WASTE CODES

☐ B YOUR WASTE PROFILE IS COMPLETE. RETAIN THIS FORM FOR YOUR RECORDS.

LABEL: ☐ BLUE STATE LABEL (NON-REG) PROFILE #: _____
☐ WHITE HAZARDOUS WASTE SEGREGATION CODE: _____

WASTE DESCRIPTION: _____

WASTE CODES _____

PROFILE COMPLETED BY: _____
PRINT NAME SIGNATURE DATE

FORM B2: TURN-IN SHEET FOR: ➡ UNUSABLE OR EXPIRED MATERIAL ONLY

COMPLETE: COLUMNS 1-5 ON TABLE BELOW.

LIST: EACH ITEM BY MSDS SERIAL NUMBER AS LISTED ON CHRIMP BAR CODE OR

NO BAR CODE?: LIST MATERIAL BY HMIS MSDS SERIAL NUMBER OR

NOT IN HMIS?: ATTACH MANUFACTURER'S MSDS.

USABLE?: RETURN MATERIAL TO CHRIMP. IF REFUSED BY CHRIMP,CALL SUBASE ENVIRONMENTAL AT X (4673) FOR PICKUP. GIVE COMPLETED FORM TO DRIVER WITH COMPLETED 1348 AND MATERIAL(S).

IF **REFUSED** BY CHRIMP NAME OF CHRIMP REP REFUSING. _____

DATE OF REFUSAL. _____

NOT USABLE?: EMAIL FORM TO SUBASE ENVIRONMENTAL AT david.w.carter2@navy.mil ***AND*** brian.hendrickson@navy.mil

MAKE SURE THAT THE MSDS EXACTLY MATCHES THE MATERIAL LISTED.

NAME:		HW SITE:			
COMMAND:		PH#:		DATE:	
BLDG/SHOP#:		FAX#:		SERIAL #	

GENERATOR COMPLETES COLUMNS 1-6:					ENVIRONMENTAL USE ONLY		
1. MSDS SERIAL #	2. STOCK #	3. DISCRIPTION	4.SOL, LIQ, AERO	5. MANUFACTURER	6.WASTE LABEL	7. WASTE CODES	8. SEG. CODE

FORM B2 REV 15 5-1-2018

HAZARDOUS WASTE

NAVAL SUBASE NEW LONDON EPA ID # CT4170022020

WASTE DESCRIPTION:	
ACTIVITY:	SITE #:
HW COORDINATOR:	TELEPHONE #:
ACCUMULATION START DATE:	EPA WASTE CODE:
WASTE PROFILE #:	

SBNL 5090/1 (800) (8-98)

In Case of Spill Contact SUBASE Fire Dept Ext 3333

STATE-REGULATED WASTE

THIS WASTE IS NOT REGULATED BY THE US ENVIRONMENTAL PROTECTION AGENCY

WASTE DESCRIPTION:

PROFILE #: WASTE CODE:

ACTIVITY: SITE #:

HW COORDINATOR:

STATE-REGULATED WASTE

UNIVERSAL WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
THE FOLLOWING MATERIALS ARE REGULATED AS A UNIVERSAL WASTE IN ACCORDANCE WITH 40 CFR PART 273

- [ ] BATTERY(IES)
- [ ] MERCURY THERMOSTATS
- [ ] MERCURY CONTAINING EQUIPMENT
- [ ] PESTICIDE(S)
- [ ] LAMP(S)

	ACCUMULATION START DATE
	PROFILE NUMBER
	HAZARD NAME (MERCURY, LEAD ACID)
	COORDINATOR NAME
	COORDINATOR PHONE

D.O.T PROPER SHIPPING NAME AND OR UN NO. WITH PREFIX (REQUIRED DURING TRANSPORT, WHEN MATERIAL IS ALSO REGULATED BY 49CFR PARTS 172-180)

HANDLE WITH CARE!

HAZARDOUS WASTE (HW) ACCUMULATION AREA CHECKLIST			
DATE:	SITE#:	BUILDING:	COORDINATOR:
1. CONTAINERS			
a. In good condition - no dents or corrosion, tops of containers free of spillage.			
b. All tops/bungs/vents closed when not in use.			
c. Containers compatible with material to be stored.			
d. Containers >26 gl. containing VOCs are DOT approved.			
2. PROFILES/LABELS			
a. Profile list is in binder and is not more than 12 months old.			
b. All profiles used are on site profile list or base-wide list.			
c. All RCRA-regulated HW containers labeled w/ "Hazardous Waste" label. All state regulated waste labeled w/ "State Regulated Waste" label.			
d. Profiled waste containers labeled w/the correct profile information as listed on current profile list. New waste stream containers labeled w/the waste identification including words to identify hazards/contents and the waste codes. All labels include Site# and Coordinator name.			
e. All labels clean and legible. Containers free of markings associated with past use.			
f. Accumulation start date on label and <90 days old.			
3. SECONDARY CONTAINMENT			
a. Liquid HW containers have adequate secondary containment. (10% of total volume or equal to largest container capacity, whichever is greater).			
b. All liquid HW containers positioned to not overhang the edge of containment.			
c. Containment area free from cracks and other damage.			
d. Containment area clean and free of spill residue, rags, leaves, ropes, rainwater and other debris.			
4. SEGREGATION			
a. Flammables, corrosives, oxidizers and reactive material, and any unknowns, stored in separate secondary containment.			
5. INSPECTIONS/RECORDS			
a. Adequate aisle space provided to inspect all containers, and containers stored such that all containers and labels are visible for inspection.			
b. Site inspected at least daily, and a signed inspection log maintained for a period of not less than 3 years. Corrective action taken and annotated for all inspection deficiencies.			
c. Annual training certificates for pri/alt coordinators and substitutes in site binder, and retained for at least three years.			
6. CONTINGENCY EQUIPMENT			
a. Accumulation Area sign prominently posted, with emergency contact and phone number correct.			
b. Clearly labeled spill kit maintained at the site. (Minimum of a broom, dustpan, plastic bag and absorbent material appropriate for waste types at the site).			
c. Charged fire extinguisher readily available.			
d. Contingency plan prominently posted containing area map indicating locations of nearest fire alarm, fire fighting equipment, phone and spill kit.			
e. Telephone, fire alarm or hand-held radio readily available and working to summon emergency help.			
f. Written procedure to notify the Fire Department in place if there is no telephone or fire alarm.			

Checklist Instructions
1. Review each time daily
2. Correct any/all items discovered
3. Sign weekly site inspection log
4. Input date/time of inspection
5. Annotate any observations and corrections made

Rev 1 March 11th, 2019

ACCUMULATION AREA DAILY HAZARDOUS WASTE INSPECTION LOG

BLDG_____ SHOP/CODE_____ MONTH/YEAR_____ ACCUMMULATION AREA_____

INSPECTOR'S NAME/SIGNATURE*	DATE	TIME	OBSERVATIONS MADE/CORRECTIVE ACTION AND DATE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			

NOTE: (2) THIS REPORT MUST BE KEPT ON FILE AT THE SITE FOR THREE YEARS FROM DATE COMPLETED SOP A(ADMIN) NLONINST 5090.2C

CONTINUE COMMENTS ON BACK AS NEEDED

*By signing this form, the individual denotes that the Accumulation Area HW Checklist was used to complete the inspection.

HAZARDOUS WASTE (HW) SATELLITE AREA CHECKLIST			
DATE:	SITE#:	BUILDING:	COORDINATOR:
1. CONTAINERS			
a. Satellite site is located at or near the point of generation of each waste.			
b. No more than one container per RCRA-regulated waste stream is present.			
c. In good condition - no dents or corrosion, tops of containers free of spillage.			
d. All tops/bungs/vents closed when not in use.			
e. Containers compatible with material to be stored.			
f. Containers >26 gl. containing VOCs are DOT approved.			
2. PROFILES/LABELS			
a. Profile list is in binder and is not more than 12 months old.			
b. All profiles used are on site profile list or base-wide list.			
c. All RCRA-regulated HW containers labeled w/ "Hazardous Waste" label. All state regulated waste labeled w/ "State Regulated Waste" label.			
d. Profiled waste containers labeled w/the correct profile information as listed on current profile list. New waste stream containers labeled w/the waste identification including words to identify hazards/contents and the waste codes. All labels included Site# and Coordinator name.			
e. All labels clean and legible. Containers free of markings associated with past use.			
3. SECONDARY CONTAINMENT			
a. Liquid HW containers have adequate secondary containment. (10% of total volume or equal to largest container capacity, whichever is greater).			
b. All liquid HW containers positioned to not overhang the edge of containment.			
c. Containment area free from cracks and other damage.			
d. Containment area clean and free of spill residue, rags, leaves, ropes, rainwater and other debris.			
4. SEGREGATION			
a. Flammables, corrosives, oxidizers and reactive material, and any unknowns, stored in separate secondary containment.			
5. CAPACITY			
a. No more than 55 gallons of RCRA-regulated HW present, (or 1 quart of acutely hazardous waste).			
b. If 55 gallon (or 1 quart) limit is reached, movement of excess to accumulation area or TSDF scheduled to take place within 72 hours to reduce amount to <55 gallons.			
6. INSPECTIONS/RECORDS			
a. Adequate aisle space provided to inspect all containers, and containers stored such that all containers and labels are visible for inspection.			
b. Site inspected at least weekly, and a signed inspection log maintained for a period of not less than 3 years. Corrective action taken and annotated for all inspection deficiencies.			
c. Annual training certificates for pri/alt coordinators and substitutes in site binder for at least three years.			
7. CONTINGENCY EQUIPMENT			
a. Satellite Area sign prominently posted, with energency contact and phone number correct.			
b. Clearly labeled spill kit maintained at the site. (Minimum of a broom, dustpan Plastic bag and absorbent material appropriate for waste types at the site).			

Checklist Instructions

1. Review each time weekly ***weekly means maximum 7 days between inspections***
2. Correct any/all items discovered
3. Sign weekly site inspection log
4. Input date/time of inspection
5. Annotate any observations and corrections made

Rev 1 March 11th, 2019

SATELLITE WEEKLY HAZARDOUS WASTE SITE INSPECTION LOG

BLDG_____ SITE_____ YEAR_____ SHOP/CODE_____

INSPECTOR'S NAME/SIGNATURE*	DATE	TIME	OBSERVATIONS MADE/CORRECTIVE ACTION AND DATE
Month			
WK 1			
WK 2			
WK 3			
WK 4			
WK 5			
Month			
WK 1			
WK 2			
WK 3			
WK 4			
WK 5			
Month			
WK 1			
WK 2			
WK 3			
WK 4			
WK 5			

NOTE: (2) THIS REPORT MUST BE KEPT ON FILE AT THE SITE FOR THREE YEARS FROM DATE COMPLETED SOPA(ADMIN) NLONINST 5090.2C CONTINUE COMMENTS ON BACK AS NEEDED

***By signing this form, the individual denotes that the Satellite HW Checklist was used to complete the inspection.**

DD 1348-1A GENERATION SHORT FORM FOR HWC USE

PROFILED WASTE

Return to Start Page

HWC Name:	SEAMAN SMITH	
HWC Tel. #:	5559	
Site #:	A18	
	Clear HWC Information	
Site #; Profile #; Desc:	BW ; P1296 ; USED OIL AND WATER ; NONE	Input Profile from Dropdown (Pick only Profiles from your Site.)
Number of Containers:	3	
Type of Containers:	POLY JUG	Input from Dropdown or Type in if not found.
Size of Containers:	5 GL	Input from Dropdown or Type in if not found.
Accumulation Start Date:	8/1/19	Accum. Site: Day First Drop is Collected / Sat. Site: Day Container is Full.
Document Number Serial	SS23	Four Digit Code Determined by User
	Clear Input Information	

PRINT 1348

Profile #:	P1296
Waste Description:	USED OIL AND WATER
Waste Codes:	CR02
FSC:	9150-DSUSEDOIL
UHC:	NONE

1. TOTAL PRICE
2. SHIP FROM: N68316
3. SHIP TO: DRMO
4. MARK FOR
QUANTITY: 3
SUPPLEMENTERAY ADDRESS
DISTRIBUTION
PROJECT
PRI: N
DOLLAR: A
ADV: H
UNIT PRICE / DOLLARS/CTS
5. DOC DATE: 8/1/2019
6. NMFC
7. FRT RATE
8. TYPE CARGO
9. PS
10. QTY REC'D
11. UP
12. UNIT WEIGHT
13. UNIT CUBE
14. UFC
15. SL
16. FREIGHT CLASSIFICATION
17. NOMENCLATURE: USED OIL AND WATER
18. TY CONT: 5 GL POLY JUG
19. NO CONT: 3
20. TOTAL WEIGHT
21. TOTAL CUBE
22. RECEIVED BY
23. DATE RECEIVED
24. DOCUMENT NUMBER & SUFFIX: N68316-9213-SS23
20. NATIONAL STOCK NOTE & ADD: 9150-DSUSEDOIL
26. REC (4-6) UI (23-24) QTY (25-29) CONT (30-32) DIST (33-35) UP (74-80)
27. ADDITIONAL DATA:

Accumulation Start Date: 8/1/2019
Profile Number: P1296
Waste Codes: CR02
Site Number: A18
UHC: NONE

USED OIL AND WATER

P1296

POINT OF CONTACT
SEAMAN SMITH
TELEPHONE NUMBER
5559

FUND SITE

DD FORM 1348-1 2 JULY 29TH, 2019 ISSUE RELEASE/RECEIPT DOCUMENT
PREVIOUS EDITION MAY BE USED
PerForm (DLA)

1. TOTAL PRICE
2. SHIP FROM: N68316
3. SHIP TO: DRMO
4. MARK FOR
QUANTITY: 3
SUPPLEMENTERAY ADDRESS
DISTRIBUTION
PROJECT
PRI: N
DOLLAR: A
ADV: H
UNIT PRICE / DOLLARS/CTS
5. DOC DATE: 8/1/2019
6. NMFC
7. FRT RATE
8. TYPE CARGO
9. PS
10. QTY REC'D
11. UP
12. UNIT WEIGHT
13. UNIT CUBE
14. UFC
15. SL
16. FREIGHT CLASSIFICATION
17. NOMENCLATURE: USED OIL AND WATER
18. TY CONT: 5 GL POLY JUG
19. NO CONT: 3
20. TOTAL WEIGHT
21. TOTAL CUBE
22. RECEIVED BY
23. DATE RECEIVED
24. DOCUMENT NUMBER & SUFFIX: N68316-9213-SS23
20. NATIONAL STOCK NOTE & ADD: 9150-DSUSEDOIL
26. REC (4-6) UI (23-24) QTY (25-29) CONT (30-32) DIST (33-35) UP (74-80)
27. ADDITIONAL DATA:

Accumulation Start Date: 8/1/2019
Profile Number: P1296
Waste Codes: CR02
Site Number: A18
UHC: NONE

USED OIL AND WATER

P1296

POINT OF CONTACT
SEAMAN SMITH
TELEPHONE NUMBER
5559

FUND SITE

DD FORM 1348-1 2 JULY 29TH, 2019 ISSUE RELEASE/RECEIPT DOCUMENT
PREVIOUS EDITION MAY BE USED
PerForm (DLA)

SECTION 01 58 00

PROJECT IDENTIFICATION
08/19, CHG 5: 08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA C1	(2003) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C2	(2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preliminary Drawing Indicating Layout And Text Content; G

1.3 PROJECT IDENTIFICATION SIGN

Prior to initiating any work on site, provide one project identification sign at the location designated by the contracting officer. Construct the sign in accordance with project sign detail, which can be downloaded at: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site. The Government will temporarily supply a copy of the rendering to use in the production of the final signboard artwork.

1.3.1 Project Identification Signboard

Provide a project identification signboard in accordance with attached Plates 2USN, 3, 4, and 5. Provide a preliminary drawing indicating layout and text content. Erect a signboard at a conspicuous location on the job site where directed by the Contracting Officer.

a. The field of the sign consists of a 4 by 8 foot sheet of grade B-B medium density overlaid exterior plywood.

b. Lumber is B or better Southern pine, pressure-preservative treated in accordance with AWPA C1 and AWPA C2. Nails are aluminum or galvanized steel.

c. Give one coat of exterior alkyd primer and two coats of exterior alkyd enamel paint to the entire signboard and supports. Perform the lettering and sign work by a skilled sign painter using paint known in the trade as bulletin colors. The colors, lettering sizes, and lettering styles are as indicated. Where preservative-treated lumber is required, utilize only cured pressure-treated wood which has had the chemicals leached from the surface of the wood prior to painting.

d. Use spray applied automotive quality high gloss acrylic white enamel paint as background for the NAVFAC logo. NAVFAC logo is an applied 2 mil film sticker/decal with either transparent or white background or paint the logo by stencil onto the sign. The weather resistant sticker/decal film is rated for a minimum of 2-year exterior vertical exposure. Mount the self-adhering sticker to the sign with pressure sensitive, permanent acrylic adhesive. Shop cut sticker/decal to rectangular shape and provide pull-off backing sheet on adhesive side of design sticker for shipping.

e. Sign paint colors (manufacturer's numbers/types listed below for color identification only)

(1) Blue = To match dark blue color in the NAVFAC logo.

(2) White = To match Brilliant White color in the NAVFAC logo.

f. NAVFAC logo must retain proportions and design integrity. NAVFAC logos in electronic format may be obtained from the WBDG at the following link: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables.
Use the following to choose color values for the paint to be used:

(1) Dark Blue = equivalent to CMYK values 100, 72, 0, 8.

(2) Light Blue = equivalent to CMYK values 69, 34, 0, 0.

(3) Cyan = equivalent to CMYK values 100, 9, 0, 6.

(4) Yellow = equivalent to CMYK values 0.9,94, 0.

g. Final signboard artwork (rendering) may be either mounted under plexiglass as indicated in attached Plates 2 and 5, or may be electrostatically printed on 4 mil self-adhering, weather resistant, glossy vinyl film and mounted to signboard. Provide film that is capable of full color reproduction of the building rendering and cover it with an ultra-violet protection film. Laminate the 2 mil satin gloss clear protection film to the white 4 mil vinyl image film. Utilize pressure sensitive "controltac" adhesive to attach rendering to signboard and smooth out surface with hand pressure tools in accordance with manufacturer's recommendations. Shop cut sticker to size required and provide pull-off backing sheet on adhesive side of film for shipping. Provide the rendering on film that is rated for a minimum of 2-years exterior vertical exposure.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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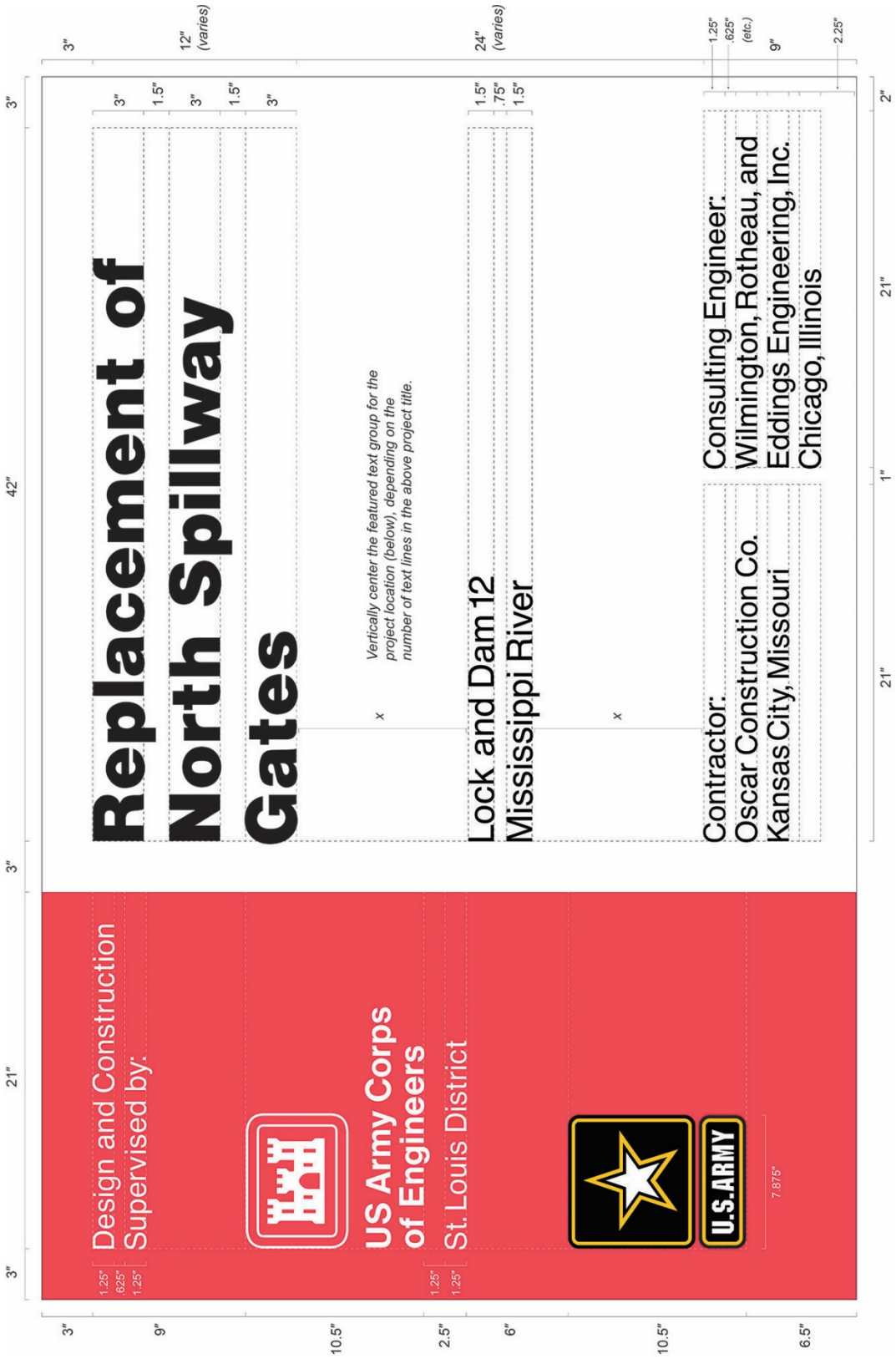
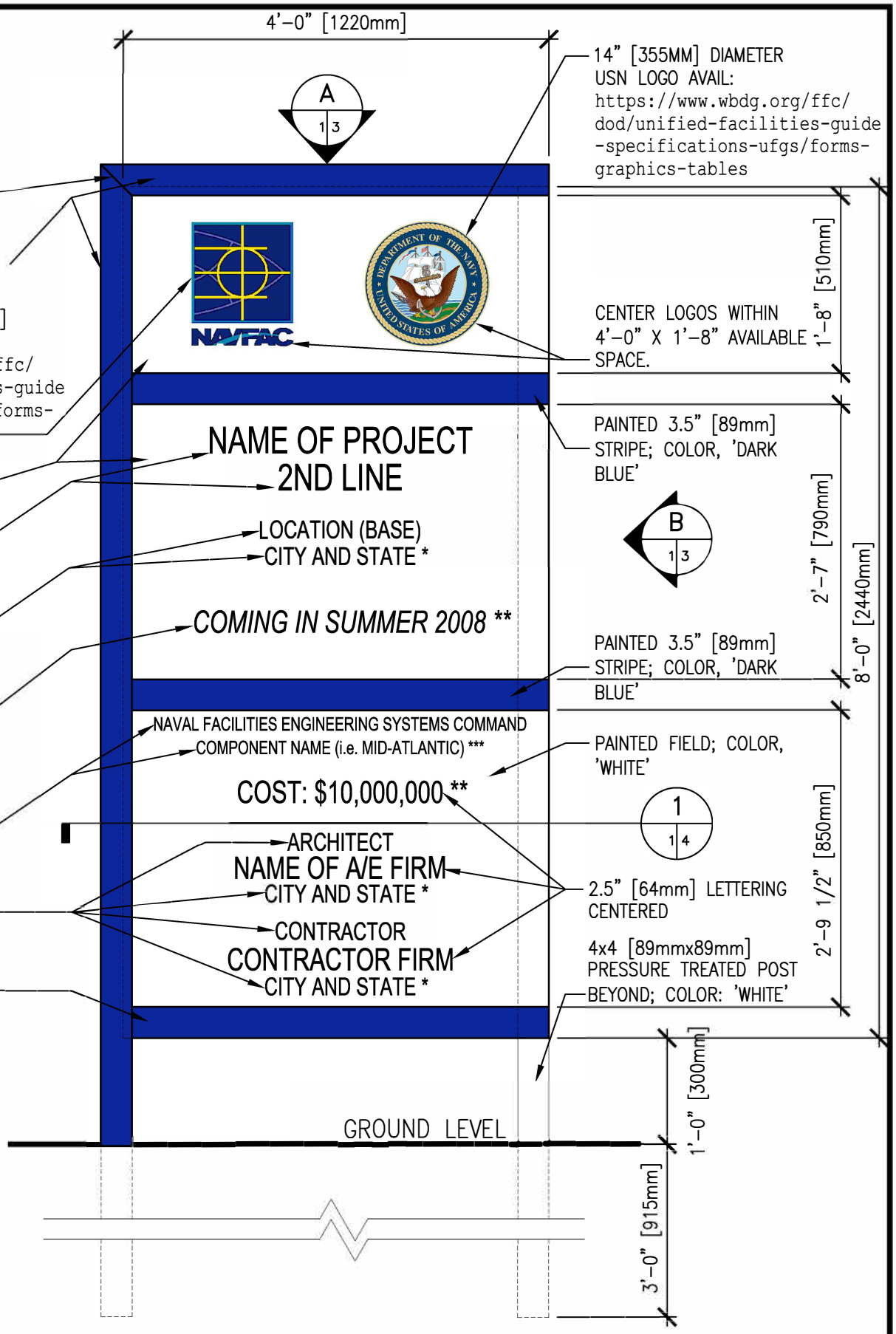
ECB No. 2020-1
SUBJECT: USACE Construction Project Signs and Use of the Army Star

ATTACHMENT A: Example Graphic of Signage with Dimensions for MILCON Project

ATTACHMENT B: Example Graphic of Signage with Dimensions for Civil Works Project





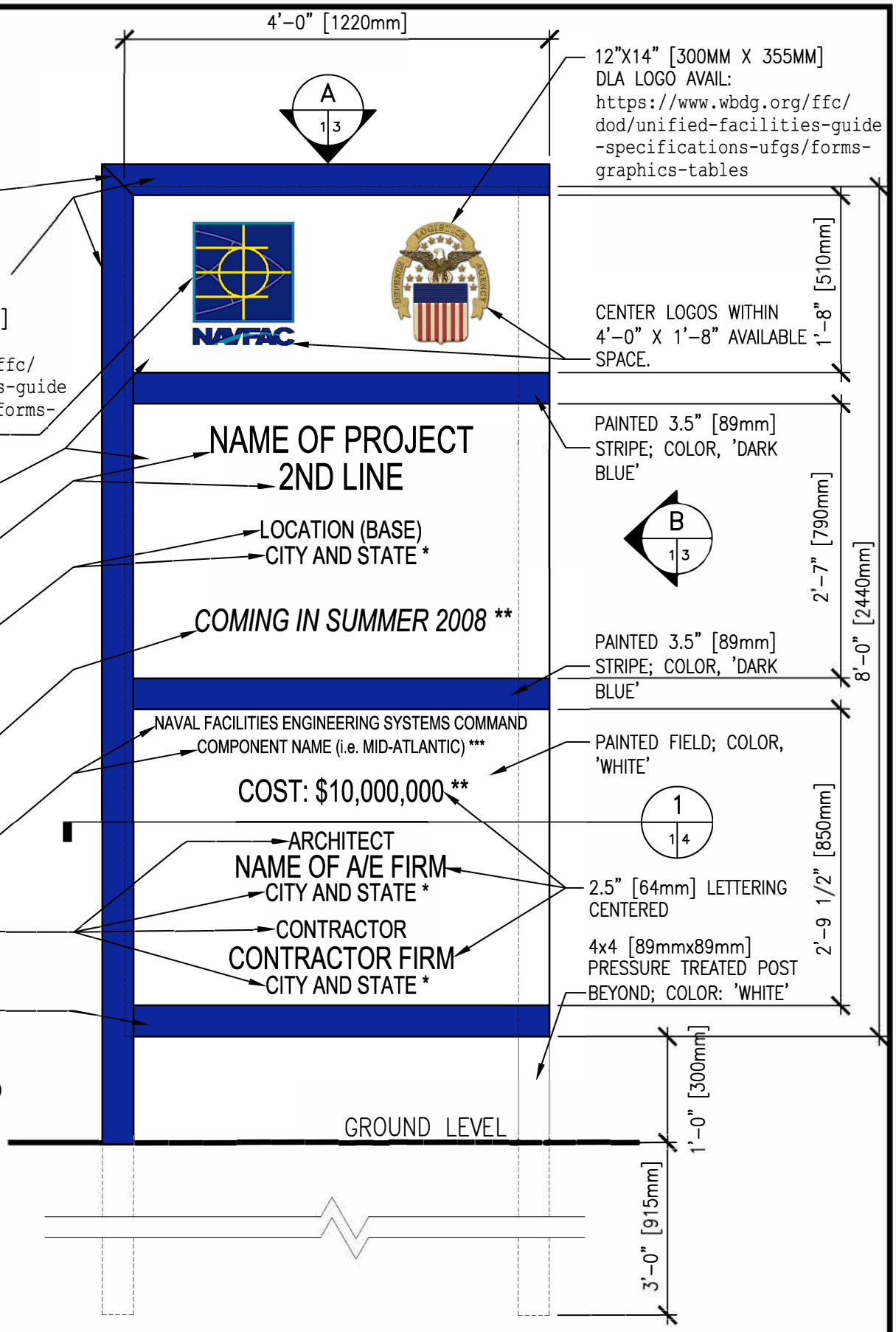
NOTES:
1. PAINT ALL OTHER WOOD SURFACES WITH ONE COAT EXT. PRIMER AND TWO COATS GLOSS WHITE ENAMEL.
2. ALL LETTERING SHALL BE EVENLY SPACED.
3. LETTER STYLE, 'ARIAL', COLOR 'DARK BLUE'. TYPICAL FOR ALL LETTERING.

*–ABBREVIATE STATE
**–CONFIRM USE WITH CONTRACTING OFFICER
***–VERIFY NAME WITH CONTRACTING OFFICER.

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 1USN



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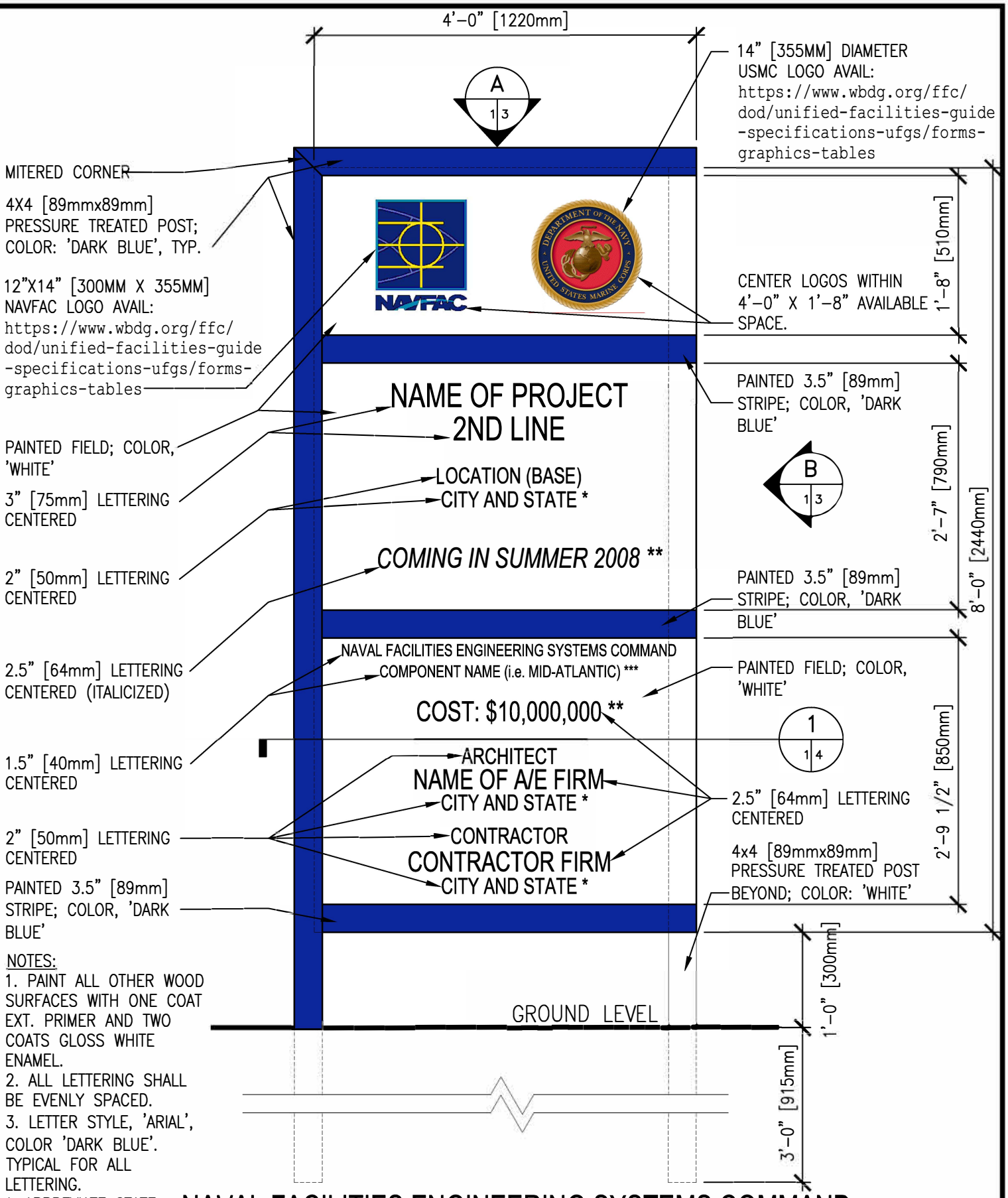
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 1DLA



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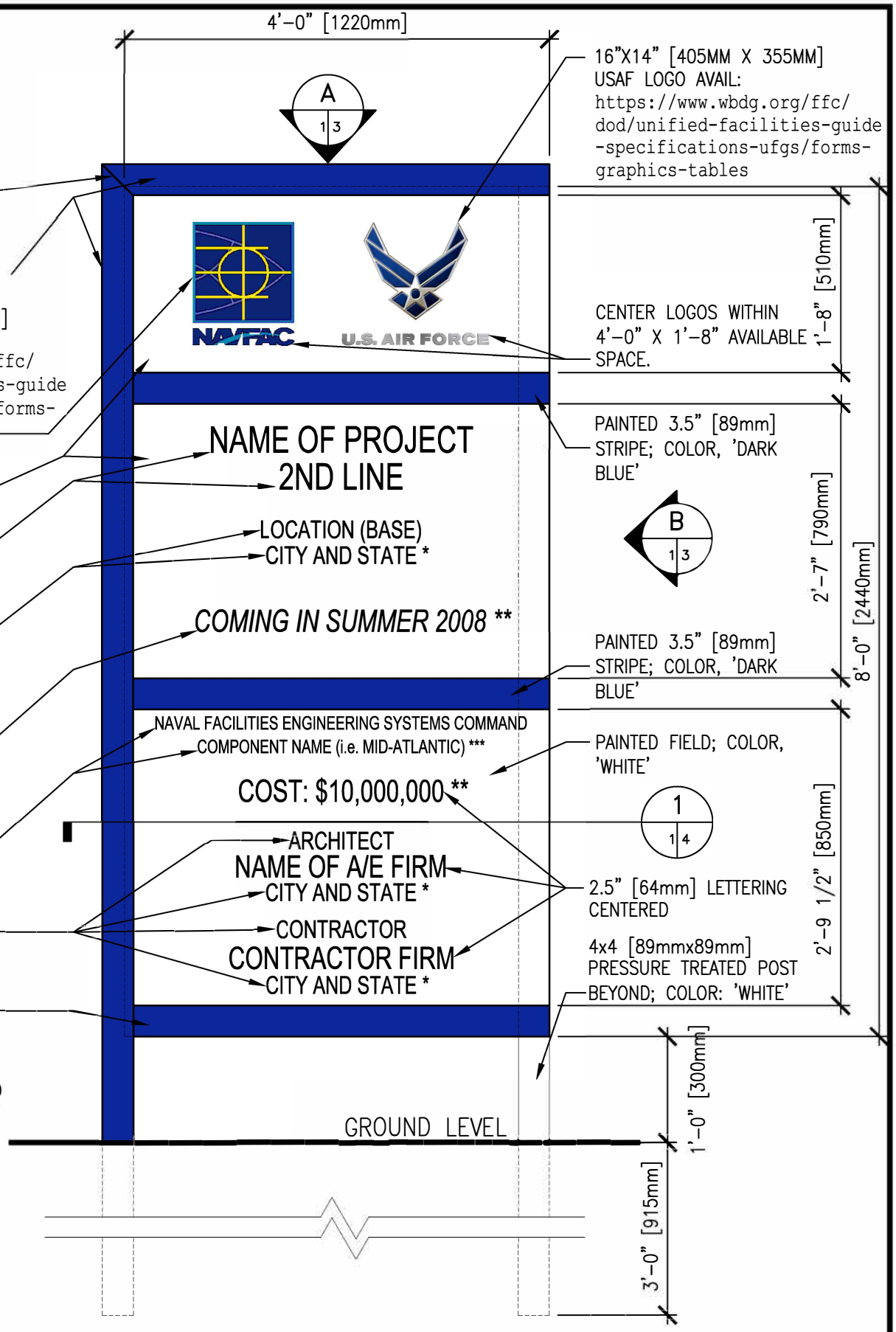
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD FOR MARINE CORPS PROJECTS

SCALE: 3/4" = 1'-0"

PLATE 1MC



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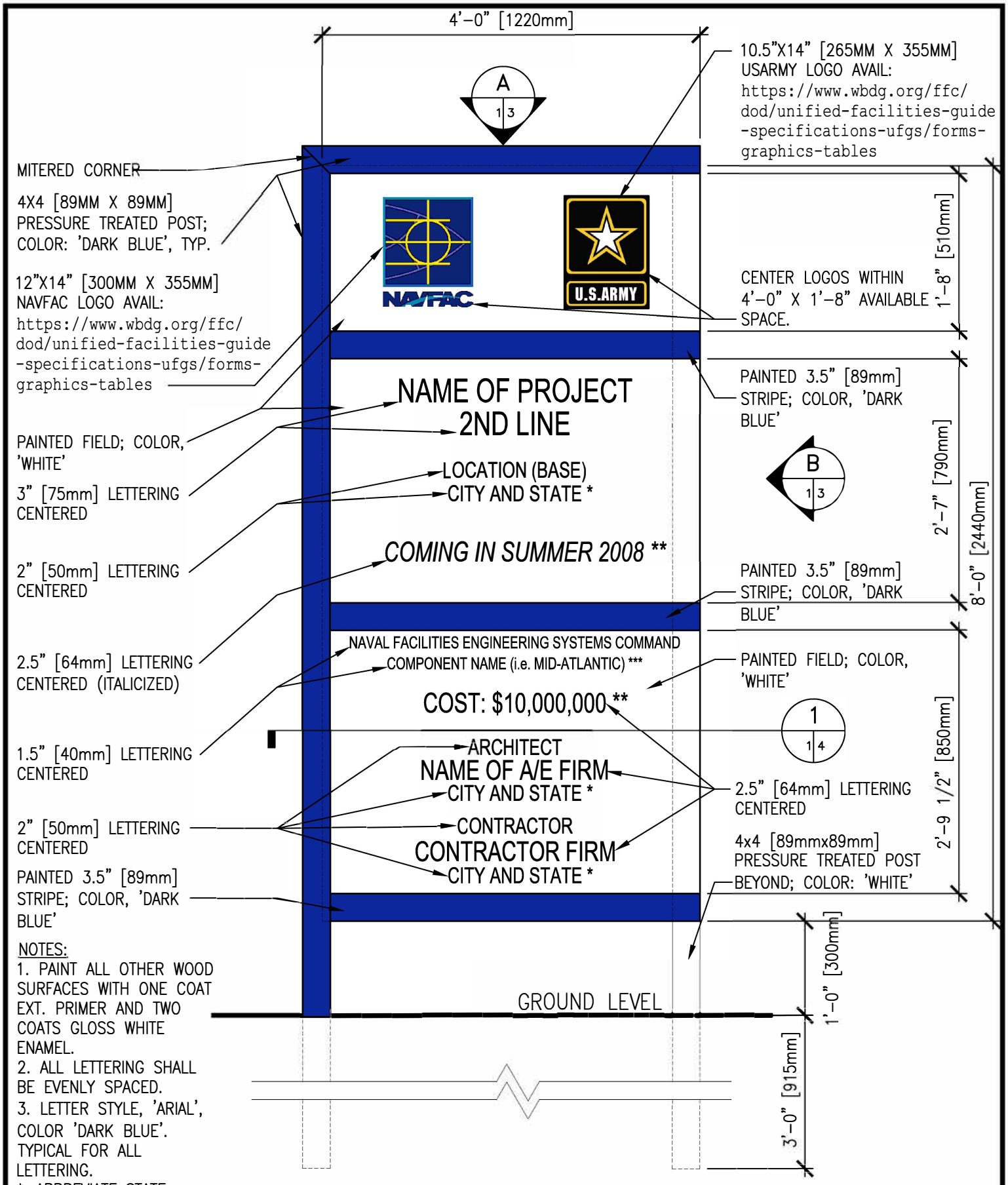
**–CONFIRM USE WITH CONTRACTING OFFICER
***–VERIFY NAME WITH CONTRACTING OFFICER.

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 1USAF



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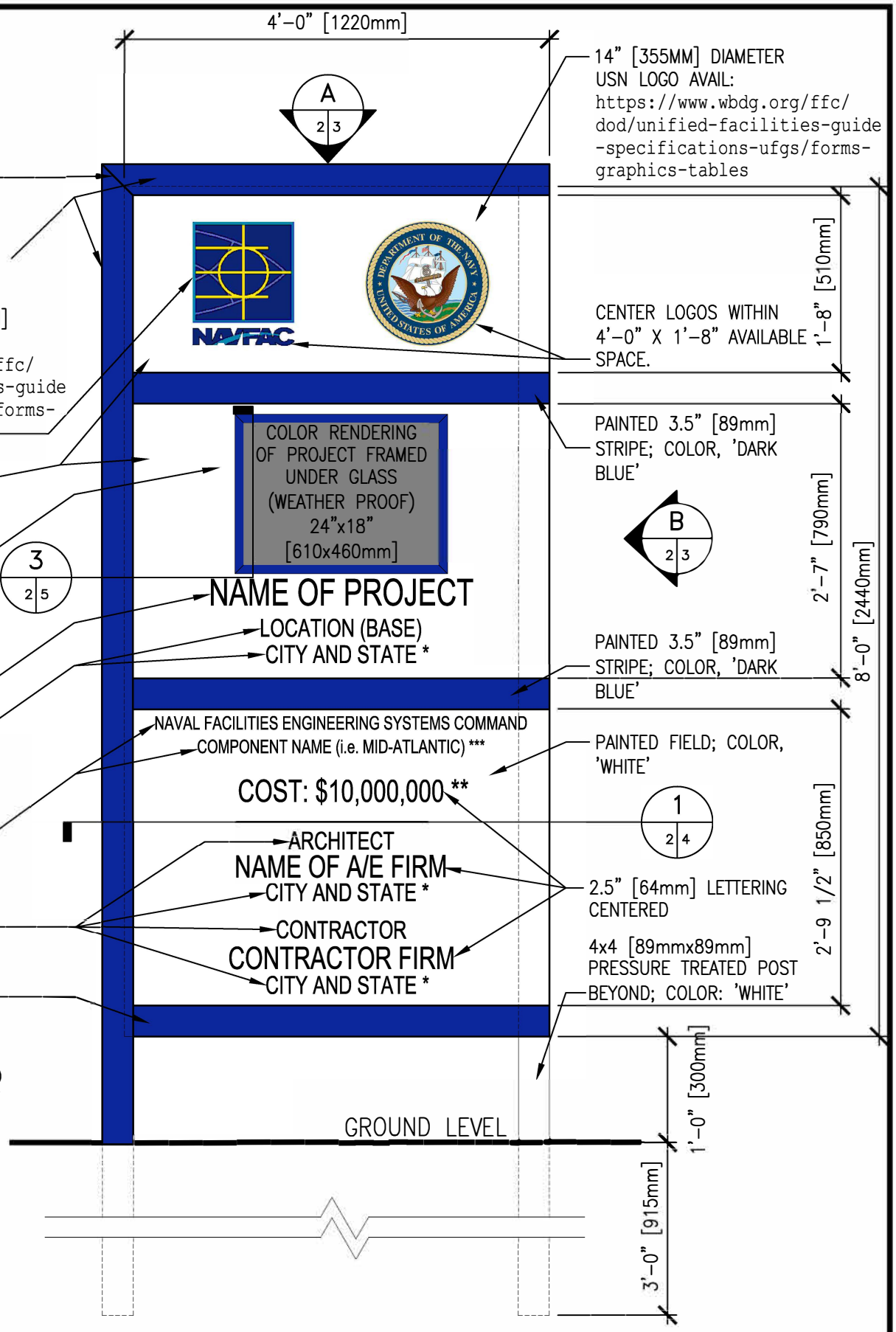
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 1USARMY



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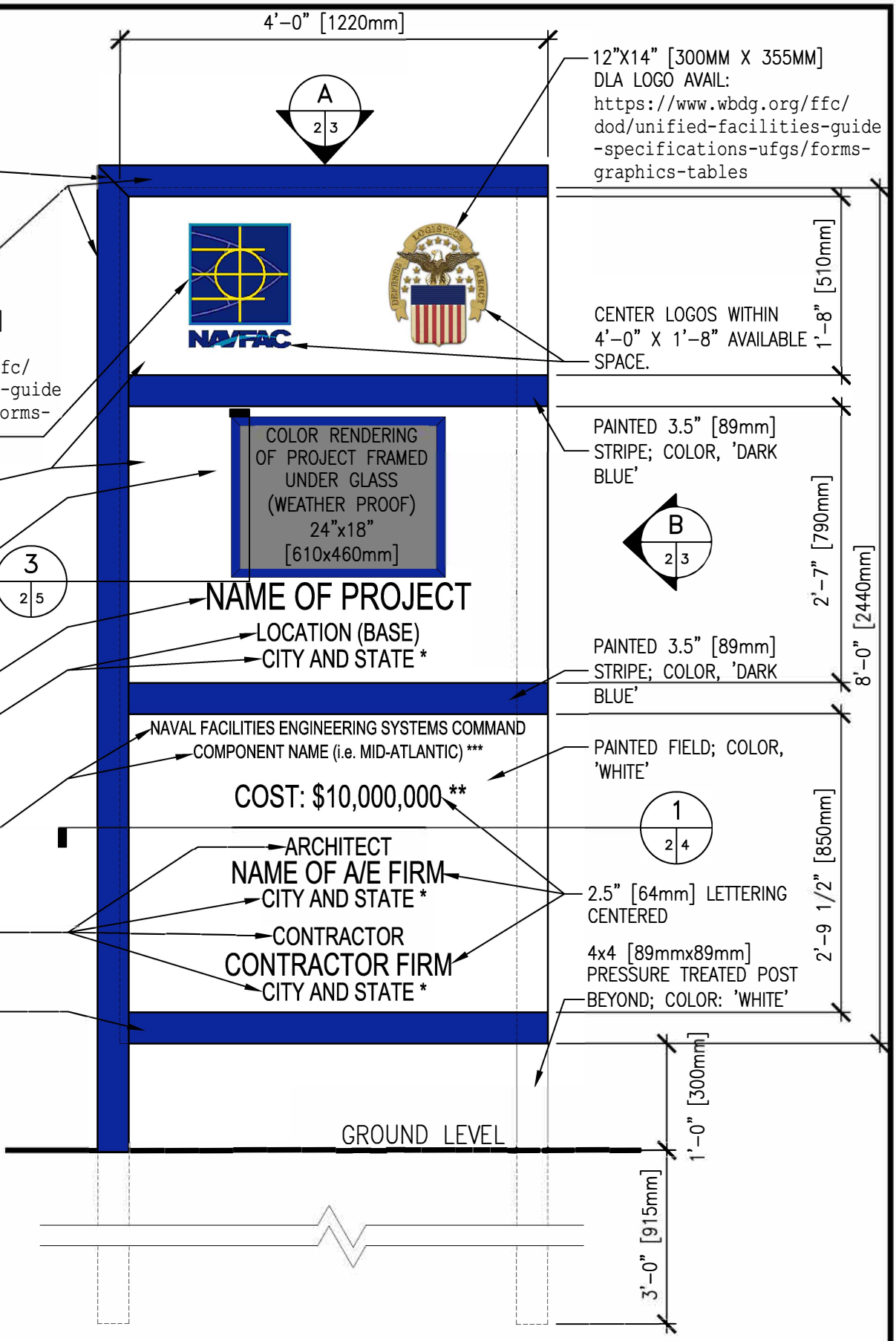
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 2USN



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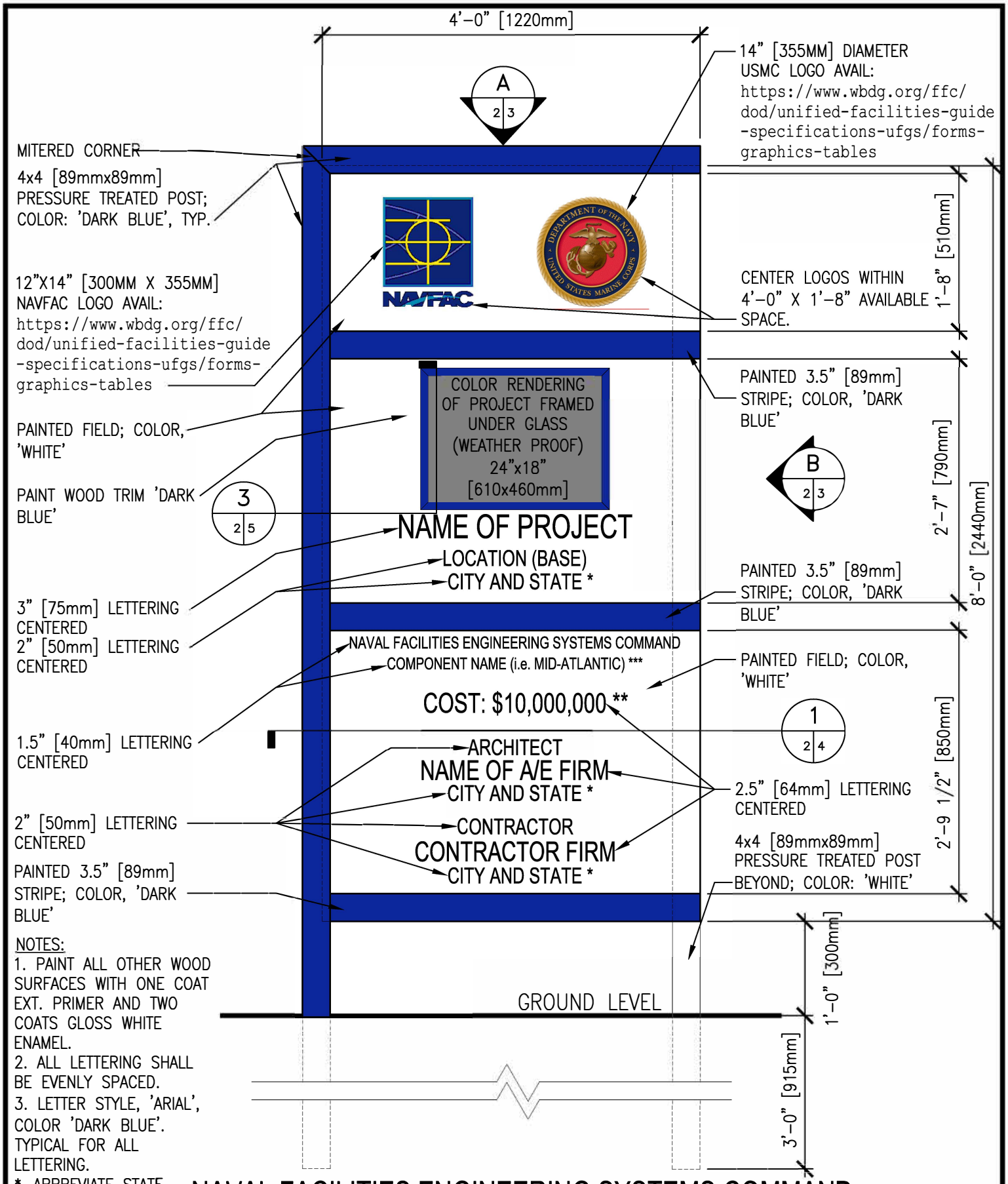
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 2DLA



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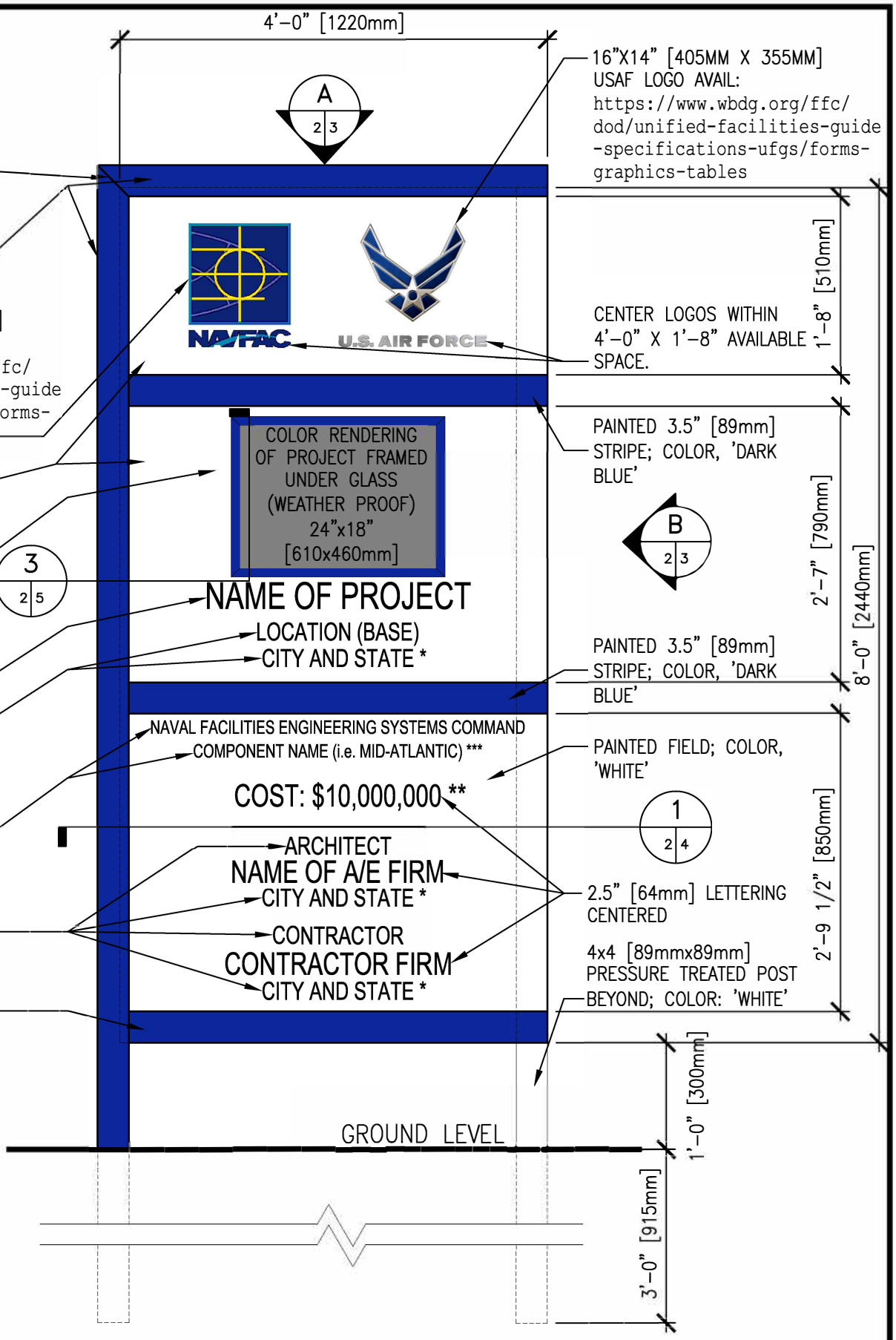
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD FOR MARINE CORPS PROJECTS

SCALE: 3/4" = 1'-0"

PLATE 2MC



NOTES:

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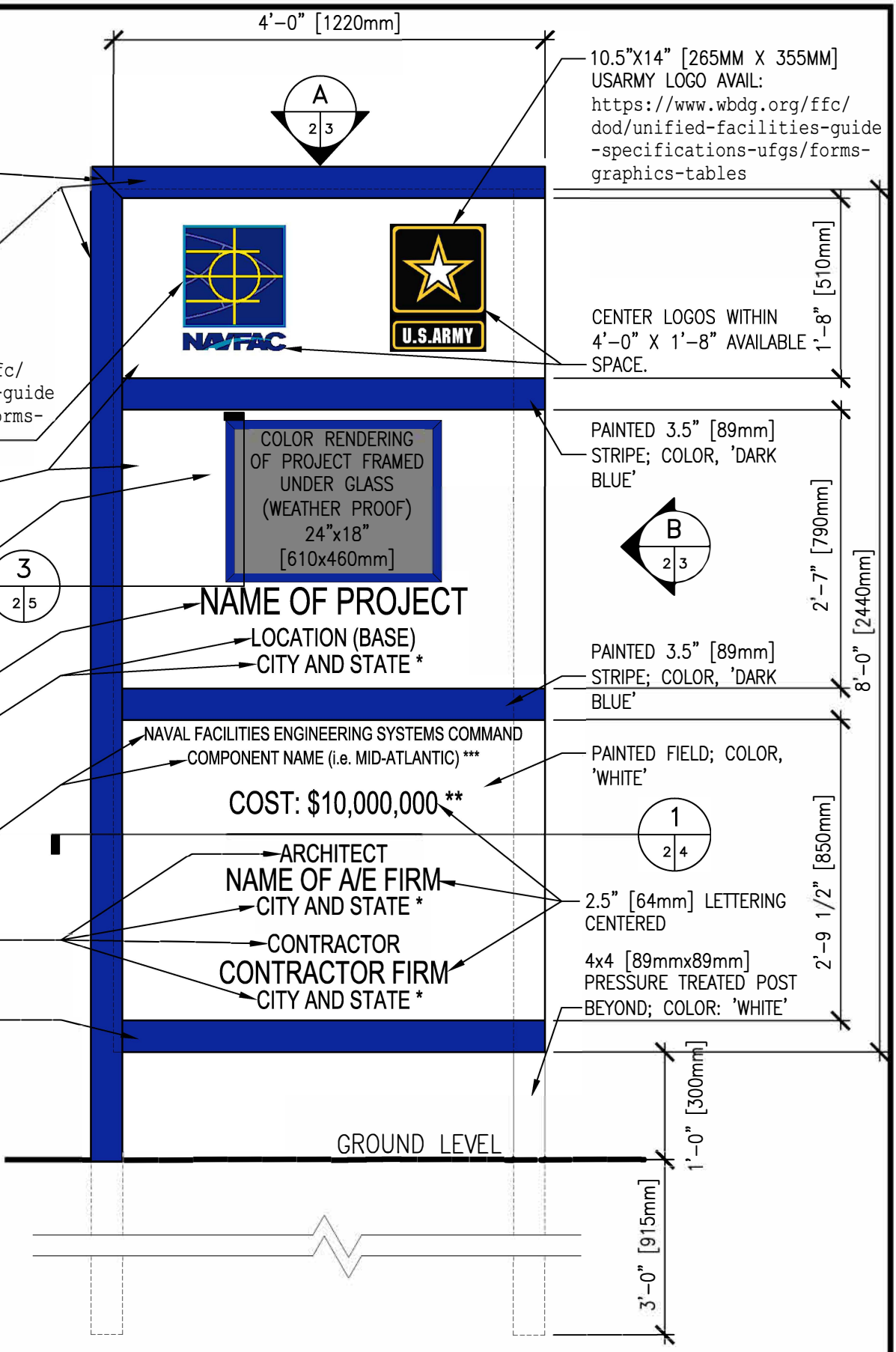
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 2USAF



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**–CONFIRM USE WITH CONTRACTING OFFICER
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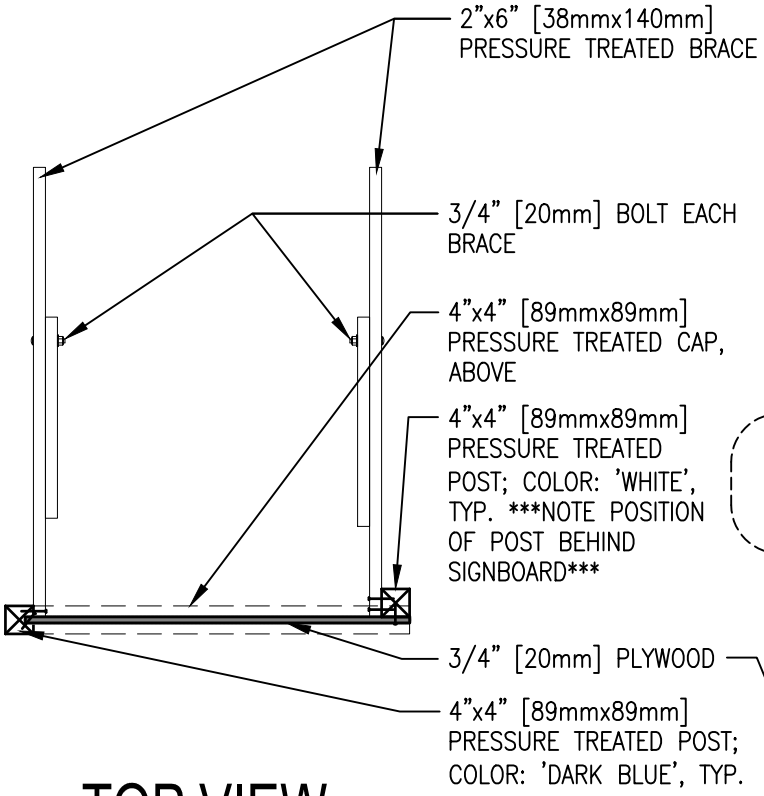
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND PROJECT IDENTIFICATION SIGNBOARD

SCALE: 3/4" = 1'-0"

PLATE 2USARMY

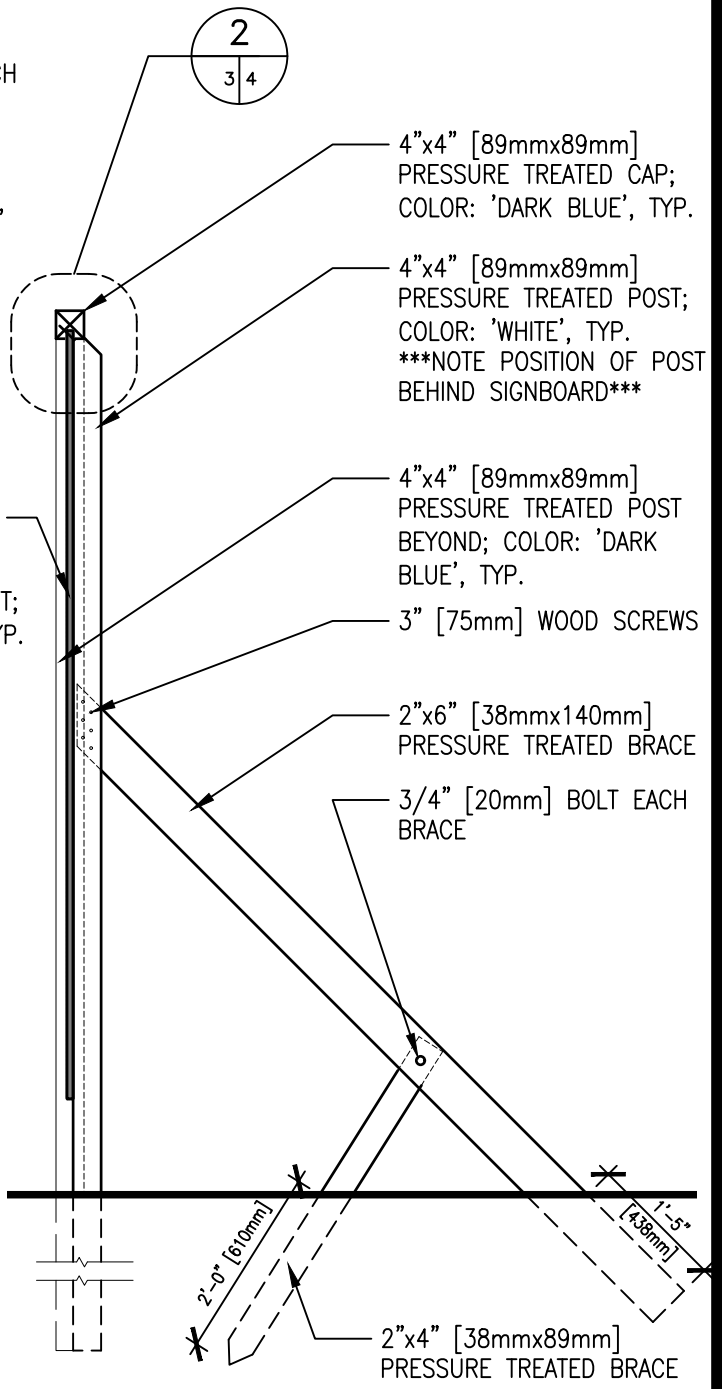


A
1,2 3

TOP VIEW

SCALE: 1/2" = 1'-0"

NOTES:
1. POSTS AND BRACES SHALL BE PRESSURE TREATED.
2. ALL FASTENERS SHALL BE ZINC COATED.
3. BRACING IS REQUIRED IN ALL SOIL CONDITIONS AND HIGH WIND ENVIRONMENTS.

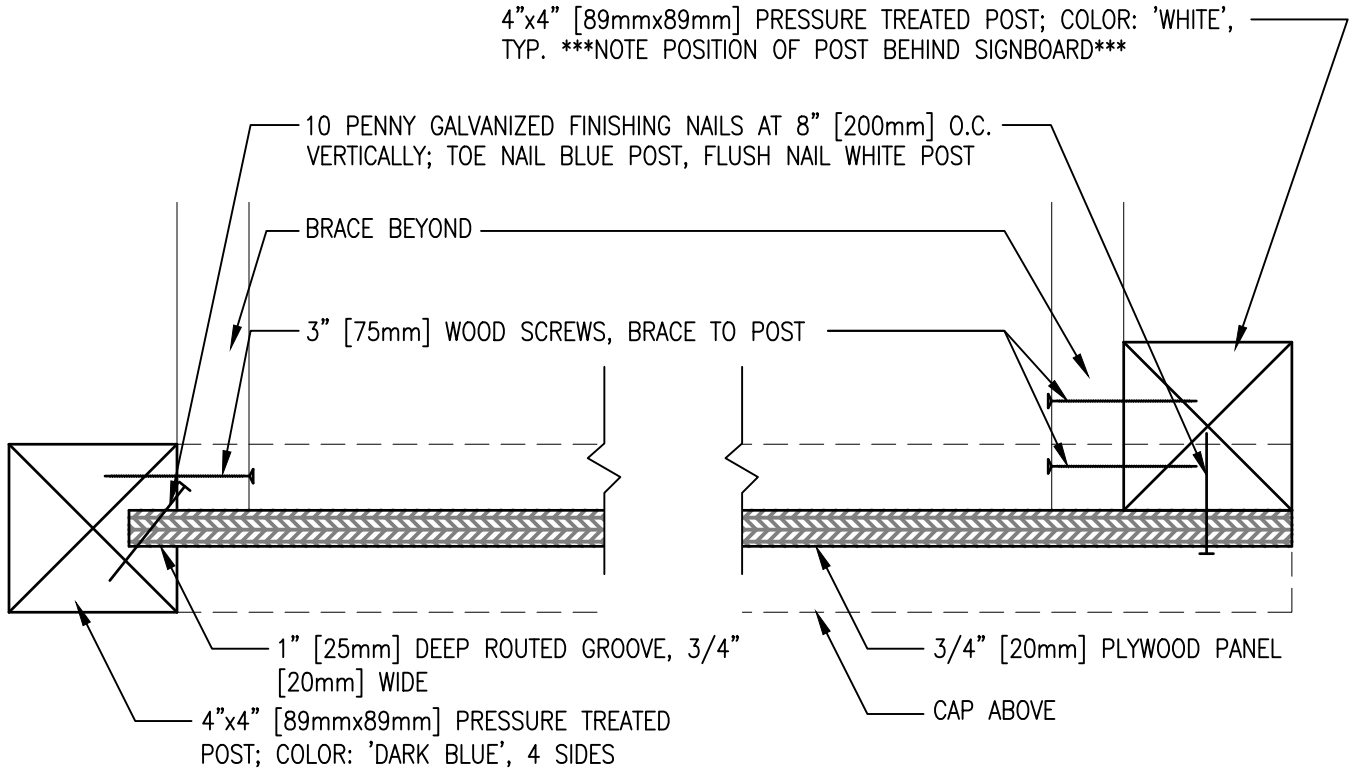


B
1,2 3

SIDE VIEW

SCALE: 1/2" = 1'-0"

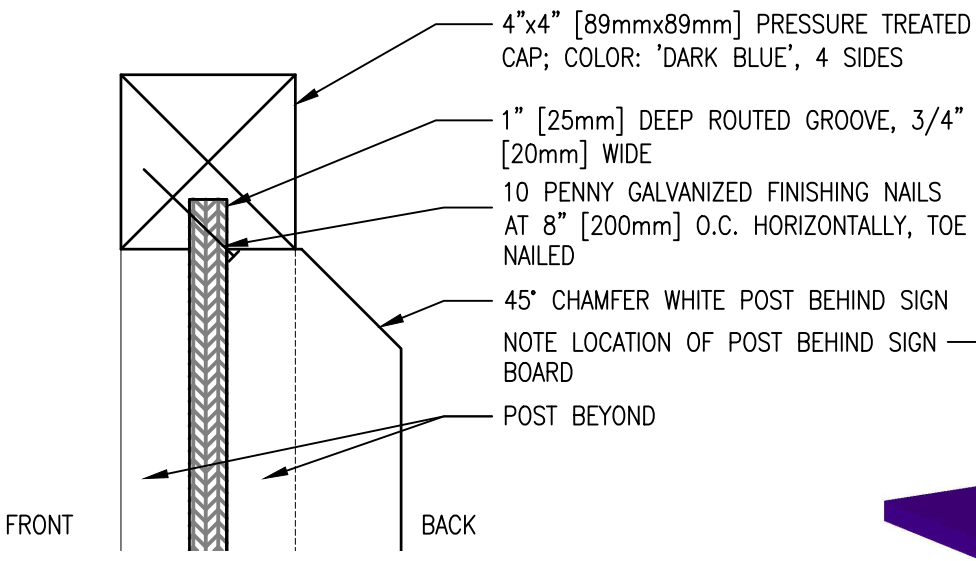
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
PROJECT IDENTIFICATION SIGNBOARD
SUPPORT DETAILS



1 PLAN SECTION

1,2 | 4

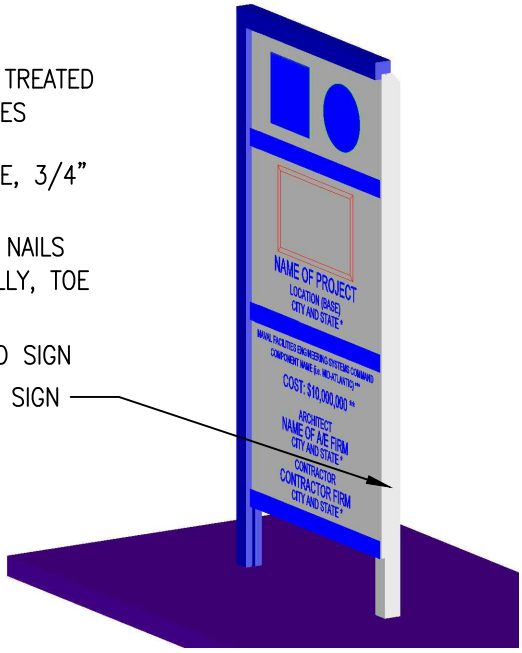
SCALE: 3" = 1'-0"



2 SECTION AT TOP

1,2 | 4

SCALE: 3" = 1'-0"

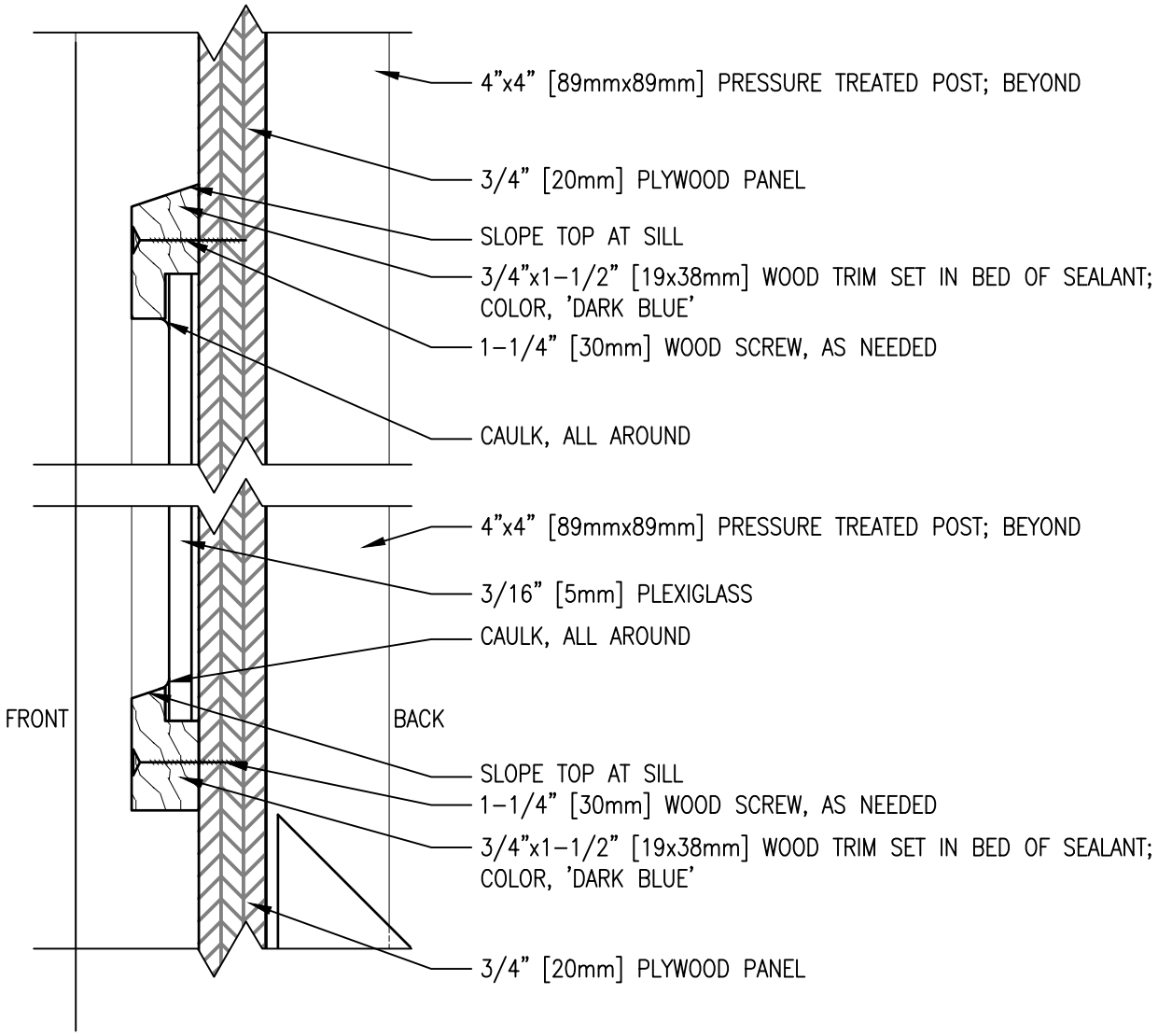


3 ISO VIEW

2 | 4

SCALE: NONE

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
PROJECT IDENTIFICATION SIGNBOARD SECTIONS

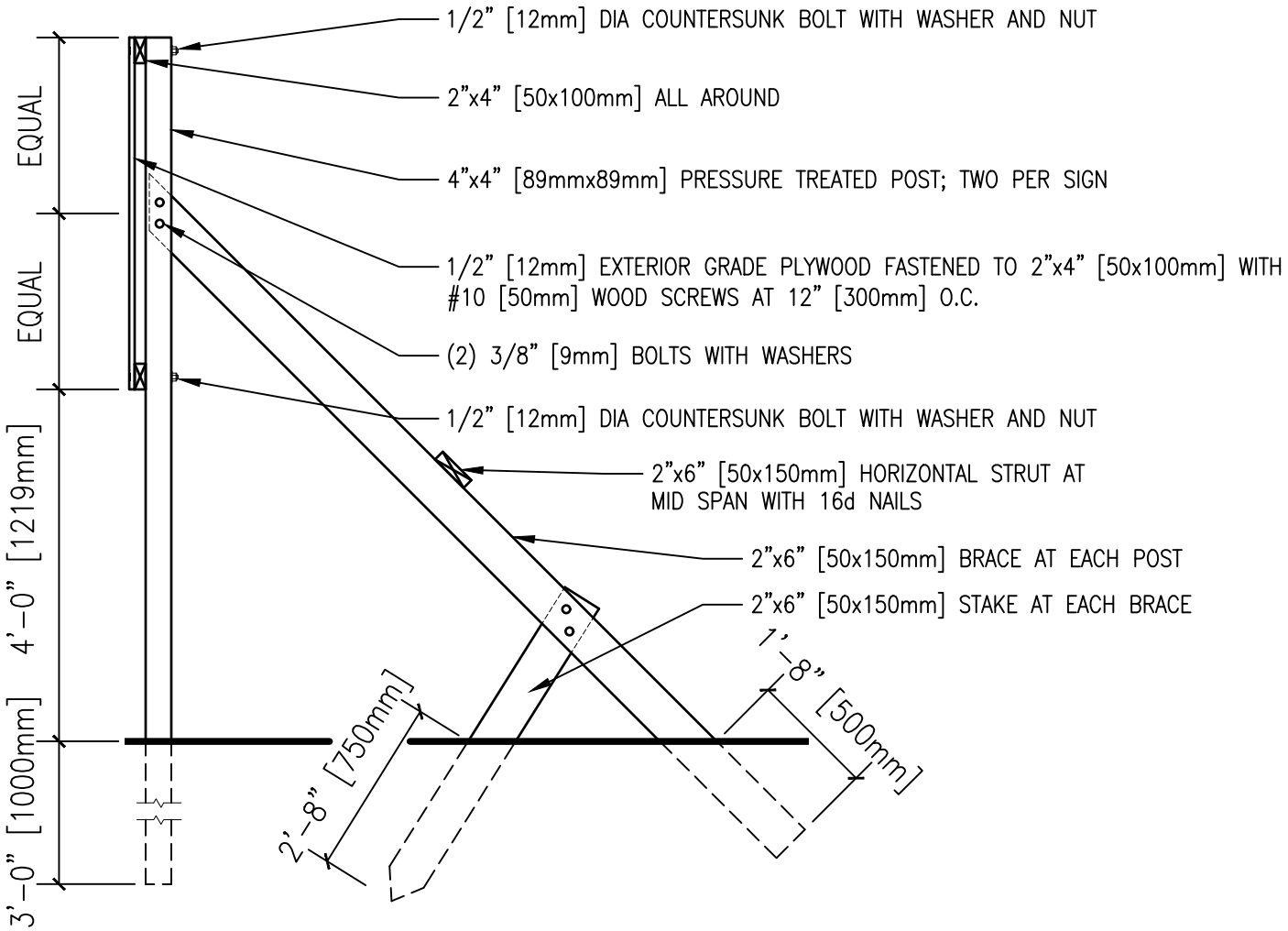


3
2 5

SECTION AT RENDERING FRAME

SCALE: 6" = 1'-0"

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
PROJECT IDENTIFICATION SIGNBOARD SECTION



A
6 6

SECTION

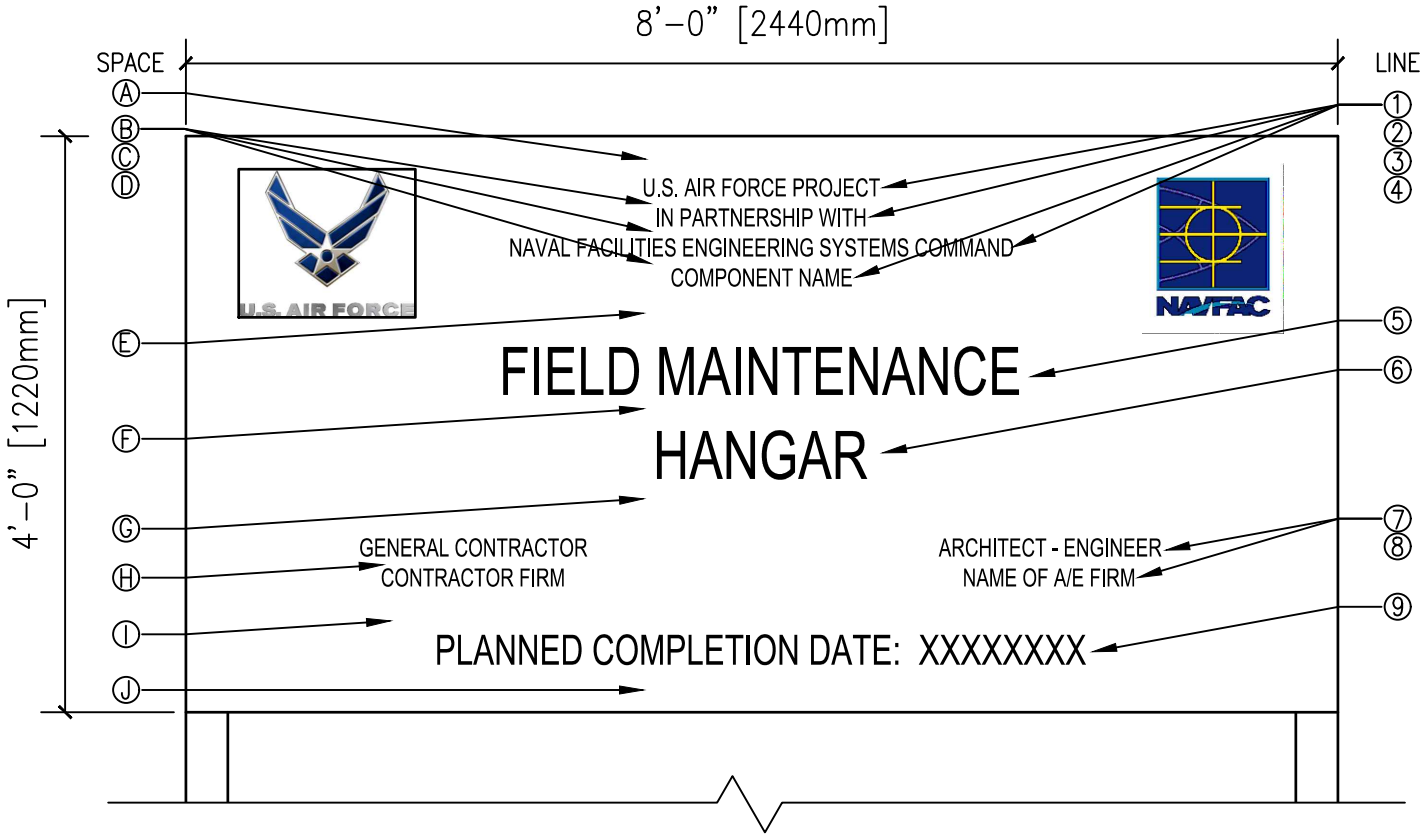
SCALE: 1/2" = 1'-0"

NOTES:

1. THE SIGN MUST BE CONSTRUCTED OF 4'x8' [1200mmx2400mm] 1/2" [12mm] GRADE A–C, EXTERIOR TYPE PLYWOOD MOUNTED ON A FRAME OF TREATED LUMBER.
2. THE HOST MAJCOM WILL PROVIDE SIGN COLORS AND DETAILS TO THE DESIGN MANAGER IN THE REQUIREMENTS AND MANAGEMENT PLAN (RAMP).
3. ALL LETTERING SHALL BE UPPERCASE HELVETICA MEDIUM.
4. PRESERVATIVE TREAT ALL WOOD SURFACES BURIED OR IN CONTACT WITH THE EARTH.
5. ALL FASTENERS SHALL BE GALVANIZED COATED.
6. LUMBER SHALL BE NON STRESS GRADE: $F_t = 8.5^5$ KGS/M^2 (1200PSI)6
   $F_t = 10.5^5$ KGS/M^2 (1500PSI)

7. THE ENTIRE SIGNBOARD AND SUPPORTS SHALL BE GIVEN ONE COAT OF EXTERIOR ALKYD PRIMER AND TWO COATS OF EXTERIOR ALKYD ENAMEL PAINT. THE LETTERING AND SIGN WORK SHALL BE PERFORMED BY A SKILLED SIGN PAINTER USING PAINT KNOWN IN THE TRADE AS BULLETIN COLORS. WHERE PRESERVATIVE–TREATED LUMBER IS REQUIRED, UTILIZE ONLY CURED PRESSURE–TREATED WOOD WHICH HAS HAD THE CHEMICALS LEACHED FROM THE SURFACE OF THE WOOD PRIOR TO PAINTING.

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
PROJECT IDENTIFICATION SIGNBOARD SECTION
U.S. AIR FORCE PROJECTS



A
7 7

SIGNBOARD

SCALE: 3/4" = 1'-0"

SPACE	HEIGHT	LINE	DESCRIPTION	LETTER HEIGHT	STROKE
Ⓐ	3.5"	①	U.S. AIR FORCE PROJECT	1.5"	3/16"
Ⓑ	1"	②	IN PARTNERSHIP WITH	1.5"	3/16"
Ⓒ	1"	③	NAVAL FACILITIES ENGINEERING COMMAND	1.5"	3/16"
Ⓓ	1"	④	COMPONENT NAME	1.5"	3/16"
Ⓔ	5"	⑤	PROJECT NAME	4"	1/2"
Ⓕ	3"	⑥	PROJECT NAME CONT'D (IF REQUIRED)	4"	1/2"
Ⓖ	5"	⑦	GENERAL CONTRACTOR/ A–E	1.5"	3/16"
Ⓗ	1"	⑧	GENERAL CONTRACTOR/ A–E	1.5"	3/16"
Ⓘ	4"	⑨	PLANNED COMPLETION DATE:	2.5"	1/4"
Ⓙ	4"				

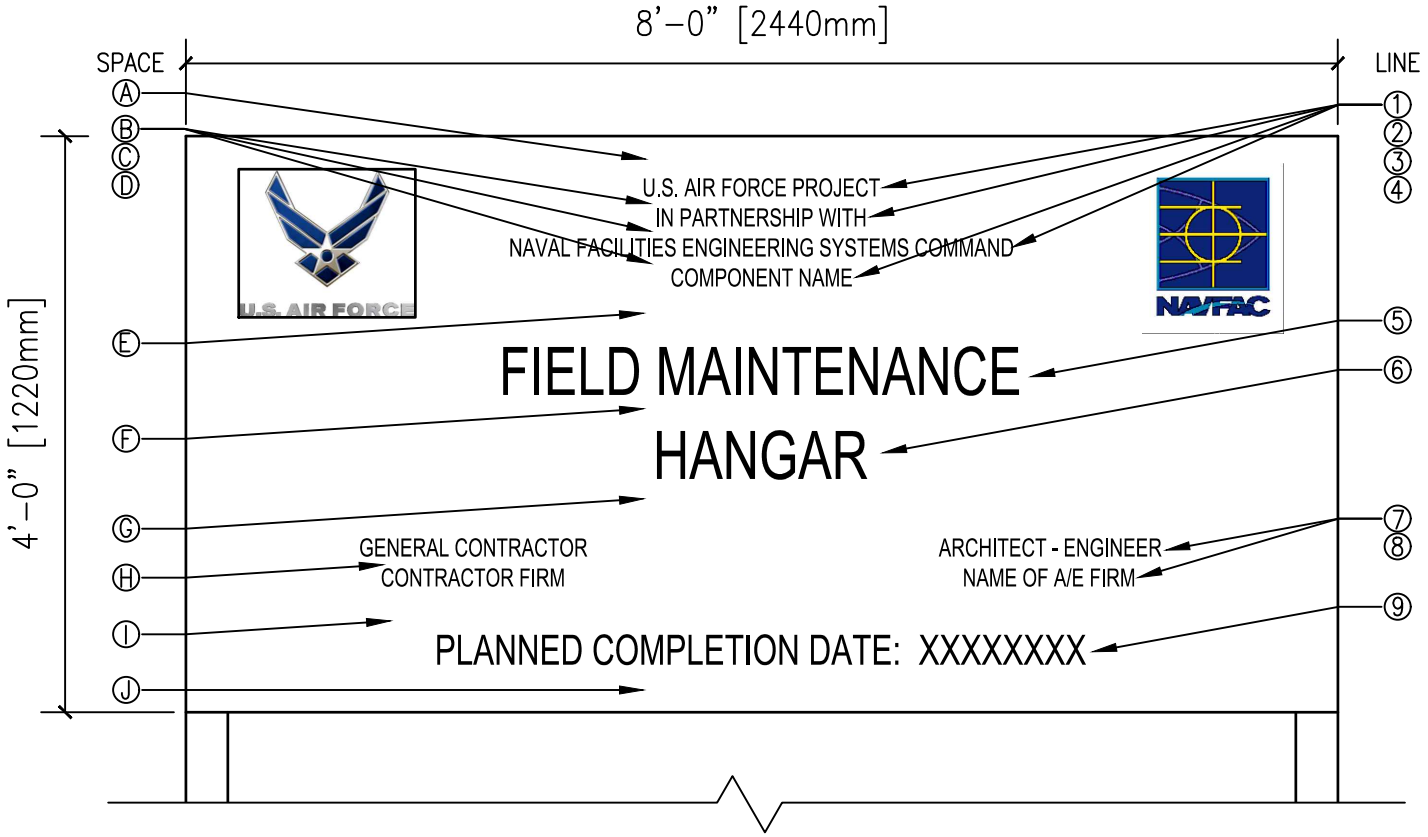
NOTES:

1. ALL LETTERING SHALL BE UPPERCASE HELVETICA MEDIUM.

2. NAVFAC LOGO AVAILABLE AT:
http://www.wbdg.org/ffc/dod/unified–facilities–guide–specifications–ufgs/forms–graphics–tables

3. AIR FORCE LOGO AVAILABLE AT:
http://www.wbdg.org/ffc/dod/unified–facilities–guide–specifications–ufgs/forms–graphics–tables

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
PROJECT IDENTIFICATION SIGNBOARD
U.S. AIR FORCE PROJECTS



A
7 7

SIGNBOARD

SCALE: 3/4" = 1'-0"

SPACE	HEIGHT	LINE	DESCRIPTION	LETTER HEIGHT	STROKE
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Ⓒ	1"	③	NAVAL FACILITIES ENGINEERING COMMAND	1.5"	3/16"
Ⓓ	1"	④	COMPONENT NAME	1.5"	3/16"
Ⓔ	5"	⑤	PROJECT NAME	4"	1/2"
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http://www.wbdg.org/ffc/dod/unified–facilities–guide–specifications–ufgs/forms–graphics–tables

3. AIR FORCE LOGO AVAILABLE AT:
http://www.wbdg.org/ffc/dod/unified–facilities–guide–specifications–ufgs/forms–graphics–tables

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND
PROJECT IDENTIFICATION SIGNBOARD
U.S. AIR FORCE PROJECTS

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
02/19, CHG 3: 11/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 273	Standards for Universal Waste Management
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Co-mingle

The practice of placing unrelated materials together in a single container, usually for benefits of convenience and speed.

1.2.2 Construction Waste

Waste generated by construction activities, such as scrap materials, damaged or spoiled materials, temporary and expendable construction materials, and other waste generated by the workforce during construction activities.

1.2.3 Demolition Debris/Waste

Waste generated from demolition activities, including minor incidental demolition waste materials generated as a result of Intentional dismantling of all or portions of a building, to include clearing of building contents that have been destroyed or damaged.

1.2.4 Disposal

Depositing waste in a solid waste disposal facility, usually a managed landfill or incinerator, regulated in the US under the Resource Conservation and Recovery Act (RCRA).

1.2.5 Diversion

The practice of diverting waste from disposal in a landfill or incinerator, by means of eliminating or minimizing waste, or reuse of materials.

1.2.6 Final Construction Waste Diversion Report

A written assertion by a material recovery facility operator identifying

constituent materials diverted from disposal, usually including summary tabulations of materials, weight in short-ton.

1.2.7 Recycling

The series of activities, including collection, separation, and processing, by which products or other materials are diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products sold or distributed in commerce, or the reuse of such materials as substitutes for goods made of virgin materials, other than fuel.

1.2.8 Reuse

The use of a product or materials again for the same purpose, in its original form or with little enhancement or change.

1.2.9 Salvage

Usable, salable items derived from buildings undergoing demolition or deconstruction, parts from vehicles, machinery, other equipment, or other components.

1.2.10 Source Separation

The practice of administering and implementing a management strategy to identify and segregate unrelated waste at the first opportunity.

1.3 CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE)

Divert a minimum of 60 percent by weight of the project construction waste and demolition debris/waste from the landfill or incinerator. Follow applicable industry standards in the management of waste. Apply sound environmental principles in the management of waste. (1) Practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction waste and demolition debris/waste from landfills and incinerators and to facilitate the recycling or reuse of excess construction materials.

1.4 CONSTRUCTION WASTE MANAGEMENT

Implement a Construction Waste Management Program for the project. Take a pro-active, responsible role in the management of construction waste, recycling process, disposal of demolition debris/waste, and require all subcontractors, vendors, and suppliers to participate in the Construction Waste Management Program. Establish a process for clear tracking, and documentation of construction waste and demolition debris/waste.

1.4.1 Implementation of Construction Waste Management Program

Develop and document how the Construction Waste Management Program will be implemented in a Construction Waste Management Plan. Submit a Construction Waste Management Plan to the Contracting Officer for approval. Construction waste and demolition debris/waste materials include un-used construction materials not incorporated in the final work, as well as demolition debris/waste materials from demolition activities or deconstruction activities. In the management of waste, consider the availability of viable markets, the condition of materials, the ability to provide material in suitable condition and in a quantity acceptable to

available markets, and time constraints imposed by internal project completion mandates.

1.4.2 Oversight

The Environmental Manager, as specified in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project.

1.4.3 Special Programs

Implement special programs involving rebates or similar incentives related to recycling of construction waste and demolition debris/waste materials. Retain revenue or savings from salvaged or recycling, unless otherwise directed. Ensure firms and facilities used for recycling, reuse, and disposal are permitted for the intended use to the extent required by federal, state, and local regulations.

1.4.4 Special Instructions

Provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the projects. Designation of single source separating or commingling will be clearly marked on the containers.

1.4.5 Waste Streams

Delineate waste streams and characterization, including estimated material types and quantities of waste, in the Construction Waste Management Plan. Manage all waste streams associated with the project. Typical waste streams are listed below. Include additional waste steams not listed:

a. Land Clearing Debris

b. Asphalt

c. Masonry and CMU

d. Concrete

e. Metals (Includes, but is not limited to, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze.)

f. Wood (nails and staples allowed)

g. Glass

h. Paper

i. Plastics (PET, HDPE,PVC,LDPE,PP,PS, Other)

j. Gypsum

k. Non-hazardous paint and paint cans

l. Carpet

m. Ceiling Tiles

n. Insulation

o. Beverage Containers

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Waste Management Plan; G; S

SD-11 Closeout Submittals

Final Construction Waste Diversion Report; S

1.6 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Construction Waste Management Plan and to develop a mutual understanding relative to the management of the Construction Waste Management Program and how waste diversion requirements will be met.

The requirements of this meeting may be fulfilled during the coordination and mutual Understanding meeting outlined in Section 01 45 00.00 20 QUALITY CONTROL. At a minimum, discuss and document waste management goals at following meetings:

a. Regular site meetings.

1.7 CONSTRUCTION WASTE MANAGEMENT PLAN

Submit Construction Waste Management Plan not less than 60 calendar days before scheduled final site or building design approval. Revise and resubmit Construction Waste Management Plan until it receives final approval from the Contracting Officer, in order for construction to begin. Execute demolition or deconstruction activities in accordance with Section 02 41 00 DEMOLITION. Manage demolition debris/waste or deconstruction materials in accordance with the approved construction waste management plan.

An approved Construction Waste Management Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Ensure all subcontractors receive a copy of the approved Construction Waste Management Plan. The plan demonstrates how to meet the project waste diversion requirement. Also, include the following in the plan:

a. Identify the names of individuals responsible for waste management and waste management tracking, along with roles and responsibilities on the project.

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c. Description of the regular meetings to be held to address waste management.

d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of materials.

e. Name of landfill and incinerator to be used.

f. Identification of local and regional re-use programs, including non-profit organizations such as schools, local housing agencies, and organization that accept used materials such as material exchange networks and resale stores. Include the name, location, phone number for each re-use facility identified, and provide a copy of the permit or license for each facility.

g. List of specific materials, by type and quantity, that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, address, and phone number.

h. Identification of materials that cannot be recycled or reused with an explanation or justification, to be approved by the Contracting Officer.

i. Description of the means by which materials identified in item (g) above will be protected from contamination.

j. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

k. Copy of training plan for subcontractors and other services to prevent contamination by co-mingling materials identified for diversion and waste materials.

m. Detailed plan and distribution of waste diversion between buildings, when project is a part of a campus.

n. Facilities or subcontractors offering construction waste transport on-site or off-site must ensure that proper shipping orders, bill of lading, manifests, or other shipping documents containing waste diversion information meet requirements of 40 CFR 273 Universal Waste Management, 49 CFR 173 Shippers - General Requirements for Shipments and Packagings, and 49 CFR 178 Specifications for Packaging. Individuals signing manifests or other shipping documents should meet the minimum training requirements.

o. List each supplier who deliver construction materials, in bulk, or package products in returnable containers or returnable packaging, or have take-back programs. List each program and the applicable material to actively monitor and track to assist in meeting waste diversion requirements on the project.

p. Identify local jurisdiction requirements for waste management. Include local requirements and points of contact.

Distribute copies of the waste management plan to each subcontractor, Environmental Manager, and the Contracting Officer.

The approved Construction Waste Management Plan must be included in the Sustainability eNotebook in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING.

1.8 RECORDS (DOCUMENTATION)

1.8.1 General

Maintain records to document the types and quantities of waste generated and diverted though re-use, recycling and sale to third parties; through disposal to a landfill or incinerator facility. Provide explanations for materials not recycled, reused or sold. Collect and retain manifests, weight tickets, sales receipts, and invoices specifically identifying diverted project waste materials or disposed materials.

1.8.2 Accumulated

Maintain a running record of materials generated and diverted from landfill disposal, including accumulated diversion rates for the project. Make records available to the Contracting Officer during construction or incidental demolition activities. Provide a copy of the diversion records to the Contracting Officer upon completion of the construction, incidental demolitions or minor deconstruction activities.

1.9 FINAL CONSTRUCTION WASTE DIVERSION REPORT

A Final Construction Waste Diversion Report is required at the end of the project. Provide Final Construction Waste Diversion Report 60 days prior to the Beneficial Occupancy Date (BOD). The final Construction Waste Diversion Report must be included in the Sustainability eNotebook in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING.

1.10 COLLECTION

Collect, store, protect, and handle reusable and recyclable materials at the site in a manner which prevents contamination, and provides protection from the elements to preserve their usefulness and monetary value. Provide receptacles and storage areas designated specifically for recyclable and reusable materials and label them clearly and appropriately to prevent contamination from other waste materials. Keep receptacles or storage areas neat and clean.

Train subcontractors and other service providers to either separate waste streams or use the co-mingling method as described in the Construction Waste Management Plan. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. Separate materials by one of the following methods described herein:

1.10.1 Source Separation Method

Separate waste products and materials that are recyclable from trash and

sort as described below into appropriately marked separate containers and then transport to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the category types as defined in the Construction Waste Management Plan.

1.10.2 Co-Mingled Method

Place waste products and recyclable materials into a single container and then transport to an authorized recycling facility, which meets all applicable requirements to accept and dispose of recyclable materials in accordance with all applicable local, state and federal regulations. The Co-mingled materials must be sorted and processed in accordance with the approved Construction Waste Management Plan.

1.10.3 Other Methods

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.11 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the following:

1.11.1 Reuse

Give first consideration to reusing construction and demolition materials as a disposition strategy. Recover for reuse materials, products, and components as described in the approved Construction Waste Management Plan. Coordinate with the Contracting Officer to identify onsite reuse opportunities or material sales or donation available through Government resale or donation programs. Sale of recovered materials is not allowed on the Installation. Consider the use of surplus industrial supply broker services, who match entities with reusable or repurpose industrial materials with entities with need of such materials.

1.11.2 Recycle

Recycle non-hazardous construction and demolition/debris materials that are not suitable for reuse. Track rejection of contaminated recyclable materials by the recycling facility. Rejected recyclables materials will not be counted as a percentage of diversion calculation. Recycle all fluorescent lamps, HID lamps, mercury (Hg) -containing thermostats and ampoules, and PCBs-containing ballasts and electrical components as directed by the Contracting Officer. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements.

1.11.3 Waste

Dispose by landfill or incineration only those waste materials with no practical use, economic benefit, or recycling opportunity.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS
05/19, CHG 1: 08/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E1971	(2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

GREEN SEAL (GS)

GS-37	(2017) Cleaning Products for Industrial and Institutional Use

U.S. DEPARTMENT OF DEFENSE (DOD)

FC 1-300-09N	(2014; with Change 6, 2021) Navy and Marine Corps Design
UFC 1-300-08	(2009; with Change 2, 2011) Criteria for Transfer and Acceptance of DoD Real Property

1.2 DEFINITIONS

1.2.1 As-Built Drawings

As-built drawings are the marked-up drawings, maintained by the Contractor on-site, that depict actual conditions and deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to submitted Requests for Information (RFI's); direction from the Contracting Officer; design that is the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as red-lined hard copies on site. These files serve as the basis for the creation of the record drawings.

1.3 SOURCE DRAWING FILES

1.3.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with

the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty Management Plan

Warranty Tags

Final Cleaning

Spare Parts Data

SD-08 Manufacturer's Instructions

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

As-Built Record of Equipment and Materials

Certification of EPA Designated Items; G

Certification Of USDA Designated Items; G

Interim DD FORM 1354; G

Checklist for DD FORM 1354; G

High Performance and Sustainable Building (HPSB) Checklist; G

1.5 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

a. Indicate manufacturer's name, part number, and stock level required for test and balance, pre-commissioning, maintenance and repair activities. List those items that may be standard to the normal maintenance of the system.

1.6 WARRANTY MANAGEMENT

1.6.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan narrative must contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Submit warranty information, made available during the construction phase, to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period must begin on the date of project acceptance and continue for the full product warranty period. Conduct a joint 4 month and 9 month warranty inspection, measured from time of acceptance; with the Contractor, Contracting Officer and the Customer Representative. The warranty management plan must include, but is not limited to, the following:

a. Roles and responsibilities of personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.

b. For each warranty, the name, address, telephone number, and e-mail of each of the guarantor's representatives nearest to the project location.

c. A list and status of delivery of Certificates of Warranty for extended warranty items, including roofs, HVAC balancing, pumps, motors, transformers, and for commissioned systems, such as fire protection and alarm systems, sprinkler systems, and lightning protection systems.

d. As-Built Record of Equipment and Materials list for each warranted equipment, item, feature of construction or system indicating:

(1) Name of item.
(2) Model and serial numbers.
(3) Location where installed.
(4) Name and phone numbers of manufacturers or suppliers.

(5) Names, addresses and telephone numbers of sources of spare parts.
(6) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have warranties longer than one year must be indicated with separate warranty expiration dates.
(7) Cross-reference to warranty certificates as applicable.
(8) Starting point and duration of warranty period.
(9) Summary of maintenance procedures required to continue the warranty in force.
(10) Cross-reference to specific pertinent Operation and Maintenance manuals.
(11) Organization, names and phone numbers of persons to call for warranty service.
(12) Typical response time and repair time expected for various warranted equipment.

e. The plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

f. Procedure and status of tagging of equipment covered by warranties longer than one year.

g. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty or safety reasons.

1.6.2 Performance Bond

The Performance Bond must remain effective throughout the construction and warranty period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.6.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. At this meeting, establish and review communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a

licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact must be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.6.4 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	
WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.	

PART 2 PRODUCTS

2.1 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9 Estimate of Percentage of Recovered Material Content for EPA Designated Items and FAR 52-223-17 Affirmative Procurement of EPA designated items in Service and Construction Contracts. Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

a. The product does not meet appropriate performance standards;

b. The product is not available within a reasonable time frame;

c. The product is not available competitively (from two or more sources);

d. The product is only available at an unreasonable price (compared with a comparable non-recycled content product)."

Record each product used in the project that has a requirement or option of containing recycled content in accordance with SECTION 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, exemptions (a, b, c, or d, as indicated), and comments. Recycled content values may be determined by weight or volume percent, but must be consistent throughout.

2.2 CERTIFICATION OF USDA DESIGNATED ITEMS

Submit the Certification of USDA Designated Items as required by FAR 52-223-1 Bio-based Product Certifications and FAR 52.223-2 Affirmative Procurement of Biobased Products Under Service and Construction Contracts. Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current USDA standards for biobased materials content. The following exemptions may apply to the non-procurement of biobased content materials:

a. The product does not meet appropriate performance standards;

b. The product is not available within a reasonable time frame;

c. The product is not available competitively (from two or more sources);

d. The product is only available at an unreasonable price (compared with a comparable bio-based content product)."

Record each product used in the project that has a requirement or option of containing biobased content in accordance with SECTION 01 33 29

SUSTAINABILITY REQUIREMENTS AND REPORTING, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, total value of biobased content, exemptions (a, b, c, or d, as indicated), and comments. Biobased content values may be determined by weight or volume percent, but must be consistent throughout.

PART 3 EXECUTION

3.1 AS-BUILT DRAWINGS

Provide and maintain two black line print copies of the PDF contract drawings for As-Built Drawings. Maintain the as-builts throughout construction as red-lined hard copies on site or red-lined PDF files. Submit As-Built Drawings 30 days prior to Beneficial Occupancy Date (BOD).

3.1.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where item(s) were relocated and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

a. Use base colors of red, green, and blue. Color code for changes as follows:

   (1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

   (2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

   (3) Additions (Green) - Added items, lettering in notes and leaders.

b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.

c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.

d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.

e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.

f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.

g. For deletions, cross out all features, data and captions that relate to that revision.

h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.

i. Indicate one of the following when attaching a print or sketch to a markup print:

   1) Add an entire drawing to contract drawings

   2) Change the contract drawing to show changes on the drawing.

   3) Provided for reference only to further detail the initial design.

j. Incorporate all shop and fabrication drawings into the markup drawings.

3.1.2 As-Built Drawings Content

Show on the as-built drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. The location and dimensions of any changes within the building structure.

c. Layout and schematic drawings of electrical circuits and piping.

d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

e. Changes in details of design or additional information obtained from working drawings specified to be prepared or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment, and foundations.

f. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

g. Changes or Revisions which result from the final inspection.

h. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.

i. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.

j. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

k. Changes in location of equipment and architectural features.

l. Modifications and compliance with FC 1-300-09N procedures.

m. Actual location of anchors, construction and control joints, etc., in concrete.

n. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

o. Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.

3.2 OPERATION AND MAINTENANCE MANUALS

Provide project operation and maintenance manuals as specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA. Provide four electronic copies of the Operation and Maintenance Manual files. Submit to the Contracting Officer for approval within 60 calendar days of the Beneficial Occupancy Date (BOD). Update and resubmit files for final approval at BOD.

3.3 CLEANUP

Provide final cleaning in accordance with ASTM E1971 and submit two copies of the listing of completed final clean-up items. Leave premises "broom clean." Comply with GS-37 for general purpose cleaning and bathroom cleaning. Use only nonhazardous cleaning materials, including natural cleaning materials, in the final cleanup. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Replace filters of operating equipment and comply with the Indoor Air Quality (IAQ) Management Plan. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Recycle, salvage, and return construction and demolition waste from project in accordance with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, and 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

3.4 REAL PROPERTY RECORD

Refer to UFC 1-300-08 for instruction on completing the DD FORM 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD FORM 1354.

3.4.1 Interim DD FORM 1354

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft DD FORM 1354 attached to this section, and submit an accounting of all installed property with Interim DD FORM 1354. Include any additional assets, improvements, and alterations from the Draft DD FORM 1354.

3.4.2 Completed DD FORM 1354

Attach the Real Property receiving Component's completed High Performance and Sustainable Building (HPSB) Checklist for each applicable building to the completed DD 1354, in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING. For convenience, a blank fillable PDF DD FORM 1354 may be obtained at the following link:

www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd1354.pdf

Submit the completed Checklist for DD FORM 1354 of Installed Building Equipment items. Attach this list to the updated DD FORM 1354.

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
08/15, CHG 2: 08/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E1971	(2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

Training Plan; G

Training Outline; G

Training Content; G

SD-11 Closeout Submittals

Training Video Recording; G

Validation of Training Completion; G

1.3 OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.3.1 Package Quality

Documents must be fully legible. Operation and Maintenance data must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions.

1.3.2 Package Content

Provide data package content in accordance with paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES. Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Use Data Package 3 for commissioned items without a specified data package requirement in the individual technical sections. Provide a Data Package 3 instead of Data Package 1 or 2, as specified in the individual technical section, for items that are commissioned.

1.3.3 Changes to Submittals

Provide manufacturer-originated changes or revisions to submitted data if a component of an item is so affected subsequent to acceptance of the O&M Data. Submit changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data within 30 calendar days of the notification of this change requirement.

1.3.4 Commissioning Authority Review and Approval

Submit the commissioned systems and equipment submittals to the Commissioning Authority (CxA) to review for completeness and applicability. Obtain validation from the CxA that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CxA communicates deficiencies to the Contracting Officer. Submit the O&M manuals to the Contracting Officer upon a successful review of the corrections, and with the CxA recommendation for approval and acceptance of these O&M manuals. This work is in addition to the normal review procedures for O&M data.

1.4 OPERATION AND MAINTENANCE MANUAL FILE FORMAT

Assemble data packages into electronic Operation and Maintenance Manuals. Assemble each manual into a composite electronically indexed file using the most current version of Adobe Acrobat or similar software capable of producing PDF file format. Provide compact disks (CD) or data digital versatile disk (DVD) as appropriate, so that each one contains operation, maintenance and record files, project record documents, and training videos. Include a complete electronically linked operation and maintenance directory.

1.4.1 Organization

Bookmark Product and Drawing Information documents using the current version of CSI MasterFormat numbering system, and arrange submittals using the specification sections as a structure. Use CSI MasterFormat and UFGS numbers along with descriptive bookmarked titles that explain the content of the information that is being bookmarked.

1.4.2 CD or DVD Label and Disk Holder or Case

Provide the following information on the disk label and disk holder or case:

a. Building Number

b. Project Title

c. Activity and Location

d. Construction Contract Number

e. Prepared For: (Contracting Agency)

f. Prepared By: (Name, title, phone number and email address)

g. Include the disk content on the disk label

h. Date

i. Virus scanning program used

1.5 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

The following are a detailed description of the data package items listed in paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES.

1.5.1 Operating Instructions

Provide specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.5.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS. Provide recommended safeguards for each identified hazard.

1.5.1.2 Operator Prestart

Provide procedures required to install, set up, and prepare each system for use.

1.5.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.5.1.4 Normal Operations

Provide Control Diagrams with data to explain operation and control of systems and specific equipment. Provide narrative description of Normal Operating Procedures.

1.5.1.5 Emergency Operations

Provide Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Provide Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of

utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.5.1.6 Operator Service Requirements

Provide instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gauge readings.

1.5.1.7 Environmental Conditions

Provide a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.5.1.8 Operating Log

Provide forms, sample logs, and instructions for maintaining necessary operating records.

1.5.1.9 Additional Requirements for HVAC Control Systems

Provide Data Package 5 and the following for control systems:

a. Narrative description on how to perform and apply functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.

b. Full as-built sequence of operations.

c. Copies of checkout tests and calibrations performed by the Contractor (not Cx tests).

d. Full points list. Provide a listing of rooms with the following information for each room:

(1) Floor

(2) Room number

(3) Room name

(4) Air handler unit ID

(5) Reference drawing number

(6) Air terminal unit tag ID

(7) Heating or cooling valve tag ID

(8) Minimum cfm

(9) Maximum cfm

e. Full print out of all schedules and set points after testing and acceptance of the system.

f. Full as-built print out of software program.

g. Marking of system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.5.2 Preventive Maintenance

Provide the following information for preventive and scheduled maintenance to minimize repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.5.2.1 Lubrication Data

Include the following preventive maintenance lubrication data, in addition to instructions for lubrication required under paragraph OPERATOR SERVICE REQUIREMENTS:

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.5.2.2 Preventive Maintenance Plan, Schedule, and Procedures

Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

a. Define the anticipated time required to perform each of each test (work-hours), test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventive maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize repairs.

b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.5.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E1971.

1.5.3 Repair

Provide manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.5.3.1 Troubleshooting Guides and Diagnostic Techniques

Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.5.3.2 Wiring Diagrams and Control Diagrams

Provide point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.5.3.3 Repair Procedures

Provide instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.5.3.4 Removal and Replacement Instructions

Provide step-by-step procedures and a list of required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Use a combination of text and illustrations.

1.5.3.5 Spare Parts and Supply Lists

Provide lists of spare parts and supplies required for repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.5.3.6 Repair Work-Hours

Provide manufacturer's projection of repair work-hours including requirements by type of craft. Identify, and tabulate separately, repair that requires the equipment manufacturer to complete or to participate.

1.5.4 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.5.4.1 Product Submittal Data

Provide a copy of SD-03 Product Data submittals documented with the

required approval.

1.5.4.2 Certificates

Provide a copy of SD-07 Certificates submittals documented with the required approval.

1.5.4.3 Manufacturer's Instructions

Provide a copy of SD-08 Manufacturer's Instructions submittals documented with the required approval.

1.5.4.4 O&M Submittal Data

Provide a copy of SD-10 Operation and Maintenance Data submittals documented with the required approval.

1.5.4.5 Parts Identification

Provide identification and coverage for the parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing must show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Group the parts shown in the listings by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.5.4.6 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components of the system. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.5.4.7 Extended Warranty Information

List all warranties for products, equipment, components, and sub-components whose duration exceeds one year. For each warranty listed, indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference the specific operation and maintenance procedures that must be performed to keep the warranty valid. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.5.4.8 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.5.4.9 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components. Provide final set points.

1.5.4.10 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms. Provide final set points.

1.5.4.11 Field Test Reports and Manufacturer's Field Reports

Provide a copy of Field Test Reports (SD-06) and Manufacturer's Field Reports (SD-09) submittals documented with the required approval.

1.5.4.12 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.6 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Provide the O&M data packages specified in individual technical sections. The information required in each type of data package follows:

1.6.1 Data Package 1

a. Safety precautions and hazards

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Extended warranty information

f. Contractor information

g. Spare parts and supply list

1.6.2 Data Package 2

a. Safety precautions and hazards

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan, schedule, and procedures

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Extended warranty information

m. Contractor information

1.6.3 Data Package 3

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Operating log

h. Lubrication data

i. Preventive maintenance plan, schedule, and procedures

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Product submittal data

q. O&M submittal data

r. Parts identification

s. Warranty information

t. Extended warranty information

u. Testing equipment and special tool information

v. Testing and performance data

w. Contractor information

x. Field test reports

1.6.4 Data Package 4

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Operating log

i. Lubrication data

j. Preventive maintenance plan, schedule, and procedures

k. Cleaning recommendations

l. Troubleshooting guides and diagnostic techniques

m. Wiring diagrams and control diagrams

n. Repair procedures

o. Removal and replacement instructions

p. Spare parts and supply list

q. Repair work-hours

r. Product submittal data

s. O&M submittal data

t. Parts identification

u. Warranty information

v. Extended warranty information

w. Personnel training requirements

x. Testing equipment and special tool information

y. Testing and performance data

z. Contractor information

aa. Field test reports

1.6.5 Data Package 5

a. Safety precautions and hazards

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan, schedule, and procedures

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Extended warranty information

s. Testing and performance data

t. Contractor information

u. Field test reports

v. Additional requirements for HVAC control systems

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the eOMSI Manual, as submitted in Section 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI). Training must include classroom or field lectures based on the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the Contracting Officer and QC. Include within the plan the following elements:

a. Equipment included in training

b. Intended audience

c. Location of training

d. Dates of training

e. Objectives

f. Outline of the information to be presented and subjects covered including description

g. Start and finish times and duration of training on each subject

h. Methods (e.g. classroom lecture, video, site walk-through, actual operational demonstrations, written handouts)

i. Instructor names and instructor qualifications for each subject

j. List of texts and other materials to be furnished by the Contractor that are required to support training

k. Description of proposed software to be used for video recording of training sessions.

3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Provide a brief summary of the FACILITY INFORMATION manual, and a more detailed presentation of the PRODUCT AND DRAWING MANUAL, specified in Section 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI). Spend 95 percent of the instruction time

during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

a. Start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting, and alarms.

b. Relevant health and safety issues.

c. Discussion of how the feature or system is environmentally responsive. Advise adjustments and optimizing methods for energy conservation.

d. Design intent.

e. Use of O&M Manual Files.

f. Review of control drawings and schematics.

g. Interactions with other systems.

h. Special maintenance and replacement sources.

i. Tenant interaction issues.

3.1.3 Training Outline

Provide the eOMSI Manual files as specified in Section 01 78 24.00 20, FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI), and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

3.1.4 Training Video Recording

Record classroom training session(s) on video. Provide to the Contracting Officer two copies of the training session(s) in DVD video recording format. Capture within the recording, in video and audio, the instructors' training presentations including question and answer periods with the attendees. The recording camera(s) must be attended by a person during the recording sessions to assure proper size of exhibits and projections during the recording are visible and readable when viewed as training.

3.1.5 Unresolved Questions from Attendees

If, at the end of the training course, there are questions from attendees that remain unresolved, the instructor must send the answers, in writing, to the Contracting Officer for transmittal to the attendees, and the training video must be modified to include the appropriate clarifications.

3.1.6 Validation of Training Completion

Ensure that each attendee at each training session signs a class roster daily to confirm Government participation in the training. At the completion of training, submit a signed validation letter that includes a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was

performed, and copies of the signed class rosters. Provide two copies of the validation to the Contracting Officer, and one copy to the Operation and Maintenance Manual Preparer for inclusion into the Manual's documentation.

3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 00.00 20 QUALITY CONTROL.

-- End of Section --

SECTION 01 78 24.00 20

FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI)
02/15, CHG 3: 08/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. DEPARTMENT OF DEFENSE (DOD)

FC 1-300-09N	(2014; with Change 6, 2021) Navy and Marine Corps Design

1.2 DEFINITIONS AND ABBREVIATIONS

1.2.1 eOMSI Manual

Manual (PDF file) provided by the Contractor that includes, but is not limited to, product information, a facility description with photos, and a list of primary facility systems.

1.2.2 eOMSI Facility Data Workbook (FDW)

A Microsoft Excel file containing required facility information populated by the Contractor.

1.2.3 Systems

The words "system", "systems", and "equipment", when used in this document refer to as-built systems and equipment.

1.2.4 Computer Assisted Design and Drafting (CADD)

Electronic Computer Assisted Design and Drafting graphic software program that is used to create facility design contract documents and Record Drawings.

1.2.5 KTR

An abbreviation for "Contractor."

1.3 eOMSI MEETINGS

1.3.1 Pre-Construction Meeting

Be prepared to discuss the following during this meeting:

a. eOMSI Manual and eOMSI Facility Data Workbook Coordination Meeting

b. Processes and methods of gathering eOMSI Manual and eOMSI Facility Data Workbook information during construction.

c. The eOMSI Submittals schedule. Include the eOMSI submittal schedule

on the Baseline Network Analysis Schedule (NAS) in accordance with Section 01 32 17.00 20 COST-LOADED NETWORK ANALYSIS SCHEDULE (NAS).

d. Electronic eOMSI Facility Data Workbook file for Contractor's use and completion.

1.3.2 eOMSI Manual and Facility Data Workbook Coordination Meeting

Facilitate a meeting after the Pre-Construction Meeting prior to the submission of the eOMSI Progress Submittal. Meeting attendance must include the Contractor's eOMSI Manual and Facility Data Workbook Preparer, and Quality Control Manager, the Commissioning Authority (CxA), and the Government's Design Manager (DM), Contracting Officer's Representative, and NAVFAC Public Works (PW) Facilities Management Division (FMD). Include any Mechanical, Electrical, and Fire Protection Sub-Contractors.

The purpose of this meeting is to reach a mutual understanding of the scope of work concerning the contract requirements for eOMSI and coordinate the efforts necessary by both the Government and Contractor to ensure an accurate collection, preparation and timely Government review of eOMSI.

1.3.3 Facility Turnover Meeting

Include eOMSI in NAVFAC Red Zone (NRZ) facility turnover meetings as specified in Section 01 30 00, ADMINISTRATIVE REQUIREMENTS.

1.4 SUBMITTAL SCHEDULING

1.4.1 eOMSI, Progress Submittal

Submit the Progress submittal when construction is approximately 50 percent complete, to the Contracting Officer for approval. Provide eOMSI Manual Files (Bookmarked PDF) and eOMSI Facility Data Workbook (Excel). Include the elements and portions of system construction completed up to this point.

The purpose of this submittal is to verify progress is in accordance with contract requirements as discussed during the eOMSI Manual Coordination Meeting. Field verify a portion of the eOMSI information in accordance with paragraph FIELD VERIFICATION.

1.4.2 eOMSI, Prefinal Submittal

Submit the 100 percent submittal of the eOMSI Prefinal Submittal to the Contracting Officer for approval within 90 calendar days of the Beneficial Occupancy Date (BOD). This submittal must provide a complete, working document that can be used to operate and maintain the facility. Any portion of the submittal that is incomplete or inaccurate requires the entire submittal to be returned for correction. Any discrepancies discovered during the Government's review of eOMSI Progress submittal must be corrected prior to the Prefinal submission.

The eOMSI Prefinal Submittal must include eOMSI Manual Files (Bookmarked PDF) and eOMSI Facility Data Workbook (Excel).

1.4.3 eOMSI, Final Submittal

Submit completed eOMSI Manual Files (Bookmarked PDF) and eOMSI Facility

Data Workbook (Excel). The Final submittal is due at BOD. Any discrepancies discovered during the Government's review of the Prefinal eOMSI submittal, including the Field Verification, must be corrected prior to the Final eOMSI submission.

1.5 UNITS OF MEASURE

Provide eOMSI utilizing the units of measure used in the Government generated contract documents.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

eOMSI, Progress Submittal; G

eOMSI, Prefinal Submittal; G

eOMSI, Final Submittal; G

PART 2 PRODUCTS

2.1 eOMSI FILES FORMAT

Format eOMSI manuals and files in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Include a complete electronically linked operation and maintenance directory. Provide four electronic copies of the eOMSI Manuals to the Contracting Officer for approval.

Provide eOMSI Facility Data Workbook on compact disks (CD) or data digital versatile disk (DVD) disks in (EXCEL) format. Scan eOMSI Manual Files and eOMSI Facility Data Workbook for viruses, malware, and spyware using a commercially available scanning program that is routinely updated to identify and remove current virus threats.

2.1.1 eOMSI Manual Organization

Organize the eOMSI Manuals into two parts: 1) Product and Drawing Information, and 2) Facility Information. Bookmark the PDF files for easy access to the information.

a. Bookmark Product and Drawing Information documents in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

b. Bookmark Facility Information to at least one level lower than the major system.

2.1.2 eOMSI Manual CD or DVD Disk Label and Disk Holder or Case

Provide disks in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

2.2 eOMSI MANUAL

2.2.1 Product and Drawing Information

Provide an organized record of the facility products, materials, equipment, and testing submittals, and the minimum information necessary to operate the facility. Provide Product and Drawing Information for the systems of the final constructed facility.

2.2.1.1 O&M Data

As a minimum, provide the approved O&M Data, submitted in the technical specification sections, in accordance with paragraph TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES in Section 01 78 23 OPERATION AND MAINTENANCE DATA.

2.2.1.2 Record Drawings

Provide an electronic, PDF copy of the Record Drawings, prepared in accordance with FC 1-300-09N and 01 78 00 CLOSEOUT SUBMITTALS. Bookmark drawings using the sheet title and sheet number.

Include Record Drawings as part of the Red-Zone specified in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS.

2.2.1.3 Utility Record Drawings

Using Record Source Drawings, show and document details of the actual installation of the utility systems; annotate and highlight the eOMSI information. Provide Utility Record Drawings in PDF format. Provide the following drawings at a large enough scale to differentiate designated isolation units from surrounding valves and switches.

a. Utility Schematic Diagrams - Provide a one line schematic diagram for each utility system such as power, water, wastewater, and gas/fuel. Schematic diagram must show from the point where the utility line is connected to the mainline up to the five-foot connection point to the facility. Indicate location or area designation for route of transmission or distribution lines; locations of duct banks, manholes/ handholes or poles; isolation units such as valves and switches; and utility facilities such as pump stations, lift stations, and substations.

b. Enlarged Connection and Cutoff Plans - Provide enlarged floor plans that provide information between the five foot utility connection point and where utilities connect to facility distribution. Enlarge floor plans/ elevations of the rooms where the utility enters the building and indicate on these plans locations of the main interior and exterior connection and cutoff points for the utilities. Also enlarge floor plans / elevations of the rooms where equipment is located. Include enough information to enable someone unfamiliar with the facility to locate the connection and cutoff points. Indicate designations such as room number, panel number, circuit breaker, or valve number, of each utility and equipment connection and cutoff point, and what that connection and cutoff point controls.

2.2.2 Facility Information

Provide the following in Facility Information:

2.2.2.1 General Facility and System Description

Describe the function of the facility. Detail the overall dimensions of the facility, number of floors, foundation type, expected number of occupants, and facility Category Code. List and generally describe all the facility systems and any special building features (for example, HVAC Controls, Sprinkler Systems, Cranes, Elevators, and Generators). Include photographs marked up and labeled to show key operating components and the overall facility appearance.

2.2.2.2 Floor Plans

Provide uncluttered, legible 11 by 17 inches floor plans. Include room numbers, type or function of spaces, and overall facility dimensions on the floor plans. Do not include items such as construction instructions, references, or frame numbers.

2.2.2.3 Floor Coverings, Wall Surfaces, and Ceiling Surfaces

Provide a table that lists by room number (including hallways and common spaces), the type, and area of finish, manufacturer's product name, identifying number, and color. Include a facility summary of the total area for each type of space and floor, wall, or ceiling finish in the table.

2.2.2.4 Windows

Provide a table that lists by room number (including hallways and common spaces), the type of window, window size, number of each size and type, special features, manufacturer's product name, identifying number, and color. The table must include a facility summary of the total number for each type and size of window.

2.2.2.5 Roofing

Provide the total area of each type of roof surface and system. Provide the name of the roofing product and system; manufacturer's, supplier's, and installer's names, addresses, and phone numbers; manufacturer's product name, identifying number, and color. For each type of roof, provide a recommended inspection, maintenance and repair schedule that details checkpoints, frequencies, and prohibited practices. List roof structural load limits.

2.2.2.6 HVAC Filters

Provide a table that lists the quantity, type, size, and location of each HVAC filter, manufacturer's product name, and identifying number.

2.2.2.7 Plumbing Fixtures

Provide a table that lists by room number, the number and type of plumbing and bathroom plumbing fixtures (for example, sinks, water closets, urinals, showers and drinking fountains).

2.2.2.8 Lighting Fixtures

Provide a table that lists by room number (including hallways and common spaces), the type of lighting fixture, ballast, number of lighting

fixtures, type of lamps and number of lamps, and the manufacturer's product name and the identifying number. The table must include a facility summary of the total number of fixtures of each type and number of lamps of each type.

2.2.2.9 Equipment Listing

Provide a table that lists the major equipment shown on the design equipment schedules. Show the item descriptions, locations, model numbers; and the names, addresses, and telephone numbers of the manufacturers, suppliers, contractors, and subcontractors.

2.2.2.10 System Flow Diagrams

Provide a flow diagram indicating system liquid, air or gas flow during normal operations. Integrate the system components into the diagram. A compilation of non-integrated, flow diagrams for the individual system components are not acceptable.

2.2.2.11 Valve List

Provide a list of all valves associated with the system. Show valve type, identification number, function, location and normal operating position.

2.2.2.12 Riser Diagrams

Provide riser diagrams and settings of equipment.

2.3 eOMSI FACILITY DATA WORKBOOK

An initial, pre-edited draft of the Model & Facility Data Matrix tab within the eOMSI Facility Data Workbook is attached to this section. The Government will provide this eOMSI Facility Data Workbook electronically to the Contractor upon award. Add, delete, and update Mastersystems, Systems, and Subsystems that may have changed during construction, or any items that may have been omitted or missed during design, at no additional cost to the Government. Complete the KTR Facility Data File tab based on the selection of Mastersystems, Systems, and Subsystems installed. The following tabs are included in the eOMSI Facility Data File Workbook and serve the purpose stated:

a. Instructions Tab: Instructions for completing Model & Facility Data Matrix Tab and KTR Facility Data File Tab. If a discrepancy exists between what is required in this section and the Workbook, the instructions within the workbook take precedence.

b. Model & Facility Data Matrix Tab: - The Matrix lists Required Facility Asset Fields for each SYSTEM and SUBSYSTEM. The Designer of Record selects SYSTEMS and SUBSYSTEMS that are within the project scope, which the Contractor needs to include and populate in KTR Facility Data File tab. The "Required Facility Asset Field Position Numbers," one through thirty-five, are pre-populated, and are not editable.

c. Required Facility Asset Fields Tab: Defines the 35 Required Facility Asset Field Position Numbers used in Model and Facility Data Matrix and KTR Facility Data File tabs.

d. KTR Sample Facility Data File Tab: Sample KTR eOMSI facility data file. This tab provides an example of the mandatory fields of

equipment installed by the Contractor, and populated in the KTR eOMSI Facility Data File Tab, along with their descriptions.

e. KTR Facility Data File Tab: Required eOMSI facility data file deliverable provided to the Government. Provide a separate and unique new row for each facility component or piece of equipment installed. Coordinate with the Government's Contracting Officer's Representative and NAVFAC PW FMD for specific facility component naming convention.

PART 3 EXECUTION

3.1 FIELD VERIFICATION

Field verify eOMSI Facility Data Workbook information with Contractor and Government personnel. Include the following personnel in this meeting: Contractor's eOMSI Manual and Facility Data Workbook Preparer and Quality Control Manager, Commissioning Authority, and the Government's Contracting Officer's Representative and NAVFAC PW FMD. Request, and provide, an eOMSI Field Verification Meeting no sooner than 14 calendar days after submission of the Progress eOMSI submittal, and another, no sooner than 14 calendar days after submission of the Prefinal eOMSI submittal. During this meeting, the Government and Contractor will verify that the eOMSI Facility Data Workbook is complete and accurate.

Field verify that at least 5 Subsystems under each of the Mastersystems are accurate, for a total of 25 Subsystems. For each of these items, verify that the required facility asset field, as defined in the "Model & Facility Data Matrix" tab, contains the specified data and it is accurate (i.e. item description, manufacturer, model no., serial no.). 100 percent accuracy of eOMSI information is required for successful field verification. If data discrepancies are discovered amongst the 25 Subsystems verified, resubmit an updated eOMSI FDW, and request a make-up field verification meeting. At the make-up field verification meeting 25 new Subsystems and their associated required facility asset fields will be field verified; the 25 new Subsystems must be 100 percent accurate. Any discrepancies discovered must be corrected prior to next eOMSI Facility Data Workbook Submittal.

(1) D10 - CONVEYING
(2) D20 - PLUMBING
(3) D30 - HVAC
(4) D40 - FIRE PROTECTION
(5) D50 - ELECTRICAL

3.2 eOMSI TRAINING

Provide training on eOMSI Manuals and Facility Data Workbook in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

-- End of Section --

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SECTION 01 78 30.00 22

GIS DATA DELIVERABLES

01/23

PART 1 GENERAL

1.1 OBJECTIVE

The primary objective of this section is to provide detailed specifications for collection and delivery of geospatial data commonly referred to as Geographic Information System (GIS) data. Ensure that all GIS data delivered is compatible with the NAVFAC Midlant GeoReadiness Center (GRC) Installation Geospatial Information and Services (IGI&S) Geodatabase.

1.1.1 Point of contact for NAVFAC MIDLANT GRC

The Point of Contact (POC) for assistance in preparation of GIS deliverables is:

Midlant GRC Manager
9742 Maryland Avenue
Bldg Z140
Naval Station Norfolk
Norfolk, VA 23511
(757) 341-0270 (Main Number)

Midlant GRC Senior Project Manager
9742 Maryland Avenue
Bldg Z140
Naval Station Norfolk
Norfolk, VA 23511
(757) 341-0273 (Main Number)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Technical Approach Document; G

SD-05 Design Data

Preliminary Gis Deliverable; G

SD-11 Closeout Submittals

GIS Data Deliverables; G

1.3 GOVERNMENT GEOSPATIAL DATA, SCHEMA, AND DOMAINS

Geo-spatial data is based on the Spatial Data Standards for Facilities,

Infrastructure and Environment (SDSFIE). Because there are recurring business driven modifications and or adaptations within the SDSFIE schema, provide all spatial and non-spatial data in the most current version utilized at the time of delivery.

1.3.1 Data Request Package Requirements

a. Submit the GIS Data Release Form prior to the start of data collection efforts and again 4 weeks prior to data delivery to ensure that GIS data has been created and will be delivered utilizing the most up to date SDSFIE schema.

1.3.1.1 Instruction for submitting a Geospatial DRP to the Contracting Officer

a. The Contracting Officer will provide NAVFAC MIDLANT Data Release forms upon request from the Contractor. Complete the request and include all information as instructed on the .

b. Request only GIS data, schema and domains for feature classes that are relevant to the Contract and within the boundary of project area and provide justifications as necessary.

c. Attach the Scope of Work, which is defined by this GIS DATA DELIVERABLES section for each GIS Data Request submittal.

d. Return the NAVFAC MIDLANT Data Release Form to the Contracting Officer for sponsorship and submittal to the GRC as instructed with required attachments and justifications for submittal.

e. Incomplete forms may delay receipt of the requested GIS data.

1.3.2 Data Collection and Utility Locations

a. Utilize the most up to date SDSFIE Schema when delivering GIS Data.

b. Prior to GPS efforts, locate all underground utilities utilizing a utility locating service in order to obtain and verify accurate feature locations.

c. Actual conditions in the field always supersede drawings. Locate and field verify all features to ensure location is correctly recorded.

d. Create data to represent the real world. For example, show water, sewer, and transportation systems connected. Create all segments from source to sink in the direction of flow.

e. Research may be required to collect data. Coordinate verification of existing data with the Contracting Officer.g. Collect utility data utilizing Survey Grade GPS data collection methods.

1.3.3 Attribute Data Requirements

a. Populate all attributes in accordance with . Obtain attributes via Contract specifications, plans and record drawings.

b. Capture, attribute, and deliver Demolished / Removed Real Property

data in the Demolished feature classes which include, BuildingDemolished (Area) and StructureDemolished (Area).

c. Capture, attribute, and deliver Demolished / Removed UTILITY data by creating a new feature class which consists of adding DEMO to the feature's naming convention for each feature, such as, but not limited to the following examples; DEMO.wHydrant (point), DEMO.swDrainageBasin,(polygon), and DEMO.wLine (polyline)

    1. Properly deliver demolished features with the current attributes associated with the feature and additionally updating the new Contract number, date of demolishment, and optional status.

d. Spatial and non-spatial data may be copied from existing data, with the exception of specific attributes. Potable water wells are an exception to this rule. Maintain potable water wells in the feature class and attributed as Removed or AIP.

e. Locate and update Abandoned In Place (AIP) utility lines in the current feature data set and attribute as AIP as required.

1.3.4 GIS Topology Rules for Geospatial Data

Create all data using GIS topology rules for polygons, points and lines, such as, but not limited to, the following:

a. Create utility and transportation systems from source to sink.

b. Draw all utilities in the direction of flow with no breaks in polyline except for fittings, manholes and other features nodes within the feature Dataset.

c. Create all utility or infrastructure system data, using GIS spatial connectivity rules which specify that vertex, edge and endpoints be snapped to features within the system. Utility or infrastructure system data include, but not limited to, transportation system and electrical, water, thermal distribution, and wastewater collection.

d. Close all polygons without slivers. All polygons must be topologically correct.

e. All polylines must be topologically correct. Connecte all polylines to avoid undershoots, overshoots and dangles. Cross polylines only if they share a point in common, at least one of which is not an endpoint.

1.3.5 Global Positioning System (GPS) Data Collection

Utilize field survey GPS data collected by means of non-recreational GPS equipment
Navy Geodetic Survey Base Station Network GPS data collection.

b. Mission planning is essential. Utilize the best Position Dilution of Precision (PDOP) values for data accuracy.

c. Conduct mission planning for GPS collection when positional dilution of precision (PDOP) value is 4 or less.

d. Spatial accuracy requirements

1. Survey and Sub-Foot GPS grade data collection requirements are as follows:

   i. Sub-Foot requirements:

      1) All points must be within plus or minus 12 inches

      2) 95 percent accuracy rate for all points.

   ii. Survey Grade requirements:

      1) All points must be within plus or minus 1 centimeter

      2) 98 percent accuracy rate for all points

e. Capture feature locations without using Offsets. Note all Offsets in the Final Report for each feature.

   1. Resubmittal of data will be required if PDOP planning was not observed per this section.

1.3.6 Coordinate System Requirements

Collect data in the following Spatial Reference / Coordinate System for each feature based on the area of interest:

1. Transverse Mercator (UTM) Zone 16N, 17N, 18N or 19N

   a. World Geodetic System 1984 (WGS84) horizontal datum

   b. North American Vertical Datum 1988 (NAVD88) vertical datum.

2. Domain precision of 1000 which will result in a database accuracy of 1/1000 m

1.4 GIS DELIVERABLES

1.4.1 GIS Deliverable Submittal Requirements

Submit all GIS Submittals for analysis by Government GIS personnel prior to final approval.

a. Prior to any spatial and non-spatial development, provide the Government with a technical approach document for review and approval. Describe in detail the Contractor's technical approach for developing GIS data to include utility locating, collecting, and attributing all GIS data.

b. Provide a GIS deliverable at the end of each phase and at each Beneficial Occupancy Date (BOD) when contracted efforts, studies or construction are delivered in phases.

c. To ensure specifications compliance and quality, provide a preliminary GIS deliverable for review when 25 percent of the data has been collected and updated.

d. Deliver digital geographic maps, GPS collection files and related data. Include all working text and documents and personal geodatabase for review in the preliminary and final delivery of data.

e. Do not deliver blank unused schema or feature class data with no attributes. Deliver only data pertinent to the Contract that adds value to the Geodatabase per this section.

f. Do not include existing data in the GIS deliverable.

g. Provide spatial and non-spatial GIS data in a format that does not require translation or pre/post processing.

h. Perform quality assurance for all data and related materials required in this section prior to submitting product to the Government.

i. Analyze data for discrepancies in subject content, correct format in accordance with this Section, and compatibility with the existing SDSFIE Schema as well as all other requirements included in this section.

1.4.2 GIS Deliverable Package Requirements

Submit one hard copy and one electronic copy. Submit each GIS deliverable containing the following information and in the most up to date SDSFIE format utilized by the GRC at the time of delivery.

a. Digital and Paper Maps.

1. Submit all maps of GIS DATA DELIVERABLES in ANSI C size.

2. Include a project title, Contract number, scale, legend, standard symbology, attributes, i.e., building numbers, road names, etc., for each map.

3. Label all utilities with direction of flow and segment line size.

4. Provide a copy of all red-line construction drawings.

5. Provide communication data on a separate map.

b. Provide all spatial and non-spatial data for review and acceptance.

c. Provide a report of specific procedures, list GPS equipment, software and versions that were utilized for the GPS data collection and creation of geospatial data.

d. Submit all GPS data files collected in the field.

e. Provide details on any offsets to include justification as to why offsets were utilized and which features and or points offsets were used.

f. Provide the source that was utilized for required attributes, such as redline drawings and or field notes.

g. Provide a coversheet that specifies the Contracting Officer, Contract number, Contract title, point of contact for GIS related questions.

h. Submit all geospatial data, reports, spreadsheet, database files, reports, and maps on a Digital Versatile Disc (DVD) platform.

1.5 GPS REQUIREMENTS AND ATTRIBUTE DATA COLLECTION

Contact the Contracting Officer for Attributes and Data Collection for real property and other miscellaneous features that are not considered a utility for a specific Navy installation. Consult the NAVFAC MIDLANT GRC Manager, for a checklist and copy of the most recent Data Dictionary.

1.6 OWNERSHIP

All digital files, hardcopy products, GPS raw data, source data acquired for this project, and related materials, including that furnished by the Government, will become the property of the Government and will not be issued, posted, distributed, or published by the Contractor.

1.7 NON-COMPLIANCE

a. Failure to comply with the requirements of this Section will result in non-acceptance of data deliverables.

b. Delivery of Geospatial (GIS) data does not replace record drawing requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION 01 91 00.15 22

TOTAL BUILDING COMMISSIONING
03/23

PART 1 GENERAL

1.1 SUMMARY

The Government has hired an independent Commissioning Firm.

This Section specifies the scope of work for the entire Commissioning Team which includes the scope of work for the Lead Commissioning Specialist, Commissioning Specialists, Designers of Record, Installing Contractors, and Equipment Suppliers. Refer to paragraph COMMISSIONING TEAM for descriptions of Commissioning Team members and assigned responsibilities.

1.2 COMMISSIONING LIMITATIONS

Commissioning Requirements specified in this Section are prohibited from fulfilling requirements specified in other Sections. Requirements specified in other Sections are prohibited from fulfilling requirements specified in this Section.

1.3 SYSTEMS TO BE COMMISSIONED

Commissioning must be performed for equipment, systems, and assemblies listed under each systems category in the following paragraphs whether or not listed equipment, system, or assembly is required to be commissioned by any reference related to Sustainability TPC.

Specified equipment, system, and assembly counts are totals that include all commissioned buildings and all construction phases in this project. Refer to items entitled "Sample Strategy" throughout this Section that must be applied to these counts.

1.3.1 Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category

a. Primary Systems.

(1) Up to one Energy Management and Control system.

b. Air Handling Systems.

(1) One dedicated outside air systems (DOAS)featuring a variable-air-volume supply air fan, a variable-air-volume exhaust air fan, air-to-air heat transfer, hot gas reheat coil, air-side energy recovery, and packaged controls.

(2) Up to 7 heatpumps each featuring an indoor section with a variable-air-volume supply air fan and auxiliary electric heat strip, air-to-air heat transfer outdoor section, and packaged controls.

(3) Up to two split system air-conditioning units each featuring packaged controls.

c. Terminal Devices.

(1) Up to two unit heaters.

(2) One exhaust air fan.

1.3.2 Plumbing Systems Category

a. One domestic heating hot water system featuring up to two electric water heaters each with packaged controls, up to one recirculating pump, and up to one temperature mixing valve.

1.3.3 Utility Systems Category

a. Up to one set of whole-building energy utility metering systems.

b. Up to one whole-building water utility metering system.

1.3.4 Electrical Type I Systems Category

a. Power - all generator paralleling and loading systems.

b. Power - all generator transfer switches.

c. Power - all grounding systems.

d. Power - all industrial control systems.

e. Power - all main distribution panels.

f. Power - all main transformers.

g. Power - all panelboards.

h. Power - all stationary generator sets.

i. Power - all step-down transformers.

j. Power - all switchgear.

k. Power - all transient voltage surge protective devices.

1.3.5 Electrical Type II Systems Category

a. Lighting - all emergency egress systems, control devices, and control systems.

b. Lighting - all exit systems, control devices, and control systems.

c. Lighting - all exterior systems, control devices, and control systems.

d. Lighting - all interior systems, control devices, and control systems.

1.3.6 Building Envelope Systems, Components, and Assemblies Category

a. All building envelope systems including curtain walls, exterior penetrations, exterior air barrier assemblies, exterior windows, exterior doors, and skylights.

b. All roofing including low sloped roofs and steep sloped roofs.

1.4 COMPLEX SYSTEMS

Complex systems are defined as the following systems categories as listed under paragraph SYSTEMS TO BE COMMISSIONED with appropriate qualifiers and are subject to more stringent requirements as specified in this Section.

a. All equipment, systems, and assemblies listed under item entitled "Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category."

b. All equipment, systems, and assemblies listed under item entitled "Plumbing Systems Category" featuring on-board factory packaged controls such as domestic heating hot water systems, domestic solar heating hot water systems, and service water pressure-booster pump systems. Refer to the following paragraph for definition of equipment featuring on-board factory packaged controls.

c. All equipment, systems, and assemblies listed under item entitled "Utility Systems Category."

Equipment featuring on-board factory packaged controls is defined as equipment that is a complex system as defined in paragraph COMPLEX SYSTEMS which features a controller issuing sophisticated logic-based commands to its internal components to accomplish the intent of Plans and Specifications. This equipment may function as either a stand-alone piece of commissioned equipment or may function as part of a commissioned system. This controller may be equipment mounted or may be remote mounted and may or may not interface with a building control system. Examples of equipment meeting and not meeting this definition are provided in the following paragraphs.

a. Equipment meeting this definition includes chillers, boilers provided with or without master controllers, packaged pumping systems, dedicated outside air systems, packaged rooftop units, computer room air conditioners, and air terminal units.

b. Equipment not meeting this definition includes unitary air-conditioners, packaged terminal air-conditioners, and heat pumps.

c. Equipment not meeting this definition, but requiring demonstration of minimum safe motor speed either prior to or during Functional Performance Testing includes variable frequency drives.

1.5 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 202	(2018) Commissioning Process for Buildings and Systems

GREEN BUILDING INITIATIVE (GBI)

GBI DOD GP Compliance	(2017) GBI Department of Defense Guiding Principles Compliance Program for New

Construction

INTERNATIONAL CODE COUNCIL, INC.

ICC IgCC	(2018) International Green Construction Code

1.6 SUBMITTALS

Commissioning Submittals are not required to be submitted by the Installing Contractor. Exchange of information between the Commissioning Team specified in this Section must still occur.

1.7 COMMISSIONING TEAM

The Commissioning Team is defined as the entity that must perform all Commissioning Activities specified in this Section for systems listed under paragraph SYSTEMS TO BE COMMISSIONED. The Commissioning Team is composed of the Lead Commissioning Specialist, Commissioning Specialists, Designers of Record, Installing Contractors, Equipment Suppliers, and the Contracting Officer's Technical Representative.

1.7.1 Lead Commissioning Specialist

The Lead Commissioning Specialist (CxC) is defined as the entity that must perform all Commissioning Responsibilities assigned in this Section that includes, but is not limited to, coordinating all aspects of the Commissioning Process; managing all Commissioning Specialists; and submitting all Commissioning Plans, schedules, reports, and documentation directly to the Contracting Officer's Technical Representative as modified in this Section.

1.7.2 Commissioning Specialists

Commissioning Specialists are defined as entities that must perform all Commissioning Responsibilities assigned in this Section that includes, but is not limited to, performing reviews, witnessing that all system components have been installed, that each control device operates, that each equipment piece operates, that complete systems operate, and that interactive systems operate in accordance with Plans and Specifications.

Commissioning Specialists must perform assigned responsibilities for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

1.7.3 Designers of Record

Designers of Record are defined as entities that must act as design professionals responsible for design of their respective system that is subject to Commissioning. Designers of Record must perform all Commissioning Responsibilities assigned in this Section.

1.7.4 Installing Contractors

Installing Contractors are defined as the General Contractor's Superintendent or Project Manager; Quality Control Representative; and

Mechanical, Controls, Plumbing, Electrical, Test and Balance, Fire Protection, and Building Envelope Sub-Contractors who provide, install, or construct systems in whole or in part for this contract. The General Contractor must provide a Lead Commissioning Representative to manage all Sub-Contractor Commissioning Representatives and Equipment Suppliers to accomplish all Commissioning Responsibilities assigned in this Section. Each Sub-Contractor must provide a Commissioning Representative to coordinate and perform all Commissioning Responsibilities for commissioned equipment, systems, and assemblies provided as part of their respective contract as directed by the General Contractor. Submission of Commissioning related certifications or qualifications for the Lead Commissioning Representative and Installing Contractor Representatives is not required.

Installing Contractors must perform all Commissioning Responsibilities assigned in this Section that includes, but is not limited to, demonstrating performance of all commissioned equipment, systems, and assemblies provided as part of their respective contract and must provide all necessary materials, services, and labor required for successful demonstration as modified in this Section.

1.7.5 Equipment Suppliers

Equipment Suppliers (ES) are defined as factory authorized start-up technicians or factory representatives knowledgeable with start-up, demonstration, and testing of commissioned equipment featuring on-board factory packaged controls provided as part of their respective contract. Each Equipment Supplier must coordinate and perform all Commissioning Responsibilities assigned in this Section as directed by the General Contractor. Submission of Commissioning related certifications or qualifications for Equipment Suppliers is not required. Refer to paragraph COMPLEX SYSTEMS for definition of equipment featuring on-board factory packaged controls's.

Equipment Suppliers must perform all Commissioning Responsibilities assigned in this Section that includes, but is not limited to, demonstrating performance of all commissioned equipment provided as part of their respective contract and must provide all necessary materials, services, and labor required for successful demonstration of all commissioned equipment provided as part of their respective contract as modified in this Section.

1.7.6 Installing Contractors and Equipment Suppliers Coordination

Installing Contractors and Equipment Suppliers must coordinate and share demonstration and testing responsibilities specified in this Section for commissioned equipment featuring on-board factory packaged controls. Installing Contractors and Equipment Suppliers must simultaneously perform all aspects of demonstration and testing for these types of systems. Refer to paragraph COMPLEX SYSTEMS for definition of equipment featuring on-board factory packaged controls.

1.7.7 Contracting Officer's Technical Representative

The Contracting Officer's Technical Representative (COTR) represents the Government for all elements of the Commissioning Process. The COTR will serve as the single point of contact with the Lead Commissioning Specialist, will receive all Commissioning Submittals, may attend meetings, and may, but is not required to, witness field inspections and

testing specified in this Section.

1.8 COMMUNICATIONS

1.8.1 Communications with the Contracting Officer's Technical Representative

Communication with the Contracting Officer's Technical Representative must be through the Lead Commissioning Specialist who acts as the single direct point of contact for all aspects of the Commissioning Process.

1.8.2 Communications between the Commissioning Team

Communications between the Commissioning Team including, but not limited to, verbal communications, schedule information, and exchange of information specified in this Section, must occur directly between the Commissioning Team without requiring interaction of the Contracting Officer's Technical Representative.

1.9 NUMBER OF BUILDINGS AND CONSTRUCTION PHASING

1.9.1 Number Of Buildings

This project includes one commissioned building.

a. Commissioning Design Reviews specified in this section must be performed as a single review for each submission inclusive of all commissioned buildings in this project. Refer to item entitled "Commissioning Design Reviews" for additional requirements.

b. Construction Phase Site Observations specified in this Section are inclusive of all commissioned buildings in this project. Refer to item entitled "Construction Phase Site Observations" for additional requirements.

c. Construction Phase Functional Performance Testing must be performed during a single continuous occurrence inclusive of all commissioned buildings for each systems category until completion of testing of all systems listed under respective systems category. Refer to item entitled "Construction Phase Functional Performance Testing" for additional requirements.

d. Post-Construction Phase Site Observations specified are inclusive of all commissioned buildings in this project. Refer to item entitled "Post-Construction Phase Site Observations" for additional requirements.

1.9.2 Construction Phasing

This project's construction is not phased.

1.10 INTERNATIONAL GREEN CONSTRUCTION CODE COMMISSIONING COMPLIANCE

International Green Construction Code (IgCC) Commissioning compliance is required for this project.

1.10.1 General Requirements

All Commissioning Activities listed in ICC IgCC paragraphs 1001.1 through

1001.3.1.3.6, ICC IgCC Informative Appendix I, and ASHRAE 202 as modified in this Section, Commissioning Activities listed in references contained in ICC IgCC's paragraphs and ASHRAE 202 as modified in this Section, and Commissioning Activities specified in this Section must be performed. All Commissioning Activities that are referred to as "optional activities," "guidance," "should activities," "recommendations," "suggested practices," "informative information," or listed as similar designations are mandatory regardless of any qualifiers.

1.10.2 Commissioning Team Responsibilities

The Commissioning Team must, at a minimum, perform all Commissioning Activities specified in the preceding item entitled "General Requirements" and must perform all Commissioning Activities specified in this Section. This Section takes precedence should there be a conflict between requirements listed in this Section and requirements listed in the ICC IgCC, listed in ASHRAE 202, or listed in any of their references.

1.11 SUSTAINABILITY THIRD PARTY CERTIFICATION (TPC) COMMISSIONING COMPLIANCE

Sustainability Third Party Certification (TPC) is required for this project.

1.11.1 General Requirements

All Commissioning Activities listed in all references for pursuing Sustainability TPC as modified in this Section and Commissioning Activities specified in this Section must be performed. All Commissioning Activities that are referred to as "optional activities," "guidance," "should activities," "recommendations," "suggested practices," "informative information," or listed as similar designations are mandatory regardless of any qualifiers and whether or not activity is included as total points toward Sustainability TPC.

1.11.2 Commissioning Team Responsibilities

The Commissioning Team must, at a minimum, perform all Commissioning Activities specified in the preceding item entitled "General Requirements," perform Commissioning Activities listed in the reference for pursuing Sustainability TPC, GBI DOD GP Compliance, as modified in this Section, perform Commissioning Activities listed in all of its references as modified in this Section, and perform Commissioning Activities specified in this Section. This Section takes precedence should there be a conflict between requirements listed in this Section and requirements listed in the reference for pursuing Sustainability TPC or listed in any of its references.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 DESIGN PHASE

3.1.1 Design Phase International Green Construction Code Commissioning Compliance

3.1.1.1 General Requirements

Activities must include, but not be limited to, Design Phase Commissioning Activities listed in ICC IgCC paragraphs 1001.1 through 1001.3.1.3.6, ICC IgCC Informative Appendix I, and ASHRAE 202 as modified in this Section, Design Phase Commissioning Activities listed in references contained in ICC IgCC's paragraphs and ASHRAE 202 as modified in this Section, and Design Phase Commissioning Activities specified in this Section.

3.1.1.2 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

The Lead Commissioning Specialist and Commissioning Specialists must, at a minimum, perform all activities specified under item entitled "Design Phase International Green Construction Code Commissioning Compliance."

3.1.2 Design Phase Sustainability Third Party Certification (TPC) Commissioning Compliance

3.1.2.1 General Requirements

Activities must include, but not be limited to, Design Phase Commissioning Activities listed in the reference for pursuing Sustainability TPC, GBI DOD GP Compliance, as modified in this Section, Design Phase Commissioning Activities listed in all of its references as modified in this Section, and Design Phase Commissioning Activities specified in this Section.

3.1.2.2 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

The Lead Commissioning Specialist and Commissioning Specialists must, at a minimum, perform activities specified in the following paragraphs.

a. The Lead Commissioning Specialist must submit all Design Phase documentation of Commissioning Activities directly to the Suitability TPC organization as modified in this Section.

b. The Lead Commissioning Specialist and Commissioning Specialists must perform all activities specified under item entitled "Design Phase Sustainability Third Party Certification (TPC)."

3.1.3 Design Phase Commissioning Coordination Meeting

3.1.3.1 General Requirements

A Design Phase Commissioning Coordination meeting must be conducted no later than 30 calendar days prior to the first Plans and Specifications submission or no later than 30 calendar days after approval of Commissioning Firm certifications and all Commissioning Specialist certifications, whichever occurs last. Meeting topics must include, but

not be limited to, the Commissioning Process, contract requirements, lines of communication, roles and responsibilities, schedules, documentation requirements, and logistics as specified in this Section. Meeting must be conducted by conference call.

3.1.3.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, conduct meeting and prepare meeting minutes complete with Attendance Roster.

3.1.3.3 Designers of Record and Others Responsibilities

Designers of Record attend this meeting. The Contracting Officer's Technical Representative, a User Representative, and a Public Works Department Representative may also attend this meeting.

3.1.4 Design Phase Commissioning Plan

3.1.4.1 General Requirements

The Design Phase Commissioning Plan must be prepared specific to this construction and contents must include, but not be limited to, contents specified in the following paragraphs.

a. Plan purpose.

b. Overview of Commissioning Activities.

c. Commissioning scope.

d. Commissioning Process outline.

e. Detailed description of Commissioning Activities.

f. List of all commissioned equipment, systems, and assemblies.

g. Description of performance criteria.

h. Building information.

i. Contact information for the Lead Commissioning Specialist, Commissioning Specialists, Designers of Record, and Contracting Officer's Technical Representative.

j. Criteria listing including Unified Facilities Criteria and Building Codes and Standards.

k. Description of Commissioning Team members.

l. Roles and responsibilities.

m. Lines of communication.

n. Documentation requirements.

o. Description of Commissioning Plan distribution during the Design Phase and Construction Phase.

p. Description of Issues and Resolution Logs distribution during the

Design Phase and Construction Phase.

q. Description of Commissioning testing document distribution during the Design Phase and Construction Phase.

r. Description of Commissioning report distribution during the Design Phase and Construction Phase.

s. Owner's Project Requirements.

t. Description of the Basis of Design.

u. Description of Plans and Specifications reviews performed by Commissioning Specialists.

v. Description of Plans and Specifications reviews performed by the Contracting Officer's Technical Representative.

w. Examples and descriptions of Site Observation Reports and Issues And Resolution Log.

x. Listing and description of Design Phase and Construction Phase Commissioning meetings.

y. Identification of Commissioning Activities for incorporation into the Project Construction Schedule.

z. Listing of submittals required by Commissioning Specialists.

aa. Examples and description of the development of Pre-Functional Checklists and Functional Performance Test Checklists.

bb. Description of Pre-Functional Checks and Functional Performance Testing complete with sample strategies.

ff. Description of Ductwork Air Leak Test (DALT) field acceptance testing specified in Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS.

gg. Description of Performance Verification Test (PVT) field acceptance testing specified in Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS.

hh. Description of Test and Balance (TAB) field acceptance testing specified in Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS.

ii. Identification of intervals at which a summary of Functional Performance Testing results will be provided to the Contracting Officer's Technical Representative for concurrence or acceptance.

jj. Listing of Operation and Maintenance Manual requirements.

kk. Description of Systems Manuals.

ll. Description of training requirements.

mm. Description of Final Commissioning Report.

3.1.4.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, prepare and submit the Design Phase Commissioning Plan no later than 45 calendar days after approval of Commissioning Specialists certifications.

File one copy of Approved Design Phase Commissioning Plan in the Sustainability eNotebook no later than 14 calendar days after receiving approval of the Design Phase Commissioning Plan.

3.1.5 Design Phase Issues And Resolution Log

3.1.5.1 General Requirements

The Design Phase Issues and Resolution Log must be prepared and maintained to track all Commissioning Issues identified by any member of the Commissioning Team. The Design Phase Issues and Resolution Log must be prepared in an electronic format that can be used throughout the Design Phase such that it can be provided to the Government upon request. Design Phase Issues and Resolution Log contents must include, but not be limited to, contents specified in the following paragraphs.

a. Project title and location.

b. Lead Commissioning Specialist's contact information.

c. Issue number.

d. Date issue was discovered.

e. Name of Commissioning Team member identifying the issue.

f. Commissioning Team member responsible for resolving the issue.

g. Current status.

h. Issue description.

i. Pictures of item if available and appropriate.

j. Effects of issue on project or building operation.

k. Possible cause of issue.

l. Proposed resolution.

m. Final resolution and final resolution date.

n. Approvals of issue resolution, including approver's name.

3.1.5.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must prepare and maintain the Design Phase Issues And Resolution Log and must submit one electronic copy no later than seven calendar days after the addition of an issue or a change in status of an issue.

3.1.6 Commissioning Design Reviews

3.1.6.1 General Requirements

Commissioning Design Reviews must be performed using Government provided software in accordance with the ICC IgCC and reference for pursuing Sustainability TPC and must include, but not be limited to, review of each submission of the Owner's Project Requirements (OPR), Basis of Design (BOD), and Plans and Specifications specified in the following paragraphs, except for the last submission. Each review must include back-checks of deficiencies identified in preceding reviews. The last submission must include a review of the OPR, BOD, and back-check of deficiencies identified in preceding reviews, but not a complete Commissioning Design Review.

a. First submission: 35-Percent Documents.

b. Second submission: 65-Percent Documents.

c. Third submission: Pre-Final Documents.

d. Fourth submission: Final Documents.

Commissioning Design Reviews must assess completeness and clarity of the OPR, verify requirements stated in the OPR are addressed in the BOD, and verify Commissioning Aspects of the Plans and Specifications including preparation in accordance with the OPR and BOD. The OPR and BOD are for reference only and do not constitute part of this contract. Commissioning Design Reviews must identify deficiencies of commissioned equipment, systems, and assemblies that include, but not be limited to, deficiencies related to the following paragraphs as applicable to this project.

a. Adverse impacts on proper operation and maintenance.

b. Adequate accessibility for proper testing.

c. Proper specification of performance and testing criteria.

d. Proper specification of relevant control sensor and control device locations.

e. Completely, clearly, and correctly developed control sequences.

3.1.6.2 Commissioning Design Review Reports

A Commissioning Design Review Report must be prepared for each Commissioning Design Review. Each deficiency must be listed individually and must be separated into categories corresponding to systems categories listed under paragraph SYSTEMS TO BE COMMISSIONED. Commissioning Design Review Report contents must include, but not be limited to, contents specified in the following paragraphs.

a. Project title, project number, and date of review.

b. Executive summary.

c. List of Plans and Specifications reviewed.

d. Deficiency location.

e. Clear description of deficiencies complete with proposed corrective actions.

f. Relevant observations from similar applications.

g. Clarifying questions related to constructability and maintainability if necessary.

Updated Commissioning Design Review Reports must be prepared to include resolution of outstanding issues reached during Commissioning Design Review meetings.

3.1.6.3 Commissioning Design Review Meetings

A Commissioning Design Review meeting must be conducted no later than 14 calendar days after preparation of each Commissioning Design Review Report to discuss proposed corrective actions and to resolve outstanding issues. The Contracting Officer's Technical Representative may attend these meetings. Meeting must be conducted by conference call.

3.1.6.4 Lead Commissioning Specialist Responsibilities

Lead Commissioning Specialist activities must include, but not be limited to, activities specified in the following paragraphs.

a. Prepare and provide Commissioning Design Review Reports to Designers of Record.

b. Conduct Commissioning Design Review meetings.

c. Update Commissioning Design Review Reports.

d. Prepare and submit Updated Commissioning Design Review Reports no later than 14 calendar days after each Commissioning Design Review meeting.

3.1.6.5 Commissioning Specialists Responsibilities

Commissioning Specialists activities must include, but not be limited to, performing Commissioning Design Reviews and attending Commissioning Design Review meetings for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.1.6.6 Designers of Record Responsibilities

Designers of Record activities must include, but not be limited to, providing written responses to Commissioning Design Review Reports, attending Commissioning Design Review meetings, implementing revisions to Plans and Specifications resulting from resolution of Commissioning Design Reports, and related activities assigned in other Sections.

3.2 CONSTRUCTION PHASE

3.2.1 Construction Phase International Green Construction Code Commissioning Compliance

3.2.1.1 General Requirements

Activities must include, but not be limited to, Construction Phase Commissioning Activities listed in ICC IgCC paragraphs 1001.1 through 1001.3.1.3.6, ICC IgCC Informative Appendix I, and ASHRAE 202 as modified in this Section, Construction Phase Commissioning Activities listed in references contained in ICC IgCC's paragraphs and ASHRAE 202 as modified in this Section, and Construction Phase Commissioning Activities specified in this Section.

3.2.1.2 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

The Lead Commissioning Specialist and Commissioning Specialists must, at a minimum, perform all activities specified under item entitled "Construction Phase International Green Construction Code Commissioning Compliance."

3.2.2 Construction Phase Sustainability Third Party Certification (TPC) Commissioning Compliance

3.2.2.1 General Requirements

Activities must include, but not be limited to, Commissioning Activities listed in the reference for pursuing Sustainability TPC, GBI DOD GP Compliance, as modified in this Section, Commissioning Activities listed in all of its references as modified in this Section, and Commissioning Activities specified in this Section.

3.2.2.2 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

The Lead Commissioning Specialist and Commissioning Specialists must, at a minimum, perform activities specified in the following paragraphs.

a. The Lead Commissioning Specialist must submit all Construction Phase documentation of Commissioning Activities directly to the Suitability TPC organization as modified in this Section.

b. The Lead Commissioning Specialist and Commissioning Specialists must perform all activities specified under item entitled "Construction Phase Sustainability Third Party Certification (TPC)."

3.2.3 Construction Phase Sequencing

3.2.3.1 Heating, Ventilation, and Air-Conditioning (HVAC) Systems

Heating, ventilation, and air-conditioning (HVAC) systems activities specified in the following paragraphs must be performed as applicable prior to performing Functional Performance Testing of systems listed under item entitled "Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED.

a. All equipment, systems, and assemblies have been completed, cleaned,

flushed, disinfected, calibrated, tested, and operate in accordance with Plans and Specifications.

b. All Ductwork Air Leakage Testing (DALT) field work, Test and Balance (TAB) field work, Pre-Final TAB Reports, and related prerequisites have been completed, submitted, and approved in accordance with Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS.

c. All inspections, measurements, and testing of building envelope and roofing systems specified in Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM have been completed, submitted, and approved.

d. All pressure testing, infrared thermography testing, and fog testing of building envelope and roofing systems specified in Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS have been completed, submitted, and approved.

e. All Pre-Functional Checks have been completed, submitted, and approved.

g. Certified TAB Report specified in Section 23 05 93.00 22 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS has been prepared, submitted, and approved.

h. Certified Certificate of Readiness has been completed, submitted, and approved.

All completed Final Functional Performance Test Checklists for commissioned equipment, systems, and assemblies listed under item entitled "Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must be submitted and approved prior to the Government performing any Performance Verification Testing specified in
Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

3.2.3.2 Electrical Systems

Electrical systems activities specified in the following paragraphs must be performed as applicable prior to performing Functional Performance Testing of systems listed under item entitled "Electrical Type II Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED.

a. All electrical, power generation, and lighting equipment, systems, and assemblies have been completed, calibrated, tested, and operate in accordance with Plans and Specifications.

b. Building Envelope has been enclosed according to contract documents and final construction has been completed.

c. All ceiling tiles, floor coverings, and window coverings have been put in place.

d. All lamps have completed a minimum 100-hour burn-in period.

e. All furniture has been put in place.

f. Certified Certificate of Readiness has been completed, submitted, and approved.

3.2.4 Construction Phase Scheduling

3.2.4.1 General Requirements

Commissioning Activities and other related activities for inclusion into the Project Construction Schedule must include, but not be limited to, activities specified in the following paragraphs.

a. Perform Construction Phase Commissioning Coordination meeting.

d. Submit and approve completed Pre-Functional Checklists.

e. Submit and approve proposed Functional Performance Test Checklists.

f. Submit and approve final Functional Performance Test Checklists.

i. Perform Construction Phase Site Observations.

j. Perform inspections, measurements, and testing of building envelope and roofing systems specified in Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM.

k. Perform pressure testing, infrared thermography testing, and fog testing of building envelope and roofing systems specified in Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

m. Submit and approve Certified TAB Report specified in Section 23 05 93.00 22 TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS.

n. Submit and approve Certified Certificate of Readiness.

o. Witness Construction Phase Functional Performance Testing.

p. Correct deficiencies discovered during Construction Phase Functional Performance Testing.

q. Re-witness Construction Phase Functional Performance Testing.

u. Government Witness of Performance Verification Testing.

v. Correct deficiencies discovered during Performance Verification Testing.

w. Government Re-witness of Performance Verification Testing.

x. Provide all Systems Manuals contents.

y. Submit and approve completed Systems Manuals.

z. Perform training.

aa. Submit and approve Final Commissioning Report.

bb. Perform Post-Construction Phase Site Observations.

dd. Witness Post-Construction Phase Functional Performance Testing if all requirements and activities for respective system could not be fully or successfully completed during the Construction Phase.

ee. Correct deficiencies discovered during Post-Construction Phase Functional Performance Testing.

ff. Re-witness Post-Construction Phase Functional Performance Testing.

3.2.4.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must request a current Project Construction Schedule from Installing Contractors no later than at the Construction Phase Commissioning Coordination Meeting and must prepare and provide to Installing Contractors a list of Commissioning Activities for inclusion into the Project Construction Schedule. The Lead Commissioning Specialist must associate each Commissioning Activity to a single construction activity such that if the date of the construction activity changes, the associated Commissioning Activity changes accordingly. List of Commissioning Activities for inclusion into the Project Construction Schedule is not required to be submitted to the Government.

3.2.4.3 Installing Contractors Responsibilities

Installing Contractors must provide a current Project Construction Schedule to the Lead Commissioning Specialist upon receiving request. Installing Contractors must incorporate the list of Commissioning Activities into the Project Construction Schedule and must link each Commissioning Activity to the associated construction activity identified by the Lead Commissioning Specialist such that if the date of the construction activity changes, the associated Commissioning Activity changes accordingly.

Installing Contractors must provide updated Project Construction Schedules to the Lead Commissioning Specialist at least on a monthly basis.

3.2.5 Construction Phase Commissioning Coordination Meeting

3.2.5.1 General Requirements

A Construction Phase Commissioning Coordination meeting must be conducted no later than 90 calendar days after award of construction contract to discuss topics that include, but not be limited to, the Commissioning Process, contract requirements, lines of communication, roles and responsibilities, Commissioning Activities for inclusion into the Project Construction Schedule, documentation requirements, Inspections and Testing, and logistics specified in this Section. Meeting must be conducted by conference call.

3.2.5.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, conduct meeting and prepare meeting minutes complete with Attendance Roster.

3.2.5.3 Installing Contractors and Others Responsibilities

Installing Contractors must attend this meeting. The Contracting Officer's Technical Representative, a User Representative, and a Public Works Department Representative may attend this meeting.

3.2.6 Construction Phase Commissioning Progress Meetings

3.2.6.1 General Requirements

Construction Phase Commissioning Progress meetings must be conducted to discuss topics that include, but not be limited to, unresolved Commissioning Issues, status of items specified to be provided to the Lead Commissioning Specialist, and upcoming Commissioning Activities. Number of Construction Phase Commissioning Progress meetings must be conducted for each systems category as specified in the following paragraphs. Meetings must be conducted by conference call.

a. Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category: Six meetings.

b. Plumbing Systems Category: Two meetings.

c. Utility Systems Category: No meetings.

d. Electrical Type I Systems Category: No meetings.

e. Electrical Type II Systems Category: Two meetings.

h. Building Envelope Systems, Components, and Assemblies Category: No meetings.

Construction Phase Commissioning Progress meetings are prohibited from being combined with conducting Construction Phase Commissioning Coordination meeting, conducting Site Observations, or witnessing Functional Performance Testing.

3.2.6.2 Commissioning Specialists Responsibilities

Each Commissioning Specialist must, at a minimum, conduct meetings and prepare meeting minutes complete with Attendance Roster for systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for systems categories assigned to other Commissioning Specialists.

3.2.6.3 Installing Contractors and Others Responsibilities

Installing Contractors must attend these meetings. The Contracting Officer's Technical Representative, a User Representative, and a Public Works Department Representative may attend these meetings.

3.2.7 Construction Phase Interim Commissioning Plan

3.2.7.1 General Requirements

The Construction Phase Interim Commissioning Plan must be prepared and must be an update to the Design Phase Commissioning Plan and contents must include, but not be limited to, contents specified in the following paragraphs.

a. All contents specified for the Design Phase Commissioning Plan.

b. Basis of Design.

c. Contact information for the entire Commissioning Team.

3.2.7.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, prepare and submit the Construction Phase Interim Commissioning Plan no later than 30 calendar days after the Construction Phase Commissioning Coordination meeting and no later than 14 calendar days prior to performing construction of the building envelope.

3.2.8 Construction Phase Final Commissioning Plan

3.2.8.1 General Requirements

The Construction Phase Final Commissioning Plan must be prepared and must be an update to the Construction Phase Interim Commissioning Plan and contents must include, but not be limited to, contents specified in the following paragraphs.

a. All contents specified for the Construction Phase Interim Commissioning Plan.

b. All Pre-Functional Checklists.

c. All approved final Functional Performance Test Checklists.

3.2.8.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, perform activities specified in the following paragraphs.

a. Prepare and submit the Construction Phase Final Commissioning Plan no later than 30 calendar days prior to performing any Functional Performance Testing.

b. File one copy of Approved Construction Phase Final Commissioning Plan in the Sustainability eNotebook no later than 14 calendar days after receiving approval of the Construction Phase Final Commissioning Plan.

3.2.9 Construction Phase Issues And Resolution Log

3.2.9.1 General Requirements

The Construction Phase Issues and Resolution Log must be prepared and maintained to track all Commissioning Issues identified by any member of the Commissioning Team. The Construction Phase Issues and Resolution Log must be prepared in an electronic format that can be used throughout the Construction Phase such that it can be provided to the Government upon request. Construction Phase Issues and Resolution Log contents must include, but not be limited to, contents specified in the following paragraphs.

a. Project title and location.

b. Lead Commissioning Specialist's contact information.

c. Issue number.

d. Date issue was discovered.

e. Name of Commissioning Team member identifying the issue.

f. Commissioning Team member responsible for resolving the issue.

g. Current status.

h. Issue description.

i. Pictures of item if available and appropriate.

j. Effects of issue on project or building operation.

k. Possible cause of issue.

l. Proposed resolution.

m. Final resolution and final resolution date.

n. Approvals of issue resolution, including approver's name.

3.2.9.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must prepare and maintain the Construction Phase Issues And Resolution Log and must submit one electronic copy no later than seven calendar days after the addition of an issue or a change in status of an issue.

3.2.10 Pre-Functional Checklists

3.2.10.1 General Requirements

Pre-Functional Checklists must be prepared for all commissioned equipment, systems, and assemblies that are subject to functional performance testing. Pre-Functional Checklist contents must include, but not be limited to, contents for physical inspections that demonstrate construction, installation and start-up of equipment, systems, and assemblies is complete. Refer to item entitled "Pre-Functional Checklists" in item entitled "Inspections and Testing" for more information.

Download example Pre-Functional Checklists for Section 01 91 00.15 TOTAL BUILDING COMMISSIONING at the following location: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables. Checklists must contain the same level of detail shown in examples, but are not required to match the format of examples.

3.2.10.2 Lead Commissioning Specialist Responsibilities

Lead Commissioning Specialist must provide blank Pre-Functional Checklists to Installing Contractors. Blank Pre-Functional Checklists are not required to be submitted to the Government.

3.2.10.3 Commissioning Specialists Responsibilities

Commissioning Specialists must prepare Pre-Functional Checklists for all equipment, systems, and assemblies listed under systems categories assigned to them in this Section that are subject to functional performance testing. Commissioning Specialists are prohibited from

performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.11 Functional Performance Test (FPT) Checklists

Functional Performance Test (FPT) Checklists must be prepared for all commissioned equipment, systems, and assemblies demonstrating performance is in accordance with Plans and Specifications as specified in the following paragraphs. A single final FPT Checklist must be prepared for each equipment piece, system, and assembly except that a single final FPT Checklist may be prepared for use with those that have identical features as modified in the following paragraphs. FPT Checklist contents must include, but not be limited to, step-by-step actions and expected results, as modified in the following paragraphs. Refer to item entitled "Construction Phase Functional Performance Testing" for more information.

3.2.11.1 Complex Systems Requirements

FPT Checklists must be prepared for all complex systems as defined in paragraph COMPLEX SYSTEMS. A single FPT Checklist must be prepared for each system except that a single FPT Checklist may be prepared for use with multiple systems that have identical control sequences such as unitary air-conditioners, packaged terminal air-conditioners, and heat pumps.

Contents must include, but not be limited to, contents specified in the following paragraphs and shown in example FPT Checklists for Section 01 91 00.15 TOTAL BUILDING COMMISSIONING available for download at the following location: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables. FPT Checklists must contain the same level of detail specified below and as shown in examples, but are not required to match the format of examples.

a. Notable system features including information about such attributes as system sizing and controls to facilitate understanding of system operation.

b. Conclusions and recommendations based on control system feature, point-to-point, actuator, and system operation observations. Conclusions must clearly indicate if system does or does not perform in accordance with requirements of Plans and Specifications. Recommendation must clearly indicate that the system should or should not be accepted by the Government.

c. Test conditions including date, beginning and ending time, and beginning and ending outdoor air conditions.

d. Identification of the equipment involved in the test.

e. Attendees present throughout the entire system test.

f. Control system feature identification including control point description, embedded/visible type, adjustable/monitoring type, actual value, and setpoint value/alarm range.

g. Point-to-point observations including demonstrating system flow meters and sensors have been calibrated and are correctly displayed on the Operator workstation.

h. Actuator operation observations demonstrating actuator responses to commands from the control system.

i. Variable frequency drive observations demonstrating minimum safe motor speed.

j. System operation observations for system-based testing demonstrating each control sequence, operation mode, and alarm condition resulting from control setpoint manipulation. System operation observations must include, but not be limited to, observations specified in the following paragraphs.

(1) Introduction identifying testing methodology.

(2) As-found conditions prior to system manipulation.

(3) Clear list of test items (step numbers).

(4) Design control sequences or interlocks segmented by unique functions.

(5) Intended test procedures following each segmented sequence or interlock identifying the system manipulation required to initiate system response.

(6) Expected system responses.

(7) Space for comments for each test item.

(8) Pass or fail indication for each test.

Performance Verification Tests prepared by the Controls Contractor are prohibited from fulfilling requirements of this Section.

3.2.11.2 Plumbing Systems Requirements

FPT Checklists must be prepared for all equipment, systems, and assemblies listed under item entitled "Plumbing Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED.

3.2.11.3 Electrical Type I Systems Requirements

FPT Checklists must not be prepared for equipment, systems, and assemblies listed under item entitled "Electrical Type I Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED.

3.2.11.4 Electrical Type II Systems Requirements

FPT Checklists must be prepared for all equipment, systems, and assemblies listed under item entitled "Electrical Type II Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED. FPT Checklists must be system-based and demonstrate end-objective performance in accordance with Plans and Specifications. FPT Checklists must not repeat fundamental performance testing such as resistance measurements required in other Sections.

3.2.11.5 Building Envelope Systems, Components, and Assemblies Requirements

FPT Checklists must not be prepared for equipment, systems, and assemblies listed under item entitled "Building Envelope Systems, Components, and Assemblies Category" in paragraph SYSTEMS TO BE COMMISSIONED.

3.2.11.6 Proposed FPT Checklist Meeting and Draft FPT Checklist Meeting

For all complex systems as defined in paragraph COMPLEX SYSTEMS, a Proposed FPT Checklist Meeting and a Draft FPT Checklist Meeting must be conducted for detailed discussions of procedures intended to demonstrate performance is in accordance with Plans and Specifications. Meetings must be conducted by conference call.

3.2.11.7 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

For all equipment, systems, and assemblies other than complex systems as defined in paragraph COMPLEX SYSTEMS, the Lead and Commissioning Specialist must perform respective responsibilities specified in the following paragraphs.

a. The Lead Commissioning Specialist must submit Final Functional Performance Test Checklists for each systems category listed under paragraph SYSTEMS TO BE COMMISSIONED for which FPT checklists are required to be prepared. FPT checklists must be submitted as a single submittal for each systems category no later than 30 calendar days prior to testing of any system in the respective systems category.

b. Commissioning Specialists must prepare Final Functional Performance Test Checklists for equipment, systems, and assemblies listed under systems categories assigned to them in this Section for which FPT checklists are required to be prepared. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

For all complex systems as defined in paragraph COMPLEX SYSTEMS, the Lead Commissioning Specialist and Commissioning Specialists must prepare and submit Final Functional Performance Test Checklists in the sequence specified in the following paragraphs. Commissioning Specialists must perform respective responsibilities for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing respective responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

a. Commissioning Specialists must prepare Proposed Functional Performance Test Checklists.

b. The Lead Commissioning Specialist must submit Proposed Functional Performance Test Checklists for all complex systems as a single submittal no later than 60 calendar days prior to testing of any complex system.

c. Commissioning Specialists must conduct the Proposed Functional Performance Test Checklist Meeting attended by the Contracting Officer's Technical Representative.

d. Commissioning Specialists must prepare Draft Functional Performance Test Checklists to incorporate input from the Contracting Officer's Technical Representative.

e. The Lead Commissioning Specialist must provide Draft Functional Performance Test Checklists to Installing Contractors and Equipment Suppliers no later than seven calendar days prior to the Draft Functional Performance Test Checklist Meeting.

f. Commissioning Specialists must conduct the Draft Functional Performance Test Checklist Meeting attended by Installing Contractors and Equipment Suppliers. The Contracting Officer's Technical Representative may attend this meeting.

g. Commissioning Specialists must prepare Final Functional Performance Test Checklists to incorporate input from Installing Contractors.

h. The Lead Commissioning Specialist must submit Final Functional Performance Test Checklists for all complex systems as a single submittal no later than seven calendar days after meeting to discuss Draft Functional Performance Test Checklists and no later than 30 calendar days prior to testing of any complex system.

3.2.11.8 Installing Contractors and Equipment Suppliers Responsibilities

Installing Contractors and Equipment Suppliers must attend Draft Functional Performance Test Checklist Meeting.

3.2.12 Construction Submittals

3.2.12.1 General Requirements

Construction Submittals must be reviewed for all commissioned equipment, systems, and assemblies to the extent necessary to verify that equipment, systems, and assemblies are in compliance with Commissioning Aspects of Owner's Project Requirements (OPR), Basis of Design (BOD), and Plans and Specifications as modified in this Section. One review for each commissioned equipment, system, and assembly must be performed coincident with Designers of Record and review must include, but not be limited to, review of shop drawings and equipment performance data. Review of resubmittals is prohibited.

The OPR and BOD are for reference only and do not constitute part of this contract.

3.2.12.2 Construction Submittal Review Reports

A Construction Submittal Review Report must be prepared for all commissioned equipment, systems, and assemblies and contents must include, but not be limited to, contents specified in the following paragraphs.

a. Project title, project number, and date of review.

b. Overview complete goals of the Commissioning-focused submittal review process.

c. Summary of deficiencies.

d. Ongoing record of all Construction Submittals received and reviewed,

list of unresolved deficiencies, and record of communications made to resolve deficiencies.

e. Descriptive outline of reviewed construction submittals complete with the Installing Contractor's submittal designation.

f. Clear description of deficiencies complete with supporting documentation.

3.2.12.3 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist activities must include, but not be limited to, activities specified in the following paragraphs.

a. Provide list of shop drawings and equipment performance data that must be reviewed to Installing Contractors.

b. Prepare and provide Construction Submittal review comments to Designers of Record.

c. Prepare and submit Construction Submittal Review Reports no later than seven calendar days after completion of each Construction Submittal review.

3.2.12.4 Commissioning Specialists Responsibilities

Commissioning Specialists must perform reviews of Construction Submittals for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.12.5 Designers of Record Responsibilities

Designers of Record activities must include, but not be limited to, receiving and considering for incorporation comments listed in Construction Submittal Review Reports provided by the Lead Commissioning Specialist.

3.2.12.6 Installing Contractors Responsibilities

Installing Contractors must provide all requested Construction Submittals and requested supplemental information to the Lead Commissioning Specialist.

3.2.13 Construction Phase Site Observations

3.2.13.1 General Requirements

Construction Phase Site Observations must be performed as specified in the following paragraphs to verify and document Commissioning Aspects of equipment, systems, and assemblies as specified in this Section. Two eight-hour Construction Phase Site Observations must be conducted for each systems category that is not specified in the following paragraphs. Specified number of observations are totals that include all commissioned buildings and all construction phases in this project.

Construction Phase Site Observations are prohibited from being combined

with witnessing Functional Performance Testing, but may be combined with Pre-Functional Checklist Verification unless indicated otherwise. Purposes of Site Observations specified in the following paragraphs for each systems category may be combined into a single Site Observation.

3.2.13.2 Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category

Site Observations must be performed for the purposes specified in the following paragraphs.

a. Two eight-hour Site Observations to identify issues that may result in unsuccessful functional performance testing and to verify and document Commissioning Aspects of commissioned equipment, systems, and assemblies listed under this systems category.

b. One eight-hour Site Observation to verify and document HVAC pipe pressure testing.

c. One eight-hour Site Observation to verify and document HVAC pump installation.

3.2.13.3 Plumbing Systems Category

Site Observations must be performed for the purposes specified in the following paragraphs.

a. One eight-hour Site Observation to identify issues that may result in unsuccessful functional performance testing and to verify and document Commissioning Aspects of commissioned equipment, systems, and assemblies listed under this systems category.

b. One eight-hour Site Observation to verify and document Plumbing pipe pressure testing.

c. One eight-hour Site Observation to verify and document Plumbing pump installation.

3.2.13.4 Utility Systems Category

Site Observations must be performed for the purposes specified in the following paragraphs.

a. No Site Observation dedicated to this systems category. Verification and documentation of Commissioning Aspects of commissioned equipment, systems, and assemblies listed under this systems category may be combined with Site Observations for other systems categories.

3.2.13.5 Electrical Type I Systems Category

Site Observations must be performed for the purposes specified in the following paragraphs.

a. Two eight-hour Site Observations to verify and document Commissioning Aspects and to witness testing performed by independent testing organizations of commissioned equipment, systems, and assemblies listed under this systems category and listed by the Lead Commissioning Specialist to require on-site verification and documentation by Commissioning Specialists. Independent testing organizations typically use tests readily available from testing

associations such as the InterNational Electrical Testing Association (NETA).

3.2.13.6 Electrical Type II Systems Category

Site Observations must be performed for the purposes specified in the following paragraphs.

a. Two eight-hour Site Observations to identify issues that may result in unsuccessful functional performance testing and to verify and document Commissioning Aspects of commissioned equipment, systems, and assemblies listed under this systems category.

3.2.13.7 Building Envelope Systems, Components, and Assemblies Category

Site Observations must be performed for the purposes specified in the following paragraphs.

c. bne eight-hour Site Observation to verify, document, and witness inspections, measurements, and testing of building envelope and roofing systems performed by independent testing agencies and specified in Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM.

c. One eight-hour Site Observation to verify, document, and witness pressure testing, infrared thermography testing, and fog testing of building envelope and roofing systems performed by independent testing agencies and specified in Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

3.2.13.8 Summary Meetings

A Summary Meeting must be conducted at the conclusion of each Site Observation for the purpose of discussing issues discovered during each Site Observation. Meeting must be conducted on-site with all attendees present.

3.2.13.9 Site Observation Reports

A Site Observation Report must be prepared for each Site Observation for the purpose of documenting issues discovered during each Site Observation.

Site Observation Reports for all equipment, systems, and assemblies listed under item entitled "Electrical Type I Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must include results of testing performed by independent testing organizations that were witnessed by Commissioning Specialists and test results that were not witnessed by Commissioning Specialists.

3.2.13.10 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must provide list of equipment, systems, and assemblies listed under item entitled "Electrical Type I Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED that require on-site verification and documentation by Commissioning Specialists to Installing Contractors.

The Lead Commissioning Specialist must submit Construction Phase Site Observation Reports complete with Summary Meeting Attendance Roster no later than seven calendar days after Site Observation.

3.2.13.11 Commissioning Specialists Responsibilities

Commissioning Specialist must perform responsibilities specified in the following paragraphs.

a. Each Commissioning Specialist must be responsible to perform Site Observations, conduct Summary Meetings, and prepare Construction Phase Site Observation Reports for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.13.12 Installing Contractors Responsibilities

Installing Contractors must provide Commissioning Specialists access to construction and systems for Site Observations and must attend Summary Meetings.

Installing Contractors must schedule testing to occur in the presence of Commissioning Specialists as specified in the following paragraphs.

a. All equipment, systems, and assemblies listed under item entitled "Electrical Type I Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED and listed by the Lead Commissioning Specialist to require on-site verification and documentation by Commissioning Specialists. Results of testing of equipment, systems, and assemblies listed under item entitled "Electrical Type I Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must be provided to the Lead Commissioning Specialist that were witnessed by Commissioning Specialists and that were not witnessed by Commissioning Specialists.

c. Pressure testing, infrared thermography testing, and fog testing specified in Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS and inspections, measurements, and testing specified in Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM for equipment, systems, and assemblies listed under item entitled "Building Envelope Systems, Components, and Assemblies Category" in paragraph SYSTEMS TO BE COMMISSIONED. Results of all tests, inspections, and measurements must be provided to the Lead Commissioning Specialist that were witnessed by Commissioning Specialists and that were not witnessed by Commissioning Specialists.

3.2.14 Pre-Functional Checks

Pre-Functional Checks must be performed prior to performing Functional Performance Testing of respective system and activities must include, but not be limited to, activities specified in the following paragraphs.

c. Perform Pre-Functional Checklist Verification.

3.2.14.1 Pre-Functional Checklist Verification

3.2.14.1.1 General Requirements

Pre-Functional Checklist Verification must be performed using Pre-Functional Checklists from the approved Construction Phase Final Commissioning Plan by conducting on-site spot-checks to verify accuracy

after receipt of completed Pre-Functional Checklists from Installing Contractors. Verification may be combined with Construction Phase Site Observations.

3.2.14.1.2 Number of Trips

The number of trips to the site for the purpose of Pre-Functional Checklist Verification for each systems category must be up to that specified in the following paragraphs. It is encouraged that these trips be combined with Construction Phase Site Observations.

a. Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category: One eight-hour trip.

b. Plumbing Systems Category: One eight-hour trip.

d. Utility Systems Category: No trip dedicated to this systems category. Verification of commissioned equipment, systems, and assemblies listed under this systems category may be combined with trips for other systems categories.

e. Electrical Type I Systems Category: No Trips.

f. Electrical Type II Systems Category: One eight-hour trip.

i. Building Envelope Systems, Components, and Assemblies Category: No Trips.

3.2.14.1.3 Sample Strategy

20-Percent sample spot-check for all equipment, systems, and assemblies for which Pre-Functional Checklists have been completed. Sample spot-check must include at least one complete item such as one complete unitary air-conditioner.

3.2.14.1.4 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must provide blank Pre-Functional Checklists to Installing Contractors.

The Lead Commissioning Specialist must submit all completed Pre-Functional Checklists and all associated equipment start-up reports for each systems category listed under paragraph SYSTEMS TO BE COMMISSIONED as a single submittal no later than seven calendar days after receipt of all completed checklists for equipment, systems, and assemblies listed under the respective systems category from Installing Contractors.

3.2.14.1.5 Commissioning Specialists Responsibilities

Commissioning Specialists must perform Pre-Functional Checklist Verifications and then must indicate acceptance of all Pre-Functional Checklist items for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.14.1.6 Installing Contractors Responsibilities

Installing Contractors must complete one Pre-Functional Checklist for each piece of equipment and system. Initial each Pre-Functional Checklist item for their area of responsibility indicating the item's construction, installation, and start-up as applicable has been verified to be complete and is ready for testing.

Installing Contractors must provide completed and initialed Pre-Functional Checklists and all associated equipment start-up reports to the Lead Commissioning Specialist as a single package for each systems category no later than seven calendar days after completion of inspection of all checklist items for each piece of equipment and system.

3.2.15 Certified Certificates of Readiness and Certificates of Readiness

3.2.15.1 General Requirements

A single Certified Certificate of Readiness must be prepared for each equipment, system, and assembly subject to Functional Performance Testing by reviewing, signing, and dating Certificates of Readiness to indicate each equipment, system, and assembly is complete and ready for testing. Testing of any equipment, system, or assembly is prohibited until after its Certified Certificate of Readiness has been submitted and approved. Government approval of Certified Certificates of Readiness does not constitute the Government's responsibility for equipment, systems, or assemblies being complete and ready for testing.

A single Certificate of Readiness must be prepared for each equipment, system, and assembly subject to Functional Performance Testing. Certificate of Readiness contents must include, but not be limited to, contents specified in the following paragraphs to the extent applicable to the specific system being tested.

a. Cover sheet with spaces for signatures and dates by the Lead Commissioning Specialist and by Installing Contractors to indicate each system is complete and ready for testing.

c. Equipment and system start-up reports.

d. Control system start-up reports.

e. Diagnostic test reports.

g. Completed Pre-Functional Checklists.

3.2.15.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must sign, date, and submit Certified Certificates of Readiness for all equipment, systems, and assemblies listed under each systems category listed under paragraph SYSTEMS TO BE COMMISSIONED as a single submittal no later than 14 calendar days prior to testing of any equipment, system, or assembly listed under respective systems category.

3.2.15.3 Commissioning Specialists Responsibilities

Commissioning Specialists must perform reviews of Certificates of Readiness for accuracy to ensure equipment, systems, and assemblies are

complete and ready for testing for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.15.4 Installing Contractors Responsibilities

Installing Contractors must prepare, sign, and date Certificates of Readiness indicating equipment, systems, and assemblies are complete and ready for testing. Certificates of Readiness for all equipment, systems, and assemblies listed under each systems category listed under paragraph SYSTEMS TO BE COMMISSIONED must be provided to the Lead Commissioning Specialist as a single package for each systems category.

3.2.16 Construction Phase Functional Performance Testing

3.2.16.1 General Requirements

Construction Phase Functional Performance Testing must be performed for all equipment, systems, and assemblies for which a Functional Performance Test (FPT) Checklist has been prepared. Testing must be performed using approved checklists and all required Commissioning Team participants must be present prior to start of testing. Testing must be aborted and rescheduled to occur at a later date if any Commissioning Team participant is not present or if deficiencies discovered during testing prevent successful completion. Testing of any equipment, system, and assembly is prohibited until after its Certified Certificate of Readiness has been submitted and approved.

All necessary materials and system modifications to simulate actual conditions as close as is practically possible must be provided. Complete all testing by returning affected equipment, systems, and assemblies to pre-test conditions.

3.2.16.2 Complex Systems Requirements

Testing of complex systems as defined in paragraph COMPLEX SYSTEMS in paragraph SYSTEMS TO BE COMMISSIONED must be performed as specified in the following paragraphs.

3.2.16.2.1 Equipment Featuring On-Board Factory Packaged Controls

Testing of equipment featuring on-board factory packaged controls must include, but not be limited to, testing specified in the following paragraphs.

a. Equipment enabling and disabling.

b. Equipment standard and optional control points necessary to accomplish functionality whether or not control points are specified in Plans and Specifications.

c. Equipment standard and optional alarms critical to safe operation whether or not optional alarms are specified in Plans and Specifications.

d. All control points added by Controls Contractor in addition to on-board factory packaged controls whether or not control points are

specified in Plans and Specifications.

3.2.16.2.2 Test Setup and Condition Simulation

Test setup must include all necessary materials and system modifications to simulate flows, pressures, temperatures, and other conditions necessary to perform testing according to specified conditions must be provided.

Condition simulation must be accomplished by temporarily changing control system setpoints. Condition simulation by over-writing control system inputs (actual) values is prohibited unless approved in advance of test by the Contracting Officer's Technical Representative.

3.2.16.2.3 Condition Simulation Methods

Condition simulation methods for equipment, systems, and assemblies listed under item entitled "Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED that are acceptable are specified in the following paragraphs.

a. When varying static pressures inside ductwork cannot be simulated within the duct, and where a sensor signals the controls system to initiate sequences at various duct static pressures, it is acceptable to simulate the various pressures with a Pneumatic Squeeze-Bulb Type Signaling Device with gauge temporarily attached to the sensing tube leading to the transmitter. It is not acceptable to reset the various setpoints, nor to simulate an electric analog signal unless approved as specified in the preceding paragraphs.

b. Dirty filter pressure drops can be simulated using sheets of cardboard at filter face.

c. Freeze-stat safeties can be simulated by packing portion of sensor with ice.

d. High outside air temperatures can be simulated with a hair blower.

e. High entering cooling coil temperatures can be used to simulate entering cooling coil conditions.

f. Do not use signal generators to simulate sensor signals unless approved by the Contracting Officer's Technical Representative, as noted above, for special cases.

g. Control setpoints can be altered. For example, to see the air conditioning compressor lockout work at an outside air temperature below lockout setpoint, when the outside air temperature is above lockout setpoint, temporarily change the lockout setpoint to be minus 0 degrees above the current outside air temperature. Caution: Setpoints are not to be raised or lowered to a point such that damage to the components, systems, or the building structure and/or contents will occur.

h. Test duct mounted smoke detectors in accordance with the manufacturer's recommendations. Perform testing with air system at minimum airflow condition in ductwork.

i. Test current sensing relays used for fan and pump status signals to control system to indicate unit failure and run status by resetting

the setpoint on the relay to simulate a lost belt or unit failure while the unit is running. Confirm that the failure alarm was generated and received at the control system. After the test is performed, return the setpoint to its original setpoint or a setpoint as indicated by the Contracting Officer's Technical Representative.

3.2.16.3 Sample Strategy

3.2.16.3.1 General Requirements

100-Percent testing of all equipment, systems, and assemblies as modified in the following paragraphs. Sample strategy for testing less than 100-percent testing must be equally applied to each commissioned building in this project.

Sample strategy testing must be applied to total equipment and system counts specified for system categories under paragraph SYSTEMS TO BE COMMISSIONED.

3.2.16.3.2 Complex Systems

Sample strategy for all complex systems as defined in paragraph COMPLEX SYSTEMS must be as specified in the following paragraphs.

a. 100-Percent testing for equipment, systems, and assemblies such as chilled water systems, HVAC heating hot water systems, renewable energy systems, building automation systems, energy management and control systems, aircraft pre-conditioned air systems, air handling unit systems including all associated fans except for remote exhaust air fans, dedicated outside air systems including all associated fans except for remote exhaust air fans, computer room air-conditioning units, whole-building energy monitoring, and whole-building water utility monitoring.

b. 20-Percent sample testing for equipment, systems, and assemblies with identical control sequences such as heat pumps, split system air-conditioning units, and packaged terminal air-conditioner units. Sample must include at least one complete item such as one complete heat pump.

3.2.16.3.3 Plumbing Systems

Sample strategy for all equipment, systems, and assemblies listed under item entitled "Plumbing Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED except plumbing systems defined as complex systems in paragraph COMPLEX SYSTEMS must be as specified in the following paragraphs.

a. 100-Percent testing for equipment, systems, and assemblies such as domestic heating hot water systems, domestic solar heating hot water systems, service water pressure-booster pump systems, process water systems, natural gas systems, and irrigation systems.

b. 20-Percent sample testing for equipment, systems, and assemblies with identical features such as fixtures, semi-instantaneous water heaters, emergency eyewash stations, and vacuum systems. Sample must include at least one complete item such as one complete fixture.

3.2.16.3.4 Electrical Type II Systems

Sample strategy for all equipment, systems, and assemblies listed under item entitled "Electrical Type II Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED except electrical systems defined as complex systems in paragraph COMPLEX SYSTEMS must be as specified in the following paragraphs.

a. 100-Percent testing for equipment, systems, and assemblies such as frequency converters, emergency power off control systems, emergency response systems, electrical utility metering systems, and photovoltaic systems.

b. 20-Percent sample testing for equipment, systems, and assemblies with identical features such as audiovisual systems, automatic receptacles controls, communications systems, energy monitoring, lighting systems, lighting control devices, lighting control systems, and security systems. Sample must include at least one complete item such as lighting in one space.

3.2.16.4 Unsuccessful Testing and Re-Testing

3.2.16.4.1 Unsuccessful Testing of 100-Percent Sample

Testing must be failed for equipment or systems for which 100-percent sample size are tested if one or more of the test procedures results in discovery of a deficiency that cannot be resolved within five minutes during testing.

Re-testing must be witnessed to the extent necessary to confirm that deficiencies have been corrected without negatively impacting the performance of the rest of the system.

3.2.16.4.2 Unsuccessful Testing of Less than 100-Percent Sample

Testing must be failed for equipment or systems for which less than 100-percent sample size are tested if one or more of the test procedures results in discovery of a deficiency, regardless of whether the deficiency is corrected during the sample test.

a. Re-testing must be witnessed of only items which experienced initial failures if the failure rate is 5-percent or less, meaning that 5-percent or less of the equipment or systems had at least one deficiency.

b. Re-testing must be witnessed of items which experienced initial failures to the extent necessary to confirm that the deficiencies have been corrected if the failure rate is higher than 5-percent, meaning that more than 5-percent of equipment or systems tested had at least one deficiency. In addition, testing of another random sample must be witnessed for the same size as the initial sample for the first time. If the second random sample set has any failures, those failed items must be retested and all remaining equipment, systems, and assemblies must be tested to complete 100-percent testing of that system type.

3.2.16.5 Re-Testing Costs

Re-testing costs may be withheld by the Contracting Officer from payments to Installing Contractors. These costs may include salary, travel costs, and per diem associated with re-testing for the Lead Commissioning

Specialist, Commissioning Specialists, and Government personnel.

3.2.16.6 Commissioning Team Participants

Participants of Functional Performance Testing must include, but not be limited to, participants specified in the following paragraphs. The Contracting Officer's Technical Representative, Public Works Department Division (PWD) Representatives, and Using Agent's Representatives (Users) may, but are not required to, participate in any testing.

3.2.16.6.1 Heating, Ventilation, and Air-Conditioning (HVAC) Systems

Commissioning Team members participating in Functional Performance Testing of equipment, systems, and assemblies listed under item entitled "Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must include, but not be limited to, participants specified in the following paragraphs.

a. Mechanical Commissioning Specialist (CxM).

b. Installing Contractors’ Quality Control Personnel (CQC).

c. Installing Contractors’ Controls Commissioning Representative (CC).

d. Installing Contractors’ TAB Commissioning Representative (TAB).

e. Installing Contractors’ Mechanical Commissioning Representative (MC).

f. Equipment Supplier (ES).

3.2.16.6.2 Plumbing Systems

Commissioning Team members participating in Functional Performance Testing of equipment, systems, and assemblies listed under item entitled "Plumbing Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must include, but not be limited to, participants specified in the following paragraphs.

a. Mechanical Commissioning Specialist (CxM).

b. Installing Contractors’ Quality Control Personnel (CQC).

c. Installing Contractors’ Controls Commissioning Representative (CC).

d. Installing Contractors’ Plumbing Commissioning Representative (PC).

e. Equipment Supplier (ES).

3.2.16.6.3 Utility Systems

Commissioning Team members participating in Functional Performance Testing of equipment, systems, and assemblies listed under item entitled "Utility Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must include, but not be limited to, participants specified in the following paragraphs.

a. Mechanical Commissioning Specialist (CxM).

b. Installing Contractors’ Quality Control Personnel (CQC).

c. Installing Contractors’ Controls Commissioning Representative (CC).

d. Installing Contractors’ TAB Commissioning Representative (TAB).

e. Installing Contractors’ Mechanical Commissioning Representative (MC).

f. Installing Contractors’ Plumbing Commissioning Representative (PC).

g. Installing Contractors’ Electrical Commissioning Representative (EC).

h. Equipment Supplier (ES).

3.2.16.6.4 Electrical Type II Systems

Commissioning Team members participating in Functional Performance Testing of equipment, systems, and assemblies listed under item entitled "Electrical Type II Systems Category" in paragraph SYSTEMS TO BE COMMISSIONED must include, but not be limited to, participants specified in the following paragraphs.

a. Electrical Commissioning Specialist (CxE).

b. Installing Contractors’ Quality Control Personnel (CQC).

c. Installing Contractors’ Electrical Commissioning Representative (EC).

d. Equipment Supplier (ES).

3.2.16.7 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, perform activities specified in the following paragraphs.

a. Contact Contracting Officer's Technical Representative no later than 30 calendar days prior to performing Testing to select which systems must be tested for samples of less than 100-percent.

b. Coordinate logistics with Installing Contractors.

c. Provide summary of Functional Performance Testing results to the Contracting Officer's Technical Representative for concurrence or acceptance at intervals no later than seven calendar days after the start of each occurrence of testing.

d. Submit completed Final Functional Performance Test Checklists for each systems category listed under paragraph SYSTEMS TO BE COMMISSIONED as a single submittal no later than 14 calendar days after successful testing of all systems listed under the respective systems category.

3.2.16.8 Commissioning Specialists Responsibilities

Commissioning Specialists must witness, re-witness, and document all testing for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.16.9 Installing Contractors Responsibilities

Installing Contractors must provide all necessary materials and perform all aspects of testing including modifications to simulate actual conditions for all equipment, systems, and assemblies related to their contract.

3.2.16.10 Equipment Suppliers Responsibilities

Equipment Suppliers must perform all aspects of testing of equipment featuring on-board factory packaged controls provided as part of their contract. Refer to paragraph COMPLEX SYSTEMS for definition of equipment featuring on-board factory packaged controls.

3.2.16.11 Installing Contractors and Equipment Supplier Coordination

Installing Contractors and Equipment Suppliers must simultaneously perform all aspects of testing of equipment featuring on-board factory packaged controls provided as part of their contract.

3.2.17 Systems Manuals

3.2.17.1 General Requirements

Systems Manuals must be prepared for all commissioned equipment, systems, and assemblies and contents must include, but not be limited to, contents specified in the following paragraphs.

a. Executive summary containing overview of design, construction, and operation requirements.

b. Certificate of Occupancy.

c. Approved Construction Phase Commissioning Plan.

d. Approved Construction Phase Issues and Resolution Log.

e. Identification of unresolved deficiencies complete with resolution plan if not included in approved Final Commissioning Report.

f. Final Owner's Project Requirements.

g. Final Basis of Design.

h. Record documents including as-built Plans and Specifications and approved Construction Submittals.

i. Operation and Maintenance Manuals.

j. Maintenance procedures, checklists, and records.

k. Recommended maintenance schedules when schedules are not provided in Operation and Maintenance manuals.

l. Ongoing Commissioning operational and maintenance record keeping procedures to monitor equipment, systems, and assemblies performance.

m. Building and equipment operation schedules.

n. Equipment and system limitations.

o. Emergency procedures.

p. Recommended schedule for sensor and actuator calibration.

q. Recommended re-testing schedule.

r. Blank copy of all approved final Functional Performance Test Checklists.

s. Completed Functional Performance Test Checklists if not included in approved Final Commissioning Report.

v. Equipment warranty information.

w. Installing Contractors and Equipment Suppliers contact information.

x. Training Plans if not included in approved Final Commissioning Report, training materials, and completed Training Attendance Rosters if not included in approved Final Commissioning Report.

y. Commissioning Design Review Reports if not included in approved Final Commissioning Report.

z. Construction Submittal Review Reports.

aa. Approved Final Commissioning Report.

bb. All Commissioning reports that are not specified in the preceding paragraphs and are not specified to be included in the approved Final Commissioning Report.

Systems Manual contents for all complex systems as defined in paragraph COMPLEX SYSTEMS, in addition to contents specified in the preceding paragraphs, must include, but not be limited to, contents specified in the following paragraphs.

a. As-built system single line diagrams.

b. As-built sequences of operation and controls drawings.

c. As-built control system setpoints and operating ranges.

3.2.17.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, provide all review comments to the Installing Contractors for all equipment, systems, and assemblies listed under each systems category as a single package no later than 45 calendar days prior to first training event for any equipment, system, or assembly in respective systems category. Review comments are not required to be submitted to the Government.

3.2.17.3 Commissioning Specialist Responsibilities

Commissioning Specialists must, at a minimum, review and prepare review comments for all Systems Manuals. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning

Specialists.

3.2.17.4 Installing Contractors Responsibilities

Installing Contractors must, at a minimum, perform activities specified in the following paragraphs.

a. Prepare and provide all Systems Manuals to the Lead Commissioning Specialist for all equipment, systems, and assemblies listed under each systems category as a single package no later than 60 calendar days prior to first training event for any equipment, system, or assembly in respective systems category.

b. Incorporate all review comments.

3.2.18 Training

3.2.18.1 Training Plans

Training Plans must be prepared for all commissioned equipment, systems, and assemblies and contents must include, but not be limited to, contents specified in the following paragraphs.

a. List of those who should receive training by position or name.

b. List of systems that require training organized by Specification Section.

c. Outline of training topics that addresses design, construction, operation, and maintenance.

d. Learning objectives and training delivery methods.

e. Planned location of the training sessions (classroom, on-site, and off-site).

f. Minimum duration of each training session.

g. Training materials requirements to be used during the instructional process.

h. Training report, records, and recording requirements.

i. Instructor qualifications.

j. Instructor name and contact information.

k. Criteria for determining whether provided training is acceptable.

l. Blank Training Attendance Rosters.

3.2.18.2 Training

Training must be performed in accordance with Training Plans and in accordance with requirements specified in other Sections.

3.2.18.3 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, provide all review

comments to the Installing Contractors for all equipment, systems, and assemblies listed under each systems category as a single package no later than 45 calendar days prior to first training event for any equipment, system, or assembly in respective systems category. Review comments are not required to be submitted to the Government.

3.2.18.4 Commissioning Specialist Responsibilities

Commissioning Specialists must, at a minimum, review and prepare review comments for all Training Plans. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.2.18.5 Installing Contractors Responsibilities

Installing Contractors must, at a minimum, perform activities specified in the following paragraphs.

a. Prepare and provide all Training Plans to the Lead Commissioning Specialist for all equipment, systems, and assemblies listed under each systems category as a single package no later than 60 calendar days prior to first training event for any equipment, system, or assembly in respective systems category.

b. Incorporate all review comments.

c. Perform training as specified in the preceding paragraphs.

d. Require all training attendees to sign Training Attendance Rosters.

e. Provide all Approved Training Plans and Completed Training Attendance Rosters to the Lead Commissioning Specialist for all equipment, systems, and assemblies listed under each systems category as a single package no later than 30 calendar days after the last training event for all equipment, systems, and assemblies in respective systems category.

3.2.19 Final Commissioning Report

3.2.19.1 General Requirements

The Final Commissioning Report must be prepared and contents must include, but not be limited to, contents specified in the following paragraphs.

a. Executive summary describing the overall Commissioning Process.

b. Results of the Commissioning Process.

c. Issues And Resolution Log.

d. Commissioning Design Review Reports.

e. Approved Construction Phase Final Commissioning Plan.

f. Approved Pre-Final Test and Balance Reports.

g. Completed Pre-Functional Checklists.

i. Completed Functional Performance Test Checklists.

k. Approved Training Plans.

l. Completed Training Attendance Rosters.

n. Indication that equipment, systems, and assemblies meet requirements of the Owner's Project Requirements, Basis of Design, and Plans and Specifications.

q. Identification of all deficiencies complete with corrective actions taken.

r. Identification of all repairs, replacements, and calibrations.

s. Identification of unresolved deficiencies complete with resolution plan and responsible Commissioning Team member.

t. List and plan for completion of any testing that must be performed during the Post-Construction (Warranty) Phase.

3.2.19.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, perform activities specified in the following paragraphs.

a. Prepare and submit the Final Commissioning Report no later than 30 calendar days after Beneficial Occupancy.

b. File one copy of Approved Final Commissioning Report in the Sustainability eNotebook no later than 14 calendar days after receiving approval of the Final Commissioning Report.

3.3 POST-CONSTRUCTION (WARRANTY) PHASE

3.3.1 Post-Construction Phase International Green Construction Code Commissioning Compliance

3.3.1.1 General Requirements

Activities must include, but not be limited to, Post-Construction Phase Commissioning Activities listed in ICC IgCC paragraphs 1001.1 through 1001.3.1.3.6, ICC IgCC Informative Appendix I, and ASHRAE 202 as modified in this Section, Post-Construction Phase Commissioning Activities listed in references contained in ICC IgCC's paragraphs and ASHRAE 202 as modified in this Section, and Post-Construction Phase Commissioning Activities specified in this Section.

3.3.1.2 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

The Lead Commissioning Specialist and Commissioning Specialists must, at a minimum, perform all activities specified under item entitled "Post-Construction Phase International Green Construction Code Commissioning Compliance."

3.3.2 Post-Construction Phase Sustainability Third Party Certification (TPC) Commissioning Compliance

3.3.2.1 General Requirements

Activities must include, but not be limited to, Post-Construction Phase Commissioning Activities listed in the reference for pursuing Sustainability TPC, GBI DOD GP Compliance, as modified in this Section, Post-Construction Phase Commissioning Activities listed in all of its references as modified in this Section, and Post-Construction Phase Commissioning Activities specified in this Section.

3.3.2.2 Lead Commissioning Specialist and Commissioning Specialists Responsibilities

The Lead Commissioning Specialist and Commissioning Specialists must, at a minimum, perform activities specified in the following paragraphs.

a. The Lead Commissioning Specialist must submit all Post-Construction Phase documentation of Commissioning Activities directly to the Suitability TPC organization as modified in this Section.

b. The Lead Commissioning Specialist and Commissioning Specialists must perform all activities specified under item entitled "Post-Construction Phase Sustainability Third Party Certification (TPC)."

3.3.3 Post-Construction Phase Issues And Resolution Log

3.3.3.1 General Requirements

The Post-Construction Phase Issues and Resolution Log must be prepared and maintained to track all Commissioning Issues identified by any member of the Commissioning Team. The Post-Construction Phase Issues and Resolution Log must be prepared in an electronic format that can be used throughout the Post-Construction Phase such that it can be provided to the Government upon request. Post-Construction Phase Issues and Resolution Log contents must include, but not be limited to, contents specified in the following paragraphs.

a. Project title and location.

b. Lead Commissioning Specialist's contact information.

c. Issue number.

d. Date issue was discovered.

e. Name of Commissioning Team member identifying the issue.

f. Commissioning Team member responsible for resolving the issue.

g. Current status.

h. Issue description.

i. Pictures of item if available and appropriate.

j. Effects of issue on project or building operation.

k. Possible cause of issue.

l. Proposed resolution.

m. Final resolution and final resolution date.

n. Approvals of issue resolution, including approver's name.

3.3.3.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must prepare and maintain the Post Construction Phase Issues And Resolution Log and must submit one electronic copy no later than 14 calendar days after completion of any Post-Construction Phase Commissioning Activity.

3.3.4 Post-Construction Phase Site Observations

3.3.4.1 General Requirements

Post-Construction Phase Site Observations must be performed for each systems category specified in the following item entitled "Number of Trips" between eight and 10 months after Beneficial Occupancy to verify and document that all commissioned equipment, systems, and assemblies are operating in accordance with the Owner's Project Requirements.

Post-Construction Phase Site Observations are prohibited from being combined with witnessing Post-Construction Phase Functional Performance Testing.

3.3.4.2 Number of Trips

The Number of Post-Construction Phase Site Observations inclusive of all commissioned buildings in this project must be as follows

a. Heating, Ventilation, and Air-Conditioning (HVAC) Systems Category: One eight-hour trip.

b. Plumbing Systems Category: One eight-hour trip.

d. Utility Systems Category: No trips.

e. Electrical Type I Systems Category: No trips.

f. Electrical Type II Systems Category: One eight-hour trip.

i. Building Envelope Systems, Components, and Assemblies Category: One eight-hour trip.

3.3.4.3 Site Observation Reports

Site Observation Reports must be prepared for each Site Observation for the purpose of documenting issues discovered during Site Observation.

3.3.4.4 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, perform activities specified in the following paragraphs.

a. Contact Contracting Officer's Technical Representative no later than 30 calendar days prior to performing Site Observation to schedule attendance of Operations and Maintenance staff and occupants and to make provisions for access to all commissioned equipment, systems, and assemblies.

b. Submit Post-Construction Phase Site Observation Reports no later than 14 calendar days after Site Observation.

3.3.4.5 Commissioning Specialists Responsibilities

Commissioning Specialists must, at a minimum, perform activities specified in the following paragraphs for equipment, systems, and assemblies listed under systems categories assigned to them in this Section. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

a. Interview Operations and Maintenance staff.

b. Interview occupants.

c. Determine status of unresolved Commissioning Issues.

d. Compare current operations to operations identified throughout the Commissioning Process.

e. Prepare Post-Construction Phase Site Observation Reports.

3.3.5 Certified Certificates of Readiness and Certificates of Readiness

Certified Certificates of Readiness and Certificates of Readiness are not required for any Post-Construction Phase activity.

3.3.6 Post-Construction Phase Functional Performance Testing

3.3.6.1 General Requirements

Post-Construction Phase Functional Performance Testing must be performed for all commissioned equipment, systems, and assemblies that could not be fully or successfully tested during the Construction Phase. Testing must be performed using approved checklists and all required Commissioning Team participants must be present prior to start of testing. Testing must be aborted and rescheduled to occur at a later date if any Commissioning Team participant is not present or if deficiencies discovered during testing prevent successful completion.

Post-Construction Phase Functional Performance Testing requirements and activities must include, but not be limited to, requirements and activities specified for Construction Phase Functional Performance Testing as modified in paragraphs under paragraph POST-CONSTRUCTION (WARRANTY) PHASE.

3.3.6.2 Commissioning Team Participants

Participants of Functional Performance Testing must include, but not be limited to, participants specified in the following paragraphs. The Contracting Officer's Technical Representative, Public Works Department Division (PWD) Representatives, and Using Agent's Representatives (Users)

may, but are not required to, participate in any testing.

a. Lead Commissioning Specialist.

b. Commissioning Specialists.

c. Installing Contractors.

d. Equipment Suppliers.

3.3.6.3 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, perform activities specified in the following paragraphs.

a. Contact Contracting Officer's Technical Representative no later than 30 calendar days prior to witnessing Post-Construction Phase Functional Performance Testing to make provisions for access to all commissioned equipment, systems, and assemblies.

b. Coordinate logistics with Installing Contractors.

c. Submit completed Final Functional Performance Test Checklists for each systems category listed under paragraph SYSTEMS TO BE COMMISSIONED as a single submittal no later than 14 calendar days after successful testing of all systems listed under the respective systems category.

3.3.7 Updated Systems Manuals

3.3.7.1 General Requirements

Updated Systems Manuals must be prepared and must be an update to Systems Manuals prepared during the Construction Phase and contents must include, but not be limited to, changes resulting from Post-Construction Phase Commissioning Activities.

3.3.7.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, provide all review comments to the Installing Contractors as a single package 45 calendar days after Post-Construction Phase Site Observations or no later than 45 calendar days after Post-Construction Phase Functional Performance Testing, whichever occurs last. Review comments are not required to be submitted to the Government.

3.3.7.3 Commissioning Specialist Responsibilities

Commissioning Specialists must, at a minimum, review and prepare review comments for all Updated Systems Manuals. Commissioning Specialists are prohibited from performing these responsibilities for equipment, systems, and assemblies listed under systems categories assigned to other Commissioning Specialists.

3.3.7.4 Installing Contractors Responsibilities

Installing Contractors must, at a minimum, perform activities specified in the following paragraphs.

a. Prepare and provide all Updated Systems Manuals to the Lead

Commissioning Specialist as a single package no later than 30 calendar days after Post-Construction Phase Site Observations or no later than 30 calendar days after Post-Construction Phase Functional Performance Testing, whichever occurs last.

b. Incorporate all review comments.

3.3.8 Updated Final Commissioning Report

3.3.8.1 General Requirements

The Updated Final Commissioning Report must be prepared and must be an update to the Final Commissioning Report prepared during the Construction Phase and contents must include, but not be limited to, changes resulting from Post-Construction Phase Commissioning Activities.

3.3.8.2 Lead Commissioning Specialist Responsibilities

The Lead Commissioning Specialist must, at a minimum, prepare and submit the Updated Final Commissioning Report no later than 30 calendar days after completion of all Functional Performance Testing.

File one copy of Approved Updated Final Commissioning Report in the Sustainability eNotebook no later than 14 calendar days after receiving approval of the Updated Final Commissioning Report.

-- End of Section --

SECTION 02 41 00

DEMOLITION AND DECONSTRUCTION
08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI Guideline K	(2009) Guideline for Containers for Recovered Non-Flammable Fluorocarbon Refrigerants

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.6	(2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(2015) Carpet Installation Standard for Commercial Carpet
CRI 105	(2015) Carpet Installation Standard for Residential Carpet

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25	(Jun 2000; Reaffirmed Oct 2010) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders; https://www.dla.mil/Portals/104/Documents/Dispositions/ddsr/docs/cylinderjointpub.pdf

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M	(2006) MILSTRIP - Military Standard Requisitioning and Issue Procedures
MIL-STD-129	(2014; Rev R; Change 1 2018; Change 2 2019) Military Marking for Shipment and Storage

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 173.301	Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.2 PROJECT DESCRIPTION

1.2.1 Definitions

1.2.1.1 Demolition

Demolition is the process of tearing apart and removing any feature of a facility together with any related handling and disposal operations.

1.2.1.2 Deconstruction

Deconstruction is the process of taking apart a facility with the primary goal of preserving the value of all useful building materials.

1.2.1.3 Demolition Plan

Demolition Plan is the planned steps and processes for managing demolition activities and identifying the required sequencing activities and disposal mechanisms.

1.2.1.4 Deconstruction Plan

Deconstruction Plan is the planned steps and processes for dismantling all or portions of a structure or assembly, to include managing sequencing activities, storage, re-installation activities, salvage, and disposal mechanisms.

1.2.2 Demolition/Deconstruction Plan

Prepare a Demolition Plan and Deconstruction Plan and submit proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, and a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be Removed. Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL. Include statements affirming Contractor inspection of the existing roof deck and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan must be approved by Contracting Officer prior to work beginning.

1.2.3 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. The work of this section is to be performed in a manner that maximizes the value derived from the salvage and recycling of materials. Remove rubbish and debris from the project site; do not allow accumulations inside or outside the buildings. The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Comply with FAR 52.236-9 to protect existing vegetation, structures, equipment, utilities, and improvements. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

1.3.2 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.3.3 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a 6-foot-high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.3.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to

start of work, utilities serving each area of alteration or removal will be shut off by the Government or utility provider and disconnected and sealed by the Contractor.

1.3.5 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.5 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the following schedule:

Schedule	
Area	Date

1.6 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition Plan; G

Deconstruction Plan; G

Existing Conditions

SD-07 Certificates

Notification; G

SD-11 Closeout Submittals

Receipts

Waste Diversion from Landfill Report; S

1.7 QUALITY ASSURANCE

Submit timely notification of demolition and deconstruction projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the Regional Office of the United States Environmental Protection Agency (USEPA), State's environmental protection agency, local air pollution control district/agency, and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will be permitted.

1.7.1 Dust and Debris Control

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.8 PROTECTION

1.8.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the Contracting Officer prior to beginning such work.

1.8.2 Protection of Personnel

Before, during and after the demolition and deconstruction work continuously evaluate the condition of the site specific features and structure being demolished and deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Contracting Officer.

1.10 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer or the Contracting Officer's Representative showing the condition of structures and other facilities adjacent to areas of alteration or

removal. Photographs or electronic images with a minimum resolution of 3072 x 2304 pixels, capable of a print resolution of 300 dpi, will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results to the Contracting Officer or the Contracting Officer's Representative.

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures.

b. Provide fill material conforming to the definition of satisfactory soil material as defined in Section 31 00 00 EARTHWORK. In addition, fill material must be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

c. Proposed fill material must be sampled and tested by an approved soil testing laboratory, and compacted as specified in Section 31 00 00 EARTHWORK

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Disassemble existing construction scheduled to be removed for reuse. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Designate materials for reuse onsite whenever possible.

3.1.1 Structures

a. Demolish and remove existing structures indicated to be removed to include slab-on-grade, foundation walls, and footings in their entirety. Remove interior walls, other than retaining walls and partitions, in their entirety. Break up basement slabs and remove in their entirety. Entirely remove sidewalks, curbs, gutters and street light bases as indicated.

b. Demolish and Deconstruct structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish and deconstruct concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Contracting Officer.

c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

d. Building not exceeding 80 feet in height may be demolished by the mechanical method of demolition.

e. Submit Waste Diversion from Landfill Report in compliance with Section 017419 for waste materials diverted from landfill for reuse, reclamation, or recycling.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities, as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 25-foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs including aggregate base as indicated. Provide neat saw cuts at limits of pavement removal as indicated. Move, grind and store pavement and slabs designated to be recycled and utilized in this project as directed by the Contracting Officer. Remove pavement and slabs not to be used in this project from the installation at Contractor's expense.

3.1.5 Roofing

Remove existing roof system and associated components in their entirety down to existing roof deck.

3.1.6 Masonry

Sawcut and remove masonry so as to prevent damage to surfaces to remain, to removed materials being salvaged, and to facilitate the installation of new work. Where new masonry adjoins existing, abut or tie the new work

into the existing construction as indicated or specified for the new work. Provide square, straight edges and corners where existing masonry adjoins new work and other locations. Masonry removed in pieces must be crushed for use as aggregate.

3.1.7 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Saw cuts in existing concrete sidewalk, roads, concrete pads, and parking areas must be at the nearest existing expansion joint or weakened plane joint and at full depth.

3.1.8 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for recycle structural steel, steel joists, girders, angles, plates, columns, and shapes. Flame-cutting torches are permitted when other methods of dismantling are not practical. Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a designated recycling facility or area as directed by the Contracting Officer, stacked according to size, type of member and length, and stored off the ground, protected from the weather.

3.1.9 Miscellaneous Metal

Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Scrap metal is the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

3.1.10 Carpentry

Salvage for recycle lumber, millwork items, and finished boards, and sort by type and size. Chip or shred and recycle salvaged wood unfit for reuse, except stained, painted, or treated wood. Remove windows, doors, frames, and cabinets, and similar items as whole units, complete with trim and accessories. Do not remove hardware attached to units, except for door closers.

3.1.11 Carpet

Remove existing carpet for reclamation in accordance with manufacturer recommendations and as follows. Remove used carpet in large pieces, roll tightly, and pack neatly in a container. Remove adhesive according to recommendations of the Carpet and Rug Institute (CRI). Provide adhesive removal solvents in compliance with CRI 104/CRI 105. Recycle removed carpet cushion.

3.1.12 Acoustic Ceiling Tile

Remove, neatly stack, and recycle acoustic ceiling tiles. Recycling may be available with manufacturer. Otherwise, give priority to a local recycling organization. Recycling is not required if the tiles contain or may have been exposed to asbestos material.

3.1.13 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Make finished surfaces of patched area flush with the adjacent existing surface and match the existing adjacent surface as closely as possible to texture and finish. Provide patching as specified and indicated, and include the following:

a. Concrete and Masonry: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

b. Where existing partitions have been removed leaving damaged or missing resilient tile flooring, patch to match the existing floor tile.

c. Patch acoustic lay-in ceiling where partitions have been removed. Make the transition between the different ceiling heights by continuing the higher ceiling level over to the first runner on the lower ceiling and closing the vertical opening with a painted sheet metal strip.

3.1.14 Air Conditioning Equipment

Remove air conditioning, refrigeration, and other equipment containing refrigerants without releasing chlorofluorocarbon refrigerants to the atmosphere in accordance with the Clean Air Act Amendment of 1990. Recover all refrigerants prior to removing air conditioning, refrigeration, and other equipment containing refrigerants and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)." Turn in salvaged Class I ODS refrigerants as specified in paragraph, "Salvaged Materials and Equipment."

3.1.15 Cylinders and Canisters

Remove all fire suppression system cylinders and canisters and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)."

3.1.16 Locksets on Swinging Doors

Remove all locksets from all swinging doors indicated to be removed and disposed of. Deliver the locksets and related items to a designated location for receipt by the Contracting Officer after removal.

3.1.17 Mechanical Equipment and Fixtures

Disconnect mechanical hardware at the nearest connection to existing

services to remain, unless otherwise noted. Disconnect mechanical equipment and fixtures at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated recycling service for disassembly and recycling of parts.

3.1.17.1 Preparation for Storage

Remove water, dirt, dust, and foreign matter from units; drain tanks, piping, and fixtures; if previously used to store flammable, explosive, or other dangerous liquids, steam clean interiors. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit. Change lubricating systems with the proper oil or grease.

3.1.17.2 Piping

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, attach end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Wrap sprinkler heads individually in plastic bags before boxing. Classify piping not designated for salvage, or not reusable, as scrap metal.

3.1.17.3 Ducts

Classify removed duct work as scrap metal.

3.1.17.4 Fixtures, Motors, and Machines

Remove and salvage fixtures, motors and machines associated with plumbing, heating, air conditioning, refrigeration, and other mechanical system installations. Salvage, box and store auxiliary units and accessories with the main motor and machines. Tag salvaged items for identification, storage, and protection from damage. Classify non-porcelain broken, damaged, or otherwise unserviceable units and not caused to be broken, damaged, or otherwise unserviceable as debris to be disposed of by the Contractor.

3.1.18 Electrical Equipment and Fixtures

Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.

3.1.18.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent,

mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.

3.1.18.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.

3.1.18.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

3.1.18.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

3.1.19 Elevators and Hoists

Remove elevators, hoists, and similar conveying equipment and salvage as whole units, to the most practical extent. Remove and prepare items for salvage without damage to any of the various parts. Salvage and store rails for structural steel with the equipment as an integral part of the unit.

3.1.20 Items with Unique/Regulated Disposal Requirements

Remove and dispose of items with unique or regulated disposal requirements in the manner dictated by law or in the most environmentally responsible manner.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements, and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, become the property of the Contractor and must be removed from Government property. Materials approved for storage by the Contracting Officer must be removed before completion of the contract. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in

the Contractor upon approval by the Contracting Officer. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment listed in the Demolition and Deconstruction Plan and indicated to be reused or relocated to prevent damage and reinstall as the work progresses. Coordinate the re-use of materials and equipment with the re-use requirements in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL. Capture re-use of materials in the diversion calculations for the project.

3.3.3 Salvaged Materials and Equipment

Remove materials and equipment that are listed in the Demolition and Deconstruction Plan and indicated and specified to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site, as directed by the Contracting Officer.

a. Salvage items and material to the maximum extent possible.

b. Store all materials salvaged for the Contractor as approved by the Contracting Officer and remove from Government property before completion of the contract. Coordinate the salvaged materials with tracking requirements in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL. Capture salvaged materials in the diversion calculations for the project.

c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.

d. Remove historical items in a manner to prevent damage. Deliver the following historical items to the Government for disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.

e. Remove and capture all Class I ODS refrigerants in accordance with the Clean Air Act Amendment of 1990, and turn in to the Navy by shipping the refrigerant container to the Defense Logistics Agency at the following address:

   Defense Depot Richmond VA (DDRV)
   SW0400
   Cylinder Operations
   8000 Jefferson Davis Highway
   Richmond, VA 23297-5900

3.3.4 Disposal of Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Section, 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting AHRI Guideline K suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. Remove recovered ODS from Government

property and dispose of in accordance with 40 CFR 82. Dispose products, equipment and appliances containing ODS in a sealed, self-contained system (e.g., residential refrigerators and window air conditioners) in accordance with 40 CFR 82. Submit Receipts or bills of lading, as specified. Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped to the Defense Depot, Richmond, Virginia.

3.3.4.1 Special Instructions

No more than one type of ODS is permitted in each container. Apply a warning/hazardous label to the containers in accordance with Department of Transportation regulations. Provide a tag with the following information on all cylinders including but not limited to fire extinguishers, spheres, or canisters containing an ODS:

a. Activity name and unit identification code

b. Activity point of contact and phone number

c. Type of ODS and pounds of ODS contained

d. Date of shipment

e. National stock number (for information, call (804) 279-4525).

3.3.4.2 Fire Suppression Containers

Deactivate fire suppression system cylinders and canisters with electrical charges or initiators prior to shipment. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.3.5 Transportation Guidance

Ship all ODS containers in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

3.3.6 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable noncombustible material in a licensed disposal facility located off the installation. Dispose of unsalvageable and non-recyclable combustible material in a licensed facility located off the installation.

3.4 CLEANUP

Remove debris and rubbish from project site and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials

resulting from removal operations with all applicable federal, state and local regulations as contractually specified in the Waste Management Plan. Storage of removed materials on the project site is prohibited.

3.5.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

3.5.3 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed and per Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

-- End of Section --

SECTION 02 65 00

UNDERGROUND STORAGE TANK REMOVAL
11/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API PUBL 1628	(1996) A Guide to the Assessment and Remediation of Underground Petroleum Releases
API RP 1604	(1996; R 2010) Closure of Underground Petroleum Storage Tanks
API RP 2003	(2015; 8th Ed) Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
API RP 2217A	(2017) Safe Work in Inert Confined Spaces in the Petroleum and Petrochemical Industries
API RP 2219	(2016) Safe Operation of Vacuum Trucks Handling Flammable and Combustible Liquids in Petroleum Service
API Std 2015	(2018) Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks

ASTM INTERNATIONAL (ASTM)

ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2167	(2015) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4397	(2016) Standard Specification for Polyethylene Sheeting for Construction,

	Industrial, and Agricultural Applications
ASTM D6938	(2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 200-1-1	(1994) Environmental Quality -- Validation of Analytical Chemistry Laboratories
EM 200-1-6	(1997) Environmental Quality -- Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects
EM 200-1-7	(2001) Environmental Quality - Performance Evaluation (PE) Program
EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual
EM 1110-1-4006	(1998) Engineering and Design -- Removal of Underground Storage Tanks (USTs)

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 530-R-97-007	(1997) Best Management Practices (BMPs) for Soils Treatment Technologies; Suggested Operational Guidelines to Prevent Cross-Media Transfer of Contaminants During Cleanup Activities
EPA 600/4-79/020	(1983) Methods for Chemical Analysis of Water and Wastes
EPA SW-846	(Third Edition; Update IV) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific

	Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 279	Standards for the Management of Used Oil
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)

1.2 SYSTEM DESCRIPTION

The work consists of removal, decontamination and disposal of one underground storage tank and associated piping and ancillary equipment, including but not limited to dewatering (if approved), disposal of contaminated soil, laboratory testing, providing reports which are required by regulatory agencies, and backfilling. Tank construction and size is unknown and must be field verified prior to removal. The tank is at the location shown on the drawings. The tank was used for storing fuel oil and will be taken out of service as part of the demolition of B524. Residue remaining in the tank is considered a hazardous waste. Subsurface conditions are represented on drawings. Groundwater is not expected to be encountered. Verify the actual conditions prior to submitting a bid. The site is not a hazardous waste site, but due to the nature of the materials and hazards present, use specified procedures until closure activities are complete.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Work Plan; G.

Site Safety and Health Plan; G

Excavation and Material Handling Plan; G

Field Sampling and Laboratory Testing Plan; G

Tank and Piping Removal and Disposal Plan; G

Spill and Discharge Control Plan; G

Qualifications; G

Laboratory Services; G

State Licensed Hazardous Waste Transporter

SD-06 Test Reports

Laboratory and Field-Testing Reports

Backfill Material

Tank Contents Verification

Contaminated Water Disposal

Soil Examination, Testing, and Analysis

Backfilling; G.

SD-11 Closeout Submittals

Salvage Rights; G

Tank Closure Report

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

Substantiate a minimum of 2 years of tank removal experience, including subcontractors and personnel employed on the project, and certification by the State, County or local authority having jurisdiction for tank removal work. Include experience for removal, transportation, and disposal of underground tanks and associated piping, in conformance with the following:

a. API RP 1604

b. 40 CFR 280, State and local regulations, and procedures.

c. Applicable safety rules and regulations.

d. Use of equipment and procedures for testing and vapor-freeing tanks.

e. Handling and disposal of types of wastes encountered in underground tank and pipe removal including disposal of underground tanks and associated piping.

f. Excavation, testing, and disposal of petroleum contaminated soils, liquids, and sludge.

g. Project titles, dates performed, owner's names, points of contact for each project with current contact phone numbers.

1.4.2 Laboratory Services

Submit documentation for laboratory services in accordance with EM 1110-1-4006, EM 200-1-1, EM 200-1-6 and EM 200-1-7.

1.4.3 Support Staff

Identify all staff involved for the various components, including personnel collecting and shipping samples, and detail staff member's qualifications.

1.4.4 Preconstruction Conference and Work Plan

Prior to the commencement of work, a preconstruction conference will be scheduled by the Contracting Officer. Prepare and submit a comprehensive

Work Plan within 30 days of contract award. The work plan will conform to the requirements of this specification, API RP 1604, API Std 2015, API RP 2003, API RP 2217A and API RP 2219. Allow 30 days in the schedule for the Government's review and approval. No adjustment for time or money will be made for re-submittals required as a result of noncompliance. No work at the site is allowed, with the exception of site inspections and mobilization, until the Work Plan is approved. As a minimum, include the following in the Work Plan:

1.4.4.1 Site Safety and Health Plan

Furnish detailed safety, health, and accident prevention provisions and develop a Site Safety and Health Plan (SSHP). Incorporate the requirements of 29 CFR 1910 and EM 385-1-1 into the SSHP. Include current training certification statement for personnel prior to entry into the work site. Do not commence work until the SSHP is approved by the Contracting Officer. As a minimum, include the following:

a. Health and safety organization, including discussion of distribution of functions and responsibilities.

b. Organization and components of the SSHP.

c. Physical and chemical site hazard identification.

d. Basic toxicology and toxicity information.

e. Discussion of the EZ and CRZ.

f. Protective clothing.

g. Respiratory protection.

h. Air quality monitoring.

i. Personnel exposure guidelines.

j. Decontamination procedures.

k. Basic first aid review.

l. Emergency response and contingency plan.

m. Site entry and exit procedures.

n. Sampling procedures.

1.4.4.2 Excavation and Material Handling Plan

Describe methods, means, equipment, sequence of operations and schedule to be employed in excavation, transport, handling, borrowing source and stockpiling of soil during underground tank removal. Include shoring requirements. Fifteen days before beginning tank removal work, submit to the Contracting Officer, for approval, a material handling plan that describes phases of dealing with the contaminated soil and water as it relates to the proposed tank and piping removal, including methods of excavating, a material handling plan for the contaminated material, soil testing requirements, and water pumping and collection requirements.

1.4.4.3 Field Sampling and Laboratory Testing Plan

Describe field sampling methods and quality control procedures. Identify laboratory and laboratory methods to be used for contamination testing. Include sample reports showing sample identification for location, date, time, sample method, contamination level, name of individual sampler, identification of laboratory, and quality control procedures.

1.4.4.4 Tank and Piping Removal and Disposal Plan

Describe methods, means, sequence of operations, and schedule to be employed in the testing, pumping, cleaning, de-vaporizing, inspecting, cutting and removal, and disposal of underground storage tanks and piping. Include methods to be employed for product, sludge, vapor, and pumpable liquid removal; purging and inerting; and storage methods proposed for control of surface water. Also address the following:

a. Treatment Options

b. Identification of waste, tank and contaminated soil transporters and means of transport.

c. Disposal and alternate facilities, disposal or remediation.

d. Decontamination procedures and coordination with SSHP.

1.4.4.5 Spill and Discharge Control Plan

Develop a comprehensive spill and discharge control plan. Consider and provide contingency measures for potential spills and discharges from handling and transportation of contaminated soils and water. A possible source of guidance for assessment and remediation is API PUBL 1628.

1.4.4.6 Site Safety and Health Officer

Identify an individual to serve as the Site Safety and Health Officer (SSHO) to report problems and concerns regarding health and safety to the Contracting Officer. Provide documentation that the SSHO possesses working knowledge of local and Federal occupational safety and health regulations, and provide training, in accordance with 29 CFR 1910 to Contractor employees in air monitoring practices and techniques. The SSHO must remain onsite to provide day to day industrial hygiene support, including air monitoring, training, and daily site safety inspections. The SSHO may be assigned other duties, such as project foreman or quality control manager.

1.4.5 Permits and Licenses

As required or as directed by the Contracting Officer, obtain local, state, or federal permits and licenses that directly impact the Contractor's ability to perform the work prior to commencing removal operations. Submit a Notification of Scheduled Permanent Closure of Underground Storage Tanks to the Connecticut Department of Energy and Environmental Protection a minimum of 30 days before beginning permanent closure of the underground storage tank.

1.4.6 Statutes and Regulations

Perform tank closures, removal, and disposal in accordance with 40 CFR 280, 40 CFR 262, 40 CFR 264, and 40 CFR 265 as well as the applicable local, State of Connecticut, and Federal regulations. Transport hazardous material and waste in accordance with Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

1.5 PROJECT/SITE CONDITIONS

Notify the Installation Environmental Coordinator (IEC) and the Contracting Officer 30 days prior to tank removal. The Contractor is responsible for contacting the Implementation Agency (IA) in accordance with the applicable reporting requirements.

PART 2 PRODUCTS

2.1 BACKFILL MATERIAL

Obtain backfill material from offsite. Classify backfill in accordance with ASTM D2487 as GW, GP, GM, GC, SW, SP, SM, SC, MH, CL, or CH and free from roots and other organic matter, trash, debris, snow, ice, or frozen materials. Secure and submit soil classification test results, including the chain-of-custody records, prior to bringing offsite materials onsite. The testing frequency for backfill material is 1 per 1000 cubic yards or a minimum of 1 test. Use non-contaminated material removed from the excavation for backfill in accordance with Paragraph BACKFILLING.

2.2 PLASTIC SHEETING

Provide plastic sheeting conforming to ASTM D4397.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Furnish labor, materials, necessary permits, laboratory tests, and reports and equipment to remove and dispose of products remaining in the underground tanks; clean and vapor free the underground tanks and connecting product and vapor recovery piping; excavate, remove underground tanks and associated piping, and backfill to the level of the adjacent ground; sample soil and water to determine if contaminated; dispose of tanks and associated piping, and petroleum contaminated soil.

3.1.1 Safety Guidelines

Comply with personnel safety guidelines and conform to the guidelines as stipulated in the approved SSHP.

3.1.2 Exclusion Zone (EZ) And Contamination Reduction Zone (CRZ)

Do not permit personnel, not directly involved with the project, to enter work zones, called the EZ and CRZ. The EZ is an area around the tank a minimum of 10 feet from the limits of the tank excavation. At the perimeter of the EZ, establish a CRZ. Clean equipment and personnel within the CRZ, as stated in the paragraph titled "Personnel and Equipment Decontamination." Locate the Contractor's site office, parking area, and other support facilities outside the EZ and CRZ. Clearly mark and post boundaries of the EZ and CRZ. Include a site map, outlining the extent of

work zones and location of support facilities, in the SSHP.

3.1.3 Onsite Training

Prior to starting onsite work, conduct a health and safety training class directed by the SSHO to discuss the implementation of the SSHP. Notify the Contracting Officer 24 hours prior to beginning the training class.

3.1.4 Personnel Protection

Furnish appropriate personal safety equipment and protective clothing to personnel and ensure that safety equipment and protective clothing is kept clean and well maintained. Furnish three clean sets of personal protective equipment and clothing for use by the Contracting Officer or official visitors as required for entry into the EZ.

3.1.5 Respiratory Protection Program

Fully employ respiratory protection program, addressing respirator usage and training, in accordance with 29 CFR 1910 and EM 385-1-1.

3.1.6 Decontamination

Decontaminate or properly dispose of personal protective equipment and clothing worn in contaminated areas at the end of the workday. The SSHO is responsible for ensuring that personal protective clothing and equipment are decontaminated before being reissued.

3.1.7 Emergency Response and First Aid Equipment

a. Prior to commencement of work, thoroughly review emergency response and contingency plan in accordance with 29 CFR 1910. In an emergency, take action to remove or minimize the cause of the emergency, alert the Contracting Officer, and institute necessary measures to prevent repetition of the emergency. Equip site-support vehicles with route maps providing directions to the medical treatment facility.

b. Provide appropriate emergency first aid equipment for treatment of exposure to site physical and chemical hazards. Provide and post a list of emergency phone numbers and points of contact for fire, hospital, police, ambulance, and other necessary contacts. Provide and post a route map detailing the directions to the nearest medical facility.

c. Notify the Contracting Officer of any unforeseen hazard or condition which becomes evident during work.

3.1.8 Burning and Explosives

Use of explosives or burning debris is not allowed. Do not permit ignition sources in the EZ and CRZ.

3.1.9 Protection of Existing Structures and Utilities

Take all necessary precautions to avoid damage to existing structures, their appurtenances, monitoring wells, or utilities that may be affected by work activities. Repair any damage to utilities or monitoring wells resulting from the Contractor's operations at no expense to the Government. Coordinate with the installation to locate underground

utilities prior to beginning construction. Do not disturb utilities encountered which were not previously shown or otherwise located without approval from the Contracting Officer.

3.2 TANK CONTENTS VERIFICATION

Conduct sampling and analysis in accordance with the approved Sampling and Analysis Plan. Submit reports, including the chain-of-custody records.

3.2.1 Sampling

Sample tank product, pumpable liquids, tank coatings and sludge. If the data is not adequate, additional sampling and analysis to the extent required by the approved offsite permitted treatment, storage, or disposal (TSD) facility receiving the material is the responsibility of the Contractor. Meeting all regulatory requirements, including the preparation of hazardous materials and waste for transportation, is the responsibility of the Contractor.

3.2.2 Analysis

Test tank contents for the parameters listed herein. Include total petroleum hydrocarbons (TPH), benzene, ethylbenzene, toluene and xylene (BETX) and lead in the analysis.

3.2.3 Characterization

Prior to removing any of the tank contents, characterize the contents to determine the type of required disposal: as a hazardous special waste based on local, state, and Federal disposal regulations. Characterize tank product in accordance with 40 CFR 261 and 40 CFR 279. Submit the waste contents determination and accompanying test results for each phase present in the tank to the Contracting Officer. The Contractor is responsible for any additional requirements identified by the disposal facility. Do not remove the tank contents until approval is given by the Contracting Officer.

3.3 CLEARING, GRUBBING AND REMOVALS

Perform clearing and grubbing in accordance with Section 31 11 00 CLEARING AND GRUBBING.

3.4 TOPSOIL

Ensure topsoil meets the requirements in Section 31 00 00 EARTHWORK.

3.5 PREPARATIONS FOR EXCAVATION

Before excavating, drain product piping back to the tank remove residual liquids trapped in the product lines and remove all product from the tank. Purge and vent the tank in accordance with API RP 1604, and as specified herein.

3.5.1 Removal of Product, Pumpable Liquids, and Sludge

Remove and dispose of tank product, pumpable liquids, and sludge. Use of Government facilities for permanent storage or disposal of the wastes is prohibited. Temporary storage on Government facilities will be allowed only until testing is complete, manifests (if necessary) are complete, and

transportation is arranged. The Contractor is responsible for obtaining all required permits. Usable product will be the property of the Contractor. Provide approved containers, vehicles, equipment, labor, signs, labels, placards and manifests and associated land disposal restriction notices and notifications, necessary for accomplishment of the work, including materials necessary for cleaning up spills that could occur from tank removal operations.

3.5.2 Contaminated Water Disposal

3.5.2.1 Sampling, Analysis, and Containment

Sample and analyze contaminated water both prior to and after treatment. Analyze contaminated water produced from excavation operations and tank pumping treated onsite, for pH; benzene, ethylbenzene, toluene, and xylene (BETX); total lead; oil and grease; and total petroleum hydrocarbons (TPH). Perform sampling and analysis prior to disposal for every 50,000 gallons of contaminated water treated. Conform analysis of contaminated water to be taken to an offsite treatment facility to the requirements of the treatment facility, with documentation of all analyses performed furnished to the Contracting Officer in accordance with paragraph RECORDS. Contain, store onsite, and analyze contaminated water prior to transport to the approved treatment, storage and disposal facility and dispose of in accordance with applicable Federal and state disposal regulations. Provide approved containers, vehicles, equipment, labor, signs, labels, placards and manifests and associated land disposal notices and notifications, necessary for accomplishment of the work.

3.5.2.2 Treatment

Treat contaminated water offsite by oil water separation filtering, air stripping and activated carbon, or other means as approved by the Contracting Officer. If contaminated water is to be treated onsite, specify the proposed treatment in the Work Plan and submit for approval, including the chain-of-custody records. Install temporary storage and treatment equipment in the general vicinity of the tank at a location approved by the Contracting Officer. Sample and analyze treated effluent and secure approval of results by the Contracting Officer before discharge to the sanitary sewer. Treat and discharge effluent in accordance with the discharge permit.

3.6 PURGING AND INERTING

After the tank and piping contents have been removed, but prior to excavation beyond the top of the tank, disconnect all the piping (except the piping needed to purge or inert the tank). Purge flammable and toxic vapors from the tank or make the tank inert in accordance with API RP 1604, with the exception that filling with water is not permitted and, if dry ice is employed, use a minimum of 3 pounds per 100 gallons of tank volume. Continuously monitor the tank atmosphere for combustible vapors if the tank is purged, or continuously monitor for oxygen, if the tank is inerted.

3.7 EXCAVATION

Mark all excavation areas, as well as work near roadways.

3.7.1 Exploratory Trenches

a. Excavate exploratory trenches as necessary to determine the tank location, limits, and the location of ancillary equipment. Upon commencing exploratory excavation, utilize organic vapor analyzer/flame ionization device (OVA/FID) equipment to obtain readings for total petroleum hydrocarbons (TPH), benzene, tolulene, ethylbenzene, and xylene (BTX), and toxicity characteristic leaching procedure (TCLP). If BTEX indicates gasoline, then provide TCLP.

b. Contaminated soil materials may be used as backfill for tank and pipe excavations. To determine soil contamination levels, continuously monitor soil materials excavated to remove tanks with an OVA/FID capable of detecting volatile organic vapors to a minimum of one ppm. Further test contaminated soils with OVA/FID readings of 10 ppm or greater for TPH and BTEX as specified herein. Soils with OVA/FID readings less than 10 ppm may be used as clean backfill. Dispose of contaminated soils in accordance with Federal, State, and local regulations.

3.7.2 Tank Excavation

a. Provide Contracting Officer with written documentation, no later than 30 days before work begins, that proper State or local authorities have been notified. Notify the Contracting Officer at least 48 hours prior to start of tank removal work. Stage operations to minimize the time that tank excavation is open and the time that contaminated soil is exposed to the weather. Provide protection measures around the excavation area to prevent water runoff and to contain the soil within the excavation area.

b. Perform excavation around the perimeter of the tank to limit the amount of potentially petroleum contaminated soil that could be mixed with previously uncontaminated soil. Segregate petroleum contaminated soil in separate stockpiles.

c. Maintain an excavation around the tank of sufficient size to allow workers ample room to complete the work, but also protect the workers from sliding or cave-ins. Install sheeting, bracing, or shoring in the absence of adequate side slopes if there is a need for workers to enter the excavated area. Divert surface water to prevent direct entry into the excavation.

d. Dewatering of the excavation may require a discharge permit by the State and will be limited to allow adequate access to the tank and piping, to assure a safe excavation, and to ensure that compaction and moisture requirements are met during backfilling. Dewatering may result in the production of petroleum contaminated water and/or free product. Recover free product from the groundwater only as part of necessary dewatering.

e. Collect and test water generated by dewatering during excavation required for removal of tanks or piping, surface water collected in open excavation, or water used for washing equipment or existing concrete or bituminous surfaces, in accordance with EPA 530-R-97-007, EPA 600/4-79/020, EPA SW-846 and state or locally required analyses.

3.7.3 Temporary Containment of Excavated Soil

Provide temporary containment area near the excavated area. Cover containment area with 30 mil polyethylene sheeting. Place excavated soil on the impervious barrier and cover with 6 mil polyethylene sheeting. Provide straw bale berm around the outer limits of the containment area and cover with polyethylene sheets. Secure edges of sheets to keep the polyethylene sheeting in place.

3.7.4 Piping Excavation

Perform excavation as necessary to remove tank piping and ancillary equipment in accordance with paragraphs: Shoring, Tank Excavation, and Open Excavations.

3.7.5 Open Excavations

Secure open excavations and stockpile areas while awaiting confirmation test results from the soil beneath the tank. Backfill the excavation as soon as possible after tank and contaminated soil removals have been completed and confirmation samples have been taken. Divert surface water around excavations to prevent water from directly entering into the excavation.

3.7.6 Hidden Structures

During excavation activities, if asphalt pavement, concrete slabs, or other hidden structures are encountered, remove and wash with high pressure water cleaning equipment. Remove and dispose of the pavement, concrete, and other structures as specified in Section 02 41 00 DEMOLITION.

3.7.7 Stockpiles

Uncontaminated excavated soil and petroleum contaminated soil, that is not a state-regulated hazardous waste, will be stockpiled and used for backfill in the tank excavation prior to using borrow material. Excavated material that is regulated by the state as a hazardous waste which is visibly stained which has an obvious petroleum odor or as required by the State of Connecticut or implementing agency is considered contaminated. Place in containers such as drums, roll-offs, or dumpsters for sampling in accordance with paragraph Stockpiled Material Sampling. Separately stockpile uncontaminated soil from the contaminated soil, a safe distance away from, but adjacent to, the excavation. Place allowable stockpiles of contaminated soil on an impermeable geomembrane a minimum of 3 layers, each 6 mils thick, covered with a 6 mils sheet of geomembrane. Place the geomembrane to prevent the stockpiled soil from coming into contact with surface water run-off. Locate the geomembrane and container cover to prevent rain or surface water from coming into contact with the contaminated soil, as well as limit the escape of the volatile constituents in the container or stockpile.

3.7.8 Acceptable Levels of Contamination

Take further samples and test soils with OVA/FID readings of 10 ppm or greater for TPH and for BTEX in accordance with EPA SW-846 and EPA 600/4-79/020, and for toxicity characteristic leaching procedure (TCLP) for lead if leaded gasoline was stored in or near the underground tank being removed. For stockpiled soils, provide a minimum of one test for every 100 cubic yards for TPH, and one test for every 25 cubic yards

for BTEX and TCLP. Soils that contain 50 ppm or more TPH, 10 ppm or more BTEX or have TCLP reading of 10 ppm lead or virgin petroleum products are considered contaminated materials. Soils which are less than the above may be used as clean fill. Furnish results to the Contracting Officer within 24 hours after the results are obtained.

3.8 REMOVAL OF PIPING, ANCILLARY EQUIPMENT, AND TANK

3.8.1 Piping and Ancillary Equipment

Disconnect all piping and ancillary equipment from the tank. Remove the piping as directed by the Contracting Officer. Cap all tank ancillary equipment and piping connections, except those connections necessary to inert the tank within the excavation zone. Clean the piping exterior and ancillary equipment to remove all soil and inspect for signs of corrosion and leakage. Ensure no spillage of the piping contents occurs, as specified in the Work Plan, and as required in paragraph SPILLS. If the soil under and around the tank pad is contaminated, remove the tank pad and dispose of offsite at an approved hazardous waste facility. If not contaminated, leave the tank pad in place.

3.8.2 Tank

Remove the tank from the excavation and clean the exterior to remove all soil and inspect for signs of corrosion, structural damage, or leakage. Use only non-sparking type materials or equipment which comes into contact with the tank, or in the vicinity of the excavation such as shovels, slings and tools. After removal from the excavation, place the tank on a level surface adjacent to the tank excavation and secure it with wood blocks to prevent movement.

3.8.3 Contaminated Soil, Tank and Piping Excavation Examination

a. After the tank has been removed from the ground, examine, and test the adjacent and underlying soil for any evidence of leakage. Visually inspect the soil for staining after removal of all obviously contaminated soil, then screen for the presence of volatile and/or semi-volatile contamination using a real time vapor monitoring instrument or immunoassay field kits.

b. If tank is 20 feet or less in length, take two samples. Take each sample 2 feet from each end of the tank and 2 feet below the bottom of the excavation.

c. If the tank is greater than 20 feet, take three samples. Take two samples 2 feet from each end of the tank and 2 feet below the bottom of the excavation. Take a third sample from the middle of the tank area and 2 feet below the bottom of the excavation.

d. Analyze samples for TPH, BTEX, and TCLP. Perform sampling and analysis conforming to standards specified above for stockpiled soils. Soils that contain 50 ppm or more TPH, 10 ppm or more BTEX, or have TCLP reading of 10 ppm of lead or virgin petroleum products are considered contaminated materials. Soils which are less than the above may be used as clean fill. Furnish results to the Contracting Officer within 24 hours after the results are obtained. Along with the results furnish a sketch showing underground tank, sampling location, and extent of excavations.

e. Stockpile onsite in accordance with paragraph Stockpiles uncontaminated soil or petroleum contaminated soil not regulated by the state as hazardous waste. Stockpile contaminated soil or suspected contaminated soil, or, if the site is a RCRA-designated CAMU, containerized until further disposition.

f. The Contracting Officer or State of Connecticut inspector will determine the extent of the contaminated soil to be removed from each site. Report any evidence indicating that the amount of contaminated soil may exceed the individual site limit specified, to the Installation's Environmental Coordinator and Contracting Officer the same day it is discovered. If minimal additional excavation is required, the Contracting Officer may allow the Contractor to proceed. If extensive contamination is encountered, sample the excavation, and backfill in accordance with paragraph BACKFILLING.

3.8.4 Testing Along Piping

For every 25 linear feet of product delivery piping, for every change in direction, and at every mechanical joint take soil sample and analyze for TPH, BTEX, and TCLP. Conform sampling and analysis of soil materials to EPA standards specified above.

3.9 TANK CLEANING

Provide clean and vapor free tank in accordance with API RP 1604.

a. Fuel Removal: All possible fuel will be pumped or otherwise removed from the tank by the Government. Consider remaining fuel contaminated or waste fuel; pump into 55 gallon drums or other suitable containers for disposal in accordance with approved procedures meeting local, State, and Federal regulations. Dispose of remaining fuel emulsions in accordance with applicable local, State, and Federal regulations. Drums or tanks used for containerizing waste fuel will be furnished by the Contractor. Oil/water separator for fuel will be furnished by the Contractor.

3.9.1 Exterior

Remove soil from the exterior of the tank, piping, and associated equipment to eliminate soil deposition on roadways during transportation to a temporary storage area, ensure markings will adhere to the surfaces, and simplify tank cutting. Use non-sparking tools to remove soil. Recover removed uncontaminated soil and soil not regulated by the state as a hazardous waste and use them as backfill in the former tank excavation or disposed of onsite. Remove and containerize soil believed to be contaminated, or if the site is a RCRA designated CAMU, collect it on 3 layers of 6 mil impermeable geomembrane and stockpile it with other contaminated soil removed from the excavation.

3.9.2 Temporary Storage

If the tank is stored after the tank exterior is cleaned and ancillary equipment is removed, and prior to being cut into sections, label the tank as directed in API RP 1604, place it on blocks, and temporarily store it on a flat area adjacent to the excavation. Prior to cleaning the tank interior, monitor the tank atmosphere for combustible vapors and purge or inert it if combustible vapors are detected. Provide warning labels as

follows:

"TANK HAS CONTAINED FUEL OIL

NOT VAPOR FREE

NOT SUITABLE FOR STORAGE OF FOOD OR LIQUIDS
INTENDED FOR HUMAN OR ANIMAL CONSUMPTION

DATE OF REMOVAL: MONTH/DAY/YEAR"

Make tank unusable for future use, then transport and dispose of tank at an EPA approved disposal site in accordance with applicable local, State, and Federal regulations.

3.9.3 Interior

Clean tank interior using a high pressure (greater than 500 psi), low volume (less than 2 gpm) water spray or Steam clean tank interior until all loose scale and sludge is removed, and contamination, in the form of a sheen, is no longer visible in the effluent stream. Also clean the interior surfaces of piping, to the extent possible, using the same method used for cleaning the tank. Contaminated water generated from interior cleaning operations (of both piping and tank) must not exceed the following quantities for each UST cleaned:

UST VOLUME (GALLONS)	PERCENT OF UST VOLUME
1,000 or less	5
10,000 or less	5 or 100 gal., whichever is less
20,000 or less	1 or 150 gal., whichever is less
greater than 20,000	1 or 250 gal., whichever is less

Handle in accordance with paragraph Contaminated Water Disposal all contaminated water resulting from cleaning operations. Clean so as to eliminate, to the greatest extent possible, the need for personnel to enter the tank. Use specially designed tank cleaning equipment which allows the tank to be cleaned prior to cutting into sections without requiring personnel to enter the tank or, if less specialized equipment is used, the tank is to be partially dissected to overcome confined space entry hazards.

3.10 SOIL EXAMINATION, TESTING, AND ANALYSIS

3.10.1 Tank Excavation Sampling Procedures

After soil known to be contaminated has been removed or after soil excavation is complete, sample the excavation with procedures, number, location, and methodology in accordance with state regulations.

3.10.2 Stockpiled Material Sampling

Sampling locations, number and specific procedures are as required by the State of Connecticut and the disposal facility.

3.10.3 Analysis

Test soil samples from the excavation and stockpiled material in accordance with the approved Sampling and Analysis Plan for the following parameters: total petroleum hydrocarbon (TPH), benzene, ethylbenzene, toluene, xylene (BETX) and toxicity characteristic leaching procedure (TCLP). Submit copies of all test results, including the chain-of-custody records, to the Contracting Officer.

3.11 BACKFILLING

a. Backfill the tank area and any other excavations as soon as possible after tank and contaminated soil removals have been completed and confirmation samples have been taken and only after the soil test results have been approved. Complete contaminated soil removal after the bottom of the tank excavation is determined to have soil contamination levels below the state standards of 100 ppm TPH approval by the state inspector or Contracting Officer.

b. Dewater the excavation if necessary. Use stockpiled material, subjected to chemical confirmation testing as backfill, if it is found to conform to the requirements of clean fill in accordance with appropriate state and local regulations contain less than 100 ppm of total petroleum hydrocarbons (TPH) and contain less than 10 ppm of BETX. Place clean backfill in layers with a maximum loose thickness of 8 inches, compacted to 90 percent maximum density for cohesive soils and 95 percent maximum density for cohesionless soils. Perform density tests using an approved commercial testing laboratory or by facilities furnished by the Contractor. Attach test results to Contractor's Quality Control Report; submit 6 copies of the report for each UST site opened, prepared in a standard 3-ring binder, within 14 days of completing work at each site. Label each binder with contract number, project name, location, and tank number; each binder must be indexed. Furnish a copy of the report to the Installation Environmental Coordinator. Perform a minimum of 1 density test on each lift. Determine laboratory tests for moisture density relations in accordance with ASTM D1557, Method B, C, or D, or ASTM D6938. A mechanical tamper may be used, provided that the results are correlated with those obtained by the hand tamper. Determine field in-place density is in accordance with ASTM D1556/D1556M, ASTM D6938, or ASTM D2167.

3.12 DISPOSAL REQUIREMENTS

3.12.1 Treatment, Disposal, and Recycling

Perform disposal of hazardous or special wastes in accordance with all local, State, and Federal solid and hazardous waste laws and regulations; the RCRA; Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS; and conditions specified herein. This work includes all necessary personnel, labor, transportation, packaging, detailed analyses (if required for disposal, manifesting, or completing waste profile sheets), equipment, and reports. Recycle product and pumpable liquids removed from the tank to the greatest extent practicable. Dispose of the

tanks removed at a state approved facility. Provide manifest for each tank disposed of in this manner as required by the State of Connecticut to document delivery and acceptance at the disposal facility.

3.12.2 Tank and Ancillary Equipment Disposal

After the tank, piping, and ancillary equipment have been removed from the excavation and the tank cleaned, cut the tank into sections with no dimension greater than 5 feet. Recycle or dispose of tank and piping sections in a State approved offsite disposal facility. Perform tank cutting prior to being taken off Government property. Do not sell the tank intact. Recycle or dispose of ancillary equipment at an approved offsite disposal facility Piping must be disconnected from the tank and removed unless otherwise indicated.

3.12.3 Transportation of Wastes

Provide transportation in accordance with Department of Transportation (DOT) Hazardous Material Regulations and State and local requirements, including obtaining all necessary permits, licenses, and approvals. Submit evidence that a State licensed hazardous waste transporter is being used.

3.12.4 Salvage Rights

The Contractor retains the rights to salvage value of recycled or reclaimed product and metal not turned in to the DLA Disposition Services or otherwise identified, so long as the requirements of 40 CFR 266 and 40 CFR 279, or the applicable State requirements are met. At the end of the contract, provide documentation on the disposition of salvaged materials.

3.12.5 Manifest Records

Maintain records of all waste determinations, including appropriate results of analyses performed, substances and sample location, the time of collection, and other pertinent data as required by 40 CFR 280, Section 74 and 40 CFR 262 Subpart D. Also record transportation, treatment, disposal methods and dates, the quantities of waste, the names and addresses of each transporter and the disposal or reclamation facility, and available for inspection, as well as copies of the following documents:

a. Manifests.

b. Waste analyses or waste profile sheets.

c. Certifications of final treatment/disposal signed by the responsible disposal facility official.

d. Land disposal notification records required under 40 CFR 268for hazardous wastes.

Provide records in accordance with Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. Upon contract close out, the records will become the property of the Government.

3.12.6 Hazardous/Special Waste Manifests

Provide manifesting conforming to the requirements specified in Section

02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.12.7 Documentation of Treatment or Disposal

Take wastes, other than recyclable or reclaimable product or metal, to a treatment, storage, or disposal facility which has EPA or appropriate state permits and hazardous or special waste identification numbers and complies with the provisions of the disposal regulations. Furnish documentation of acceptance of special waste by the original return copy of the hazardous waste manifest, signed by the owner or operator of a facility legally permitted to treat or dispose of those materials are to be furnished to the Contracting Officer not later than 5 working days following the delivery of those materials to the facility; and include a copy in the Tank Closure Report. Furnish a statement of agreement from the proposed treatment, storage or disposal facility and certified transporters to accept hazardous or special wastes in the Work Plan and to the Contracting Officer not less than 14 days before transporting any wastes. If the Contractor selects a different facility than is identified in the Work Plan, provide documentation for approval to certify that the facility is authorized and meets the standards specified in 40 CFR 264.

3.13 SPILLS

Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Inspect vehicles leaving the area of contamination to ensure that no contaminated materials adhere to the wheels or undercarriage. Take immediate containment actions as necessary to minimize effect of any spill or leak. Cleanup in accordance with applicable Federal, State, local laws and regulations, and district policy at no additional cost to the Government. Refer to Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS for spill response and reporting requirements.

3.14 INSPECTIONS

Arrange for and perform required inspections. Provide copies of inspections to Contracting Officer.

3.15 TANK CLOSURE REPORT

Submit a Site Assessment/Tank Closure Report in a single binder notebook containing a collection of reports, records, starting and ending dates of reporting period, inspections, documentation, and data as follows:

a. Complete UST Notification Form (within 30 days of closure).

b. Description of work, including removal procedures, number of tanks removed, identification of tanks removed and disposed of (include site map showing location of tank and piping), cubic yards of excavated soil, location of disposal sites, and dates of excavation.

c. Site plan, including location of tanks and piping, limits of excavation, sampling points, results of excavation, and depths.

d. Laboratory and field-testing reports, copies of data and test results from testing laboratory and the chain-of-custody records.

e. Tank disposal paperwork (6 copies of UST Notification Form and method of conditioning tank for disposal), contaminated soil disposal

paperwork (include laboratory testing reports), and contaminated water disposal paperwork (include laboratory testing reports).

f. Certifications required by implementing agency.

g. Building permit, inspection permits, and other permits required for underground tank removal, notifications, and inspection reports.

h. Cumulative quantities of soil excavated, beginning with start date for each tank and associated piping.

3.16 COMPACTION, FINISH GRADING, and SEEDING

Provide backfill, compaction, grading, and seeding in accordance with Section 31 00 00 EXCAVATION.

-- End of Section --

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SECTION 02 81 00

TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 415-1-266	(2000) Construction -- Resident Engineer Management Guide (REMG) for Hazardous, Toxic, and Radioactive Waste (HTRW) Projects

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

DOT 4500.9R	Defense Transportation Regulation, Part 2, Cargo Movement, Chapter 204, Hazardous Material

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 279	Standards for the Management of Used Oil

40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.2.2 Hazardous Waste

A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Packaging Notifications

Hazardous Waste Management Plan; G

Onsite Hazardous Waste Management; G

Notices of Non-Compliance and Notices of Violation

SD-06 Test Reports

Recordkeeping; G

Exception Report; G

Spill Response

SD-07 Certificates

Transportation and Disposal Coordinator; G

Training; G

Certification

Shipping Documents and Packagings Certification; G

Security Plan

Certificates of Disposal

Waste Minimization

1.4 QUALITY ASSURANCE

1.4.1 Transportation and Disposal Coordinator

Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC must serve as the single point of contact for all environmental regulatory matters and have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, asbestos waste shipment records, PCB manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC must have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

1.4.2 Training

Hazardous materials employees must be trained, tested, and certified to carry out their assigned duties safely and effectively. Employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Employees must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H to determine that shipments do not constitute DOT regulated hazardous materials.

1.4.3 Certification

The hazardous materials transporter must possess a current certificate of registration issued by the Research and Special Programs Administration

(RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.4.4 Laws and Regulations Requirements

Comply with Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. Notify the Contracting Officer immediately if compliance exceeds the scope of work or conflicts with specific requirements of the contract.

PART 2 PRODUCTS

2.1 MATERIALS

Provide all the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards and EP 415-1-266. Details in this specification must not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

Provide bulk and non-bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging must meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Packaging must conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and be compatible with the material to be packaged as required by 40 CFR 262. Also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers. The hazardous materials being packaged must not react dangerously with, decompose or ignite the sorbent packaging materials. Additionally, sorbents used to treat free liquids to be disposed of in landfills must be non-biodegradable as specified in 40 CFR 264, Section .314. In addition, packaging notifications will be provided to the Government in accordance with 49 CFR 172, Section .178.2(c) regarding type and dimensions of closures, including gaskets, needed to satisfy performance test requirements.

2.1.2 Markings

Provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 262, Section .32 (for hazardous waste), 40 CFR 761, Section .45 (for PCBs), and 40 CFR 61, Section .149(d) (for asbestos). Markings must withstanda 180-day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.3 Labeling

Provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels must meet design

specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels must be durable weather resistant and withstanding a 180-day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.4 Placards

For each offsite shipment of hazardous material/waste, provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Provide placards for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30-day exposure to open weather conditions and must meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

Provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials must be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials must be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

Provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 HAZARDOUS WASTE MANAGEMENT PLAN

Prepare a Hazardous Waste Management Plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed. The plan must address both onsite and offsite hazardous waste management. Describe the methods to be used to ensure accurate piece counts or weights of shipments; describe waste minimization methods; identify and describe facilities to be used for treatment, storage, and disposal (TSD); identify areas onsite where hazardous wastes are to be handled; and identify whether transfer facilities are to be used; and if so, how the wastes will be tracked to ultimate disposal. Submit the plan to the Contracting Officer for approval prior to start of work. Submit written documentation of weekly hazardous waste inspections on a monthly basis.

3.2 ONSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the onsite management of all hazardous materials and waste with the installation environmental function and the Contracting Officer. These paragraphs apply to Government owned waste only. The Contractor is responsible for ensuring compliance with Federal, state, and local hazardous waste laws and regulations and verifying those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify hazardous wastes using criteria set forth in 40 CFR 261 or applicable state and local laws, regulations, and ordinances. Comply with generator requirements in 40 CFR 262 and applicable state or local law or regulations when accumulating hazardous

waste onsite. Onsite accumulation times must be restricted to applicable time frames referenced in 40 CFR 262, Section .34 and applicable state or local law or regulation. Accumulation start dates commence when waste container is transferred into a 90 day accumulation site or permitted storage facility. Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 and applicable state or local law or regulation as soon as the waste is containerized. An additional marking must be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas weekly and provide written documentation of the inspection. Include date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.2.1 Hazardous Waste Classification

Identify, in consultation with the Contracting Officer, all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or applicable state or local law or regulation. Also identify applicable treatment standards in 40 CFR 268 and state land disposal restrictions and make a determination as to whether or not the waste meets or exceeds the standards. Submit waste profiles, analyses, classification and treatment standards information to Contracting Officer for review and approval.

3.3 OFFSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the offsite transfer of all hazardous materials and waste with the installation environmental function and the Contracting Officer. Use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Do not use offsite treatment, storage, and disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air). Submit Notices of Non-Compliance and Notices of Violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. Immediately provide copies of such notices to the Contracting Officer. Also furnish relevant documents regarding the incident and any information requested by the Contracting Officer, and coordinate its response to the notice with the Contracting Officer or the designated representative prior to submission to the notifying authority. Also furnish a copy to the Contracting Officer of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

3.3.1 Treatment, Storage, and Disposal Facility and Transporter

Provide the Contracting Officer with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information must be contained in the Hazardous Waste Management Plan and be approved by the Contracting Officer prior to waste disposal.

3.3.2 Facility Status Information

Facilities receiving hazardous waste must be permitted in accordance with

40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements or permitted by a state authorized by the Environmental Protection Agency to administer the RCRA permit program. Additionally, prior to using a TSD Facility, contact the EPA Regional Offsite Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Offsite policy and submit this information to the Contracting Officer in the Hazardous Waste Management Plan.

3.3.3 Shipping Documents and Packagings Certification

Prior to shipment of any hazardous material offsite and a minimum of 14 days prior to anticipated pickup, provide for review written certification to the Contracting Officer that hazardous materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements. Furnish designated disposal facility packaging assurances not later than 35 days after acceptance of the shipment. The Contractor's TDC must also provide written certification regarding waste minimization efforts documenting that efforts have been taken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.3.4 Transportation

Prior to conducting hazardous materials activities, the Contractor responsible for pre-transportation activities must either certify to the Government that a Security Plan is in place which meets the requirements of 49 CFR 172, Subpart I or in the event that the types or amounts of hazardous materials are excluded from the security planning requirements, a written statement to that effect detailing the basis for the exception. Use manifests for transporting hazardous wastes as required by 40 CFR 263 or applicable state or local law or regulation. Transportation must comply with all requirements in the Department of Transportation referenced regulations in the 49 CFR series. Prepare hazardous waste manifests for each shipment of hazardous waste shipped offsite. Complete manifests using instructions in 40 CFR 262, Subpart B and applicable state or local law or regulation. Submit manifests and waste profiles to Contracting Officer for review and approval. Prepare land disposal restriction notifications as required by 40 CFR 268 or applicable state or local law or regulation for each shipment of hazardous waste. Submit notifications with the manifest to the Contracting Officer for review and approval. In accordance with DOT 4500.9R, inspect motor vehicles used to transport hazardous materials in accordance the 49 CFR and DOT safety regulations and complete DDForm 626, Motor Vehicle Inspection.

3.3.5 Treatment and Disposal of Hazardous Wastes

Coordinate any offsite shipments of hazardous materials or hazardous wastes with the installation environmental function. Initial, or satellite hazardous waste accumulation is limited to 55 gallons (or 1 quart of acutely hazardous waste). Once a waste stream exceeds 55 gallons, it must be transferred to an onsite 90-day (180 day small quantity generator) accumulation area, or a permitted hazardous waste treatment, storage or disposal facility within three days. Ship hazardous wastes only to facilities which are properly permitted to accept the hazardous waste or operating under interim status. Ensure wastes are treated to meet land disposal treatment standards in 40 CFR 268 prior to land disposal. Propose TSD facilities via submission of the Hazardous

Waste Management Plan, subject to the approval of the Contracting Officer. Submit Certificates of Disposal documenting the ultimate disposal, destruction or placement of hazardous wastes, polychlorinated biphenyls (PCBs), and asbestos within 180 days of initial shipment. Receipt of these certificates will be required for final payment.

3.4 RADIOACTIVE MATERIALS MANAGEMENT

3.4.1 Identification of Proper Shipping Names

Use 49 CFR 172, Section .101 to identify proper shipping names for each hazardous material (including hazardous wastes) to be shipped offsite. Submit proper shipping names to the Contracting Officer in the form of draft shipping documents for review and approval.

3.4.2 Packaging, Labeling, and Marking

Package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations. Mark each container of hazardous waste of 110 gallons or less with the following:

"HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal.
If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
Generator's name _____
Manifest Document Number _____".

3.4.3 Shipping Documents

Ensure that each shipment of hazardous material sent offsite is accompanied by properly completed shipping documents. This includes shipments of samples that may potentially meet the definition of a Department of Transportation regulated hazardous material.

3.4.3.1 PCB Waste Shipment Documents

Prepare hazardous waste manifests for each shipment of PCB waste shipped offsite. Complete manifests using instructions in 40 CFR 761, Sections .207 and .208 and other applicable requirements. Submit documents to Contracting Officer for review and approval.

3.4.3.2 Asbestos Waste Shipment Documents

Prepare waste shipment records, as required by 40 CFR 61, for shipments of asbestos. Submit waste shipment records to the Contracting Officer for review and approval. Waste shipment records must be signed by the Contractor.

3.4.3.3 Other Hazardous Material Shipment Documents

Prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest or asbestos waste shipment record which fulfills the shipping paper requirements. The bill of lading must satisfy the requirements of 49 CFR 172, Subpart C, and 40 CFR 279 if shipping used oil and applicable state or local law or regulation and must be submitted to the Contracting Officer for review and approval. For laboratory samples and treatability study samples, prepare bills of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d) and (e) and any applicable state

or local law or regulation. Bill of ladings requiring shipper's certifications must be signed by the Government.

3.5 SPECIAL REQUIREMENTS FOR ASBESTOS WASTES

If work involves asbestos containing wastes, manage these wastes in accordance with specification Section 02 82 00 ASBESTOS REMEDIATION.

3.6 WASTE MINIMIZATION

Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes. Identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals. Submit written certification that waste minimization efforts have been undertaken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.7 RECORDKEEPING

Maintain adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports; maintain asbestos waste shipment records for a minimum of 3 years from the date of shipment or any longer period required by applicable law or regulation or other provision of this contract; and maintain bill of ladings for a minimum of 375 days from the date of shipment or longer period required by applicable law or regulation or other provision of this contract. Submit information necessary to file state annual or EPA biennial reports for hazardous waste transported, treated, stored, or disposed of under this contract. Do not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. Submit the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter must accompany the data to include the contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation, prepare, and submit an exception report to the Contracting Officer within 37 days of shipment initiation.

3.8 SPILL RESPONSE

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the Contracting Officer immediately. Direction from the Contracting Officer concerning a spill or release is not considered a change under the contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the Contracting Officer. Comply with applicable requirements of Federal, state, or local laws or regulations regarding any spill incident.

3.9 EMERGENCY CONTACTS

Comply with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. Monitor the phone on a 24-hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted on a 24-hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
Project/Contract #:	
Waste Stream:	
Primary TSD Facility, EPA ID # and Location:	
Alter. TSD Facility, EPA ID # and Location:	
EPA Region	Contact
I	888-372-7341
II	212-673-4040
III	800-438-2474 or 215-814-5000
IV	800-241-1754 or 404-562-9900
V	312-353-2000
VI	800-887-6063 or 214-665-2210
VII	800-223-0425
VIII	800-424-8802
IX	415-947-8713
X	800-424-4372 or 206-553-4973
EPA representative contacted:	
EPA representative phone number:	
Date contacted:	
Comment:	
The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.	
Date:	Signature:
Phone number:	

-- End of Section --

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SECTION 02 82 00

ASBESTOS REMEDIATION
11/18, CHG 1: 11/19

PART 1 GENERAL

1.1 SCOPE

Work shall be performed in accordance with 19a-332, Statues, 20-400-1 to 9, Statues, 20-435-441, and Statute 22a-252.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2	(2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM C732	(2017; R 2022 Standard Test Method for Aging Effects of Artificial Weathering on Latex Sealants
ASTM D522/D522M	(2017) Mandrel Bend Test of Attached Organic Coatings
ASTM D2794	(1993; R 2019) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D4397	(2016) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2022) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E119	(2020) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E736/E736M	(2017) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

ASTM E1368	(2014) Visual Inspection of Asbestos Abatement Projects

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(2014) Compressed Air for Human Respiration; 6th Edition

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1	(2020) Occupational and Educational Personal Eye and Face Protection Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2019) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH NMAM	(2016; 5th Ed) NIOSH Manual of Analytical Methods

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 560/5-85-024	(1985) Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1926.51	Sanitation
29 CFR 1926.59	Hazard Communication
29 CFR 1926.103	Respiratory Protection
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.1101	Asbestos
40 CFR 61-SUBPART A	General Provisions
40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices

49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

NAVFAC P-502	(2017) Asbestos Program Management
ND OPNAVINST 5100.23	(2005; Rev G) Navy Occupational Safety and Health (NAVOSH) Program Manual

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Sep 2022) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

STATE OF CONNECTICUT, DEPARTMENT OF PUBLIC HEALTH (DPH), ASBESTOS REGULATIONS

19a-332	Standards for Asbestos Abatement
Statues, 20-400-1 to 9	Personnel asbestos licensing
Statues, 20-435-441	Contractor licensing, worker certificates, training programs, regulatory authority.
Statute 22a-252	Disposal of Asbestos

1.3 DEFINITIONS

1.3.1 ACM

Asbestos Containing Materials.

1.3.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

1.3.3 Area Sampling

Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.3.4 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite

asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

1.3.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.3.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

1.3.7 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

1.3.8 Authorized Person

Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

1.3.9 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.3.10 Competent Person (CP)

A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent. The competent person must have a current State of Connecticut asbestos contractors or supervisors license.

1.3.11 Contractor

The Contractor is that individual, or entity under contract to perform the herein listed work.

1.3.12 Disposal Bag

A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

1.3.13 Disturbance

Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

1.3.14 Encapsulation

The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.

1.3.15 Encapsulants

Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

a. Removal Encapsulant (can be used as a wetting agent)

b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)

c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)

d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

1.3.16 Friable Asbestos Material

A term defined in 40 CFR 61-SUBPART M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

1.3.17 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.

1.3.18 Government Consultant (GC)

That qualified person employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The GC is normally a private consultant, but can be an employee of the Government.

1.3.19 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters must retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.3.20 Model Accreditation Plan (MAP)

USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

1.3.21 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

1.3.22 NESHAP

National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61-SUBPART M.

1.3.23 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.3.24 Permissible Exposure Limits (PELs)

1.3.24.1 PEL-Time Weighted Average (TWA)

Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time weighted average (TWA).

1.3.24.2 PEL-Excursion Limit

An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes.

1.3.25 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

1.3.26 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

1.3.27 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E1368. The QP must be appropriately licensed in the State of Connecticut.

1.3.28 TEM

Refers to Transmission Electron Microscopy.

1.3.29 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.3.30 Transite

A generic name for asbestos cement wallboard and pipe.

1.3.31 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 0.00042 psi.

1.3.32 Worker

Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation, if required by the OSHA Class of work to be performed or by the state where the work is to be performed. The worker must be appropriately licensed in the State of Connecticut.

1.4 REQUIREMENTS

1.4.1 Description of Work

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures must be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the demolition and removal of asbestos containing materials located in the building which is governed by 40 CFR 763 and NAVFAC P-502. Under normal conditions non-friable or chemically bound materials containing asbestos would not be considered hazardous; however, this material may release airborne asbestos fibers during demolition and removal and therefore must be handled in accordance with the removal and disposal procedures as specified herein. Provide negative pressure enclosure and wet techniques as outlined in this specification. The work area will be evacuated during the asbestos abatement work. A competent person must supervise asbestos removal work as specified herein.

1.4.2 Unexpected Discovery of Asbestos

Notify the Contracting Officer if any previously untested building components suspected to contain asbestos are impacted by the work.

1.4.3 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.4.3.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination must be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.4.3.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.4.4 Employee Training

Submit certificates, prior to the start of work but after the main abatement submittal, signed by each employee indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis. Organize certificates by individual worker, not grouped by type of certification. Post appropriate evidence of compliance with the training requirements of 40 CFR 763. Train personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. Document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101 and 29 CFR 1926.103. Fully cover engineering and other hazard control techniques and procedures. Asbestos wors must have a current State of Connecticut asbestos worker's license.

1.4.5 Permits, Licenses, and Notifications

Prior to the start of work, obtain necessary permits and licenses in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities. Notify the Regional Office of the

United States Environmental Protection Agency (USEPA) State's environmental protection agency local air pollution control district/agency and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M. Notify the Contracting Officer and other appropriate Government agencies in writing 20 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations. Submit copies of all Notifications to the Contracting Officer.

1.4.6 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of EM 385-1-1, 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, 40 CFR 763 and ND OPNAVINST 5100.23. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government apply.

1.4.7 Respiratory Protection Program

Establish and implement a respirator program as required by 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program to the Contracting Officer. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.4.7.1 Respirator Program Records

Submit records of the respirator program as required by 29 CFR 1926.103, and 29 CFR 1926.1101.

1.4.7.2 Respirator Fit Testing

The Contractor's PQP must conduct a qualitative or quantitative fit test conforming to 29 CFR 1926.103 for each worker required to wear a respirator, and any authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test must be performed prior to initially wearing a respirator and every 12 months thereafter. If physical changes develop that will affect the fit, a new fit test must be performed. Functional fit checks must be performed each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.4.7.3 Respirator Selection and Use Requirements

Provide respirators and ensure that they are used as required by 29 CFR 1926.1101 and in accordance with CGA G-7 and the manufacturer's recommendations. Respirators must be approved by the National Institute for Occupational Safety and Health NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. For air-purifying respirators, the particulate filter must be high-efficiency particulate air (HEPA)/(N-,R-,P-100). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator

type must be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered.

1.4.8 Asbestos Hazard Control Supervisor

The Contractor must be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

1.4.9 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

1.4.10 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal of materials containing asbestos. The plan, not to be combined with other hazard abatement plans, must be prepared, signed, and sealed by the PQP. Provide a Table of Contents for each abatement submittal, which follows the sequence of requirements in the contract. The plan must include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body protection, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan must also include (both fire and medical emergency) response plans and an Activity Hazard Analyses (AHAs) in accordance with EM 385-1-1. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor, CP and PQP must meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan must be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.4.11 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary

Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm must be independent of the asbestos contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.4.12 Landfill Approval

Submit written evidence that the landfill is approved for asbestos disposal by the U.S. Environmental Protection Agency, Region 1, Air Enforcement Section (38W12), and local regulatory agencies. Within three working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within one day of the shipment leaving the project site.

1.4.13 Transporter Certification

Submit written evidence that the transporter is approved to transport asbestos waste in accordance with the DOT requirements of 49 CFR 171, 49 CFR 172 and 49 CFR 173 as well as registration requirements of 49 CFR 107 and all other State and local regulatory agency requirements.

1.4.14 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Amended Water; G

Safety Data Sheets (SDS) for All Materials; G

Encapsulants; G

Respirators; G

Local Exhaust Equipment; G

Pressure Differential Automatic Recording Instrument; G

Vacuums; G

Glovebags; G

SD-06 Test Reports

Air Sampling Results; G

Pressure Differential Recordings for Local Exhaust System; G

Clearance Sampling; G

Asbestos Disposal Quantity Report; G

SD-07 Certificates

Employee Training; G

Notifications; G

Respiratory Protection Program; G

Asbestos Hazard Abatement Plan; G

Testing Laboratory; G

Landfill Approval; G

Delivery Tickets; G

Waste Shipment Records; G

Transporter Certification; G

Medical Certification; G

Private Qualified Person Documentation; G

Designated Competent Person; G

Worker's License; G

Contractor's License; G

Federal, State or Local Citations on Previous Projects; G

Encapsulants; G

Equipment Used to Contain Airborne Asbestos Fibers; G

Water Filtration Equipment; G

Vacuums; G

Ventilation Systems; G

SD-11 Closeout Submittals

Permits and Licenses; G

Notifications; G

Respirator Program Records; G

Rental Equipment; G

1.6 QUALITY ASSURANCE

1.6.1 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP must be appropriately licensed in the State of Connecticut as a Project Monitor. The PQP and the asbestos contractor must not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The PQP must be a first tier subcontractor.

1.6.2 Designated Competent Person Documentation

The Designated Competent Person must be experienced in the administration and supervision of asbestos abatement projects including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite. The Designated Competent Person must be on-site at all times when asbestos abatement activities are underway.Submit training certification and a current State of Connecticut Asbestos Contractor's and Supervisor's License. Submit evidence that the Designated Competent Person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA designated competent person requirements. The Designated Competent Person must be a first tier subcontractor.

1.6.3 Worker's License

Submit documentation that workers meet the requirements of 29 CFR 1926.1101, 40 CFR 61-SUBPART M and have a current State of Connecticut Asbestos Workers License.

1.6.4 Contractor's License

Submit a copy of the asbestos contractor's license issued by the State of Connecticut. Submit the following certification along with the license: "I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926.1101, 40 CFR 61-SUBPART MEM 385-1-1, and the Federal, State and local requirements for those asbestos abatement activities that they will be involved in." This certification statement must be signed by the Company's President or Chief Executive.

1.6.5 Air Sampling Results

Complete fiber counting and provide results to the PQP for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within three

working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the PQP. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance must levels exceed 0.1 fibers per cubic centimeter.

1.6.6 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the asbestos control area is removed. Submit pressure differential recordings for each work day to the PQP for review and to the Contracting Officer within 24-hours from the end of each work day.

1.6.7 Federal, State or Local Citations on Previous Projects

Submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities within the last 5 years (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company must be provided.

1.6.8 Preconstruction Conference

Conduct a safety preconstruction conference to discuss the details of the Asbestos Hazard Abatement Plan, Accident Prevention Plan (APP) including the AHAs required in specification Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. The safety preconstruction conference must include the Contractor and their Designated Competent Person, Designated IH and Project Supervisor and the Contracting Officer. Deficiencies in the APP will be discussed. Onsite work must not begin until the APP has been accepted.

1.7 SECURITY

Secured areas must be provided for each regulated area. A log book must be kept documenting entry into and out of the regulated area. Entry into regulated areas must only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas must be trained, medically evaluated, and wear the required personal protective equipment.

1.8 EQUIPMENT

1.8.1 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Encapsulants must conform to current USEPA requirements, contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and conform to the following performance requirements.

2.1.1 Removal Encapsulants

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.2 Bridging Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test

Requirement	Test Standard
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.3 Penetrating Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Cohesion/Adhesion Test - 50 pounds of force/foot	ASTM E119
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.4 Lock-down Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E119

Requirement	Test Standard
Bond Strength: 100 pounds of force/foot	ASTM E736/E736M
(Tests compatibility with cementitious and fibrous fireproofing)	

2.2 DUCT TAPE

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

2.3 DISPOSAL CONTAINERS

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers must be provided for ACM wastes as required by 29 CFR 1926.1101. Disposal containers can be in the form of:

a. Disposal Bags

b. Fiberboard Drums

c. Cardboard Boxes

2.4 SHEET PLASTIC

Sheet plastic must be polyethylene of 6 mil minimum thickness and must be provided in the largest sheet size necessary to minimize seams. Film must be black and conform to ASTM D4397, except as specified below

2.4.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets must be provided. Film must be black and must conform to the requirements of NFPA 701.

2.4.2 Reinforced

Reinforced sheets must be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock must consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film must meet flame resistant standards of NFPA 701.

2.5 MASTIC REMOVING SOLVENT

Mastic removing solvent must be nonflammable and must not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite must have a flash point greater than 140 degrees F.

2.6 LEAK-TIGHT WRAPPING

Two layers of 6 mil minimum thick polyethylene sheet stock must be used for the containment of removed asbestos-containing components or materials such as large tanks, boilers, insulated pipe segments and other materials. Upon placement of the ACM component or material, each layer

must be individually leak-tight sealed with duct tape.

2.7 VIEWING INSPECTION WINDOW

Where feasible, a minimum of one clear, 1/8 inch thick, acrylic sheet, 18 by 24 inches, must be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows must be sealed leak-tight with industrial grade duct tape.

2.8 WETTING AGENTS

Removal encapsulant (a penetrating encapsulant) must be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant must be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS above.

PART 3 EXECUTION

3.1 EQUIPMENT

Provide the Contracting Officer or the Contracting Officer's Representative, with at least two complete sets of personal protective equipment as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Air Monitoring Equipment

The Contractor's PQP must approve air monitoring equipment. The equipment must include, but must not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps must also be equipped with an automatic flow control unit which must maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

d. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

3.1.2 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.2.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, removal of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103. Breathing air must comply with CGA G-7.

3.1.3 Exterior Whole Body Protection

3.1.3.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but must not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

3.1.3.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the PQP after each use.

3.1.3.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. HEPA vacuum and remove asbestos contaminated reusable protective clothing while still wearing respirators at the boundary of the asbestos work area, seal in two impermeable bags, label outer bag as asbestos contaminated waste, and transport for decontamination. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Wastewater filters must be installed in series with the first stage pore size 20 microns and the second stage pore size of 5 microns. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste. Keep the floor of the decontamination unit's clean room dry and clean at all times. Proper housekeeping and hygiene requirements must be maintained. Provide soap and towels for showering, washing and drying. Cloth towels provided must be disposed of as ACM waste or must be laundered in accordance with 29 CFR 1926.1101.

Physically attach the decontamination units to the asbestos control area. Construct both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

3.1.3.4 Eye Protection

Provide eye protection that complies with ANSI/ISEA Z87.1 when operations present a potential eye injury hazard. Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.4 Regulated Areas

All Class I, II, and III asbestos work must be conducted within regulated areas. The regulated area must be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

3.1.5 Load-out Unit

Provide a temporary load-out unit that is adjacent and connected to the regulated area. Attach the load-out unit in a leak-tight manner to each regulated area.

3.1.6 Warning Signs and Labels

Provide bilingual warning signs printed in English and Spanish at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to the requirements are acceptable

3.1.6.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

Legend	Notation
DANGER	one inch Sans Serif Gothic or Block
ASBESTOS	one inch Sans Serif Gothic or Block
MAY CAUSE CANCER	one inch Sans Serif Gothic or Block
CAUSES DAMAGE TO LUNGS	1/4 inch Sans Serif Gothic or Block

Legend	Notation
AUTHORIZED PERSONNEL ONLY	1/4 inch Sans Serif Gothic or Block
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA	1/4 inch Sans Serif Gothic or Block

Spacing between lines must be at least equal to the height of the upper of any two lines.

3.1.6.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST AVOID CREATING DUST

3.1.7 Local Exhaust System

Provide a local exhaust system in the asbestos control area in accordance with ASSP Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the asbestos control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors and remote from any public access or ventilation system intakes.

3.1.8 Tools

Vacuums must be leak proof to the filter and equipped with HEPA filters. Filters on vacuums must conform to ASSP Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse. Reusable tools must be thoroughly decontaminated prior to being removed from the regulated areas.

3.1.9 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.1.10 Glovebags

Submit written manufacturers proof that glovebags will not break down under expected temperatures and conditions.

3.1.11 Single Stage Decontamination Area

A decontamination area (equipment room/area) must be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment. The equipment room or area must be adjacent to the regulated area for the decontamination of employees, material, and their equipment which could be contaminated with asbestos. The area must be covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

3.1.12 Decontamination Area Exit Procedures

Ensure that the following procedures are followed:

a. Before leaving the regulated area, remove all gross contamination and debris from work clothing using a HEPA vacuum.

b. Employees must remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal or laundering.

c. Employees must not remove their respirators until showering.

d. Employees must shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, NAVFAC P-502, and as specified herein. Use wet removal procedures and negative pressure enclosure techniques. Wear and utilize protective clothing and equipment as specified herein. No eating, smoking, drinking, chewing gum, tobacco, or applying cosmeticsis permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing material must not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification

are complied with by the trade personnel. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, prior to the commencement of asbestos work. Power to the regulated area must be locked-out and tagged in accordance with 29 CFR 1910.147. Disconnect electrical service when wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water. All electrical work must be performed by a licensed electrician. Stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. Correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work must resume only upon notification by the Contracting Officer. Corrective actions must be documented. If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

3.2.1 Building Ventilation System and Critical Barriers

Building ventilation system supply and return air ducts in a regulated area must be isolated by airtight seals to prevent the spread of contamination throughout the system. The airtight seals must consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces must be sealed with industrial grade duct tape.

a. A Competent Person must supervise the work.

b. For indoor work, critical barriers must be placed over all openings to the regulated area.

c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

3.2.2 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it must be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PQP work may proceed at the discretion of the Contracting Officer.

3.2.3 Furnishings

Furniture and equipment will be removed from the area of work by the Government before asbestos work begins.

3.2.4 Precleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

3.2.5 Asbestos Control Area Requirements

3.2.5.1 Negative Pressure Enclosure

Removal of asbestos material require the use of a negative pressure enclosure. Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area. Negative pressure enclosure development must include protective covering of uncontaminated walls, and ceilings with a continuous membrane of two layers of minimum 6-mil plastic sheet sealed with tape to prevent water or other damage. Provide two layers of 6-mil plastic sheet over floors and extend a minimum of 12 inches up walls. Seal all joints with tape. Provide local exhaust system in the asbestos control area. Openings will be allowed in enclosures of asbestos control areas for personnel and equipment entry and exit, the supply and exhaust of air for the local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain the efficiency of the system.

3.2.5.2 Glovebag

If the construction of a negative pressure enclosure is infeasible for the removal of asbestos material located in the building. Use alternate techniques as indicated in 29 CFR 1926.1101. Establish designated limits for the asbestos regulated area with the use of rope or other continuous barriers, and maintain all other requirements for asbestos control areas. The PQP must conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds background or 0.01 fibers per cubic centimeter whichever is greater, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Contracting Officer. This sampling may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those obtained by the Contractor, the Government will determine which results predominate. If adjacent areas are contaminated as determined by the Contracting Officer, clean the contaminated areas, monitor, and visually inspect the area as specified herein.

3.2.5.3 Regulated Area for Class II Removal

Removal of asbestos containing floor tile/mastic, are Class II removal activities. Establish designated limits for the asbestos regulated work area with the use of red barrier tape; install critical barriers, splash guards and signs, and maintain all other requirements for asbestos control area except local exhaust. Place impermeable dropcloths on surfaces beneath removal activity extending out 3 feet in all directions. A detached decontamination system may be used. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If workers the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.6 Removal Procedures

Wet asbestos material with a fine spray of amended water during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 6 mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Containerize asbestos containing material while wet. Do not allow asbestos material to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

3.2.6.1 Sealing Contaminated Items Designated for Disposal

Remove contaminated architectural, mechanical, and electrical appurtenances such as venetian blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lock-down encapsulant must be tinted a contrasting color and spray-applied by airless method. Thoroughness of sealing operation must be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants must comply with the performance requirements specified herein.

3.2.6.2 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 1/4 inch thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos lagging cloth, overlapping the existing ends by at least 4 inches. When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

3.2.7 Methods of Compliance

3.2.7.1 Mandated Practices

The specific abatement techniques and items identified must be detailed in the Contractor's AHAP. Use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters.

b. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposal.

d. Inspection and repair of polyethylene.

e. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room or area.

3.2.7.2 Control Methods

Use the following control methods:

a. Local exhaust ventilation equipped with HEPA filter;

b. Enclosure or isolation of processes producing asbestos dust;

c. Where the feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, use them to reduce employee exposure to the lowest levels attainable and must supplement them by the use of respiratory protection.

3.2.7.3 Unacceptable Practices

The following work practices must not be used:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean up.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.2.8 Class I Work Procedures

In addition to requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

a. A Competent Person must supervise the installation and operation of the control methods.

b. For jobs involving the removal of more than 25 feet or 10 square feet of TSI or surfacing material, place critical barriers over all openings to the regulated area.

c. HVAC systems must be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.

d. Impermeable dropcloths (6 mil or greater thickness) must be placed on surfaces beneath all removal activity.

e. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area must be ventilated with a HEPA unit and employees must use PPE.

3.2.9 Specific Control Methods for Class I Work

Use Class I work procedures, control methods and removal methods for the following ACM:

a. Spray Applied Fireproofing

b. Gypsum Wallboard and Joint Compound

c. Thermal System Insulation and Mudded Pipe Fittings

d. Plaster and Textured Ceilings and Walls

e. Vermiculite

3.2.9.1 Negative Pressure Enclosure (NPE) System

The system must provide at least four air changes per hour inside the containment. The local exhaust unit equipment must be operated 24-hours per day until the containment is removed. The NPE must be smoke tested for leaks at the beginning of each shift and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Pressure differential must be monitored continuously, 24-hours per day, with an automatic manometric recording instrument and Records must be provided daily on the same day collected to the Contracting Officer. The Contracting Officer must be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system must not be used as the local exhaust system for the regulated area. The NPE must terminate outdoors unless an alternate arrangement is allowed by the Contracting Officer. All filters used must be new at the beginning of the project and must be periodically changed as necessary and disposed of as ACM waste.

3.2.9.2 Glovebag Systems

Glovebags must be used without modification, smoke-tested for leaks, and completely cover the circumference of pipe or other structures where the work is to be done. Glovebags must be used only once and must not be moved. Glovebags must not be used on surfaces that have temperatures exceeding 150 degrees F. Prior to disposal, glovebags must be collapsed using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation must be wrapped and sealed in 2 layers of plastic or otherwise rendered intact. At least two persons must perform glovebag removal. Asbestos regulated work areas must be established for glovebag abatement. Designated boundary limits for the asbestos work must be established with rope or other continuous barriers and all other requirements for asbestos control areas must be maintained, including area signage and boundary warning tape.

a. Attach HEPA vacuum systems to the bag to prevent collapse during removal of ACM.

b. The negative pressure glove boxes must be fitted with gloved apertures and a bagging outlet and constructed with rigid sides from metal or other material which can withstand the weight of the ACM and water used during removal. A negative pressure must be created in the system using a HEPA filtration system. The box must be smoke tested for leaks prior to each use.

3.2.9.3 Mini-Enclosure

Mini-containment (small walk-in enclosure) to accommodate no more than two persons, may be used if the disturbance or removal can be completely contained by the enclosure. The mini-enclosure must be inspected for leaks and smoke tested before each use. Air movement must be directed away from the employee's breathing zone within the mini-enclosure.

3.2.9.4 Wrap and Cut Operation

Prior to cutting pipe, the asbestos-containing insulation must be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps must be taken: install glovebag, strip back sections to be cut 6 inches from point of cut, and cut pipe into manageable sections.

3.2.9.5 Class I Removal Method

Class I ACM must be removed using a control method described above. Prepare work area as previously specified. Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area. Spread one layer of 6-mil seamless plastic sheeting on the floor below the work area. Bag all asbestos debris which has fallen to the floor as asbestos-containing debris. Place all debris in plastic disposal bags of 6-mil minimum thickness. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers or the designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work, and immediately correct the situation.

3.2.10 Class II Work Procedures

In addition to the requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

a. A Competent Person must supervise the work.

b. For indoor work, critical barriers must be placed over all openings to the regulated area.

c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

3.2.11 Air Sampling

Perform sampling of airborne concentrations of asbestos fibers in accordance with 29 CFR 1926.1101, the Contractor's air monitoring plan and as specified herein. Sampling performed in accordance with

29 CFR 1926.1101 must be performed by the PQP. Sampling performed for environmental and quality control reasons must be performed by the PQP. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate. Results of breathing zone samples must be posted at the job site and made available to the Contracting Officer. Submit all documentation regarding initial exposure assessments, negative exposure assessments, and air-monitoring results.

3.2.11.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

3.2.11.2 Sampling During Asbestos Work

The PQP must provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air sample fiber counting must be completed, and results provided within 24-hours (breathing zone samples), and 24 hours (environmental/clearance monitoring) after completion of a sampling period. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where alternate methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels. The written results must be signed by testing laboratory analyst, testing laboratory principal and the GC. The air sampling results must be documented on a Contractor's daily air monitoring log.

3.2.11.3 Final Clearance Requirements, NIOSH PCM Method

For PCM sampling and analysis using NIOSH NMAM Method 7400, the fiber concentration inside the abated regulated area, for each airborne sample, must be less than 0.01 f/cc. The abatement inside the regulated area is considered complete when every PCM final clearance sample is below the clearance limit. If any sample result is greater than 0.01 total f/cc, the asbestos fiber concentration (asbestos f/cc) must be confirmed from that same filter using NIOSH NMAM Method 7402 (TEM) at Contractor's expense. If any confirmation sample result is greater than 0.01 asbestos f/cc, abatement is incomplete and cleaning must be repeated at the Contractor's expense. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at the Contractor's expense.

3.2.11.4 Sampling After Final Clean-Up (Clearance Sampling)

Provide area sampling of asbestos fibers using aggressive air sampling

techniques as defined in the EPA 560/5-85-024 and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PQP must perform a visual inspection in accordance with ASTM E1368 to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Prepare a written report signed and dated by the PQP documenting that the asbestos control area is free of dust, dirt, and debris and all waste has been removed. Perform at least 5 samples. The asbestos fiber counts from these samples must be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value take appropriate actions to re-clean the area and repeat the sampling and analysis at the Contractor's expense.

3.2.11.5 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, pay all costs associated with the required recleaning, resampling, and analysis, until final clearance requirements are met.

3.2.12 Site Inspection

While performing asbestos engineering control work, the Contractor must be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation must be at the Contractor's expense.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor must re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government must have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Title to Materials

All waste materials, except as specified otherwise, become the property of the Contractor and must be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

3.3.3.1 Procedure for Disposal

Coordinate all waste disposal manifests with the Contracting Officer and NAVFAC EV. Collect asbestos waste, contaminated waste water filters, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. Clearly indicate on the outside of each container the name of the waste generator and the location at which the waste was generated. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Comply with 40 CFR 61-SUBPART M, State, regional, and local standards for hauling and disposal. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags must remain in the drum and the entire contaminated drum must be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums must wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

3.3.3.2 Asbestos Disposal Quantity Report

Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for the amount of asbestos containing material released for disposal.

Allow the GC to inspect, record and report the amount of asbestos containing material removed and released for disposal on a daily basis.

-- End of Section --

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SECTION 02 83 00

LEAD REMEDIATION
11/18

PART 1 GENERAL

1.1 SCOPE

Work shall be performed in accordance with 19a-111-1 to 11, 20-478-1 to 3, and 22a-449(c)-100-119.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2	(2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM E1613	(2012) Standard Test Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) Techniques
ASTM E1644	(2021) Standard Practice for Hot Plate Digestion of Dust Wipe Samples for the Determination of Lead
ASTM E1726	(2021) Standard Practice for Preparation of Soil Samples by Hotplate Digestion for Subsequent Lead Analysis
ASTM E1727	(2016) Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination
ASTM E1728/E1728M	(2020) Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination
ASTM E1792	(2020) Standard Specification for Wipe Sampling Materials for Lead in Surface Dust

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2019) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780	(1995; Errata Aug 1996;Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
29 CFR 1926.103	Respiratory Protection
29 CFR 1926.1126	Chromium
29 CFR 1926.1127	Cadmium
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials

	Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

ND OPNAVINST 5100.23	(2005; Rev G) Navy Occupational Safety and Health (NAVOSH) Program Manual

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Sep 2022) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

STATE OF CONNECTICUT, DEPARTMENT OF PUBLIC HEALTH REGULATIONS

19a-111-1 to 11	Lead Poisoning Prevention and Control Regulations
20-478-1 to 3	Standards for Licensure and Certification of Lead Abatement Contractors, Lead Consultants, and Lead Abatement Personnel
22a-449(c)-100-119	Hazardous Waste Management

1.3 DEFINITIONS

1.3.1 Abatement

Measures defined in 40 CFR 745, Section 223, designed to permanently eliminate lead-based paint hazards.

1.3.2 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period; to an airborne concentration of cadmium of 2.5 micrograms per cubic meter of air averaged over an 8-hour period; to an airborne concentration of chromium (VI) of 2.5 micrograms per cubic meter of air averaged over an 8-hour period.

1.3.3 Area Sampling

Sampling of lead, cadmium, chromium concentrations within the lead, cadmium, chromium control area and inside the physical boundaries which is representative of the airborne lead, cadmium, chromium concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

1.3.4 Cadmium Permissible Exposure Limit (PEL)

Five micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.1127. If an employee is exposed for more than 8-hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 40/No. hrs worked per day

1.3.5 Certified Industrial Hygienist (CIH)

As used in this section refers to a person retained by the Contractor who is certified as an industrial hygienist and who is trained in the recognition and control of lead, cadmium and chromium hazards in accordance with current federal, State, and local regulations. CIH must be certified for comprehensive practice by the American Board of Industrial Hygiene. The Certified Industrial Hygienist must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.3.6 Child-Occupied Facility

Real property which is a building or portion of a building constructed prior to 1978 visited regularly by the same child, six-years of age or under, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least 3-hours, and the combined annual visits last at least 60-hours. Child-occupied facilities include but are not limited to, day-care centers, preschools and kindergarten classrooms.

1.3.7 Chromium Permissible Exposure Limit (PEL)

Five micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.1126. If an employee is exposed for more than 8-hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 40/No. hrs worked per day

1.3.8 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead, cadmium and chromium hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead, cadmium and chromium hazard. The Contractor may provide more than one CP as required to supervise and monitor the work. The CP must be a Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals or a licensed lead-based paint abatement Supervisor/Project Designer in the State of Connecticut.

1.3.9 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment (PPE).

1.3.10 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.3.11 Deleading

Activities conducted by a person who offers to eliminate lead-based paint or lead-based paint hazards or paints containing cadmium/chromium or to plan such activities in commercial buildings, bridges or other structures.

1.3.12 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead, cadmium, chromium to which an employee is exposed, averaged over an 8-hour workday as indicated in 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

1.3.13 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead, cadmium, chromium contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

1.3.14 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds. The use of the term Lead in this section also refers to paints which contain detectable concentrations of Cadmium and Chromium. For the purposes of the section lead-based paint (LBP) and paint with lead (PWL) also contains cadmium and chromium.

1.3.15 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

1.3.16 Lead-Based Paint Activities

In the case of target housing or child occupied facilities, lead-based paint activities include: a lead-based paint inspection, a risk assessment, or abatement of lead-based paint hazards.

1.3.17 Lead-Based Paint Hazards

Paint-lead hazard, dust-lead hazard or soil-lead hazard as identified in 40 CFR 745, Section 65. Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

1.3.18 Lead, Cadmium, Chromium Control Area

A system of control methods to prevent the spread of lead, cadmium, chromium dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.3.19 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than 8-hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.3.20 Material Containing Lead/Paint with Lead (MCL/PWL)

Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.3.21 Personal Sampling

Sampling of airborne lead, cadmium, chromium concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Samples must be representative of the employees' work tasks. Breathing zone must be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.3.22 Physical Boundary

Area physically roped or partitioned off around lead, cadmium, chromium control area to limit unauthorized entry of personnel.

1.3.23 Target Housing

Residential real property which is housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any one or more children age 6-years or under resides or is expected to reside in such housing for the elderly or persons with disabilities) or any zero bedroom dwelling.

1.4 DESCRIPTION

Construction activities impacting PWL or material containing lead, cadmium, chromium which are covered by this specification include the demolition or removal of material containing lead, cadmium, chromium in any condition, located within or on the building and as indicated on the drawings. The work covered by this section includes work tasks and the precautions specified in this section for the protection of building occupants and the environment during and after the performance of the hazard abatement activities.

1.4.1 Protection of Existing Areas To Remain

Project work including, but not limited to, lead, cadmium, chromium hazard abatement work, storage, transportation, and disposal must be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, restore work and areas to the original condition.

1.4.2 Coordination with Other Work

Coordinate with work being performed in adjacent areas to ensure there are no exposure issues. Explain coordination procedures in the Lead, Cadmium, Chromium Compliance Plan and describe how the Contractor will prevent lead, cadmium and chromium exposure to other contractors and Government personnel performing work unrelated to lead, cadmium and chromium activities.

1.4.3 Sampling and Analysis

Submit a log of the analytical results from sampling conducted during the abatement. Keep the log of results current with project activities and brief the results to the Contracting Officer as analytical results are reported.

1.4.3.1 Dust Wipe Materials, Sampling and Analysis

Sampling must conform to ASTM E1728/E1728M and ASTM E1792. Analysis must conform to ASTM E1613 and ASTM E1644.

1.4.3.2 Soil Sampling and Analysis

Sampling must conform to ASTM E1727. Analysis must conform to ASTM E1613 and ASTM E1726.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Competent Person Qualifications; G

Training Certification; G

Occupational and Environmental Assessment Data Report; G

Medical Examinations; G

Lead, Cadmium, Chromium Waste Management Plan; G

Licenses, Permits and Notifications; G

Occupant Protection Plan; G

Lead, Cadmium, Chromium Compliance Plan; G

Written Evidence of TSD Approval; G

SD-03 Product Data

Respirators; G

Vacuum Filters; G

Negative Air Pressure System; G

Materials and Equipment; G

Expendable Supplies; G

Local Exhaust Equipment; G

Pressure Differential Automatic Recording Instrument; G

Pressure Differential Log; G

SD-06 Test Reports

Sampling and Analysis; G

Occupational and Environmental Assessment Data Report; G

Sampling Results; G

Pressure Differential Recordings For Local Exhaust System; G

SD-07 Certificates

Testing Laboratory; G

Third Party Consultant Qualifications; G

Occupant Notification; G

Notification of the Commencement of LBP Hazard Abatement; G

Clearance Certification; G

SD-11 Closeout Submittals

Hazardous Waste Manifest; G

Turn-In Documents or Weight Tickets; G

1.6 QUALITY ASSURANCE

1.6.1 Qualifications

1.6.1.1 Competent Person (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph COMPETENT PERSON (CP) RESPONSIBILITIES. Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard (29 CFR 1926.62), Chromium standard (29 CFR 1926.1126), Cadmium standard (29 CFR 1926.1127) which shows ability to assess occupational and environmental exposure to lead, cadmium, chromium; experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Demonstrate a minimum of 3 years experience implementing OSHA's Lead in Construction standard (29 CFR 1926.62), Chromium standard (29 CFR 1926.1126), and Cadmium standard (29 CFR 1926.1127). Submit proper documentation that the CP is trained and licensed and certified in accordance with federal, State and local laws. The competent person must be a licensed lead-based paint abatement Supervisor/Project Designer in the State of Connecticut.

1.6.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, stating that the employee has received the required lead, cadmium and chromium training specified in

29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, 40 CFR 745 and is certified to perform or supervise deleading, lead removal or demolition activities in the State of Connecticut.

1.6.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air analysis, testing, and reporting of airborne concentrations of lead, cadmium and chromium. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis must be OSHA approved.

1.6.1.4 Third Party Consultant Qualifications

Submit the name, address and telephone number of the third party consultant selected to perform the wipe sampling for determining concentrations of lead, cadmium and chromium in dust. Submit proper documentation that the consultant is trained and certified as an inspector technician or inspector/risk assessor by the USEPA authorized State (or local) certification and accreditation program.

1.6.1.5 Certified Risk Assessor

The Certified Risk Assessor must be certified pursuant to 40 CFR 745, Section 226 and be responsible to perform the clearance sampling, clearance sample data evaluation and summarize clearance sampling results in a section of the abatement report. The risk assessor must sign the abatement report to indicate clearance requirements for the contract have been met.

1.6.2 Requirements

1.6.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all federal, State, and local requirements.

b. Review and approve Lead, Cadmium, Chromium Compliance Plan for conformance to the applicable referenced standards.

c. Continuously inspect LBP/PWL or MCL work for conformance with the approved plan.

d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Control work to prevent hazardous exposure to human beings and to the environment at all times.

g. Supervise final cleaning of the lead, cadmium, chromium control area, take clearance wipe samples if necessary; review clearance sample

results and make recommendations for further cleaning.

h. Certify the conditions of the work as called for elsewhere in this specification.

i. The CP must be certified pursuant to 40 CFR 745, Section 226 and is responsible for development and implementation of the occupant protection plan, the abatement report and supervise lead, cadmium and chromium hazard abatement work activities.

1.6.2.2 Lead, Cadmium, Chromium Compliance Plan

Submit a detailed job-specific plan of the work procedures to be used in the disturbance of lead, cadmium and chromium, LBP/PWL or MCL. Include in the plan a sketch showing the location, size, and details of lead, cadmium, chromium control areas, critical barriers, physical boundaries, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead, cadmium, chromium is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead, cadmium, chromium related work, collected waste water and dust containing lead, cadmium, chromium and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead, cadmium, chromium is not released outside of the lead, cadmium, chromium control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multicontractor worksites to inform affected employees and to clarify responsibilities to control exposures.

The plan must be developed and signed by a certified Lead Project Designer in the State of Connecticut. The plan must include the name and certification number of the person signing the plan.

In occupied buildings, the plan must also include an occupant protection program that describes the measures that will be taken during the work to notify and protect the building occupants.

1.6.2.3 Occupational and Environmental Assessment Data Report

If initial monitoring is necessary, submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

In order to reduce the full implementation of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 the Contractor must provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of 29 CFR 1926.62,29 CFR 1926.1126, 29 CFR 1926.1127 and supporting the Lead, Cadmium, Chromium Compliance Plan.

a. The initial monitoring must represent each job classification, or if working conditions are similar to previous jobs by the same employer,

provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62,29 CFR 1926.1126, 29 CFR 1926.1127. The data must represent the worker's regular daily exposure to lead, cadmium, chromium for stated work.

b. Submit worker exposure data gathered during the task based trigger operations of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead, cadmium and chromium containing coatings are present.

c. The initial assessment must determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead, cadmium, chromium compliance plan per 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

1.6.2.4 Medical Examinations

Submit pre-work blood lead levels and post-work blood lead levels for all workers performing lead, cadmium, chromium activities during the execution of the work. Initial medical surveillance as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 must be made available to all employees exposed to lead, cadmium, chromium at any time (one day) above the action level. Full medical surveillance must be made available to all employees on an annual basis who are or may be exposed to lead, cadmium and chromium in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Adequate records must show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead, cadmium, chromium as indicated in 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

1.6.2.5 Training

Train each employee performing work that disturbs lead, cadmium, chromium, who performs LBP/MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, 40 CFR 745 and State and local regulations where appropriate.

1.6.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

b. Establish and implement a respiratory protection program as required by 29 CFR 1926.103, 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and 29 CFR 1926.55.

1.6.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.6.2.8 Lead, Cadmium, Chromium Waste Management

The Lead, Cadmium, Chromium Waste Management Plan must comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

a. Identification and classification of wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of USEPA State (in accordance with Connecticut) and local hazardous waste permit applications, permits, manifests, and USEPA Identification numbers.

d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal, and disposal. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Clean up and containerize wastes daily.

h. Include any process that may alter or treat waste rendering a hazardous waste non-hazardous.

i. Unit cost for hazardous waste disposal according to this plan.

1.6.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, State, and local authorities regarding lead, cadmium and chromium. Comply with the applicable requirements of the current issue of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, EM 385-1-1, ND OPNAVINST 5100.23. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirements apply.

Licensing and certification in the state of Connecticut is required.

1.6.3 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the lead, cadmium, chromium control area is removed. Submit pressure differential recordings for each work day to the PQP for review and to the Contracting Officer within 24-hours from the end of each work day.

1.6.4 Licenses, Permits and Notifications

Certify and submit in writing to the Regional Office of the EPA, state's environmental protection agency responsible for lead hazard abatement activities, and the Contracting Officer at least 10 days prior to the commencement of work that licenses, permits and notifications have been obtained. All associated fees or costs incurred in obtaining the licenses, permits, and notifications are included in the contract price.

1.6.5 Occupant Protection Plan

The certified project designer must develop and implement an Occupant Protection Plan describing the measures and management procedures to be taken during lead, cadmium, and chromium hazard abatement activities to protect the building occupants/building facilities and the outside environment from exposure to any lead, cadmium, and chromium contamination while lead, cadmium, and chromium hazard abatement activities are performed.

1.6.6 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the Lead, Cadmium, and Chromium Waste Management Plan and the Lead, Cadmium, and Chromium Compliance Plan, including procedures and precautions for the work.

1.7 EQUIPMENT

1.7.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead, cadmium and chromium dust, fume, and mist. Respirators must comply with the requirements of 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

1.7.2 Special Protective Clothing

Personnel exposed to lead, cadmium, chromiumcontaminated dust must wear proper disposable protective whole body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.7.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

1.7.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.7.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal

protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead, cadmium and chromium removal work within the lead, cadmium and chromium controlled area. Personal protective equipment must include disposable whole body covering, including appropriate foot, head, eye, and hand protection. PPE remains the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

1.7.6 Abrasive Removal Equipment

The use of powered machine for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

1.7.7 Negative Air Pressure System

1.7.7.1 Minimum Requirements

Do not proceed with work in the area until containment is set up and HEPA filtration systems are in place. The negative air pressure system must meet the requirements of ASSP Z9.2 including approved HEPA filters in accordance with UL 586. Negative air pressure equipment must be equipped with new HEPA filters, and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Negative air pressure system minimum requirements are listed as follows:

a. The unit must be capable of delivering its rated volume of air with a clean first stage filter, an intermediate filter and a primary HEPA filter in place.

b. The HEPA filter must be certified as being capable of trapping and retaining mono-disperse particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.

c. The unit must be capable of continuing to deliver no less than 70 percent of rated capacity when the HEPA filter is 70 percent full or measures 2.5 inches of water static pressure differential on a magnehelic gauge.

d. Equip the unit with a manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0 percent. The manometer must be calibrated daily as recommended by the manufacturer.

e. Equip the unit with a means for the operator to easily interpret the readings in terms of the volumetric flow rate of air per minute moving through the machine at any given moment.

f. Equip the unit with an electronic mechanism that automatically shuts the machine off in the event of a filter breach or absence of a filter.

g. Equip the unit with an audible horn that sounds an alarm when the machine has shut itself off.

h. Equip the unit with an automatic safety mechanism that prevents a worker from improperly inserting the main HEPA filter.

1.7.7.2 Auxiliary Generator

Provide an auxiliary generator with capacity to power a minimum of 50 percent of the negative air machines at any time during the work. When power fails, the generator controls must automatically start the generator and switch the negative air pressure system machines to generator power. The generator must not present a carbon monoxide hazard to workers.

1.7.8 Vacuum Systems

Vacuum systems must be suitably sized for the project, and filters must be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers (mean aerodynamic diameter) at a minimum efficiency of 99.97 percent. Properly dispose of used filters that are being replaced.

1.7.9 Heat Blower Guns

Heat blower guns must be flameless, electrical, paint-softener type with controls to limit temperature to 1,100 degrees F. Heat blower must be (grounded) 120 volts ac, and must be equipped with cone, fan, glass protector and spoon reflector nozzles.

1.8 PROJECT/SITE CONDITIONS

1.8.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Keep materials and equipment needed to complete the project available and on the site. Submit a description of the materials and equipment required; including Safety Data Sheets (SDSs) for material brought onsite to perform the work.

2.1.1 Expendable Supplies

Submit a description of the expendable supplies required.

2.1.1.1 Polyethylene Bags

Disposable bags must be polyethylene plastic and be a minimum of 6 mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and capable of being made leak-tight. Leak-tight means that solids, liquids or dust cannot escape or spill out.

2.1.1.2 Polyethylene Leak-tight Wrapping

Wrapping used to wrap lead, cadmium, chromium contaminated debris must be polyethylene plastic that is a minimum of 6 mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.

2.1.1.3 Polyethylene Sheeting

Sheeting must be polyethylene plastic with a minimum thickness of 6 mil, or any other thick plastic material shown to demonstrate at least equivalent performance; and be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, provide flame-resistant polyethylene sheets which conform to the requirements of NFPA 701.

2.1.1.4 Tape and Adhesive Spray

Tape and adhesive must be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive must retain adhesion when exposed to wet conditions, including amended water. Tape must be minimum 2 inches wide, industrial strength.

2.1.1.5 Containers

When used, containers must be leak-tight and be labeled in accordance with EPA, DOT and OSHA standards.

2.1.1.6 Chemical Paint Strippers

Chemical paint strippers must not contain methylene chloride and be formulated to prevent stain, discoloration, or raising of the substrate materials.

2.1.1.7 Chemical Paint Stripper Neutralizer

Neutralizers for paint strippers must be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

2.1.1.8 Detergents and Cleaners

Detergents or cleaning agents must not contain trisodium phosphate and have demonstrated effectiveness in lead, cadmium and chromium control work using cleaning techniques specified by HUD 6780 guidelines.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

a. Notify the Contracting Officer 20 days prior to the start of any lead, cadmium and chromium work.

b. Occupant Notification

Submit occupant written acknowledgment of the delivery of lead hazard information pamphlet (EPA 747-K-99-001 "Protect Your Family From Lead in Your Home") prior to commencing the renovation work for each affected unit using language provided in 40 CFR 745 Subpart E.

c. Notification of the Commencement of LBP Hazard Abatement

Submit a copy of the notification of the commencement of LBP hazard abatement to occupants according to the procedures established by the Contracting Officer.

3.1.1.2 Lead, Cadmium, and Chromium Control Area

a. Physical Boundary - Provide physical boundaries around the lead, cadmium, chromium control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead, cadmium and chromium will not escape outside of the lead, cadmium and chromium control area. Prohibit the general public from accessing the lead, cadmium, and chromium control areas.

b. Warning Signs - Provide warning signs at approaches to lead, cadmium, and chromium control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs must comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Furnishings

The Government will remove furniture and equipment from the building before lead, cadmium and chromium work begins.

3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead, cadmium, and chromium control areas. Seal intake and exhaust vents in the lead, and cadmium, chromium control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead, cadmium, chromium control area.

3.1.1.5 Local Exhaust System

Provide a local exhaust system in the lead, cadmium, and chromium control area in accordance with ASSP Z9.2, 29 CFR 1926.62, 29 CFR 1926.1126 and 29 CFR 1926.1127 that will provide at least 4 air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the lead, cadmium, and chromium control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the lead, cadmium, and chromium control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the lead, cadmium, and chromium control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors and remote from any public access or ventilation system intakes.

3.1.1.6 Negative Air Pressure System Containment

a. Operate the negative air pressure systems to provide at least 4 air changes per hour inside the containment. Operate the local exhaust unit equipment continuously until the containment is removed. Smoke

test the negative air pressure system for leaks at the beginning of each shift. The certified supervisor is responsible to continuously monitor and keep a pressure differential log with an automatic manometric recording instrument. Notify the Contracting Officer immediately if the pressure differential falls below the prescribed minimum. Submit the continuously monitored pressure differential log, as specified. Do not use the building ventilation system as the local exhaust system. Terminate the local exhaust system out of doors unless the Contracting Officer allows an alternate arrangement. All filters must be new at the beginning of the project and be periodically changed as necessary to maintain specified pressure differential and disposed of as lead, cadmium and chromium contaminated waste.

b. Discontinuing Negative Air Pressure System. Operate the negative air pressure system continuously during abatement activities unless otherwise authorized by the Contracting Officer. At the completion of the project, units must be run until full cleanup has been completed and final clearance testing requirements have been met. Dismantling of the negative air pressure systems must be approved by the Contracting Officer be as presented in the Lead, Cadmium, and Chromium Compliance Plan. Seal the HEPA filter machine intakes with polyethylene to prevent environmental contamination.

3.1.1.7 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

3.1.1.8 Eye Wash Station

Provide suitable facilities within the work area for quick drenching or flushing of the eyes where eyes may be exposed to injurious corrosive materials.

3.1.1.9 Mechanical Ventilation System

a. Use adequate ventilation to control personnel exposure to lead, cadmium and chromium in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Evaluate and maintain local exhaust ventilation systems in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127.

b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.

c. Use locally exhausted, power actuated tools or manual hand tools.

3.1.1.10 Personnel Protection

Personnel must wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead, cadmium, and chromium control area. No one will be permitted in the lead, cadmium, and chromium control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead, Cadmium, and Chromium Control Area Requirements

Establish a lead, cadmium, and chromium control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

Full containment - Contain removal operations by the use of critical barriers, HEPA filtered exhaust, and a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the CP. For containment areas larger than 1,000 square feet install a minimum of two 18 inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.

3.3 APPLICATION

3.3.1 Lead, Cadmium, and Chromium Work

Perform lead, cadmium, and chromium work in accordance with approved Lead, Cadmium, and Chromium Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead, cadmium, chromium when the work is performed in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127, or 40 CFR 745, and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, State, and local requirements.

3.3.2 Paint with Lead, Cadmium, and Chromium or Material Containing Lead, Cadmium, and Chromium Removal

Manual or power sanding or grinding of lead, cadmium, chromium surfaces or materials is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead, cadmium, and chromium is prohibited. Provide methodology for removing lead, cadmium, chromium in the Lead, Cadmium, and Chromium Compliance Plan. Select lead, cadmium, and chromium removal processes to minimize contamination of work areas outside the control area with lead, cadmium, and chromium contaminated dust or other lead, cadmium, and chromium contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead, cadmium, and chromium. Describe this removal process in the Lead, Cadmium, and Chromium Compliance Plan.

Provide methodology for lead, cadmium and chromium, LBP/PWL removal and processes to minimize contamination of work areas outside the control area with lead, cadmium, and chromium contaminated dust or other lead, cadmium, and chromium contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead, cadmium, and chromium. Describe this lead, cadmium and chromium, LBP/PWL removal/control process in the Lead, Cadmium, Chromium Compliance Plan.

3.3.2.1 Paint with Lead, Cadmium, and Chromium or Material Containing Lead, Cadmium, and Chromium - Indoor Removal

Perform manual removal in the lead, cadmium, and chromium control areas using enclosures, barriers or containments and powered locally exhausted tools equipped with HEPA filters. Collect residue and debris for disposal in accordance with federal, State, and local requirements.

3.3.2.2 Paint with Lead, Cadmium, and Chromium or Material Containing Lead, Cadmium, and Chromium - Outdoor Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the Lead, Cadmium, and Chromium Compliance Plan. The worksite preparation (barriers or containments) must be job dependent and presented in the Lead, Cadmium, and Chromium Compliance Plan.

3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead, cadmium, and chromium controlled area, they must perform the following procedures and must not leave the work place wearing any clothing or equipment worn in the control area:

a. Vacuum all clothing before entering the contaminated change room.

b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.

c. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing, move to an appropriate shower facility, shower.

d. Change to clean clothes prior to leaving the clean clothes storage area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air Sampling

Conduct sampling for lead, cadmium, and chromium in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and as specified herein. Air sampling must be directed or performed by the CP.

a. The CP must be on the job site directing the air sampling and inspecting the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.

b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, signed by the CP, within 72-hours after the air samples are taken.

d. Conduct area air sampling daily, on each shift in which lead, cadmium and chromium and lead-based paint removal operations are performed, in areas immediately adjacent to the lead, cadmium and chromium control area. Conduct sufficient area monitoring to ensure unprotected personnel are not exposed at or above 30 micrograms of lead per cubic meter of air or 2.5 micrograms of cadmium/chromium per cubic meter of air. If 30 micrograms of lead per cubic meter of air or 2.5 micrograms of cadmium/chromium per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased

levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Resume removal work only after the CP and the Contracting Officer give approval.

3.4.1.2 Testing of Material Containing Lead, Cadmium, Chromium Residue

Test residue in accordance with 40 CFR 261 for hazardous waste.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead, cadmium, and chromium control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead, cadmium, and chromium operation has been completed, clean the controlled area of all visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead, Cadmium, and Chromium Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, and visually inspect all contaminated areas. The CP must then certify in writing that the area has been cleaned of lead, cadmium and chromium contamination before clearance testing.

3.5.1.1 Clearance Certification

The CP must certify in writing that air samples collected outside the lead, cadmium, and chromium control area during paint removal operations are less than 30 micrograms of lead per cubic meter of airand less than 2.5 micrograms of cadmium/chromium per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127; and that there were no visible accumulations of material and dust containing lead, cadmium, and chromium left in the work site. Do not remove the lead, cadmium, and chromium control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

3.5.2 Disposal

Contact the Contracting Officer or designated representative for the facility RCRA identification number that is to be used on each manifest.

Submit a copy of the applicable EPA and or state permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous lead material by permitted facilities. Hazardous lead material waste manifests must be reviewed, signed, and approved by the Contracting Officer before the Contractor may ship waste. To obtain specific disposal instructions, coordinate with the Installation Environmental Office. Refer to location special requirements for the Installation Point of Contact information.

a. Dispose of material, whether hazardous or non-hazardous in accordance with all laws and provisions and all federal, State, or local

regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

b. Contractor is responsible for segregation of waste. Collect lead, cadmium, chromium contaminated waste, scrap, debris, bags, containers, equipment, and lead, cadmium, and chromium contaminated clothing that may produce airborne concentrations of lead, cadmium, and chromium particles. Label the containers in accordance with 29 CFR 1926.62, 29 CFR 1926.1126, 29 CFR 1926.1127 and 40 CFR 261, 40 CFR 262 and corresponding state regulations.

c. Dispose of lead, cadmium, and chromium contaminated material classified as hazardous waste at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Government property.

d. Accumulate waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums or appropriately sized container for smaller volumes. Properly label each drum to identify the type of hazardous material (49 CFR 172). For hazardous waste, the collection container requires marking/labeling in accordance with 40 CFR 262 and corresponding state regulations during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for accumulation of waste containers. Coordinate authorized accumulation volumes and time limits with the host installation environmental function.

e. Handle, store, transport, and dispose lead, cadmium, chromium or lead, cadmium, and chromium contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

f. All lead, cadmium, and chromium waste generation, management, and disposal will be coordinated with the host installation environmental function.

3.5.2.1 Disposal Documentation

Coordinate all disposal or off-site shipments of lead, cadmium, and chromium waste with the host installation environmental function. Submit written evidence of TSD approval to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead, cadmium, chromium disposal by the EPA, State, or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed, and dated by the initial transporter in accordance with 40 CFR 262. rovide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for non-hazardous waste disposal.

3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal

facility is received and approved by the Contracting Officer. The manifest must detail and certify the amount of lead, cadmium, and chromium containing materials or non-hazardous waste delivered to the treatment or disposal facility.

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SECTION 02 84 16

HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY
11/22

PART 1 GENERAL

1.1 SCOPE

Work shall be performed in accordance with 22a-449(c)-100-119.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 273	Standards for Universal Waste Management
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 178	Specifications for Packagings

STATE OF CONNECTICUT, DEPARTMENT OF PUBLIC HEALTH REGULATIONS

22a-449(c)-100-119	Hazardous Waste Management

1.3 REQUIREMENTS

Removal and disposal of PCB containing lighting ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB ballasts.

1.4 DEFINITIONS

1.4.1 Certified Industrial Hygienist (CIH)

A industrial hygienist hired by the contractor must be certified by the American Board of Industrial Hygiene.

1.4.2 Leak

Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

1.4.3 Lamps

Lamp is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

1.4.4 Polychlorinated Biphenyls (PCBs)

PCBs as used in this specification mean the same as PCBs, and all related items, as defined in 40 CFR 761, Section 3, Definitions.

1.4.5 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

1.4.6 Universal Waste

Universal Waste means any of the following hazardous wastes that are managed under the universal waste requirements 40 CFR 273:

(1) Batteries as described in Sec. 273.2 of this chapter;

(2) Pesticides as described in Sec. 273.3 of this chapter;

(3) Mercury containing equipment as described in Sec. 273.4 of this chapter; and

(4) Lamps as described in Sec. 273.5 of this chapter.

1.5 QUALITY ASSURANCE

1.5.1 Regulatory Requirements

Perform PCB related work in accordance with 40 CFR 761. Perform mercury-containing lamps storage and transport in accordance with

40 CFR 261, 40 CFR 264, 40 CFR 265, 40 CFR 273.

1.5.2 Training

Instruction and certification of training of all persons involved in the removal of PCB containing lighting ballasts and mercury-containing lamps is the responsibility of the Certified Industrial Hygienist (CIH). Include in the instruction: The dangers of PCB and mercury exposure, decontamination, safe work practices, and applicable OSHA and EPA regulations. The CIH must review and approve the PCB and Mercury-Containing Lamp Removal Work Plans.

1.5.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 265, 40 CFR 268, 40 CFR 270, 40 CFR 273 and of the Contractor removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Qualifications of CIH; G

Training Certification; G

PCB and Lamp Removal Work Plan; G

PCB and Lamp Disposal Plan; G

SD-11 Closeout Submittals

Transporter Certification of notification to EPA of their PCB waste activities and EPA ID numbers; G

Certification of Decontamination

Certificate of Disposal and/or recycling. Submit to the Government before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.

DD Form 1348-1

1.7 ENVIRONMENTAL REQUIREMENTS

Use special clothing:

a. Disposable gloves (polyethylene)

b. Eye protection

c. PPE as required by CIH

1.8 SCHEDULING

Notify the Contracting Officer 20 days prior to the start of PCB and mercury-containing lamp removal work.

1.9 QUALITY ASSURANCE

1.9.1 Qualifications of CIH

Submit the name, address, and telephone number of the Industrial Hygienist selected to perform the duties in paragraph CERTIFIED INDUSTRIAL HYGIENIST. Submit training certification that the Industrial Hygienist is certified, including certification number and date of certification or re certification.

1.9.2 PCB and Lamp Removal Work Plan

Submit a job-specific plan within 20 calendar days after award of contract of the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps. Include in the plan: Requirements for Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. The plan must be approved and signed by the Certified Industrial Hygienist. Obtain approval of the plan by the Contracting Officer prior to the start of PCB and/or lamp removal work.

1.9.3 PCB and Lamp Disposal Plan

Submit a PCB and lamp Disposal Plan within 45 calendar days after award of contract, complying with the applicable requirements of federal, state, and local PCB and Universal waste regulations and address:

a. Estimated quantities of wastes to be generated, disposed of, and recycled.

b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste permit applications and EPA identification numbers, as required.

c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp wastes.

d. Spill prevention, containment, and cleanup contingency measures to be implemented.

e. Work plan and schedule for PCB and mercury-containing lamp waste removal, containment, storage, transportation, disposal and or recycling. Clean up and containerize wastes daily.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the removal of PCB containing lighting ballasts, associated mercury-containing fluorescent lamps, and high intensity discharge (HID) lamps in accordance with local, state, or federal regulations. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not break mercury containing fluorescent lamps or high intensity discharge lamps.

3.1.1 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:

a. Obtaining suitable PCB and mercury-containing lamp storage sites.

b. Notifying Contracting Officer prior to commencing the operation.

c. Reporting leaks and spills to the Contracting Officer.

d. Cleaning up spills.

e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.

f. Maintaining inspection, inventory and spill records.

3.2 PCB SPILL CLEANUP REQUIREMENTS

3.2.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills.

3.2.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

3.2.3 PCB Spill Cleanup

40 CFR 761, subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. Properly contain and dispose of spent absorbent as solid PCB waste.

3.2.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide test results of cleanup and certification of decontamination.

3.3 REMOVAL

3.3.1 Ballasts

As ballast are removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label must be assumed to contain PCBs and containerized and disposed of as required under paragraphs STORAGE FOR DISPOSAL and DISPOSAL. If there are less than 1600 "No PCB" labeled lighting ballasts, dispose of them as normal demolition debris. If there are more than 1600 "No PCB" labeled ballasts, establish whether the "No PCB" labeled ballasts contain diethylhexyl phthalate (DEHP) either by test or by checking with the ballast manufacturer indicated on the label. Submit testing results and/or written confirmation from the manufacturer to the Contracting Officer. If the ballasts do not contain DEHP, dispose of them as normal construction debris. If they do contain DEHP, dispose of them as hazardous material in accordance with Federal, State, and local regulations. As a basis of bid assume ballasts with "No PCB" labels do not contain DEHP and may disposed of as normal construction debris. If 1600 or more DEHP ballasts are disposed of in a 24 hour period, notify the National Response Team at 800-424-8802.

3.3.2 Lighting Lamps

Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as universal waste as specified herein.

3.4 STORAGE FOR DISPOSAL

3.4.1 Storage Containers for PCBs

49 CFR 178. Store PCB in containers approved by DOT for PCB.

3.4.2 Storage Containers for lamps

Store mercury containing lamps in appropriate DOT containers. Store and label boxes for transport in accordance with 40 CFR 273.

3.4.3 Labeling of Waste Containers

Label with the following:

a. Date the item was placed in storage and the name of the cognizant activity/building.

b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.

c. Label mercury-containing lamp waste in accordance with 40 CFR 273. Affix labels to all lighting waste containers.

3.5 DISPOSAL

Dispose of off Government property in accordance with EPA, DOT, and local regulations at a permitted site.

3.5.1 Identification Number

Federal regulations 40 CFR 761, and 40 CFR 263 require that generators, transporters, commercial storers, and disposers of PCB waste posses U.S. EPA identification numbers. Verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest. If not, advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work. For mercury containing lamp removal, Federal regulations 40 CFR 273 require that large quantity handlers of Universal waste (LQHUW) must provide notification of universal waste management to the appropriate EPA Region (or state director in authorized states), obtain an EPA identification number, and retain for three years records of off-site shipments of universal waste. Verify that the activity has a U.S. EPA generator identification number for use on the Universal Waste manifest. If not, advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work.

3.5.2 Transporter Certification

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB waste from the Government. Return a signed copy to the Government before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities (EPA Form 7710-53).

3.5.2.1 Certificate of Disposal and/or Recycling

40 CFR 761. Include in the certificate for the PCBs and PCB items disposed:

a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.

b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.

c. A statement certifying the fact of disposal and or recycling of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.

d. A certification as defined in 40 CFR 761.

3.5.3 Disposal by the Government

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Coordinate delivery of PCBs on-site with local Environmental for subsequent disposal on Defense Logistics Agency Disposition Services (DLA DS) contracts. If the primary site is filled to capacity, contact the Contracting Officer. The transport distance to any storage site will not exceed the distance between the project site and the DLA DS storage site.

3.5.3.1 Delivery

Contact DLA DS at least 5 working days in advance to make arrangements for delivery of PCB to the storage site.

3.5.3.2 DD Form 1348-1

Prepare DD Form 1348-1 Turn-in Document (TID), which will accompany the PCB to the storage site. Ensure that a responsible person from the activity that owns the PCB signs the DD Form 1348-1.

-- End of Section --

SECTION 02 84 33

REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs)
11/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.145	Specifications for Accident Prevention Signs and Tags
29 CFR 1910.1000	Air Contaminants
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 174	Carriage by Rail
49 CFR 175	Carriage by Aircraft
49 CFR 176	Carriage by Vessel
49 CFR 177	Carriage by Public Highway
49 CFR 178	Specifications for Packagings
49 CFR 179	Specifications for Tank Cars

1.2 REQUIREMENTS

The work includes the removal and disposal of any PCB items. Perform work in accordance with 40 CFR 761 and the requirements specified herein.

1.3 DEFINITIONS

1.3.1 Leak

Leak or leaking means any instance in which a PCB Article, PCB Container, or PCB Equipment has any PCBs on any portion of its external surface.

1.3.2 PCBs

PCBs as used in this specification mean the same as PCBs, PCB Article, PCB Article Container, PCB Container, PCB Equipment, PCB Item, PCB Transformer, PCB-Contaminated Electrical Equipment, as defined in 40 CFR 761, Section 3, Definitions.

1.3.3 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

1.4 QUALITY ASSURANCE

1.4.1 Training

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

1.4.2 Certified Industrial Hygienist (CIH)

Obtain the services of an industrial hygienist certified by the American Board of Industrial Hygiene to certify training, review and approve the PCB removal plan, including determination of the need for personnel protective equipment (PPE) in performing PCB removal work.

1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site 29 CFR 1910.1000, 40 CFR 761, and Contractor work practices for removal, storage and disposal of PCBs.

1.4.4 Surveillance Personnel

Surveillance personnel may enter PCB control areas for brief periods of time provided they wear disposable polyethylene gloves and disposal polyethylene foot covers, as a minimum. Additional protective equipment may be required if respiratory hazard is involved or if skin contact with PCB is involved.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

PCB Removal Work Plan

PCB Disposal Plan

SD-07 Certificates

Training certification

Qualifications of CIH

Notification

Transporter Certification of notification to EPA of their PCB waste activities and EPA ID numbers

Certification of Decontamination for PCB Spill

Post Cleanup Sampling Data

Certificate of Disposal

1.6 EQUIPMENT

1.6.1 Special Clothing

Work clothes consist of PPE as required by OSHA regulations, including, but not limited to the following:

a. Disposable coveralls

b. Gloves (Disposable rubber gloves may be worn under these)

c. Disposable foot covers (polyethylene)

d. Chemical safety goggles

e. Half mask cartridge respirator.

1.6.2 Special Clothing for Government Personnel

Provide PPE specified in paragraph SPECIAL CLOTHING to the Contracting Officer as required for inspection of the work.

1.6.3 PCB Spill Kit

Assemble a spill kit to include the following items:

ITEM	MINIMUM QUANTITY
1. Disposable gloves (polyethylene)	6 prs
2. Gloves with a high degree of impermeability to PCB	6 prs
3. Disposable coveralls with permeation resistance to PCB	4 ea
4. Chemical safety goggles	2 ea
5. Disposable foot covers (polyethylene)	6 prs

6. PCB Caution Sign: "PCB Spill--Authorized Personnel Only"	2 ea
7. Banner guard or equivalent banner material	100 feet
8. Absorbent material	5 bags
9. Blue polyethylene waste bags	5 ea
10. Cloth backed tape	1 roll
11. Area access logs, blank	10 ea
12. Brattice cloth, 6' x 6'	1 piece
13. Rags	20 ea
14. Ball point pens	20 ea
15. Herculite, 4' x 4' and 8' x 8'	2 ea and 1 ea
16. Blank metal signs and grease pencils	2 ea
17. Waste containers 55 gallon drum, may be used as container for kit	1 ea

1.7 QUALITY ASSURANCE

1.7.1 Training Certification

Submit certificates, prior to the start of work but after the main abatement submittals, signed and dated by the CIH and by each employee stating that the employee has received training. Organize certificates by individual worker, not grouped by type of certificates.

1.7.2 Qualifications of CIH

Submit the name, address, and telephone number of the Industrial Hygienist selected to perform the duties in paragraph CERTIFIED INDUSTRIAL HYGIENIST. Submit proper documentation that the Industrial Hygienist is certified, including certification number and date of certification/recertification.

1.7.3 PCB Removal Work Plan

Submit a detailed job-specific plan of the work procedures to be used in the removal of PCB-containing materials, not to be combined with other hazardous abatement plans. Provide a Table of Contents for each abatement submittal which follows the sequence of requirements in the contract. Include in the plan a sketch showing the location, size, and details of PCB control areas, location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation system. Include in the plan, eating, drinking, smoking and restroom procedures, interface of trades, sequencing of PCB related work, PCB disposal plan, respirators, protective equipment, and a detailed description of the method of

containment of the operation to ensure that PCB contamination is not spread or carried outside of the control area. Include provisions to ensure that airborne PCB concentrations of 3.10 E-08 pound per cubic feet of air are not exceeded outside of the PCB control area. Include air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion of the plan. Obtain approval of the plan prior to the start of PCB removal work.

1.7.4 PCB Disposal Plan

Submit a PCB Disposal Plan within 45 calendar days after award of contract for Contracting Officer's approval. Comply with applicable requirements of Federal, State, and local PCB waste regulations and address:

a. Identification of PCB wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of EPA State and local PCB waste permit applications, permits and EPA Identification numbers.

d. Names and qualifications (experience and training) of personnel who will be working on-site with PCB wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures to be implemented.

g. Work plan and schedule for PCB waste containment, removal and disposal. Clean up and containerize wastes daily.

1.7.5 Notification

Notify the Contracting Officer 20 days prior to the start of PCB removal work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Decontamination Room, Clean Room and Shower Facilities

a. Provide material and labor for construction of a decontamination room, a clean room, and shower facilities. Provide rooms with doors and attach to the exit ways of PCB work areas. Provide rooms of sufficient size to accommodate the Contractor's operation within. Provide portable toilet and shower facilities. Locate shower facilities between the clean room and decontamination room. Provide separate clothing lockers or containers in each room to prevent

contamination of street and work clothes.

b. Remove PCB-contaminated PPE in the decontamination room before proceeding to showers. Workers must shower before lunch and at the end of each day's work. Hot water, towels, soap, and hygienic conditions are the responsibility of the Contractor.

3.1.2 PCB Control Area

Isolate PCB control area by physical boundaries to prevent unauthorized entry of personnel. Food, drink and smoking materials are not permitted in areas where PCBs are handled or PCB items are stored.

3.1.3 Personnel Protection

Workers must wear and use PPE, as recommended by the Industrial Hygienist, upon entering a PCB control area. If PPE is not required per the CIH, specify in the PCB removal work plan.

3.1.4 Footwear

Work footwear remains inside work area until completion of the job.

3.1.5 Permissible Exposure Limits (PEL)

PEL for PCBs is 3.1 E-08 lb/cubic foot on an 8-hour time weighted average basis.

3.1.6 Special Hazards

a. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced.

b. Do not heat PCBs to temperatures of 135 degrees F or higher without Contracting Officer's concurrence.

3.1.7 PCB Caution Label

40 CFR 761, Subpart C. Affix labels to PCB waste containers and other PCB-contaminated items. Provide label with sufficient print size to be clearly legible, with bold print on a contrasting background, displaying the following: CAUTION: Contains PCBs (Polychlorinated Biphenyls).

3.1.8 PCB Caution Sign

29 CFR 1910.145. Provide signs at approaches to PCB control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area.

3.2 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the complete removal of PCBs located at the site as indicated or specified in accordance with local, State, or Federal regulations. Package and mark PCB as required by EPA and DOT regulations and dispose of off Government property in accordance with EPA, DOT, and local regulations at a permitted site.

3.2.1 No Smoking

Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the Contracting Officer.

3.2.2 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761 and the applicable requirements of this section, including but not limited to:

a. Obtaining advance approval of PCB storage sites.

b. Notifying Contracting Officer prior to commencing the operation.

c. Reporting leaks and spills to the Contracting Officer.

d. Cleaning up spills.

e. Maintaining an access log of employees working in a PCB control area and providing a copy to the Contracting Officer upon completion of the operation.

f. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.

g. Maintaining a spill kit as specified in paragraph PCB SPILL KIT.

h. Maintaining inspection, inventory and spill records.

3.3 PCB TRANSFORMERS

3.3.1 Draining of Transformer Liquid

Perform work in accordance with 49 CFR 171, 49 CFR 172, 49 CFR 173, 49 CFR 174, 49 CFR 175, 49 CFR 176, 49 CFR 177, 49 CFR 178, and 49 CFR 179, Subchapter C and as specified herein. Drain the transformer, switches, and regulators of free flowing liquid prior to transportation. Place the drained liquids in DoT Spec drums. The drums must not contain more than 50 gallons of oil. If the equipment cannot be drained, then place it in DoT Spec drums. DoT drum specifications must meet UN 1A1/Y1.6 (steel drum) or UN 1H1/Y1.6 (plastic drum).

3.3.2 Markings

Provide drums and drained PCB-contaminated electrical equipment with caution label markings as specified in paragraph PCB CAUTION LABEL.

3.3.3 Laboratory Analysis

Provide all transformers with a laboratory analysis for turn-in. DLA DS prefers a gas chromatograph test. The only two exceptions to this rule are:

a. The transformer is hermetically sealed (solder sealed or fusion sealed. No access ports or openings).

b. The name plate states that the transformer contains Pyranol,

Interteen, etc.

Attach a copy of the lab analysis to both the DD 1348-1 and the transformer itself.

3.3.4 Markings

3.3.4.1 Transformers, Less Than 50 ppm

Add absorbent material to absorb residue oil remaining after draining. Write the date drained on the transformer. Turn in transformers to DLA DS.

3.3.4.2 Transformers, 50-499 ppm

Same procedure as transformers in the less than 50 ppm range.

3.3.4.3 Transformers, Greater Than 500 ppm

Stencil date drained on the transformer. Turn in transformer to DLA DS.

3.3.4.4 Drums

Stencil on DOT-approved 55 gallon drums containing PCB liquid the following:

a. ppm

b. Date drum filled

c. Serial number of transformer liquid came from

d. National Stock Number

(1) "9999-00-OIL" for <50 ppm

(2) "9999-00-CONPCB" for 50-499 ppm

(3) "9999-00-PCBOIL" for >500 ppm

Do not mix different ppms in the same drum. Drums must have a 2 inch ullage space from the top of the drum.

3.4 PCB REMOVAL

Select PCB removal procedure to minimize contamination of work areas with PCB or other PCB-contaminated debris/waste. Handle PCBs such that no skin contact occurs. PCB removal process should be described in the work plan.

3.4.1 Confined Spaces

As feasible, do not carry out PCB handling operations in confined spaces. A confined space means a space having limited means of egress and inadequate cross ventilation.

3.4.2 Control Area

Establish a PCB control area around the PCB item as specified in paragraph PCB CONTROL AREA. Only personnel briefed on the elements in the paragraph TRAINING and on the handling precautions are allowed into the area.

3.4.3 Exhaust Ventilation

If used, discharge exhaust ventilation for PCB operations to the outside and away from personnel.

3.4.4 Temperatures

As feasible, handle PCBs at ambient temperatures and not at elevated temperatures.

3.4.5 Solvent Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with an appropriate solvent or by wiping down three times with a solvent wetted rag. Suggested solvents are Stoddard solvent or hexane.

3.4.6 Drip Pans

Drip pans are required under portable PCB transformers and rectifiers in use or stored for use. Provide the pans with a containment volume of at least one and one-half times the internal volume of PCBs in the item.

3.4.7 Evacuation Procedures

Provide written procedures for evacuation of injured workers. Do not delay aid for a seriously injured worker for reasons of decontamination.

3.5 PCB SPILL CLEANUP REQUIREMENTS

3.5.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills on the ground or in the water, PCB spills in drip pans, or PCB leaks.

3.5.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

3.5.3 PCB Spill Cleanup

40 CFR 761, Subpart G. Initiate cleanup of spills as soon as possible, but no later than 48 hours of its discovery. To clean up spills, personnel must wear the PPE prescribed in paragraph SPECIAL CLOTHING of this section. If misting, elevated temperatures or open flames are present, or if the spill is situated in a confined space, notify the Contracting Officer. Mop up the liquid with rags or other conventional absorbent. Properly contain and dispose of spent absorbent as solid PCB waste.

3.5.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide certification of decontamination.

3.5.5 Sampling Requirements

Perform post cleanup sampling as required by 40 CFR 761, Section 130, Sampling Requirements. Do not remove boundaries of the PCB control area until site is determined satisfactorily clean by the Contracting Officer.

3.6 STORAGE FOR DISPOSAL

3.6.1 Storage Containers for PCBs

49 CFR 178. Store liquid PCBs in Department of Transportation (DOT) Specification 17E containers. Store nonliquid PCB mixtures, articles, or equipment in DOT Specification 5, 5B, or 17C containers with removable heads.

3.6.2 Waste Containers

Label with the following:

a. "Solid (or Liquid) Waste Polychlorinated Biphenyls"

b. The PCB Caution Label, paragraph PCB CAUTION LABEL

c. The date the item was placed in storage and the name of the cognizant activity/building.

3.6.3 PCB Articles and PCB-Contaminated Items

Label with items b. through c. above.

3.6.4 Approval of Storage Site

Obtain in advance Contracting Officer approval using the following criteria without exception.

a. Adequate roof and walls to prevent rainwater from reaching the stored PCBs.

b. An adequate floor which has continuous curbing with a minimum 6 inch high curb. Such floor and curbing must provide a containment volume equal to at least two times the internal volume of the largest PCB article or PCB container stored therein or 25 percent of the total internal volume of all PCB equipment or containers stored therein, whichever is greater.

c. No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from the curbed area.

d. Floors and curbing constructed of continuous smooth and impervious materials such as portland cement, concrete or steel to prevent or minimize penetrations of PCBs.

e. Not located at a site which is below the 100-year flood water elevation.

f. Post each storage site with the PCB Caution Sign, paragraph PCB CAUTION SIGN.

3.7 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of PCBs. Restrict the spread of dust and debris; keep waste from being distributed over work area.

Do not remove the PCB control area and warning signs prior to the Contracting Officer's approval. Reclean areas showing residual PCBs.

3.8 DISPOSAL

Comply with disposal requirements and procedures outlined in 40 CFR 761. Do not accept PCB waste unless it is accompanied by a manifest signed by the Government. Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB waste from the Government. Return a signed copy to the Government before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities.

3.8.1 Certificate of Disposal

40 CFR 761. Submit to the Government within 30 days of the date that the disposal of the PCB waste identified on the manifest was completed. Include in the certificate for the PCBs and PCB items disposed:

a. The identity of the disposal facility, by name, address, and EPA identification number.

b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.

c. A statement certifying the fact of disposal of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.

d. A certification as defined in 40 CFR 761, Section 3.

3.8.1.1 Payment Upon Furnishing Certificate of Disposal of PCBs

Payment will not be made until the certificate of disposal has been furnished to the Contracting Officer.

3.8.2 Disposal by the Government

Coordinate delivery of PCBs on-site with local Environmental for subsequent disposal on DLA DS contracts. If the primary site is filled to capacity, contact the Public Works Center Hazardous Waste Branch Environmental Engineer to determine an alternate storage site. The transport distance to any storage site must not exceed the distance between the project site and the DLA DS storage site.

3.8.2.1 Delivery

Contact DRMO at least 5 working days in advance to make arrangements for delivery of the PCBs to the storage site.

3.8.2.2 DD Form 1348-1

Prepare DD Form 1348-1 Turn-in Document (TID), which will accompany the

PCBs to the storage site. Ensure that a responsible person from the activity that owns the PCBs signs the DD Form 1348-1.

3.8.2.3 Payment Upon Furnishing DD Form 1348-1

Payment will not be made until a completed DD Form 1348-1 has been furnished to the Contracting Officer.

-- End of Section --

Mystic Air Quality Consultants, Inc.
1204 North Road (Rt. 117) Groton, Connecticut 06340

January 12, 2009

Mr. Michael Gearan
P & S Construction, Inc.
35 John Street Suite 200
Lowell, Massachusetts 01852

A86 /A87. Buukens

RECEIVED
FEB 5 2009
P & S CONSTRUCTION, INC

Re: **Limited and Directed Asbestos Sampling** (1/22/09)
Naval Subase; Groton, Connecticut
Location: Weapons Storage Facility- Interior & Exterior Caulking

Dear Mr. Gearan:

As requested, Mystic Air Quality Consultants, Inc. conducted a limited and directed survey of accessible materials at the location noted above on January 22, 2009. This survey was conducted by our State of Connecticut licensed asbestos inspector, Robert Buckingham, to determine the presence of asbestos-containing materials. The samples were analyzed at Environmental Hazards Services (NVLAP # 101882-0) in Virginia.

Summary of the findings

Upon testing by polarized light microscopy, all samples collected and analyzed from the location above were found to be asbestos containing. *See Enclosure (1) for lab results, and Enclosure (2) for chain of custody and roster of suspect materials.*

Implications of the findings

As required by state and federal regulations prior to renovation or demolition, all the asbestos-containing materials that will be disturbed by renovation, will need to be removed by a licensed asbestos abatement contractor -employing trained and certified personnel who follow all pertinent asbestos abatement regulations.

Limitations of the survey

This survey and report only deal with accessible areas of the buildings. Additionally, there may be other non-accessible materials above ceilings, behind walls, and below floors that become evident during your renovation activity. Should the requisite EPA/OSHA competent person working for the contractor discover such materials they will need to be tested for asbestos content so determinations of their abatement and disposal (if required) can be made.

Please do not hesitate to contact us with questions relating to the sample results. We thank you for the opportunity to conduct this survey.

Sincerely,

Christopher J. Eident CIH, CSP, RS
CEO

Communications (24 hours):
Office: (860) 449-8903 FAX: (860) 449-8860 Toll Free: 1 (800) 247-7746
website: www.mysticair.com e-mail:maqc2@aol.com

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.
7469 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Mystic Air Quality Consultants
1204 North Road, Rt. 117
Groton, CT 06340

DATE OF RECEIPT: 28 Jan 2009
DATE OF ANALYSIS: 28 Jan 2009
DATE OF REPORT: 29 Jan 2009

CLIENT NUMBER: 7-2564 SB
EHS PROJECT #: 2009-01-1099
PROJECT: Naval Subase-Groton, CT; Weapons Storage Facility

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	1/ Black Tar-Like; Silver Paint-Like	15% Chrysotile 15% Total Asbestos	85% Non-Fibrous
02	2/	DID NOT ANALYZE	
03	3/	DID NOT ANALYZE	
04	4/ Black Tar-Like	9% Chrysotile 9% Total Asbestos	91% Non-Fibrous
05	5/	DID NOT ANALYZE	
06	6/	DID NOT ANALYZE	

QC SAMPLE: M1-1993-1

QC BLANK: SRM 1866 Fiberglass

REPORTING LIMIT: 1% Asbestos

METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116 *

ANALYST: Araceli Enzler

Reviewed By Authorized Signatory: _____
Howard Varner, General Manager
Irma Faszewski, Quality Assurance Coordinator

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 7-2564 SB
EHS PROJECT #: 2009-01-1099
PROJECT: Naval Subase-Groton, CT; Weapons Storage Facility

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of Environmental Hazards Services, L.L.C. California Certification #2319 NY ELAP #11714. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection.

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), for enhanced detection capabilities) for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

* All California samples analyzed by Polarized Light Microscopy, EPA Method 600/M4-82-020, Dec. 1982.

LEGEND NAD = no asbestos detected
SCF = suspected ceramic fibers

plm1.dot/05AUG2008/REV3/ MR

-- PAGE 02 of 02 – END OF REPORT --

ENVIRONMENTAL
e Road Richmond, Virginia 23237 Phone (804) 275-4786 Fax (804) 275-4907

6 PLM

EHS 2009-01-1099

CHAIN OF CUSTODY FORM

Company Name: Mystic Air Quality Consultants
Address: 1204 North Road
City, State, Zip: Groton, CT 06340
EHS Client Account #: 7-2564 B
Phone #: 860-449-8903 Fax #: 860-449-8860
P.O. #:

Date: 1/27/09
Contact Name: Chris Eidet
Sampler Name: Robert Buckingham
Project #: Naval Subase - Groton, CT Weapons Storage Facility
Client: P&S Construction

Particulate: Total Nuisance (NIOSH 0500) ☐
Respirable (NIOSH 0600) ☐

Sample Number	Sample & Date	Asbestos: Bulk ID by PLM	Asbestos: (PCM) Fiber Count	Asbestos: PLM Point Count	Asbestos: PLM Gravimetric	Lead: Air	Lead: Paint (%)	Lead: Paint (PPM)	Lead: Paint (mg/cm²)	Lead: Soil	Lead: Wipe * (See Note)	Lead: TCLP (Pb)	Lead: Waste Water	Other Metals (Specify metals below): TCLP RCRA 8	Other Metals: Welding Fume	Other Metals: Toxic Metal Profile	Indoor Air Quality: Biocassette	Indoor Air Quality: Slide	Indoor Air Quality: Surface Swab	Indoor Air Quality: Surface Tape	Indoor Air Quality: Bulk	Indoor Air Quality: Viable Analysis*	Air Volume (L) OR Wipe Area (ft²) OR Scrape Area (cm²)	Comments *Specify: -Total Fungal Count w/ID -Stachybotrys Culture w/Total Fungal Count & IDs -Total Thermophilic Fungal Count w/ID
1-3	1/22/09	✓																					500 sq ft	Interior Caulking
4-6	" "	✓																					300 sq ft	Exterior Caulking

* Do wipe samples submitted meet ASTM E1792 requirements? Yes ☐ No ☐

Released by: Robert Buckingham	Signature: Robert Buckingham	Date/Time: 1/27/09 - 9:30 A
Received by: L. Holder	Signature: L. Holder	Date/Time: 1/28/09 1pm
Released by:	Signature:	Date/Time:
Received by:	Signature:	Date/Time:

revised 2/2002

Mystic Air Quality Consultants, Inc.
1204 North Road (Rt. 117) Groton, Connecticut 06340

Asbestos Containing Suspect Materials Roster

Site: Naval Subase - Weapons Storage Facility
Groton, CT #

SAMPLE No.S	Type Of Material	Amount of Material	Condition of Material	Specific Location of Suspect ACM at Site
1-3	Interior Caulking	500 sq. ft	In-Tact	Inside Facility
4-6	Exterior Caulking	300 sq. ft	In-Tact	Outside Facility

EPA considers the materials above as "suspect" asbestos-containing materials.

Date: 1/22/09 Inspector Robert Buckingham

Telecommunications (24 hours):
Office: (203) 449-8903
FAX: (203) 449-8860
CT Toll Free: 1 (800) 247-7746
NE Toll Free: 1 (800) 722-7746

Massad, Rich CIV NAVFAC MIDLANT

From: Dominic Galluci [dgalluci@psconstruction.net]
Sent: Monday, March 30, 2009 8:48 AM
To: Massad, Rich CIV NAVFAC MIDLANT
Subject: FW: Bldg A86 & A87 Asbestos Survey Report - Bunker Demolition Surveys From MAQ Jan 09

Attachments: Mystic Air-Survay Report-Bldg A86-A87-Bunkers.pdf

Mystic Air-Survay Report-Bldg ...

From: Ketal Patel [mailto:kpatel@psconstruction.net]
Sent: Monday, February 09, 2009 2:13 PM
To: 'Carl Johnson'
Cc: 'Dominic Galluci'; 'Frank Marino'
Subject: Bldg A86 & A87 Asbestos Survey report

Carl,

Attached please find asbestos survey report for building A86 and A87 for your review and use.

Thanks

Ketal Patel

P&S Construction, inc.

35 John St, Suite 200

Lowell, MA-01852

Ph: 978 452 3782 X 125

Fax: 978 452 3784

INDUSTRIAL HYGIENE BULK/WIPE SAMPLE SURVEY FORM

Sample Date: 10/17/16

Laboratory: NMCPHC – CIHL Detachment Norfolk
1285 West D Street, Building U-238; Norfolk, VA 23511
Laboratory Report #: 47789

IH Group: NBHC - Groton
IH POC: J. Hudacek
IH Comm/DSN Phone: 5273
IH EMail: jennifer.a.hudacek.civ@mail.mil
Case File #: 17-005

IH UIC: 61726 **Activity:** PWD **UIC:** 40085 **Field Office:**

Bldg./Hull #: 451 **Shop Location:** **Shop Code/Name:**

Sample Site (If different from above):
Activity: UIC: Field Office:
Bldg./Hull # 393 Shop Location: Shop Code/Name:

Field #	1	2	3	4
Bulk or Wipe	(Bulk) Wipe	(Bulk) Wipe	(Bulk) Wipe	(Bulk) Wipe
Area Wiped (cm²)				
Wipe Media				
Wipe Media Lot #				
Related Air Samples				
SEG				
Worksite	Exterior →			
Boundary	In Out No	In Out No	In Out No	In Out No
Specific Site of Sample	Top of Window →			Side of Window
Source of Sample	Window #1	Window #2	Window #3 →	
Sample Material Description	Caulking →			
OPCODE				
Operation	Bulk Sampling →			
Task				
Related Shop SOP	17-003	17-004	17-005	17-006
Sample #	~~16-206~~	~~16-207~~	~~16-208~~	~~16-209~~
Laboratory #	223042	223043	223044	223045

Stressor	CAS#	Result/Unit	Result/Unit	Result/Unit	Result/Unit
Asbestos					

Calculations:

Comments:

17-005

Sampler: [illegible] w/ HAK Date Completed: 17OCT16

Sent to Lab By: [illegible] Date Sent: 10/18/16

Data Entered By: Date Entered:

Reviewing IH: JENNIFER HUDACEK Date Reviewed: 10/18/16

Received By: [illegible] Date Received: 19OCT16

NMCPHC 5100/16 (REV 11/2009)

Navy Environmental and Preventive Medicine Unit Two
CIHL Norfolk
1285 West D. Street
Norfolk, VA 23511-3394

ASBESTOS ID ANALYTICAL REPORT

Submitted by: Jennifer Hudacek
Groton, CT 54G
IH Group NHCNE-NBHC Groton
Groton,, CT 06349

Samples Received: 10/19/2016
Results Analyzed: 10/21/2016
Date Reported: 10/24/2016

Laboratory Report #: 47789

Method: NIOSH 9002
Analyzed by PLM

Lab ID #	Sample ID #	Analyte	CAS #	Results: Type Detected	Results: % Composition
223042	17-003	Asbestos ID			None Detected
223043	17-004	Asbestos ID			None Detected
223044	17-005	Asbestos ID			None Detected
223045	17-006	Asbestos ID			None Detected

********** END OF REPORTED RESULTS **********

Analyst _____ Stacey Freeman-Massey, Chemist

Approved By: _____ Dawn Friedrichs, Chemist

Laboratory Director

ANALYTICAL NOTES: Unless otherwise noted above, all the samples were received in acceptable condition. The reported results are a semi-quantitative indication of the presence or absence of asbestos. The "% composition" is based on a visual estimation of the amount of asbestos fibers in the sample. The lower limit of quantitation is approximately 1% per constituent. The reported results relate only to the bulk samples received and analytes tested.

INDUSTRIAL HYGIENE BULK/WIPE SAMPLE SURVEY FORM

Sample Date: 10/17/16

Laboratory: NMCPHC – CIHL Detachment Norfolk
1285 West D Street, Building U-238; Norfolk, VA 23511
Laboratory Report #: 47789

IH Group: NBHC - Groton
IH POC: J. Hudacek
IH EMail:
IH Comm/DSN Phone: 5273
Case File #: 17-005

IH UIC: 61726 **Activity:** PWD **UIC:** 40085 **Field Office:**

Bldg./Hull #: 451 **Shop Location:** **Shop Code/Name:**

Sample Site (If different from above):
Activity: UIC: Field Office:
Bldg./Hull # 393 Shop Location: Shop Code/Name:

Field #	5	6	7	8
Bulk or Wipe	(Bulk) Wipe	(Bulk) Wipe	(Bulk) Wipe	(Bulk) Wipe
Area Wiped (cm²)				
Wipe Media				
Wipe Media Lot #				
Related Air Samples				
SEG				
Worksite	Exterior →			
Boundary	In Out No	In Out No	In Out No	In Out No
Specific Site of Sample	Bottom of Window	Top of Window	Side of Window	Bottom of Window
Source of Sample	Window #3	Window #4 →		
Sample Material Description	Caulking →			
OPCODE				
Operation	Bulk Sampling →			
Task				
Related Shop SOP				
Sample #	~~16~~ 17-007	17-008	17-009	17-010
Laboratory #	223046	223047	223048	223049

Stressor	CAS#	Result/Unit	Result/Unit	Result/Unit	Result/Unit
Asbestos					

Calculations:

Comments:

17-005

Sampler: W Hallow HALL Date Completed: 17OCT16	Sent to Lab By: Date Sent: 10/18/16
Data Entered By: Date Entered:	
Reviewing IH: JENNIFER HUDACEK Date Reviewed: 10/18/16	Received By: Date Received: 19OCT16

NMCPHC 5100/16 (REV 11/2009)

Navy Environmental and Preventive Medicine Unit Two
CIHL Norfolk
1285 West D. Street
Norfolk, VA 23511-3394

ASBESTOS ID ANALYTICAL REPORT

Submitted by: Jennifer Hudacek
Groton, CT 54G
IH Group NHCNE-NBHC Groton
Groton,, CT 06349

Samples Received: 10/19/2016
Results Analyzed: 10/21/2016
Date Reported: 10/24/2016

Laboratory Report #: 47789

Method: NIOSH 9002
Analyzed by PLM

Lab ID #	Sample ID #	Analyte	CAS #	Results: Type Detected	Results: % Composition
223046	17-007	Asbestos ID			None Detected
223047	17-008	Asbestos ID			None Detected
223048	17-009	Asbestos ID			None Detected
223049	17-010	Asbestos ID			None Detected

********** END OF REPORTED RESULTS **********

Analyst _____ Stacey Freeman-Massey, Chemist

Approved By: _____ Dawn Friedrichs, Chemist

Laboratory Director

ANALYTICAL NOTES: Unless otherwise noted above, all the samples were received in acceptable condition. The reported results are a semi-quantitative indication of the presence or absence of asbestos. The "% composition" is based on a visual estimation of the amount of asbestos fibers in the sample. The lower limit of quantitation is approximately 1% per constituent. The reported results relate only to the bulk samples received and analytes tested.

INDUSTRIAL HYGIENE BULK/WIPE SAMPLE SURVEY FORM

Sample Date: 10/12/16

Laboratory: NMCPHC – CIHL Detachment Norfolk
1285 West D Street, Building U-238; Norfolk, VA 23511
Laboratory Report #: 47789

IH Group: NBHC - Groton
IH POC: J. Hudacek
IH EMail:
IH Comm/DSN Phone:
Case File #: 17-005

IH UIC: 61726 **Activity:** PWD **UIC:** 40085 **Field Office:**

Bldg./Hull #: 451 **Shop Location:** **Shop Code/Name:**

Sample Site (If different from above):
Activity: UIC: Field Office:
Bldg./Hull # 393 Shop Location: Shop Code/Name:

Field #	9	10	11	12
Bulk or Wipe	(Bulk) Wipe	(Bulk) Wipe	(Bulk) Wipe	(Bulk) Wipe
Area Wiped (cm²)				
Wipe Media				
Wipe Media Lot #				
Related Air Samples				
SEG				
Worksite	Exterior →	→	→	→
Boundary	In Out No	In Out No	In Out No	In Out No
Specific Site of Sample	Top of Window	Side of Window	Sash	Side of Window
Source of Sample	Window #6 →	→	Window #7	Window #8
Sample Material Description	Caulking →	→	Glazing →	→
OPCODE				
Operation	Bulk Sampling →	→	→	→
Task				
Related Shop SOP				
Sample #	17-011	17-012	17-013	17-014
Laboratory #	223050	223051	223052	223053

Stressor	CAS#	Result/Unit	Result/Unit	Result/Unit	Result/Unit
Asbestos					

Calculations:

Comments:

17-005

Sampler: WHALL **Date Completed:** 17OCT16	**Sent to Lab By:** [illegible] **Date Sent:** 10/18/16
Data Entered By: _____ Date Entered: _____	
Reviewing IH: JENNIFER HUDACEK **Date Reviewed:** 10/18/16	**Received By:** [illegible] **Date Received:** 19OCT16

NMCPHC 5100/16 (REV 11/2009)

Navy Environmental and Preventive Medicine Unit Two
CIHL Norfolk
1285 West D. Street
Norfolk, VA 23511-3394

ASBESTOS ID ANALYTICAL REPORT

Submitted by: Jennifer Hudacek
Groton, CT 54G
IH Group NHCNE-NBHC Groton
Groton,, CT 06349

Samples Received: 10/19/2016
Results Analyzed: 10/21/2016
Date Reported: 10/24/2016

Laboratory Report #: 47789

Method: NIOSH 9002
Analyzed by PLM

Lab ID #	Sample ID #	Analyte	CAS #	Results: Type Detected	Results: % Composition
223050	17-011	Asbestos ID			None Detected
223051	17-012	Asbestos ID			None Detected
223052	17-013	Asbestos ID	77536-68-6	Tremolite	1
223053	17-014	Asbestos ID	77536-68-6	Tremolite	1

********** END OF REPORTED RESULTS **********

Analyst _____ Stacey Freeman-Massey, Chemist

Approved By: _____ Dawn Friedrichs, Chemist

Laboratory Director

ANALYTICAL NOTES: Unless otherwise noted above, all the samples were received in acceptable condition. The reported results are a semi-quantitative indication of the presence or absence of asbestos. The "% composition" is based on a visual estimation of the amount of asbestos fibers in the sample. The lower limit of quantitation is approximately 1% per constituent. The reported results relate only to the bulk samples received and analytes tested.

Phone: (757) 953-6622
Fax: (757) 953-7213 DSN: 377-6622

INDUSTRIAL HYGIENE BULK/WIPE SAMPLE SURVEY FORM

Sample Date: 10/17/16

Laboratory: NMCPHC – CIHL Detachment Norfolk
1285 West D Street, Building U-238; Norfolk, VA 23511
Laboratory Report #: 47789

IH Group: NBHC - Groton
IH POC: J. Hudacek
IH EMail:
IH Comm/DSN Phone:
Case File #: 17-005

IH UIC: 61726 **Activity:** PWD **UIC:** 40085 Field Office:

Bldg./Hull #: 451 **Shop Location:** **Shop Code/Name:**

Sample Site (If different from above):
Activity: UIC: Field Office:
Bldg./Hull # 393 Shop Location: Shop Code/Name:

Field #	13			
Bulk or Wipe	(Bulk) Wipe	Bulk Wipe	Bulk Wipe	Bulk Wipe
Area Wiped (cm²)				
Wipe Media				
Wipe Media Lot #				
Related Air Samples				
SEG				
Worksite	Exterior			
Boundary	In Out No	In Out No	In Out No	In Out No
Specific Site of Sample	Sash			
Source of Sample	Window #9			
Sample Material Description	Glazing			
OPCODE				
Operation	Bulk Sampling			
Task				
Related Shop SOP				
Sample #	17-015			
Laboratory #	223054			

Stressor	CAS#	Result/Unit	Result/Unit	Result/Unit	Result/Unit
Asbestos					

Calculations:

Comments:

17-005

Sampler: WHALL Date Completed: 17OCT16

Sent to Lab By: Date Sent: 10/18/16

Data Entered By: Date Entered:

Reviewing IH: JENNIFER HUDACEK Date Reviewed: 10/18/16

Received By: Date Received: 19OCT16

NMCPHC 5100/16 (REV 11/2009)

Navy Environmental and Preventive Medicine Unit Two
CIHL Norfolk
1285 West D. Street
Norfolk, VA 23511-3394

ASBESTOS ID ANALYTICAL REPORT

Submitted by: Jennifer Hudacek
Groton, CT 54G
IH Group NHCNE-NBHC Groton
Groton,, CT 06349

Samples Received: 10/19/2016
Results Analyzed: 10/21/2016
Date Reported: 10/24/2016

Laboratory Report #: 47789

Method: NIOSH 9002
Analyzed by PLM

Lab ID #	Sample ID #	Analyte	CAS #	Results: Type Detected	Results: % Composition
223054	17-015	Asbestos ID	77536-68-6	Tremolite	1

********** END OF REPORTED RESULTS **********

Analyst _____ Stacey Freeman-Massey, Chemist

Approved By: _____ Dawn Friedrichs, Chemist

Laboratory Director

ANALYTICAL NOTES: Unless otherwise noted above, all the samples were received in acceptable condition. The reported results are a semi-quantitative indication of the presence or absence of asbestos. The "% composition" is based on a visual estimation of the amount of asbestos fibers in the sample. The lower limit of quantitation is approximately 1% per constituent. The reported results relate only to the bulk samples received and analytes tested.

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com cinnasblab@EMSL.com

EMSL Order:	041615331
CustomerID:	USNA64
CustomerPO:	16d1433emlcd8k
ProjectID:	

Attn: **Jennifer Hudacek**
Naval Health Care New England
Box 600 (Code 54G)
Groton, CT 06349

Phone:	
Fax:	(860) 694-4045
Received:	06/09/16 9:30 AM
Analysis Date:	6/14/2016
Collected:	

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

SAMPLE ID	DESCRIPTION	APPEARANCE	% MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
16-056 *041615331-0001*	Sentry Post - Crème 12x12 Tile Top Layer	White Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-057 *041615331-0002*	Sentry Post - Associated Yellow Mastic	Brown Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-058 *041615331-0003*	Sentry Post - 2nd Layer Down Blue 12x12 Floor Tile	Blue Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-059 *041615331-0004*	Sentry Post - Associated Yellow Mastic	Yellow Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-060 *041615331-0005*	Sentry Post - 3rd Layer Down Tan 9x9 Floor Tile	Brown Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-061 *041615331-0006*	Sentry Post - Associated Mastic	Black Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-062 *041615331-0007*	Sentry Post - 4th Layer Down Pinkish 9x9 Floor Tile	Brown/Red Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-063 *041615331-0008*	Sentry Post - Associated Mastic	Black Non-Fibrous Homogeneous	100	None	No Asbestos Detected
16-064 *041615331-0009*	Sentry Post - Bottom Layer Tile 9x9	Brown Non-Fibrous Homogeneous	77.3	None	22.7% Chrysotile

Analyst(s)

Sandy Burany, Ph.D (10)

Benjamin Ellis, Laboratory Manager
or other approved signatory

This laboratory is not responsible for % asbestos in total sample when the residue only is submitted for analysis. The above report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical, Inc. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NYS ELAP 10872, PA ID# 68-00367

Initial report from 06/14/2016 15:39:39

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com cinnasblab@EMSL.com

EMSL Order:	041615331
CustomerID:	USNA64
CustomerPO:	16d1433emlcd8k
ProjectID:	

Attn: **Jennifer Hudacek**
Naval Health Care New England
Box 600 (Code 54G)
Groton, CT 06349

Phone:	
Fax:	(860) 694-4045
Received:	06/09/16 9:30 AM
Analysis Date:	6/14/2016
Collected:	

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

SAMPLE ID	DESCRIPTION	APPEARANCE	% MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
16-065 *041615331-0010*	Sentry Post - Associated Mastic	Black Non-Fibrous Homogeneous	99.2	None	0.76% Chrysotile

Analyst(s)

Sandy Burany, Ph.D (10)

Benjamin Ellis, Laboratory Manager
or other approved signatory

This laboratory is not responsible for % asbestos in total sample when the residue only is submitted for analysis. The above report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical, Inc. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NYS ELAP 10872, PA ID# 68-00367

Initial report from 06/14/2016 15:39:39

THIS IS THE LAST PAGE OF THE REPORT.

OrderID: 041615331

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Bulk Building Material Chain of Custody

EMSL Order Number (*Lab Use Only*): 041615331

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-5974

Company: Naval Branch Health Clinic	EMSL-Bill to: ☒ Same ☐ Different If Bill to is Different note instructions in Comments** *Third Party Billing requires written authorization from third party*
Street: Box 600 Code 546	
City: Groton State/Province: CT	Zip/Postal Code: Country:
Report To (Name): Jennifer Hudacek	Telephone #:
Email Address: Jennifer.a.hudacek.civ@mail.mil	Fax #: Purchase Order: 16D1H33EMLCD8K
Project Name/Number:	Please Provide Results: ☐ Fax ☒ Email
U.S. State Samples Taken: CT	CT Samples: ☐ Commercial/Taxable ☐ Residential/Tax Exempt

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☒ 24 Hour ☐ 48 Hour ■ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

PLM - Bulk (reporting limit)	TEM – Bulk
☐ PLM EPA 600/R-93/116 (<1%)	■ TEM EPA NOB – EPA 600/R-93/116 Section 2.5.5.1
☐ PLM EPA NOB (<1%)	☐ NY ELAP Method 198.4 (TEM)
Point Count ☐ 400 (<0.25%) ☐ 1000 (<0.1%)	☐ Chatfield Protocol (semi-quantitative)
Point Count w/Gravimetric ☐ 400 (<0.25%) ☐ 1000 (<0.1%)	☐ TEM % by Mass – EPA 600/R-93/116 Section 2.5.5.2
☐ NIOSH 9002 (<1%)	☐ TEM Qualitative via Filtration Prep Technique
☐ NY ELAP Method 198.1 (friable in NY)	☐ TEM Qualitative via Drop Mount Prep Technique
☐ NY ELAP Method 198.6 NOB (non-friable-NY)	**Other**
☐ OSHA ID-191 Modified	☐
☐ Standard Addition Method	

☐ Check For Positive Stop – Clearly Identify Homogenous Group | Date Sampled:

Samplers Name: WALTER HALL | Samplers Signature: Walter Hall

Sample #	HA #	Sample Location	Material Description
16-056	1	Creme 12x12 tile top layer	Sentry post
16-057	2	assoc. yellow mastic	
16-058	3	2nd layer down blue 12x12	
16-059	4	assoc. yellow mastic	
16-060	5	3rd layer down tan? 9x9	
16-061	6	assoc mastic	
16-062	7	~~bottom~~ 4th down layer pinkish 9x9	
16-063	8	assoc. mastic	
16-064	9	bottom layer tile 9x9	
16-065	10	assoc. mastic	

RECEIVED EMSL CINNAMINSON, NJ 16 JUN -9 AM 1:40

Client Sample # (s): 16-056 - 16-065 Total # of Samples: 10

Relinquished (Client): J Hudacek Date: 6/8/16 Time: 0800

Received (Lab): B Beatty Date: 6/9/16 Time: 930

Comments/Special Instructions:

Controlled Document – Asbestos COC – R6 – 11/29/2012

Page 1 of 1 pages

7

EMSL Analytical, Inc.
29 North Plains Highway, Unit # 4 Wallingford, CT 06492
Tel/Fax: (203) 284-5948 / (203) 284-5978
http://www.EMSL.com / wallingfordlab@emsl.com

EMSL Order: 241700471
Customer ID: USNA64
Customer PO: 17D1205EMLCD9K
Project ID:

Attention: Chris Hudacek
Naval Health Care New England
NACC - Attn: Industrial Hygiene Dept.
Box 600 Building 449
Groton, CT 06349
Project: 17-067

Phone: (860) 694-5273
Fax: (860) 694-4045
Received Date: 02/07/2017 11:00 AM
Analysis Date: 02/14/2017
Collected Date: 02/06/2017

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

Sample ID	Description	Appearance	% Matrix Material	% Non-Asbestos Fibers	Asbestos Types
17-041 *241700471-0001*	Bldg. 524- hallway by armory - 12"x12" beige floor tile- top layer	Beige Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-042 *241700471-0002*	Bldg. 524- hallway by armory - mastic assoc. w/12"x12" beige floor tile- top layer Insufficient Material				
17-043 *241700471-0003*	Bldg. 524- hallway by armory - 12"x12" beige floor tile- top layer	Beige Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-044 *241700471-0004*	Bldg. 524- hallway by armory - mastic assoc. w/12"x12" beige floor tile- top layer	Black Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-045 *241700471-0005*	Bldg. 524- hallway by armory - 12"x12" beige floor tile- bottom layer	Beige Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-046 *241700471-0006*	Bldg. 524- hallway by armory - mastic assoc. w/12"x12" beige floor tile- bottom layer	Black Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-047 *241700471-0007*	Bldg. 524- hallway by armory - 12"x12" beige floor tile- bottom layer	Beige Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-048 *241700471-0008*	Bldg. 524- hallway by armory - mastic assoc. w/12"x12" floor tile- bottom layer	Black Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-049 *241700471-0009*	Bldg. 524- Armory - 12"x12" gray floor tile	Gray Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-050 *241700471-0010*	Bldg. 524- Armory - black mastic assoc. w/12"x12" gray floor tile	Black Non-Fibrous Homogeneous	100	None	No Asbestos Detected
17-051 *241700471-0011*	Bldg. 524- Armory - 12"x12" gray floor tile	Gray Non-Fibrous Homogeneous	100	None	No Asbestos Detected

This laboratory is not responsible for % asbestos in total sample when the residue only is submitted for analysis. The above report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical, Inc. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Wallingford, CT

Initial report from: 02/14/2017 08:56:08

EMSL Analytical, Inc.
29 North Plains Highway, Unit # 4 Wallingford, CT 06492
Tel/Fax: (203) 284-5948 / (203) 284-5978
http://www.EMSL.com / wallingfordlab@emsl.com

EMSL Order: 241700471
Customer ID: USNA64
Customer PO: 17D1205EMLCD9K
Project ID:

Attention: Chris Hudacek
Naval Health Care New England
NACC - Attn: Industrial Hygiene Dept.
Box 600 Building 449
Groton, CT 06349
Project: 17-067

Phone: (860) 694-5273
Fax: (860) 694-4045
Received Date: 02/07/2017 11:00 AM
Analysis Date: 02/14/2017
Collected Date: 02/06/2017

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

Sample ID	Description	Appearance	% Matrix Material	% Non-Asbestos Fibers	Asbestos Types
17-052 *241700471-0012*	Bldg. 524- Armory - black mastic assoc. w/12"x12" gray floor tile				
Insufficient Material					

Analyst(s)

Almedina Hodzic (10)

Lauren Brennan, Asbestos Lab Manager
or other approved signatory

This laboratory is not responsible for % asbestos in total sample when the residue only is submitted for analysis. The above report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical, Inc. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Wallingford, CT

Initial report from: 02/14/2017 08:56:08

P-848, MK-48 Torpedo Magazine
A&E Contract: N62472-04-D-1432
Job Order No.: 5G4890
Naval Subase New London, Groton, CT

ENVIRONMENTAL DESIGN ANALYSIS

Existing Conditions (Site Investigation) – Environmental

Asbestos

A site visit to the facility occurred on February 11, 2010 to perform an asbestos containing materials (ACM) survey within fifty-one (51) Keyport Magazines and one (1) Torpedo Bunker. The survey was conducted by a United States Environmental Protection Agency (USEPA) AHERA Accredited Inspector and State of Connecticut accredited inspector, qualified by experience, education and training in the recognition of suspect ACM.

The Inspection was performed on Keyport Magazines A-1 – A-11, A-12 - A-21, A-22 – A-32, A-33 – A-37, A-43 – A-48, A-67 - A-71 and A-75 – A-77. Torpedo Bunker A-104 was also inspected during the site visit.

Due to a change in the scope of work for the project, another site visit occurred on August 2, 2010 to inspect the remaining twelve (12) Keyport Magazines. The scope of work has been modified to include the demolition of all of the Keyport Magazines and to omit the demolition of Torpedo Bunker A-104.

The inspection and sampling information collected from the Keyport Magazines in February still applies to the project. The information located within the report pertaining to Torpedo Bunker A-104 is provided for informational use by the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT) and shall not be included / interpreted as part of this project.

The August 2, 2010 inspection was performed on Keyport Magazines A-38 – A-42, A-49, A-50, A-65, A-66 and A-72 – A-74.

A visual inspection of the Keyport Magazines and Torpedo Bunker A-104 identified suspect ACM that included the following:

- Black Cement
- Brown Mastic
- White Cement
- Structural Concrete
- Grey Cement
- Black Fabric Roof Covering
- White Caulking
- Black Gasket Material
- White Caulking at Separation Joint
- Door Frame Caulking

A total of twenty one (21) bulk material samples were collected on February 11, 2010. A total of five (5) bulk material samples were collected on August 2, 2010. The bulk samples were forwarded to Carolina Environmental, Inc. of Cary, North Carolina for analysis. Carolina Environmental Inc. is accredited by the National Institute of Standards and Technology's "National Voluntary Laboratory Accreditation Program" (NVLAP #101768-0).

Building material samples were analyzed via Polarized Light Microscopy (PLM) coupled with Dispersion Staining as per EPA/600/M4-82/020 Methodology. This method is recommended by the Environmental Protection Agency (EPA) for general building materials.

Asbestos is present if the material analyzed is found to contain greater than one percent (>1%) asbestos by weight. This stipulation is outlined in the EPA Publication EPA 500/5-85-024, Section 2.2.2.2.

Asbestos containing materials (ACM) have been identified within Torpedo Bunker A-104 and include brown mastic and grey cement associated with the seams of the interior corrugated metal panels. Materials that were non-suspect or were sampled and through analysis found to not contain asbestos include black cement, white cement, structural cement, black fabric roof covering, white caulking, black gasket material, white caulking at separation joints and door frame caulking.

Asbestos containing materials that will be disturbed or rendered friable during renovation or demolition activity, must be removed and disposed prior to beginning that activity. Asbestos removal services must be performed by a Connecticut Certified / Licensed asbestos abatement contractor.

The following materials were found to contain more than one percent (>1%) asbestos by weight. The conditions of the materials are designated as good, damaged or significantly damaged. The following summary only addresses locations at the facility where work is to be performed:

TORPEDO BUNKER A-104

Location	**Material**	**Condition**	**Quantity**
Interior Corrugated Metal Panel Seams	Brown Mastic / Grey Cement	Good/Non-Friable	~ 250 L.F.

The brown mastic / grey cement cannot be separated from the corrugated metal panels. In this instance, for removal purposes, because the materials cannot be separated, all of the material must be considered asbestos containing when being removed and disposed. The following applies:

Location	**Material**	**Condition**	**Quantity**
Torpedo Bunker A-104	Corrugated Metal Wall Panels	Good/Non-Friable	~ 650 ft^2

The sample summary from February 11, 2010 including the sample number, material, location and analytical result is attached. The sample summary from August 2, 2010 including the sample number, material, location and analytical result is also attached.

Attached please find the following information:

- Photographs
- Inspector license information
- Laboratory certification information
- Laboratory data sheets from each sampling event

ASBESTOS CONTAINING MATERIALS BULK MATERIAL SAMPLE SUMMARY

FEBRUARY 11, 2010

SAMPLE NO.	MATERIAL	LOCATION	% ASBESTOS
2-11-JW-01A	Black Cement	Torpedo Bunker A-104	None Detected
2-11-JW-01B	Brown mastic	Torpedo Bunker A-104	**3% Chrysotile**
2-11-JW-02A	Black Cement	Torpedo Bunker A-104	None Detected
2-11-JW-02B	Brown mastic	Torpedo Bunker A-104	**3% Chrysotile**
2-11-JW-03	White Cement	Torpedo Bunker A-104	None Detected
2-11-JW-04	White Cement	Torpedo Bunker A-104	None Detected
2-11-JW-05	White Cement	Torpedo Bunker A-104	None Detected
2-11-JW-06	Grey Concrete	Torpedo Bunker A-104	None Detected
2-11-JW-07	Grey Concrete	Torpedo Bunker A-104	None Detected
2-11-JW-08	Grey Cement	Torpedo Bunker A-104	**10% Chrysotile**
2-11-JW-09	Grey Cement	Torpedo Bunker A-104	**10% Chrysotile**
2-11-JW-10	White Caulking	Torpedo Bunker A-104	None Detected
2-11-JW-11	White Caulking	Torpedo Bunker A-104	None Detected
2-11-JW-12	Black Roof Cover	Torpedo Bunker A-104	None Detected
2-11-JW-13	Black Roof Cover	Torpedo Bunker A-104	None Detected
2-11-JW-14	White Caulking	Keyport A-3	None Detected
2-11-JW-15	White Caulking	Keyport A-3	None Detected
2-11-JW-16	Black Gasket	Keyport A-3	None Detected
2-11-JW-17	Black Gasket	Keyport A-3	None Detected
2-11-JW-18	White Caulking Exterior	Keyport A-3	None Detected
2-11-JW-19	White Caulking Exterior	Keyport A-3	None Detected

ASBESTOS CONTAINING MATERIALS BULK MATERIAL SAMPLE SUMMARY

AUGUST 2, 2010

SAMPLE NO.	MATERIAL	LOCATION	% ASBESTOS
08-02-JW-01	White Caulk	Keyport A-42	None Detected
08-02-JW-02	White Caulk	Keyport A-60	None Detected
08-02-JW-03	Black Gasket	Keyport A-42	None Detected
08-02-JW-04	Black Gasket	Keyport A-60	None Detected
08-02-JW-05	Black Felt Cover	Keyport A-42	None Detected

PHOTOGRAPHS

PHOTO 1: Asbestos containing brown mastic / grey cement located at the seams of the corrugated metal panels within Torpedo Bunker A-104.

PHOTO 2: Corrugated metal panels within Torpedo Bunker A-104 showing asbestos containing brown mastic / grey cement at seams.

PHOTO 3: Non-asbestos containing white caulking located at the seams of the Keyport Magazines

PHOTO 4: Non-asbestos containing black foam gasket located at metal door frame of Keyport Magazines

INSPECTOR LICENSE / CERTIFICATION

Certificate of Training

Awarded to

JAMES WEBB

For successful completion of a 4 Hour, 1/2 Day

Asbestos Building Inspector
Annual Refresher Training
FEBRUARY 22, 2010

This training was approved and given in accordance with the Regulations for Connecticut State Agencies RCSA 20 – 440 – 1-9 and RCSA 20 – 441 and meets the requirements of the EPA Revised MAP under TSCA Title II of 4/4/94.

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: AI/RI/18087 **Exam Grade:** 95 **Expiration Date:** 02/22/2011
Exam Date: 02/22/2010

Christopher J. Bident, CIH, CSP, RS *George Williamson, Training Director*

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH
PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT
THE INDIVIDUAL NAMED BELOW IS LICENSED
BY THIS DEPARTMENT AS A:

ASBESTOS CONSULTANT - INSPECTOR

LICENSE NO.
000586
CURRENT THROUGH
08/31/10
VALIDATION NO.
C3-894552

JAMES T. WEBB

CONVENTIONAL

LABORATORY ACCREDITATION

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

Carolina Environmental, Inc.

Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

BULK ASBESTOS FIBER ANALYSIS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2010-04-01 through 2011-03-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

NVLAP-01C (REV 2009-01-28)

State of Connecticut, Department of Public Health

Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

CAROLINA ENVIRONMENTAL, INC.

LOCATED AT 107 NEW EDITION COURT IN CARY, NORTH CAROLINA 27511

AND REGISTERED IN THE NAME OF John D. Koenigs

THIS CERTIFICATE IS ISSUED IN THE NAME OF Tianbao Bai, Ph.D. WHO HAS BEEN DESIGNATED

BY THE REGISTRANT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF APPROVAL AS FOLLOWS:

ASBESTOS
BULK MATERIALS – PLM
AIR – FIBER COUNTING – PCM

THIS CERTIFICATE EXPIRES March 31, 2012 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH

DATED AT HARTFORD, CONNECTICUT, THIS 30th DAY OF March 2010

Registration No.

PH-0271

SUZANNE BLANCAFLOR, MS
CHIEF, ENVIRONMENTAL HEALTH SECTION

ANALYTICAL RESULTS
FEBRUARY 11, 2010

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: (919) 481-1413 Fax: (919) 481-1442

LABORATORY REPORT
ASBESTOS BULK ANALYSIS

Client: Quad 3
72 Glenmaura National Blvd
Moosic, PA 18507

Project: 2-11-JW

CEI Lab Code: A10-0962
Received: 02-16-10
Analyzed: 02-17-10
Reported: 02-17-10
Analyst: Ashley Miller

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
2-11-JW-01	A994688A Heterogeneous,	CEMENT Black, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
	A994688B Homogeneous,	MASTIC Brown, Fibrous, Bound CHRY 3% MAST 97 % CELL <1 %	CHRY 3%
2-11-JW-02	A994689A Heterogeneous,	CEMENT Black, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
	A994689B Homogeneous,	MASTIC Brown, Fibrous, Bound CHRY 3% MAST 97 % CELL <1 %	CHRY 3%
2-11-JW-03	A994690 Homogeneous,	CEMENT White, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
2-11-JW-04	A994691 Homogeneous,	CEMENT White, Non-fibrous, Bound BIND 100 % CELL <1 %	ND

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: 2-11-JW

Lab Code: A10-0962

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
2-11-JW-05	A994692	CEMENT Homogeneous, White, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
2-11-JW-06	A994693	CONCRETE Homogeneous, Grey, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
2-11-JW-07	A994694	CONCRETE Homogeneous, Grey, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
2-11-JW-08	A994695	CEMENT Homogeneous, Grey, Fibrous, Bound CHRY 10% BIND 90 % CELL <1 %	CHRY 10%
2-11-JW-09	A994696	CEMENT Homogeneous, Grey, Fibrous, Bound CHRY 10% BIND 90 % CELL <1 %	CHRY 10%
2-11-JW-10	A994697	CAULKING Homogeneous, White, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
2-11-JW-11	A994698	CAULKING Homogeneous, White, Non-fibrous, Bound BIND 100 % CELL <1 %	ND

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: 2-11-JW

Lab Code: A10-0962

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
2-11-JW-12	A994699	ROOF COVER Heterogeneous, Black, Non-fibrous, Bound RUBR 100 % CELL <1 %	ND
2-11-JW-13	A994700	ROOF COVER Heterogeneous, Black, Non-fibrous, Bound RUBR 100 % CELL <1 %	ND
2-11-JW-14	A994701	CAULKING Heterogeneous, White, Non-fibrous, Bound CAULK 100 % CELL <1 % PAINT <1 %	ND
2-11-JW-15	A994702	CAULKING Heterogeneous, White, Non-fibrous, Bound CAULK 100 % CELL <1 % PAINT <1 %	ND
2-11-JW-16	A994703	GASKET Homogeneous, Black, Non-fibrous, Bound FOAM 100 % CELL <1 %	ND
2-11-JW-17	A994704	GASKET Homogeneous, Black, Non-fibrous, Bound FOAM 100 % CELL <1 %	ND
2-11-JW-18	A994705	CAULKING Homogeneous, White, Non-fibrous, Bound CAULK 100 % CELL <1 %	ND

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: 2-11-JW

Lab Code: A10-0962

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
2-11-JW-19	A994706	CAULKING	ND
	Homogeneous,	White, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	

The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR =Rubber
		VER =Vermiculite

CLIENT: Quad 3

PROJECT: 2-11-JW
CEI LAB CODE: A10-0962

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

ANALYST Ashley Miller

REVIEWED BY Tianbao Bai

Tianbao Bai, Ph.D.
Laboratory Director

End of Report

A10. 0962

CAROLINA ENVIRONMENTAL, INC.

CHAIN OF CUSTODY RECORD

ASBESTOS/LEAD ANALYSIS

107 New Edition Court, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

Client: Quad 3

Address: 72 Glenmaura National Blvd.
Moosic, PA 18507

EMail:

PO # :

Project Manager: Brian Poplarchick

Phone: (570) 793-6017

Fax:

PROJECT DESCRIPTION	PROJECT CODE	ASBESTOS: PLM Bulk	PLM Point Count	PLM Gravimetric	PCM Air	TEM Bulk*	TEM Air*	LEAD PAINT: Lead Paint*	Lead Wipe*	Lead Soil*	Lead Air*	Other Analysis
Residual caulking @ door frame	2-11-JW-10	X										
Residual caulking @ door frame	2-11-JW-11	X										
Black fabric roof cover	2-11-JW-12	X										
Black fabric roof cover	2-11-JW-13	X										
White caulk @ metal door frame header	2-11-JW-14	X										
White caulk @ metal door frame header	2-11-JW-15	X										
Black gasket at metal door frame header	2-11-JW-16	X										
Black gasket at metal door frame header	2-11-JW-17	X										
White caulk @ concrete separation joint	2-11-JW-18	X										
White caulk @ concrete separation joint	2-11-JW-19	X										

set
set
set
set
set

TURN-AROUND TIME

*Lead and TEM results require 48 Hour TAT or longer

- ☐ 5 DAYS
- ☐ 3 DAYS
- ☐ 48 HOURS
- ☒ 24 HOURS*
- ☐ 4 HOURS*

CLIENT ID#

REMARKS:

☒ Accept Samples
☐ Reject Samples

Samples will be disposed of 30 days after analysis, unless otherwise requested.

Relinquished By:	Date / Time:	Received By:	Date / Time:
James Webb	2-11-10	Agnetta Hates	2-12-10 / 3:10 pm
Agnetta Hates	2-15-10 / 10:15am	Kitti Nutt	02/16/10 9:45 am

CEI FORM #200-1 VERSION 2006-1

A10.0962 (19)
A994688-A994706

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

CHAIN OF CUSTODY RECORD
ASBESTOS/LEAD ANALYSIS

Client: Quad 3
Address: 72 Glenmaura National Blvd.
Moosic, PA 18507

Project Manager: Brian Poplarchick
Phone: (570) 793-6017
Fax:

PO #:

	PROJECT DESCRIPTION	PROJECT CODE	ASBESTOS: PLM Bulk	PLM Point Count	PLM Gravimetric	PCM Air	TEM Bulk*	TEM Air*	LEAD PAINT: Lead Paint*	Lead Wipe*	Lead Soil*	Lead Air*	Other Analysis
set	Black cement @ corrugated metal seams	2-11-JW-01	X										
	Black cement @ corrugated metal seams	2-11-JW-02	X										
	White cement @ room perimeter	2-11-JW-03	X										
set	White cement @ room perimeter	2-11-JW-04	X										
	White cement @ room perimeter	2-11-JW-05	X										
	Structural concrete	2-11-JW-06	X										
set	Structural concrete	2-11-JW-07	X										
	Grey cement @ corrugated metal seams	2-11-JW-08	X										
set	Grey cement @ corrugated metal seams	2-11-JW-09	X										

TURN-AROUND TIME
* Lead and TEM results require 48 Hour TAT or longer

- [ ] 5 DAYS
- [ ] 3 DAYS
- [ ] 48 HOURS
- [x] 24 HOURS*
- [ ] 4 HOURS*

CLIENT ID# 25418

REMARKS:

- [x] Accept Samples
- [ ] Reject Samples

Samples will be disposed of 30 days after analysis, unless otherwise requested.

Relinquished By:	Date / Time:	Received By:	Date / Time:
James Webb	2-11-10	[signature]	2-12-10 / 3:00pm
[signature]	2-15-10 / 10:15am	[signature]	02/16/10 9:45am

CEI FORM #200-1 VERSION 2006-1

ANALYTICAL RESULTS
AUGUST 2, 2010

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: (919) 481-1413 Fax: (919) 481-1442

LABORATORY REPORT
ASBESTOS BULK ANALYSIS

Client: Quad 3
72 Glenmaura National Blvd
Moosic, PA 18507

Project: 08-02-JW

CEI Lab Code: A10-6207
Received: 08-03-10
Analyzed: 08-04-10
Reported: 08-04-10
Analyst: Gregory J. Hanes

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
08-02-JW-C1	A1049819	CAULKING Heterogeneous, Grey, Fibrous, Bound BIND 92 % CELL 8 %	ND
08-02-JW-C2	A1049820	CAULKING Heterogeneous, Grey, Fibrous, Bound BIND 97 % CELL 3 %	ND
08-02-JW-03	A1049821	GASKET Homogeneous, Black, Non-fibrous, Bound FOAM 100 %	ND
08-02-JW-04	A1049822	GASKET Homogeneous, Black, Non-fibrous, Bound FOAM 100 %	ND
08-02-JW-05	A1049823	CLOTH Homogeneous, Grey, Fibrous, Loosely Bound DEBR 3 % SYNT 97 %	ND

The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FRGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
ND = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

CLIENT: Quad 3

PROJECT: 08-02-JW

CEI LAB CODE: A10-6207

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

ANALYST _____

REVIEWED BY _____

Tianbao Bai, Ph.D.
Laboratory Director

End of Report

A10-6207 (5)
A1049819A/049823

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

CHAIN OF CUSTODY RECORD
ASBESTOS/LEAD ANALYSIS

Client: Quad 3	**Project Manager:** Brian Poplarchick
Address: 72 Glenmaura National Blvd.	**Phone:** (570) 793-6017
Moosic, PA 18507	**Fax:**
PO # :	

PROJECT DESCRIPTION	PROJECT CODE	ASBESTOS: PLM Bulk	PLM Point Count	PLM Gravimetric	PCM Air	TEM Bulk*	TEM Air	LEAD PAINT: Lead Paint*	Lead Wipe*	Lead Soil*	Lead Air*	Other Analysis
White caulk @ concrete keyport façade	08-02-JW-01	X										
White caulk @ concrete keyport façade	08-02-JW-02	X										
Black foam gasket @ metal door track	08-02-JW-03	X										
Black foam gasket @ metal door track	08-02-JW-04	X										
Black felt tarp over keyport	08-02-JW-05	X										
		X										
		X										
		X										
		X										

set
set

TURN-AROUND TIME
*Lead and TEM results require 48 Hour TAT or longer

- [ ] 5 DAYS
- [ ] 3 DAYS
- [ ] 48 HOURS
- [x] 24 HOURS*
- [ ] 4 HOURS*

CLIENT ID#

REMARKS:

- [ ] Accept Samples
- [ ] Reject Samples

Samples will be disposed of 30 days after analysis, unless otherwise requested.

Relinquished By:	Date / Time:	Received By:	Date / Time:
Andrew Webb (AW)	08-03-10 pm	Sandy LeFlore	08-03-10 / 4:02 pm
Relinquished By: Sandy LeFlore	Date / Time: 08-03-10 / 5:30 pm	Received By:	Date / Time: 080310 9:15am

P-848, MK-48 Torpedo Magazine
A&E Contract: N62472-04-D-1432
Job Order No.: 5G4890
Naval Subase New London, Groton, CT

ENVIRONMENTAL DESIGN ANALYSIS

Existing Conditions (Site Investigation) – Environmental

Lead Based Paint (LBP)

A site visit to the facility occurred from February 9 through February 12, 2010 to perform a Lead Based Paint (LBP) survey within fifty-one (51) Keyport Magazines and one (1) Torpedo Bunker. The survey was conducted by an Environmental Technician, qualified by experience, education and training in the recognition and sample collection of LBP.

The inspection was performed on Keyport Magazines A-1 – A-11, A-12 – A21, A-22 – A-32, A-33 – A-37, A-43 – A-48, A-67 – A-71 and A-75 – A-77. Torpedo Bunker A-104 was also inspected during the site visit.

Due to a change in the scope of work for the project, another site visit occurred from August 2 through August 3, 2010 to inspect the remaining twelve (12) Keyport Magazines. The scope of work has been modified to include the demolition of all of the Keyport Magazines and to omit the demolition of Torpedo Bunker A-104.

The inspection and sampling information collected from the Keyport Magazines in February still applies to the project. The information located within the report pertaining to Torpedo Bunker A-104 is provided for informational use by the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT) and shall not be included / interpreted as part of this project.

From August 2 through August 3, 2010 an inspection was performed on Keyport Magazines A-38 – A-42, A-49, A-50, A-65, A-66 and A-72 – A-74.

A visual inspection of the Keyport Magazines and Torpedo Bunker identified painted surfaces that included doors, door frames, vents and interior stencils. Paint samples were collected from each of the Keyport Magazine doors and twenty five percent of the Keyport Magazine interior stencils. Paint samples of Torpedo Bunker A-104 door, door frame and vent were also collected.

A total of sixty-seven (67) bulk paint samples were collected during the February site visit. Five (5) bulk paint samples were collected during the August site visit. The bulk paint samples were forwarded to International Asbestos Testing Laboratories (IATL) of Mount Laurel, New Jersey for analysis. IATL is accredited by the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Program and under National Lead Laboratory Accreditation Program (NLLAP #100188) for lead based paint sample analysis. The paint samples were analyzed via ASTM D3335-85A Methodology via Atomic Absorption Spectrophotometry (AAS).

The bulk paint samples confirmed the presence of lead. Sixteen (16) samples exceeded the Housing and Urban Development (HUD) and Environmental Protection Agency (EPA) lead paint action level of 0.5 % lead by weight. The paint samples collected from the interior stencils of the Keyport Magazines were found to exceed the regulatory limit (>0.5% lead by weight).

The remaining samples collected were found to be below the regulatory limit but some still reported detectable concentrations of lead. A sample summary including the sample number, material, location and analytical result is attached.

Toxicity Characteristics Leaching Procedure (TCLP) for lead sample collection and analysis for demolition waste stream categorization was not performed during this phase of the project. TCLP for lead sample collection and analysis will be required following demolition of the Keyport Magazines and Torpedo Bunker. The TCLP samples shall be representative of the waste stream.

To reduce the risk of exceeding TCLP for lead disposal limits abatement of the interior stencil paint should be considered. Contractor's working at the site are responsible for compliance with all Federal, State and Local regulations including 29 CFR 1926.62.

Attached please find the following information:

- Photographs
- Laboratory data sheets from each sampling event
- Laboratory accreditation information

LEAD PAINT SAMPLE ANALYSIS SUMMARY

FEBRUARY 9 – 12, 2010

SAMPLE NO.	MATERIAL	LOCATION	CONCENTRATION LEAD BY WEIGHT (%)
001Pb.10225.01	Grey Paint (Door)	Keyport A-1	<0.0079
002Pb.10225.01	Grey Paint (Door)	Keyport A-2	0.018
003Pb.10225.01	Grey Paint (Door)	Keyport A-22	<0.0070
004Pb.10255.01	Yellow Paint (Interior Stencil)	Keyport A-22	**24**
005Pb.10255.01	Grey Paint (Door)	Keyport A-23	<0.0082
006Pb.10121.01	Grey Paint (Door)	Keyport A-24	0.0063
007Pb.10121.01	Grey Paint (Door)	Keyport A-25	<0.0076
008Pb.10121.01	Grey Paint (Door)	Keyport A-26	<0.0073
009Pb.10121.01	Grey Paint (Door)	Keyport A-27	<0.0081
010Pb.10121.01	Grey Paint (Door)	Keyport A-28	<0.0082
011Pb.10121.01	Grey Paint (Door)	Keyport A-29	<0.0068
012Pb.10121.01	Grey Paint (Door)	Keyport A-30	<0.0071
013Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-30	**15**
014Pb.10121.01	Grey Paint (Door)	Keyport A-31	<0.0073
015Pb.10121.01	Grey Paint (Door)	Keyport A-32	<0.0069
016Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-23	**15**
017Pb.10121.01	Grey Paint (Door)	Keyport A-33	<0.0081
018Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-33	**22**
019Pb.10121.01	Grey Paint (Door)	Keyport A-34	0.020
020Pb.10121.01	Grey Paint (Door)	Keyport A-35	0.0072
021Pb.10121.01	Grey Paint (Door)	Keyport A-36	0.0093
022Pb.10121.01	Grey Paint (Door)	Keyport A-37	0.0080
023Pb.10121.01	Grey Paint (Door)	Torpedo Bunker A-104	0.058
024Pb.10121.01	Grey Paint (Frame)	Torpedo Bunker A-104	0.069
025Pb.10121.01	Grey Paint (Vent)	Torpedo Bunker A-104	0.053
026Pb.10121.01	Grey Paint (Door)	Keyport A-3	0.029
027Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-3	**24**
028Pb.10121.01	Grey Paint (Door)	Keyport A-4	0.019
029Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-4	**11**
030Pb.10121.01	Grey Paint (Door)	Keyport A-5	0.050
031Pb.10121.01	Grey Paint (Door)	Keyport A-6	<0.0072
032Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-6	**4.0**
033Pb.10121.01	Grey Paint (Door)	Keyport A-12	<0.0080
034Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-12	**18**
035Pb.10121.01	Grey Paint (Door)	Keyport A-13	<0.0059
036Pb.10121.01	Grey Paint (Door)	Keyport A-14	<0.0061
037Pb.10121.01	Grey Paint (Door)	Keyport A-15	0.015

LEAD PAINT SAMPLE ANALYSIS SUMMARY

FEBRUARY 9 – 12, 2010

SAMPLE NO.	MATERIAL	LOCATION	CONCENTRATION LEAD BY WEIGHT (%)
038Pb.10121.01	Grey Paint (Door)	Keyport A-16	<0.0081
039Pb.10121.01	Grey Paint (Door)	Keyport A-17	<0.0075
040Pb.10121.01	Grey Paint (Door)	Keyport A-18	<0.0082
041Pb.10225.01	Grey Paint (Door)	Keyport A-19	<0.0072
042Pb.10225.01	Grey Paint (Door)	Keyport A-20	<0.0072
043Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-20	**23**
044Pb.10225.01	Grey Paint (Door)	Keyport A-21	0.011
045Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-21	**16**
046Pb.10225.01	Grey Paint (Door)	Keyport A-43	0.0074
047Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-43	**17**
048Pb.10225.01	Grey Paint (Door)	Keyport A-44	0.013
049Pb.10225.01	Grey Paint (Door)	Keyport A-45	<0.0068
050Pb.10225.01	Grey Paint (Door)	Keyport A-46	<0.0067
051Pb.10225.01	Grey Paint (Door)	Keyport A-47	<0.0058
052Pb.10225.01	Grey Paint (Door)	Keyport A-48	<0.0077
053Pb.10225.01	Grey Paint (Door)	Keyport A-67	<0.0060
054Pb.10225.01	Grey Paint (Door)	Keyport A-68	<0.0054
055Pb.10225.01	Grey Paint (Door)	Keyport A-69	<0.0064
056Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-69	**21**
057Pb.10225.01	Grey Paint (Door)	Keyport A-70	<0.0081
058Pb.10225.01	Grey Paint (Door)	Keyport A-71	<0.0080
059Pb.10225.01	Grey Paint (Door)	Keyport A-75	<0.0070
060Pb.10121.01	Yellow Paint (Interior Stencil)	Keyport A-75	**16**
061Pb.10225.01	Grey Paint (Door)	Keyport A-76	0.0073
062Pb.10225.01	Grey Paint (Door)	Keyport A-77	0.024
063Pb.10225.01	Grey Paint (Door)	Keyport A-7	0.020
064Pb.10225.01	Grey Paint (Door)	Keyport A-8	0.041
065Pb.10225.01	Grey Paint (Door)	Keyport A-9	0.39
066Pb.10225.01	Grey Paint (Door)	Keyport A-10	0.035
067Pb.10225.01	Grey Paint (Door)	Keyport A-11	0.034

LEAD PAINT SAMPLE ANALYSIS SUMMARY

AUGUST 2 – 3, 2010

SAMPLE NO.	MATERIAL	LOCATION	CONCENTRATION LEAD BY WEIGHT (%)
001Pb.10255.01	Yellow Paint (Interior Stencil)	Keyport A-38	**23**
002Pb.10255.01	Yellow Paint (Interior Stencil)	Keyport A-49	**21**
003Pb.10255.01	Grey Paint (Door)	Keyport A-66	0.013
004Pb.10255.01	Yellow Paint (Interior Stencil)	Keyport A-72	**21**
005Pb.10255.01	Grey Paint (Door)	Keyport A-38	0.074

PHOTOGRAPHS

Photo 1: View of typical Keyport Magazine door paint and interior stencil paint.

Photo 2: View of Torpedo Bunker A-104 door paint, door frame paint and vent paint.

LABORATORY DATA SHEETS
FEBRUARY 9 – 12, 2010

iATL INTERNATIONAL
Asbestos Testing Laboratories

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Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client:	Quad 3 Group	**Report Date:**	2/23/2010
	72 Glenmaura National Blvd.	**Report Number:**	0210006967
	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870847	001Pb.10255.01	Grey Paint (Door) Keyport A-1	<0.0079***
3870848	002Pb.10255.01	Grey Paint (Door) Keyport A-2	0.018
3870849	003Pb.10255.01	Grey Paint (Door) Keyport A-22	<0.0070
3870850	004Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-22	24
3870851	005Pb.10255.01	Grey Paint (Door) Keyport A-23	<0.0082
3870852	006Pb.10255.01	Grey Paint (Door) Keyport A-24	0.0063
3870853	007Pb.10255.01	Grey Paint (Door) Keyport A-25	<0.0076
3870854	008Pb.10255.01	Grey Paint (Door) Keyport A-26	<0.0073
3870855	009Pb.10255.01	Grey Paint (Door) Keyport A-27	<0.0081
3870856	010Pb.10255.01	Grey Paint (Door) Keyport A-28	<0.0082

NATIONAL LEAD LABORATORY ACCREDITATION PROGRAM (NLLAP)
AIHA No. 100188 / NYSDOH-ELAP No. 11021

Analysis Methods: ASTM D3335-85A "Standard Method To Test For Low Concentrations Of Lead In Paint By Atomic Absorption Spectrophotometry"
EPA SW846-(7420/7421) "Standard Method To Test For Low Concentrations Of Lead In Soils, Sludges and Sediments By AAS"

Comments: Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. IATL assumes that appropriate sampling methods have been used and the data upon which these results are based have been accurately supplied by the client. Method Detection Limit (MDL) per EPA Method 40 CFR Part 136 Apendix B. Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies. LSD=0.2 ppm. MDL=0.0024% by weight. RL= 0.010% by weight (based upon 100 mg sampled). * Insufficient sample provided to perform QC reanalysis (< 200 mg) ** Not enough sample provided to analyze (<50 mg) *** Matrix / substrate interference possible. Sample results are not corrected for contamination by field or analystical blanks. This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any government agency. This report shall not be

Date Received: 2/17/2010

Date Analyzed: 2/19/2010

Analyst: C. Shaffer

Approved By:

Frank E. Ehrenfeld, III
Laboratory Director

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	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870857	011Pb.10255.01	Grey Paint (Door) Keyport A-29	<0.0068
3870858	012Pb.10255.01	Grey Paint (Door) Keyport A-30	<0.0071
3870859	013Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-30	15
3870860	014Pb.10255.01	Grey Paint (Door) Keyport A-31	<0.0073
3870861	015Pb.10255.01	Grey Paint (Door) Keyport A-32	<0.0069
3870862	016Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-23	15
3870863	017Pb.10255.01	Grey Paint (Door) Keyport A-33	<0.0081
3870864	018Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-33	22
3870865	019Pb.10255.01	Grey Paint (Door) Keyport A-34	0.020
3870866	020Pb.10255.01	Grey Paint (Door) Keyport A-35	0.0072

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	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870867	021Pb.10255.01	Grey Paint (Door) Keyport A-36	0.0093
3870868	022Pb.10255.01	Grey Paint (Door) Keyport A-37	0.0080
3870869	023Pb.10255.01	Grey Paint (Door) Torpedo Bunker A-98	0.058
3870870	024Pb.10255.01	Grey Paint (Frame) Torpedo Bunker A-98	0.069
3870871	025Pb.10255.01	Grey Paint (Vent) Torpedo Bunker A-98	0.053
3870872	026Pb.10255.01	Grey Paint (Door) Keyport A-3	0.029
3870873	027Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-3	24
3870874	028Pb.10255.01	Grey Paint (Door) Keyport A-4	0.019
3870875	029Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-4	11
3870876	030Pb.10255.01	Grey Paint (Door) Keyport A-5	0.050

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	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870877	031Pb.10255.01	Grey Paint (Door) Keyport A-6	<0.0072
3870878	032Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-6	4.0
3870879	033Pb.10255.01	Grey Paint (Door) Keyport A-12	<0.0080
3870880	034Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-12	18
3870881	035Pb.10255.01	Grey Paint (Door) Keyport A-13	<0.0059
3870882	036Pb.10255.01	Grey Paint (Door) Keyport A-14	<0.0061
3870883	037Pb.10255.01	Grey Paint (Door) Keyport A-15	0.015
3870884	038Pb.10255.01	Grey Paint (Door) Keyport A-16	<0.0081
3870885	039Pb.10255.01	Grey Paint (Door) Keyport A-17	<0.0075
3870886	040Pb.10255.01	Grey Paint (Door) Keyport A-18	<0.0082

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	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870887	041Pb.10255.01	Grey Paint (Door) Keyport A-19	<0.0072
3870888	042Pb.10255.01	Grey Paint (Door) Keyport A-20	<0.0072
3870889	043Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-20	23
3870890	044Pb.10255.01	Grey Paint (Door) Keyport A-21	0.011
3870891	045Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-21	16
3870892	046Pb.10255.01	Grey Paint (Door) Keyport A-43	0.0074
3870893	047Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-43	17
3870894	048Pb.10255.01	Grey Paint (Door) Keyport A-44	0.013
3870895	049Pb.10255.01	Grey Paint (Door) Keyport A-45	<0.0068
3870896	050Pb.10255.01	Grey Paint (Door) Keyport A-46	<0.0067

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CERTIFICATE OF ANALYSIS

Client:	Quad 3 Group	**Report Date:**	2/23/2010
	72 Glenmaura National Blvd.	**Report Number:**	0210006967
	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870897	051Pb.10255.01	Grey Paint (Door) Keyport A-47	<0.0058
3870898	052Pb.10255.01	Grey Paint (Door) Keyport A-48	<0.0077
3870899	053Pb.10255.01	Grey Paint (Door) Keyport A-67	<0.0060
3870900	054Pb.10255.01	Grey Paint (Door) Keyport A-68	<0.0054
3870901	055Pb.10255.01	Grey Paint (Door) Keyport A-68	<0.0064
3870902	056Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-69	21
3870903	057Pb.10255.01	Grey Paint (Door) Keyport A-70	<0.0081
3870904	058Pb.10255.01	Grey Paint (Door) Keyport A-71	<0.0080
3870905	059Pb.10255.01	Grey Paint (Door) Keyport A-75	<0.0070
3870906	060Pb.10255.01	Yellow Paint (Interior Stencil) Keyport A-75	16

NATIONAL LEAD LABORATORY ACCREDITATION PROGRAM (NLLAP)
AIHA No. 100188 / NYSDOH-ELAP No. 11021

Analysis Methods: ASTM D3335-85A "Standard Method To Test For Low Concentrations Of Lead In Paint By Atomic Absorption Spectrophotometry"
EPA SW846-(7420/7421) "Standard Method To Test For Low Concentrations Of Lead In Soils, Sludges and Sediments By AAS"

Comments: Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. IATL assumes that appropriate sampling methods have been used and the data upon which these results are based have been accurately supplied by the client. Method Detection Limit (MDL) per EPA Method 40 CFR Part 136 Apendix B. Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies. LSD=0.2 ppm. MDL=0.0024% by weight. RL= 0.010% by weight (based upon 100 mg sampled). * Insufficient sample provided to perform QC reanalysis (< 200 mg) ** Not enough sample provided to analyze (<50 mg) *** Matrix / substrate interference possible. Sample results are not corrected for contamination by field or analystical blanks. This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any government agency. This report shall not be

Date Received: 2/17/2010

Date Analyzed: 2/19/2010

Analyst: C. Shaffer

iATL INTERNATIONAL
Asbestos Testing Laboratories

9000 Commerce Parkway, Suite B
Mount Laurel, NJ 08054
Toll Free 877-428-4285
Local: 856-231-9449
Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client:	Quad 3 Group	**Report Date:**	2/23/2010
	72 Glenmaura National Blvd.	**Report Number:**	0210006967
	Moosic PA 18507	**Project:**	NAVFAC-Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
3870907	061Pb.10255.01	Grey Paint (Door) Keyport A-76	0.0073
3870908	062Pb.10255.01	Grey Paint (Door) Keyport A-77	0.024
3870909	063Pb.10255.01	Grey Paint (Door) Keyport A-7	0.020
3870910	064Pb.10255.01	Grey Paint (Door) Keyport A-8	0.041
3870911	065Pb.10255.01	Grey Paint (Door) Keyport A-9	0.39
3870912	066Pb.10255.01	Grey Paint (Door) Keyport A-10	0.035
3870913	067Pb.10255.01	Grey Paint (Door) Keyport A-11	0.034

NATIONAL LEAD LABORATORY ACCREDITATION PROGRAM (NLLAP)
AIHA No. 100188 / NYSDOH-ELAP No. 11021

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Comments: Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. IATL assumes that appropriate sampling methods have been used and the data upon which these results are based have been accurately supplied by the client. Method Detection Limit (MDL) per EPA Method 40 CFR Part 136 Apendix B. Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies. LSD=0.2 ppm. MDL=0.0024% by weight. RL= 0.010% by weight (based upon 100 mg sampled). * Insufficient sample provided to perform QC reanalysis (< 200 mg) ** Not enough sample provided to analyze (<50 mg) *** Matrix / substrate interference possible. Sample results are not corrected for contamination by field or analystical blanks. This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any government agency. This report shall not be

Date Received: 2/17/2010

Date Analyzed: 2/19/2010

Analyst: C. Shaffer

LABORATORY DATA SHEETS
AUGUST 2 – 3, 2010

9000 Commerce Parkway, Suite B
Mount Laurel, NJ 08054
Toll Free 877-428-4285
Local: 856-231-9449
Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client:	Quad 3 Group	**Report Date:**	8/18/2010
	72 Glenmaura National Blvd.	**Report Number:**	0810006036
	Moosic PA 18507	**Project:**	NAVFAC - Groton, CT
		Project No.:	10255.01

LEAD PAINT SAMPLE ANALYSIS SUMMARY

Lab No.	Client No.	Location / Description	Concentration Lead By Weight (%)
4048399	001Pb.10255.01	Interior Stencil (Yellow) Keyport A-38	23
4048400	002Pb.10255.01	Interior Stencil (Yellow) Keyport A-49	21
4048401	003Pb.10255.01	Door Paint (Gray) Keyport A-66	0.013
4048402	004Pb.10255.01	Interior Stencil (Yellow) Keyport A-72	21
4048403	005Pb.10255.01	Door Paint (Gray) Keyport A-72	0.074

NATIONAL LEAD LABORATORY ACCREDITATION PROGRAM (NLLAP)
AIHA No. 100188 / NYSDOH-ELAP No. 11021

Analysis Methods: ASTM D3335-85A "Standard Method To Test For Low Concentrations Of Lead In Paint By Atomic Absorption Spectrophotometry"
EPA SW846-(7420/7421) "Standard Method To Test For Low Concentrations Of Lead In Soils, Sludges and Sediments By AAS"

Comments: Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. IATL assumes that appropriate sampling methods have been used and the data upon which these results are based have been accurately supplied by the client. Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Apendix B. Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies. LSD=0.2 ppm MDL=0.0024% by weight. RL= 0.010% by weight (based upon 100 mg sampled). * Insufficient sample provided to perform QC reanalysis (<200 mg) ** Not enough sample provided to analyze (<50 mg) *** Matrix / substrate interference possible. Sample results are not corrected for contamination by field or analytical blanks. This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any government agency. This report shall not be

Date Received: 8/5/2010

Date Analyzed: 8/9/2010

Analyst: C. Shaffer

Approved By: Frank E. Ehrenfeld, III
Laboratory Director

LABORATORY ACCREDITATION

AIHA

Laboratory Accreditation Programs, LLC

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

International Asbestos Testing Laboratories (IATL)

9000 Commerce Parkway, Suite B, Mt. Laurel, NJ 08054

Laboratory ID: 100188

has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC thereby, conforming to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories*. The above named laboratory, along with all premises from which key activities are performed, as listed above, have been accredited by AIHA-LAP, LLC in the following:

ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: 05/01/2011
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: 05/01/2011
❑	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires:
❑	**FOOD**	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with LQAP requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA website for the most current status of the scope of accreditation.

Pamela A. Kostle

Pamela A. Kostle, CIH
Chairperson, Analytical Accreditation Board

Date Issued: 05/01/2009

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

International Asbestos Testing Laboratories (IATL)
9000 Commerce Parkway, Suite B, Mt. Laurel, NJ 08054

Laboratory ID: **100188**
Issue Date: 05/01/2009

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or revocation. A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

The EPA recognizes the AIHA-LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air analysis is not included as part of the NLLAP.

Environmental Lead Laboratory Accreditation Program (ELLAP)

Initial Accreditation Date: 1/20/1997

Field of Testing (FoT)	Method	Method Description *(for internal methods only)*
Airborne Dust	NIOSH 7082	
Paint	ASTM D3335-85a	
Settled Dust By Wipe	EPA SW-846 7420	
Soil	EPA SW-846 7420	

The laboratory participates in the following AIHA-LAP, LLC testing programs:

- ✓ Paint
- ✓ Soil
- ✓ Settled Dust by Wipe
- ✓ Airborne Dust

P-848, MK-48 Torpedo Magazine
A&E Contract: N62472-04-D-1432
Job Order No.: 5G4890
Naval Subase New London, Groton, CT

ENVIRONMENTAL DESIGN ANALYSIS

Existing Conditions (Site Investigation) – Environmental

Mercury Components

A site visit to the facility occurred from February 9 through February 12, 2010 to perform a Mercury Containing Component survey within fifty-one (51) Keyport Magazines and one (1) Torpedo Bunker. The survey was conducted by and Environmental Technician, qualified by experience, education and training in the recognition of mercury containing components.

The inspection was performed on Keyport Magazines A-1 – A-11, A-12 – A21, A-22 – A-32, A-33 – A-37, A-43 – A-48, A-67 – A-71 and A-75 – A-77. Torpedo Bunker A-104 was also inspected during the site visit.

Due to a change in the scope of work for the project, another site visit occurred from August 2 through August 3, 2010 to inspect the remaining twelve (12) Keyport Magazines. The scope of work has been modified to include the demolition of all of the Keyport Magazines and to omit the demolition of Torpedo Bunker A-104.

The inspection and sampling information collected from the Keyport Magazines in February still applies to the project. The information located within the report pertaining to Torpedo Bunker A-104 is provided for informational use by the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT) and shall not be included / interpreted as part of this project.

From August 2 through August 3, 2010 an inspection was performed on Keyport Magazines A-38 – A-42, A-49, A-50, A-65, A-66 and A-72 – A-74.

A visual inspection of the Keyport Magazines and Torpedo Bunker identified suspect materials that included light fixtures. The light fixtures located at the site were identified as incandescent and/or High Pressure Sodium (HPS) bulbs. The HPS bulbs contain mercury. Caution should be exercised during the removal of the bulbs so that the bulbs do not break releasing the sodium vapor.

The following materials were identified as mercury containing:

Location	Material	Condition	Quantity
Keyports A-1 – A-11	HPS Bulb	Good	12
Keyports A-12 – A-21	HPS Bulb	Good	11
Keyports A-22 – A-32	HPS Bulb	Good	12
Keyports A-33 – A-42	HPS Bulb	Good	12
Keyports A-43 – A-66	HPS Bulb	Good	13

Location	Material	Condition	Quantity
Keyports A-67 – A-74	HPS Bulb	Good	12
Keyports A-75 – A-77	HPS Bulb	Good	7
Torpedo Bunker A-104	HPS Bulb	Good	1

The HPS bulbs contain mercury and would have to be removed and disposed of following all Federal, State and Local regulations. Prior to disposal the HPS bulbs would be subject to current TCLP sampling prescribed by the EPA. This test is used to determine whether an item is a hazardous waste or non-hazardous waste under current EPA definition.

These lamps would fail the TCLP test and would be considered hazardous. The bulbs would qualify as a Universal Waste as outlined in the EPA Universal Waste Rule. It is recommended that the bulbs be managed as a Universal Waste following all Federal, State and Local regulations.

Attached please find the following information:

- Photographs

PHOTOGRAPHS

PHOTO 1: Typical light fixture located at each Keyport Magazine and Torpedo Bunker A-104.

PHOTO 2: Typical security light fixture located at the site.

P-848, MK-48 Torpedo Magazine
A&E Contract: N62472-04-D-1432
Job Order No.: 5G4890
Naval Subase New London, Groton, CT

ENVIRONMENTAL DESIGN ANALYSIS

Existing Conditions (Site Investigation) – Environmental

Polychlorinated Biphenyls (PCBs)

A site visit to the facility occurred from February 9 through February 12, 2010 to perform a Mercury Containing Component survey within fifty-one (51) Keyport Magazines and one (1) Torpedo Bunker. The survey was conducted by and Environmental Technician, qualified by experience, education and training in the recognition of PCB containing components.

The inspection was performed on Keyport Magazines A-1 – A-11, A-12 – A21, A-22 – A-32, A-33 – A-37, A-43 – A-48, A-67 – A-71 and A-75 – A-77. Torpedo Bunker A-104 was also inspected during the site visit.

Due to a change in the scope of work for the project, another site visit occurred from August 2 through August 3, 2010 to inspect the remaining twelve (12) Keyport Magazines. The scope of work has been modified to include the demolition of all of the Keyport Magazines and to omit the demolition of Torpedo Bunker A-104.

The inspection and sampling information collected from the Keyport Magazines in February still applies to the project. The information located within the report pertaining to Torpedo Bunker A-104 is provided for informational use by the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT) and shall not be included / interpreted as part of this project.

From August 2 through August 3, 2010 an inspection was performed on Keyport Magazines A-38 – A-42, A-49, A-50, A-65, A-66 and A-72 – A-74.

A visual inspection of the Keyport Magazines and Torpedo Bunker identified suspect materials that included light fixtures. Destructive inspection techniques were not performed during the site visit so the light fixture ballasts are assumed to contain PCBs.

The following materials were identified as PCB containing:

Location	Material	Condition	Quantity
Keyports A-1 – A-11	Light Fixture Ballast	Good	12
Keyports A-12 – A-21	Light Fixture Ballast	Good	11
Keyports A-22 – A-32	Light Fixture Ballast	Good	12
Keyports A-33 – A-42	Light Fixture Ballast	Good	12
Keyports A-43 – A-66	Light Fixture Ballast	Good	13
Keyports A-67 – A-74	Light Fixture Ballast	Good	12

Location	Material	Condition	Quantity
Keyports A-75 – A-77	Light Fixture Ballast	Good	7
Torpedo Bunker A-104	Light Fixture Ballast	Good	1

Removal and disposal of the PCB containing light fixture ballasts shall follow all Federal, State and Local regulations. The waste generated during the removal of the ballasts shall be managed as a Connecticut Regulated CR-01 waste stream.

Attached please find the following information:

- Photographs

PHOTOGRAPHS

PHOTO 1: Typical light fixture located at each Keyport Magazine and Torpedo Bunker A-104.

PHOTO 2: Typical security light fixture located at the site.

P-848, MK-48 Torpedo Magazine
A&E Contract: N62472-04-D-1432
Job Order No.: 5G4890
Naval Sub Base New London, Groton, CT

ENVIRONMENTAL DESIGN ANALYSIS

Existing Conditions (Site Investigation) – Environmental

Introduction

Quad Three Group, Inc., was contracted with NAVFAC Sub Base New London, Groton, Connecticut to perform Engineering Services as part of the construction of an MK-48 Torpedo magazine and other miscellaneous site improvements. Engineering services included: topographic survey, geotechnical investigation, hazardous materials investigation, environmental contamination study, field investigation, and preliminary concept development.

Environmental Contamination Study

On February 11 and February 12, 2010, Quad Three Group, Inc. contracted with Geo-science Engineering Co. Inc. and General Borings, Inc. to perform Soil Borings / Environmental Borings at the Naval Submarine Base in Groton, Connecticut. A drill rig utilizing a 2' Split Spoon sampler was used to collect soil samples at a depth of 2' below ground surface (bgs). The spoons were decontaminated between each use to eliminate potential cross contamination. A Photoionization Detector (PID) was used to scan each 2' section of soil. No reading above 0.0 ppm was observed.

A total of 12 borings were installed throughout the subject property (See Appendix A for boring locations). Borings S/EB-001, S/EB-002, S/EB-003, S/EB-004, S/EB-005, S/EB-006 were sampled for both structural and chemical analysis. Borings EB-007, EB-008, EB-009 and EB-010 were sampled for chemical analysis but not structural analysis. Borings S/EB-011 and S/EB-012 were sampled for structural analysis but not chemical analysis, however, logs and PID readings were recorded. Complete Boring Logs can be found in Appendix B.

One sample was obtained from each of the first ten borings (S/EB-001, S/EB-002, S/EB-003, S/EB-004, S/EB-005, S/EB-006, EB-007, EB-008, EB-009 and EB-010). Borings S/EB-011 and S/EB-012 were added during drilling activities. They were scanned with the PID and logged, no samples were obtained. Each sample was placed in a nine ounce unpreserved jar. After the samples were collected they were placed in a cooler with ice and transported to Phoenix Environmental Laboratories under a proper chain of custody. Each sample was analyzed for Extractable Total Petroleum Hydrocarbons (ETPH) and for RCRA metals by EPA method SW-6010.

The analytical results were reviewed and compared to Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil. All results were below Direct Exposure Criteria. Laboratory analytical data is summarized in the tables below. A copy of the analytical results can be found in Appendix D of this report.

Due to a change in location of the MK-48 Torpedo Magazine, additional borings were required. The information from the February drilling is still useful as it pertains to the general site area and construction.

On August 2, and August 3, 2010, Quad Three Group, Inc. contracted with Geo-science Engineering Co. Inc. and General Borings, Inc. to perform Soil Borings / Environmental Borings at the Naval Submarine Base in Groton, Connecticut. A drill rig utilizing a 2' Split Spoon sampler was used to collect soil samples at various depths below ground surface (bgs). The spoons were decontaminated between each use to eliminate potential cross contamination. A Photoionization Detector (PID) was used to scan each 2' section of soil. No reading above 0.0 ppm was observed.

A total of 4 borings were installed throughout the relocation of the MK-48 Torpedo Magazine (See Appendix A for boring locations). Borings SB-P848-13, SB-P848-14, SB-P848-15 and SB-P848-16 were sampled for both structural and chemical analysis. Complete Boring Logs can be found in Appendix B.

A total of ten (10) samples were collected from the four borings: two samples were obtained from SB-P848-13, one from SB-P848-14, four from SB-P848-15 and three from SB-P848-16. Each sample was placed in a nine ounce unpreserved jar. After the samples were collected they were placed in a cooler with ice and transported to Phoenix Environmental Laboratories under a proper chain of custody. Each sample was analyzed for Extractable Total Petroleum Hydrocarbons (ETPH) and for RCRA metals by EPA method SW-6010.

The analytical results were reviewed and compared to Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil. All results were below Direct Exposure Criteria. Laboratory analytical data is summarized in the tables below. A copy of the analytical results can be found in Appendix D of this report.

Description	**Sample ID # AS75650 Client Sample # S/EB-001 Quad 3 # 10255.01**			**Time Sampled: 10:30 Date 2/11/10**		**Sample Type: Soil**	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	2/13/10	J/E	10
Barium	**39.1**	mg/Kg	0.37	SW6010	2/13/10	J/E	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	2/13/10	J/E	34
Chromium	**11.6**	mg/Kg	0.37	SW6010	2/13/10	J/E	100
Lead	**4.26**	mg/Kg	0.37	SW6010	2/13/10	J/E	500
Mercury	<0.06	mg/Kg	0.06	SW6010	2/13/10	J/E	20
Selenium	<1.5	mg/kg	1.5	SW6010	2/13/10	J/E	340
Silver	<0.37	mg/Kg	0.37	SW6010	2/13/10	J/E	340
TPH	ND	mg/Kg	10	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	**Sample ID # AS75651 Client Sample # S/EB-002 Quad 3 # 10255.01**			**Time Sampled: 11:00 Date 2/11/10**		**Sample Type: Soil**	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	2/13/10	J/E	10
Barium	**42.8**	mg/Kg	0.33	SW6010	2/13/10	J/E	4700
Cadmium	<0.33	mg/Kg	0.33	SW6010	2/13/10	J/E	34
Chromium	**13.0**	mg/Kg	0.33	SW6010	2/13/10	J/E	100
Lead	**4.12**	mg/Kg	0.33	SW6010	2/13/10	J/E	500
Mercury	<0.08	mg/Kg	0.08	SW6010	2/13/10	J/E	20
Selenium	<1.3	mg/kg	1.3	SW6010	2/13/10	J/E	340
Silver	<0.33	mg/Kg	0.33	SW6010	2/13/10	J/E	340
TPH	ND	mg/Kg	11	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75652 Client Sample # S/EB-003 Quad 3 # 10255.01			Time Sampled: 13:55 Date 2/11/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	2/13/10	J/E	10
Barium	**47.4**	mg/Kg	0.37	SW6010	2/13/10	J/E	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	2/13/10	J/E	34
Chromium	**10.2**	mg/Kg	0.37	SW6010	2/13/10	J/E	100
Lead	**7.63**	mg/Kg	0.37	SW6010	2/13/10	J/E	500
Mercury	<0.06	mg/Kg	0.06	SW6010	2/13/10	J/E	20
Selenium	<1.5	mg/kg	1.5	SW6010	2/13/10	J/E	340
Silver	<0.37	mg/Kg	0.37	SW6010	2/13/10	J/E	340
TPH	**170**	mg/Kg	10	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75653 Client Sample # S/EB-004 Quad 3 # 10255.01			Time Sampled: 12:45 Date 2/11/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**1.5**	mg/Kg	0.7	SW6010	2/13/10	J/E	10
Barium	**36.8**	mg/Kg	0.33	SW6010	2/13/10	J/E	4700
Cadmium	<0.33	mg/Kg	0.33	SW6010	2/13/10	J/E	34
Chromium	**11.8**	mg/Kg	0.33	SW6010	2/13/10	J/E	100
Lead	**4.46**	mg/Kg	0.33	SW6010	2/13/10	J/E	500
Mercury	<0.07	mg/Kg	0.07	SW6010	2/13/10	J/E	20
Selenium	<1.3	mg/kg	1.3	SW6010	2/13/10	J/E	340
Silver	<0.33	mg/Kg	0.33	SW6010	2/13/10	J/E	340
TPH	ND	mg/Kg	10	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75654 Client Sample # S/EB-005 Quad 3 # 10255.01			Time Sampled: 10:00 Date 2/12/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	2/13/10	J/E	10
Barium	**27.2**	mg/Kg	0.37	SW6010	2/13/10	J/E	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	2/13/10	J/E	34
Chromium	**7.57**	mg/Kg	0.37	SW6010	2/13/10	J/E	100
Lead	**6.87**	mg/Kg	0.37	SW6010	2/13/10	J/E	500
Mercury	<0.06	mg/Kg	0.06	SW6010	2/13/10	J/E	20
Selenium	<1.5	mg/kg	1.5	SW6010	2/13/10	J/E	340
Silver	<0.37	mg/Kg	0.37	SW6010	2/13/10	J/E	340
TPH	ND	mg/Kg	10	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75655 Client Sample # S/EB-006 Quad 3 # 10255.01			Time Sampled: 9:00 Date 2/12/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**3.4**	mg/Kg	0.8	SW6010	2/13/10	J/E	10
Barium	**21.9**	mg/Kg	0.41	SW6010	2/13/10	J/E	4700
Cadmium	<0.41	mg/Kg	0.41	SW6010	2/13/10	J/E	34
Chromium	**12.6**	mg/Kg	0.41	SW6010	2/13/10	J/E	100
Lead	**47.0**	mg/Kg	0.41	SW6010	2/13/10	J/E	500
Mercury	<0.08	mg/Kg	0.08	SW6010	2/13/10	J/E	20
Selenium	<1.6	mg/kg	1.6	SW6010	2/13/10	J/E	340
Silver	<0.41	mg/Kg	0.41	SW6010	2/13/10	J/E	340
TPH	ND	mg/Kg	10	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75656 Client Sample # EB-007 Quad 3 # 10255.01			Time Sampled: 9:25 Date 2/12/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**1.2**	mg/Kg	0.9	SW6010	2/13/10	J/E	10
Barium	**37.9**	mg/Kg	0.43	SW6010	2/13/10	J/E	4700
Cadmium	<0.43	mg/Kg	0.43	SW6010	2/13/10	J/E	34
Chromium	**15.4**	mg/Kg	0.43	SW6010	2/13/10	J/E	100
Lead	**6.70**	mg/Kg	0.43	SW6010	2/13/10	J/E	500
Mercury	<0.1	mg/Kg	0.1	SW6010	2/13/10	J/E	20
Selenium	<1.7	mg/kg	1.7	SW6010	2/13/10	J/E	340
Silver	<0.43	mg/Kg	0.43	SW6010	2/13/10	J/E	340
TPH	ND	mg/Kg	13	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75657 Client Sample # EB-008 Quad 3 # 10255.01			Time Sampled: 11:15 Date 2/12/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**1.7**	mg/Kg	0.7	SW6010	2/13/10	EK	10
Barium	**62.9**	mg/Kg	0.35	SW6010	2/13/10	EK	4700
Cadmium	<0.35	mg/Kg	0.35	SW6010	2/13/10	EK	34
Chromium	**13.7**	mg/Kg	0.35	SW6010	2/13/10	EK	100
Lead	**14.2**	mg/Kg	0.35	SW6010	2/13/10	EK	500
Mercury	<0.08	mg/Kg	0.08	SW6010	2/13/10	RS	20
Selenium	<1.4	mg/kg	1.4	SW6010	2/13/10	EK	340
Silver	<0.35	mg/Kg	0.35	SW6010	2/13/10	EK	340
TPH	**130**	mg/Kg	11	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75658 Client Sample # EB-009 Quad 3 # 10255.01			Time Sampled: 10:55 Date 2/12/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	2/13/10	EK	10
Barium	**48.7**	mg/Kg	0.34	SW6010	2/13/10	EK	4700
Cadmium	<0.34	mg/Kg	0.34	SW6010	2/13/10	EK	34
Chromium	**11.9**	mg/Kg	0.34	SW6010	2/13/10	EK	100
Lead	**0.90**	mg/Kg	0.34	SW6010	2/13/10	EK	500
Mercury	<0.08	mg/Kg	0.08	SW6010	2/13/10	RS	20
Selenium	<1.3	mg/kg	1.4	SW6010	2/13/10	EK	340
Silver	<0.34	mg/Kg	0.34	SW6010	2/13/10	EK	340
TPH	ND	mg/Kg	10	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75659 Client Sample # EB-010 Quad 3 # 10255.01			Time Sampled: 11:35 Date 2/12/10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	2/13/10	EK	10
Barium	**43.5**	mg/Kg	0.37	SW6010	2/13/10	EK	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	2/13/10	EK	34
Chromium	**16.3**	mg/Kg	0.37	SW6010	2/13/10	EK	100
Lead	**4.32**	mg/Kg	0.37	SW6010	2/13/10	EK	500
Mercury	<0.06	mg/Kg	0.06	SW6010	2/13/10	RS	20
Selenium	<1.5	mg/kg	1.5	SW6010	2/13/10	EK	340
Silver	<0.37	mg/Kg	0.37	SW6010	2/13/10	EK	340
TPH	ND	mg/Kg	11	CT ETPH	2/15/10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75658 Client Sample #SB-P848-13 2' Quad 3 # 10255.01			Time Sampled: 9:00 Date 8.3.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.7	mg/Kg	0.7	SW6010	8.9.10	TH	10
Barium	**38.4**	mg/Kg	0.37	SW6010	8.9.10	TH	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	8.9.10	TH	34
Chromium	**12.1**	mg/Kg	0.37	SW6010	8.9.10	TH	100
Lead	**3.33**	mg/Kg	0.37	SW6010	8.9.10	TH	500
Mercury	<0.06	mg/Kg	0.06	SW7471	8.6.10	RS	20
Selenium	<1.5	mg/kg	1.5	SW6010	8.9.10	TH	340
Silver	<0.37	mg/Kg	0.37	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	11	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75659 Client Sample #SB-P848-13 3.5' Quad 3 # 10255.01			Time Sampled: 9:10 Date 8.3.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	0.8	mg/Kg	0.7	SW6010	8.9.10	TH	10
Barium	**36.9**	mg/Kg	0.34	SW6010	8.9.10	TH	4700
Cadmium	<0.34	mg/Kg	0.34	SW6010	8.9.10	TH	34
Chromium	**16.1**	mg/Kg	0.34	SW6010	8.9.10	TH	100
Lead	**3.22**	mg/Kg	0.34	SW6010	8.9.10	TH	500
Mercury	<0.07	mg/Kg	0.07	SW7471	8.6.10	RS	20
Selenium	<1.4	mg/kg	1.4	SW6010	8.9.10	TH	340
Silver	<0.34	mg/Kg	0.34	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	10	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75650 Client Sample #SB-P848-14 1' Quad 3 # 10255.01			Time Sampled: 9:35 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	1.1	mg/Kg	0.8	SW6010	8.9.10	TH	10
Barium	**35.7**	mg/Kg	0.38	SW6010	8.9.10	TH	4700
Cadmium	<0.38	mg/Kg	0.38	SW6010	8.9.10	TH	34
Chromium	**9.90**	mg/Kg	0.38	SW6010	8.9.10	TH	100
Lead	**4.56**	mg/Kg	0.38	SW6010	8.9.10	TH	500
Mercury	<0.06	mg/Kg	0.06	SW7471	8.6.10	RS	20
Selenium	<1.5	mg/kg	1.5	SW6010	8.9.10	TH	340
Silver	<0.38	mg/Kg	0.38	SW6010	8.9.10	TH	340
TPH	**360**	mg/Kg	10	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75651 Client Sample #SB-P848-15 2' Quad 3 # 10255.01			Time Sampled: 10:50 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	0.9	mg/Kg	0.37	SW6010	8.9.10	TH	10
Barium	**24.1**	mg/Kg	0.37	SW6010	8.9.10	TH	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	8.9.10	TH	34
Chromium	**9.74**	mg/Kg	0.37	SW6010	8.9.10	TH	100
Lead	**1.66**	mg/Kg	0.37	SW6010	8.9.10	TH	500
Mercury	<0.06	mg/Kg	0.06	SW7471	8.6.10	RS	20
Selenium	<1.5	mg/kg	1.5	SW6010	8.9.10	TH	340
Silver	<0.37	mg/Kg	0.37	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	11	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75652 Client Sample #SB-P848-15 4' Quad 3 # 10255.01			Time Sampled: 10:55 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**1.8**	mg/Kg	0.8	SW6010	8.9.10	TH	10
Barium	**44.2**	mg/Kg	0.40	SW6010	8.9.10	TH	4700
Cadmium	<0.40	mg/Kg	0.40	SW6010	8.9.10	TH	34
Chromium	**11.8**	mg/Kg	0.40	SW6010	8.9.10	TH	100
Lead	**7.21**	mg/Kg	0.40	SW6010	8.9.10	TH	500
Mercury	<0.09	mg/Kg	0.09	SW7471	8.6.10	RS	20
Selenium	<1.6	mg/kg	1.6	SW6010	8.9.10	TH	340
Silver	<0.40	mg/Kg	0.40	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	11	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75653 Client Sample #SB-P848-15 6' Quad 3 # 10255.01			Time Sampled: 11:05 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**1.7**	mg/Kg	0.8	SW6010	8.9.10	LK	10
Barium	**56.9**	mg/Kg	0.42	SW6010	8.9.10	LK	4700
Cadmium	<0.42	mg/Kg	0.42	SW6010	8.9.10	LK	34
Chromium	**12.7**	mg/Kg	0.42	SW6010	8.9.10	LK	100
Lead	**3.36**	mg/Kg	0.42	SW6010	8.9.10	LK	500
Mercury	<0.10	mg/Kg	0.10	SW7471	8.6.10	RS	20
Selenium	<1.7	mg/kg	1.7	SW6010	8.9.10	LK	340
Silver	<0.42	mg/Kg	0.42	SW6010	8.9.10	LK	340
TPH	ND	mg/Kg	13	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75654 Client Sample #SB-P848-15 15.5' Quad 3 # 10255.01			Time Sampled: 11:30 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.8	mg/Kg	0.8	SW6010	8.9.10	TH	10
Barium	**48.0**	mg/Kg	0.38	SW6010	8.9.10	TH	4700
Cadmium	<0.38	mg/Kg	0.38	SW6010	8.9.10	TH	34
Chromium	**5.18**	mg/Kg	0.38	SW6010	8.9.10	TH	100
Lead	<0.38	mg/Kg	0.38	SW6010	8.9.10	TH	500
Mercury	<0.07	mg/Kg	<0.07	SW7471	8.6.10	RS	20
Selenium	<1.5	mg/kg	<1.5	SW6010	8.9.10	TH	340
Silver	<0.38	mg/Kg	<0.38	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	12	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75655 Client Sample #SB-P848-16 2' Quad 3 # 10255.01			Time Sampled: 15:30 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	<0.8	mg/Kg	0.8	SW6010	8.9.10	TH	10
Barium	**36.5**	mg/Kg	0.39	SW6010	8.9.10	TH	4700
Cadmium	<0.39	mg/Kg	0.39	SW6010	8.9.10	TH	34
Chromium	**11.0**	mg/Kg	0.39	SW6010	8.9.10	TH	100
Lead	**2.57**	mg/Kg	0.39	SW6010	8.9.10	TH	500
Mercury	<0.07	mg/Kg	0.07	SW7471	8.6.10	RS	20
Selenium	<1.6	mg/kg	1.6	SW6010	8.9.10	TH	340
Silver	<0.39	mg/Kg	0.39	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	11	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75656 Client Sample #SB-P848-16 4' Quad 3 # 10255.01			Time Sampled: 15:35 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**0.9**	mg/Kg	0.7	SW6010	8.9.10	TH	10
Barium	**67.2**	mg/Kg	0.37	SW6010	8.9.10	TH	4700
Cadmium	<0.37	mg/Kg	0.37	SW6010	8.9.10	TH	34
Chromium	**15.0**	mg/Kg	0.37	SW6010	8.9.10	TH	100
Lead	**1.96**	mg/Kg	0.37	SW6010	8.9.10	TH	500
Mercury	<0.08	mg/Kg	0.08	SW7471	8.6.10	RS	20
Selenium	<1.5	mg/kg	<1.5	SW6010	8.9.10	TH	340
Silver	<0.37	mg/Kg	0.37	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	11	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Description	Sample ID # AS75657 Client Sample SB-P848-16 6' Quad 3 # 10255.01			Time Sampled: 16:00 Date 8.2.10		Sample Type: Soil	
Test Parameter	**Results**	**Units**	**RL**	**Method**	**Test Date**	**Analyst**	**Residential Direct Exposure Criteria (mg/kg)***
Arsenic	**0.7**	mg/Kg	0.6	SW6010	8.9.10	TH	10
Barium	**60.2**	mg/Kg	0.32	SW6010	8.9.10	TH	4700
Cadmium	<0.32	mg/Kg	0.32	SW6010	8.9.10	TH	34
Chromium	**7.32**	mg/Kg	0.32	SW6010	8.9.10	TH	100
Lead	**1.55**	mg/Kg	0.32	SW6010	8.9.10	TH	500
Mercury	<0.07	mg/Kg	0.07	SW7471	8.6.10	RS	20
Selenium	<1.3	mg/kg	1.3	SW6010	8.9.10	TH	340
Silver	<0.32	mg/Kg	0.32	SW6010	8.9.10	TH	340
TPH	ND	mg/Kg	10	CT ETPH	8.6.10	JRB	500

*Criteria from Appendix A to Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil.

Conclusions and Recommendations

Quad Three Group, Inc., has reviewed the analytical results and compared them to Regulations of Connecticut State Agencies, Direct Exposure Criteria for Soil. All results were below Direct Exposure Criteria. At this time, it is Quad Three's recommendation that no further action is required.

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GENERATOR
TO BE DEMOLISHED

100 KVA TRANSFORMER
TO BE DEMOLISHED

EXISTING IDS
SERVICE PANELS
TO BE RELOCATED

EXISTING ELECTRICAL
SERVICE PANELS .
TO BE RELOCATED

393

EB-P848-7

S/EB-P848-6

S/EB-P848-5

EB-P848-8

A113 A94 A95 A96 A97

A104 A103 A102 A101 A100 A99 A98

A105 A106 A107 A108 A109 A110 A111

ROW A ROW B ROW C ROW D ROW E ROW F ROW G

SP-P848-13 SP-P848-14 SP-P848-15 SP-P848-16

SB-P848-11 SB-P848-12

30" CMP 30" RCP 18" RCP

SEE DWG C4 FOR EXISTING
KEYPORT MAGAZINE
CONSTRUCTION

LEGEND

- EDGE OF PAVEMENT
- 80 CONTOUR LINE W/ELEVATION
- FENCE LINE
- SD_x STORM LINE
- W_x WATER LINE
- E_x OVERHEAD ELECTRIC
- EU_x UNDERGROUND ELECTRIC
- POWER POLE
- ONE (1) LUMINAIRE HEAD MOUNTED ON POLE
- TWO (2) LUMINAIRE HEADS MOUNTED ON POLE
- MOTION DETECTOR
- BORING
- DETECTOR ELEC BOX
- BOLLARD
- STORM INLET
- STORM MANHOLE
- BENCHMARK W/ELEVATION
- ELECTRICAL JUNCTION BOX
- ×86.97 SPOT ELEVATION
- INDICATES STRUCTURE TO BE DEMOLISHED

1" = 30'-0"

30' 20' 0 30' 60' 90'

NO.	DESCRIPTION	DATE	APPR

NAVFAC

PRELIMINARY NOT FOR CONSTRUCTION

SEAL

Quad 3 Architecture Engineering Environmental Services
Wilkes-Barre, PA 18701
Phone 570 829-4200
Fax 570 829-3732
Web www.quad3.com
A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE XX/XX/10

DES	RRR	DRW	RRR	CHK	RBK

PM/DM RS/LE

BRANCH MANAGER

CHIEF ENG/ARCH DWG

FIRE PROTECTION

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NORTHEAST IPT

NAVAL FACILITIES ENGINEERING COMMAND ~ MID-ATLANTIC
NAVAL STATION ~ NORFOLK, VIRGINIA

NEW LONDON NAVAL SUBMARINE BASE
GROTON, CT

P-848 MK-48 TORPEDO MAGAZINE

CONCEPTUAL DEMOLITION & BORING LOCATION PLAN

SCALE: 1" = 30'

EPROJECT NO.: 795983

CONSTR. CONTR. NO. #####-##-#-####

NAVFAC DRAWING NO. ######

SHEET # OF

C2

DRAWFORM REVISION: 10 MARCH 2009

FILE NAME: K:\10255.01\CIVIL\C2.dwg LAYOUT NAME: C2 PLOTTED: Thursday, August 26, 2010 - 2:54pm USER: jrouch

S/EB 001; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 11, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 11, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 001**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	10:00	10:30	3.7 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 1.3' (3'-5') 0.7'	1.0 to 3.0 Light Brown Sand/Silt/Gravel 3.0 to 5.0 Light Brown Sand/Silt/Gravel	Sample obtained at 2.0' bgs at 10:30 Refusal at 3.7' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10	--				
	----------	----------	----------	----------	----------
10 11 12 13 14 15					
	----------	----------	----------	----------	----------
15 16 17 18 19 20					
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S/EB 002; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 11, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 11, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 002**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	10:35	11:00	4.1 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 0.8' (3'-5') 0.6'	1.0 to 3.0 Light Brown Sand/Silt/Gravel 3.0 to 5.0 Light Brown Sand/Silt/Gravel	Sample obtained at 3.0' bgs at 11:00 Refusal at 4.1' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10	--				
	----------	----------	----------	----------	----------
10 11 12 13 14 15	--				
	----------	----------	----------	----------	----------
15 16 17 18 19 20	--				
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S/EB 003; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 11, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 11, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 003**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	13:45	13:55	4.3 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 1.0' (3'-5') 0.9'	1.0 to 3.0 Light Brown Sand/Silt/Gravel 3.0 to 5.0 Light Brown Sand/Silt/Gravel	Sample obtained at 2.0' bgs at 14:00 Refusal at 4.3' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10	--				
	----------	----------	----------	----------	----------
10 11 12 13 14 15	--				
	----------	----------	----------	----------	----------
15 16 17 18 19 20	--				
	----------	----------	----------	----------	----------

S/EB 004; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 11, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 11, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 004**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	12:15	12:45	5.9 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 1.4' (3'-5') 2.0'	1.0 to 3.0 Light Brown Sand/Silt 3.0 to 5.0 Light Brown Sand/Silt/Gravel	Sample obtained at 2.0' bgs at 12:45
	---	---	---	---	---
5 6 7 8 9 10	0		Recovered: (5'-7') 0.0'		Refusal at 5.9' bgs
	---	---	---	---	---
10 11 12 13 14 15	--				
	---	---	---	---	---
15 16 17 18 19 20	--				
	---	---	---	---	---

S/EB 005; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 005**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	9:30	10:00	15.0' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 0.8' (3'-5') 1.3'	1.0 to 3.0 Light Brown Sand/Silt 3.0 to 5.0 Light Brown Sand/Silt/Gravel	Sample obtained at 2.0' bgs at 10:00
	---	---	---	---	---
5 6 7 8 9 10	0	0.0 ppm	Recovered: (5'-7') 1.0' (7-9') 1.0'	5.0 to 7.0 Brown Sand / Silt 7.0 to 9.0 Dark Gray Silt	
	---	---	---	---	---
10 11 12 13 14 15	0	0.0 ppm	Recovered: (9'-11') 2.0' (11'-13') 1.0' (13'-15') 1.8'	9.0 to 11.0 Gray Silt (wet) 11.0 to 13.0 Gray Silt (wet) 13.0 to 15.0 Gray Silt (wet)	Refusal at 15.0' bgs
	--- --	---	---	---	---
15 16 17 18 19 20	---	---	---	---	---

S/EB 006; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 006**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	8:40	9:00	6.6' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (0'-2') 0.5' (2'-4') 0.5'	0.0 to 2.0 Light Brown Sand/Silt 2.0 to 4.0 Light Brown Sand/Silt	Sample obtained at 2.0' bgs at 9:00
	---	---	---	---	---
5 6 7 8 9 10	0	0.0 ppm	Recovered: (4'-6') 0.8' (6'-8') 0.0'	4.0 to 6.0 Brown Sand / Silt	Refusal at 6.6' bgs
	---	---	---	---	---
10 11 12 13 14 15					
	---	---	---	---	---
	--				
15 16 17 18 19 20					
	---	---	---	---	---

EB 007; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **EB - 007**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	9:15	9:25	7.0' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (0'-2') 0.5' (2'-4') 0.2'	0.0 to 2.0 Light Brown Sand/Silt 2.0 to 4.0 Light Brown Sand/Silt	Sample obtained at 2.0' bgs at 9:25
	---	---	---	---	---
5 6 7 8 9 10	0	0.0 ppm	Recovered: (4'-6') 2.0' (6'-8') 0.8'	4.0 to 6.0 Light Brown Sand / Silt (wet) 6.0 to 8.0 Light Brown Sand / Silt (wet)	Refusal at 7.0' bgs
	---	---	---	---	---
10 11 12 13 14 15					
	---	---	---	---	---
	--				
15 16 17 18 19 20					
	---	---	---	---	---

EB 008; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **EB - 008**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	11:00	11:15	2.5' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 1.5'	1.0 to 3.0 Light Brown Sand/Silt	Sample obtained at 2.0' bgs at 9:25 Refusal at 2.5' bgs
	---	---	---	---	---
5 6 7 8 9 10					
	---	---	---	---	---
10 11 12 13 14 15					
	---	---	---	---	---
	--				
15 16 17 18 19 20					
	---	---	---	---	---

EB 009; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **EB - 009**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	10:45	10:55	3.0' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 1.0'	1.0 to 3.0 Light Brown Sand/Silt	Sample obtained at 2.0' bgs at 10:55 Refusal at 3.0' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10					
	----------	----------	----------	----------	----------
10 11 12 13 14 15					
	----------	----------	----------	----------	----------
	--				
15 16 17 18 19 20					
	----------	----------	----------	----------	----------

EB 010; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **EB - 010**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	11:25	11:35	2.5' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 0.2'	1.0 to 3.0 Light Brown Sand/Silt	Sample obtained at 2.0' bgs at 11:35 Refusal at 2.5' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10					
	----------	----------	----------	----------	----------
10 11 12 13 14 15					
	---------- --	----------	----------	----------	----------
15 16 17 18 19 20					
	----------	----------	----------	----------	----------

S/EB 011; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 011**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	14:45	15:15	14.0' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	0	0.0 ppm	Recovered: (0'-2') 1.6' (2'-4') 1.6'	0.0 to 2.0 Light Brown Sand/Silt/Gravel 2.0 to 4.0 Light Brown Sand/Silt/Gravel (2'-3') Dark Gray Silt (3'-4')	
	---	---	---	---	---
5 6 7 8 9 10	0	0.0 ppm	Recovered: (4'-6') 1.0' (6-8') 1.0' (8'-10') 1.5'	4.0 to 6.0 Dark Gray Silt Trace Sand 6.0 to 8.0 Dark Gray Silt Trace Sand 8.0 to 10.0 Dark Gray Silt Trace Sand	
	---	---	---	---	---
10 11 12 13 14 15	0	0.0 ppm	Recovered: (10'-12') 2.0' (12'-14') 1.0'	10.0 to 12.0 Dark Gray Silt Trace Sand 12.0 to 14.0 Dark Gray Silt Trace Sand Leaves / Roots at 13'	No Sample Obtained Refusal at 14.0' bgs
	---	---	---	---	---
	--				
15 16 17 18 19 20					
	---	---	---	---	---

S/EB 012; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: February 12, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: February 12, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **S/EB - 012**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	10:15	10:40	11.6' feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	0	0.0 ppm	Recovered: (0'-2') 1.0' (2'-4') 1.0'	0.0 to 2.0 Light Brown Sand/Silt 2.0 to 4.0 Light Brown Sand/Silt/Gravel Trace Dark Gray Silt	
	---	---	---	---	---
5 6 7 8 9 10	0	0.0 ppm	Recovered: (4'-6') 1.8' (6-8') 1.8' (8'-10') 1.5'	4.0 to 6.0 Dark Gray Silt 6.0 to 8.0 Dark Gray Silt 8.0 to 10.0 Dark Gray Silt	
	---	---	---	---	---
10 11 12 13 14 15	0	0.0 ppm	Recovered: (10'-12') 1.5'	10.0 to 12.0 Dark Gray Silt Trace Sand Brown Sand/Silt at 11-11.5'	No Sample Obtained Refusal at 11.6' bgs
	---	---	---	---	---
	--				
15 16 17 18 19 20					
	---	---	---	---	---

SB-P848-13; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: August 3, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: August 3, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **SB-P848-13**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	8:55	9:10	3.8 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	2	0.0 ppm	Recovered: (1'-3') 1.8' (3'-5') 0.8'	1.0 to 3.0 Brown Sandy Silt 3.0 to 5.0 Brown Sandy Silt	Sample obtained at 2.0' bgs at 10:30 and 3.5' bgs at 9:10 Refusal at 3.8' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10	--				
	----------	----------	----------	----------	----------
10 11 12 13 14 15					
	----------	----------	----------	----------	----------
15 16 17 18 19 20					
	----------	----------	----------	----------	----------

SB-P848-14; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: August 2, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: August 2, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **SB-P848-14**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	9:25	10:30	1.7 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	1	0.0 ppm	Recovered: (1'-3') 1.7'	1.0 to 3.0 Brown silty sand with gravel	Sample obtained at 1.0' bgs at 9:35 Refusal at 1.7' bgs
	----------	----------	----------	----------	----------
5 6 7 8 9 10	--				
	----------	----------	----------	----------	----------
10 11 12 13 14 15	--				
	----------	----------	----------	----------	----------
15 16 17 18 19 20	--				
	----------	----------	----------	----------	----------

SB-P848-15; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: August 2, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: August 2, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **SB-P848-15**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	10:45	14:30	21.9 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	2	0.0 ppm	Recovered: (1'-3') 1.5' (3'-5') 1.3'	1.0 to 3.0 Brown Silty Sand with Gravel 3.0 to 5.0 Grey Silty Sand with Gravel	Sample obtained at 2.0' bgs at 10:50 and 4.0' bgs at 10:55
	---	---	---	---	---
5 6 7 8 9 10	1	0.0 ppm	Recovered: (5'-7') 1.5' (7'-9') 2.0'	5.0 to 7.0 Brown Silty Sand with Gravel 7.0 to 9.0 1' Brown Silty Sand 1' Grey Silty Sand	Sample obtained at 6.0' bgs at 11:05
	---	---	---	---	---
10 11 12 13 14 15	-- 0.0 ppm	Recovered: (9'-11') 2.0'	9.0 to 11.0 Grey Sandy Silt	After consistency to 11.0' sampler was adavanced to 15' then to 20'
	---	---	---	---	---
15 16 17 18 19 20 21 22	1	0.0 ppm	Recovered: (15-17') 2.0' (20-21.9') 1.9'	15.0 to 17.0 Grey Gravel / Weathered Rock 20.0 to 21.9 Grave / Weathered Rock	Water at 15.5' bgs Refusal at 21.9' bgs
	---	---	---	---	---

SB-P848-16; Soil Boring Log

QUAD THREE GROUP, INC.	SOIL BORING LOGS
Project: P-848, MK-48 Torpedo Magazine / Sub Base	Date Started: August 2, 2010
Client: Naval Submarine Base in Groton, Connecticut	Date Finished: August 2, 2010
Purpose: Log soil type during soil/environmental boring activity.	
Contractor: General Boring, Inc.	Boring Number: **SB-P848-16**
Driller: General Boring, Inc.	Job Number: 10255.01
Geologist:	Sheet: **1**

Time Log	Begin	Finish	Depth	S.W.L. Elevation TOC	TOC/GL Surface
	15:15	16:30	6.3 feet bgs		

Depth (feet)	Sample No's	PID	Visual Log Description	Lithologic Description	Notes
0 1 2 3 4 5	2	0.0 ppm	Recovered: (1'-3') 1.7' (3'-5') 1.8'	1.0 to 3.0 Brown Silty Sand with Gravel 3.0 to 5.0 Grey Silty Sand with Gravel	Sample obtained at 2.0' bgs at 15:30 and 4.0' bgs at 15:35
	---	---	---	---	---
5 6 7 8 9 10	1	0.0 ppm	Recovered: (5'-7') 1.3'	5.0 to 7.0 Brown to Light Brown Silty Sand	Sample obtained at 6.0' bgs at 16:00 Refusal at 6.3' bgs
	---	---	---	---	---
10 11 12 13 14 15	--				
	---	---	---	---	---
15 16 17 18 19 20	--				
	---	---	---	---	---

L:\Projects\102\10255.01 MK 48 Torpedo Magazine\Environmental Contamination Study\Soil Boring Logs August 2010.Doc

February 2010

Photo 1. Auger breaking through black top

Photo 2. EB-008

Photo 3. Boring shown just prior to placement of black top patch.

Photo 4. Spoon sampler being driven into soil on EB-010

August 2010

Photo 1. Drill Rig set up over SB-P848-14

Photo 2. Drill Rig set up over SB-P848-16

Photo 3. Core-drilling through bedrock, SB-P848-14

Photo 4. Split-Spoon sampler being driven into soil on SB-P848-13

PHOENIX
Environmental Laboratories, Inc.

Thursday, February 18, 2010

Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Project ID: GROTON SUB BASE
Sample ID#s: AS75650 - AS75659

This laboratory is in compliance with the QA/QC procedures outlined in EPA 600/4-79-019, Handbook for Analytical Quality in Water and Waste Water, March 1979, SW846 QA/QC and NELAC requirements of procedures used.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
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PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/11/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75650

Project ID: GROTON SUB BASE

Client ID: S/EB-001

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	< 0.7	0.7	mg/Kg	02/13/10		J/E	SW6010
Barium	39.1	0.37	mg/Kg	02/13/10		J/E	SW6010
Cadmium	< 0.37	0.37	mg/Kg	02/13/10		J/E	SW6010
Chromium	11.6	0.37	mg/Kg	02/13/10		J/E	SW6010
Lead	4.26	0.37	mg/Kg	02/13/10		J/E	SW6010
Mercury	< 0.06	0.06	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.5	1.5	mg/Kg	02/13/10		J/E	SW6010
Silver	< 0.37	0.37	mg/Kg	02/13/10		J/E	SW6010
Percent Solid	93		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	10	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	78		%	02/15/10		JRB	CT ETPH

Project ID: GROTON SUB BASE

Client ID: S/EB-001

Phoenix I.D.: AS75650

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller

Phyllis Shiller, Laboratory Director

February 19, 2010

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/11/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75651

Project ID: GROTON SUB BASE

Client ID: S/EB-002

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	< 0.7	0.7	mg/Kg	02/14/10		J/E	SW6010
Barium	42.8	0.33	mg/Kg	02/14/10		J/E	SW6010
Cadmium	< 0.33	0.33	mg/Kg	02/14/10		J/E	SW6010
Chromium	13.0	0.33	mg/Kg	02/14/10		J/E	SW6010
Lead	4.12	0.33	mg/Kg	02/14/10		J/E	SW6010
Mercury	< 0.08	0.08	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.3	1.3	mg/Kg	02/14/10		J/E	SW6010
Silver	< 0.33	0.33	mg/Kg	02/14/10		J/E	SW6010
Percent Solid	92		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	71		%	02/15/10		JRB	CT ETPH

Project ID: GROTON SUB BASE

Client ID: S/EB-002

Phoenix I.D.: AS75651

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller

Phyllis Shiller, Laboratory Director

February 19, 2010

PHOENIX
Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/11/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75652

Project ID: GROTON SUB BASE
Client ID: S/EB-003

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	< 0.7	0.7	mg/Kg	02/14/10		J/E	SW6010
Barium	47.4	0.37	mg/Kg	02/14/10		J/E	SW6010
Cadmium	< 0.37	0.37	mg/Kg	02/14/10		J/E	SW6010
Chromium	10.2	0.37	mg/Kg	02/14/10		J/E	SW6010
Lead	7.63	0.37	mg/Kg	02/14/10		J/E	SW6010
Mercury	< 0.06	0.06	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.5	1.5	mg/Kg	02/14/10		J/E	SW6010
Silver	< 0.37	0.37	mg/Kg	02/14/10		J/E	SW6010
Percent Solid	93		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	170	10	mg/Kg	02/16/10		JRB	CT ETPH
Identification	**		mg/Kg	02/16/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	87		%	02/16/10		JRB	CT ETPH

Project ID: GROTON SUB BASE
Client ID: S/EB-003

Phoenix I.D.: AS75652

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

**Petroleum hydrocarbon chromatogram was not a perfect match with any of the standards,
but contains a distribution in the C26 to C36 range. The sample was quantitated against a C9-C36 standard.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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February 19, 2010

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ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/11/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75653

Project ID: GROTON SUB BASE
Client ID: S/EB-004

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	1.5	0.7	mg/Kg	02/14/10		J/E	SW6010
Barium	36.8	0.33	mg/Kg	02/14/10		J/E	SW6010
Cadmium	< 0.33	0.33	mg/Kg	02/14/10		J/E	SW6010
Chromium	11.8	0.33	mg/Kg	02/14/10		J/E	SW6010
Lead	4.46	0.33	mg/Kg	02/14/10		J/E	SW6010
Mercury	< 0.07	0.07	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.3	1.3	mg/Kg	02/14/10		J/E	SW6010
Silver	< 0.33	0.33	mg/Kg	02/14/10		J/E	SW6010
Percent Solid	97		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	10	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	81		%	02/15/10		JRB	CT ETPH

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/12/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75654

Project ID: GROTON SUB BASE

Client ID: S/EB-005

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	< 0.7	0.7	mg/Kg	02/14/10		J/E	SW6010
Barium	27.2	0.37	mg/Kg	02/14/10		J/E	SW6010
Cadmium	< 0.37	0.37	mg/Kg	02/14/10		J/E	SW6010
Chromium	7.57	0.37	mg/Kg	02/14/10		J/E	SW6010
Lead	6.87	0.37	mg/Kg	02/14/10		J/E	SW6010
Mercury	< 0.06	0.06	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.5	1.5	mg/Kg	02/14/10		J/E	SW6010
Silver	< 0.37	0.37	mg/Kg	02/14/10		J/E	SW6010
Percent Solid	93		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	70		%	02/15/10		JRB	CT ETPH

Project ID: GROTON SUB BASE
Client ID: S/EB-005

Phoenix I.D.: AS75654

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/12/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75655

Project ID: GROTON SUB BASE

Client ID: S/EB-006

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	3.4	0.8	mg/Kg	02/14/10		J/E	SW6010
Barium	21.9	0.41	mg/Kg	02/14/10		J/E	SW6010
Cadmium	< 0.41	0.41	mg/Kg	02/14/10		J/E	SW6010
Chromium	12.6	0.41	mg/Kg	02/14/10		J/E	SW6010
Lead	47.0	0.41	mg/Kg	02/14/10		J/E	SW6010
Mercury	< 0.08	0.08	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.6	1.6	mg/Kg	02/14/10		J/E	SW6010
Silver	< 0.41	0.41	mg/Kg	02/14/10		J/E	SW6010
Percent Solid	79		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	12	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	81		%	02/15/10		JRB	CT ETPH

Project ID: GROTON SUB BASE
Client ID: S/EB-006

Phoenix I.D.: AS75655

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/12/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75656

Project ID: GROTON SUB BASE

Client ID: EB-007

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	1.2	0.9	mg/Kg	02/14/10		J/E	SW6010
Barium	37.9	0.43	mg/Kg	02/14/10		J/E	SW6010
Cadmium	< 0.43	0.43	mg/Kg	02/14/10		J/E	SW6010
Chromium	15.4	0.43	mg/Kg	02/14/10		J/E	SW6010
Lead	6.70	0.43	mg/Kg	02/14/10		J/E	SW6010
Mercury	< 0.1	0.1	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.7	1.7	mg/Kg	02/14/10		J/E	SW6010
Silver	< 0.43	0.43	mg/Kg	02/14/10		J/E	SW6010
Percent Solid	77		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/12/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	13	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	80		%	02/15/10		JRB	CT ETPH

Project ID: GROTON SUB BASE

Client ID: EB-007

Phoenix I.D.: AS75656

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/12/10	10:30
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75657

Project ID: GROTON SUB BASE

Client ID: EB-008

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	1.7	0.7	mg/Kg	02/17/10		EK	SW6010
Barium	62.9	0.35	mg/Kg	02/17/10		EK	SW6010
Cadmium	< 0.35	0.35	mg/Kg	02/17/10		EK	SW6010
Chromium	13.7	0.35	mg/Kg	02/17/10		EK	SW6010
Lead	14.2	0.35	mg/Kg	02/17/10		EK	SW6010
Mercury	< 0.08	0.08	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.4	1.4	mg/Kg	02/17/10		EK	SW6010
Silver	< 0.35	0.35	mg/Kg	02/17/10		EK	SW6010
Percent Solid	92		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed					X	SW7471
Total Metals Digest	Completed			02/15/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	130	11	mg/Kg	02/16/10		JRB	CT ETPH
Identification	**		mg/Kg	02/16/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	85		%	02/16/10		JRB	CT ETPH

Project ID: GROTON SUB BASE
Client ID: EB-008

Phoenix I.D.: AS75657

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

**Petroleum hydrocarbon chromatogram was not a perfect match with any of the standards,
but contains a distribution in the C24 to C36 range. The sample was quantitated against a C9-C36 standard.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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February 19, 2010

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Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/12/10	10:55
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75658

Project ID: GROTON SUB BASE

Client ID: EB-009

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	< 0.7	0.7	mg/Kg	02/16/10		EK	SW6010
Barium	48.7	0.34	mg/Kg	02/16/10		EK	SW6010
Cadmium	< 0.34	0.34	mg/Kg	02/16/10		EK	SW6010
Chromium	11.9	0.34	mg/Kg	02/16/10		EK	SW6010
Lead	0.90	0.34	mg/Kg	02/16/10		EK	SW6010
Mercury	< 0.08	0.08	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.3	1.3	mg/Kg	02/16/10		EK	SW6010
Silver	< 0.34	0.34	mg/Kg	02/16/10		EK	SW6010
Percent Solid	94		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed					X	SW7471
Total Metals Digest	Completed			02/15/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	10	mg/Kg	02/15/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/15/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	80		%	02/15/10		JRB	CT ETPH

Project ID: GROTON SUB BASE
Client ID: EB-009

Phoenix I.D.: AS75658

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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Analysis Report

February 18, 2010

FOR: Mr. Dan Nealon
Quad Three Group Inc.
72 Gunnaura National Blvd.
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	DN	02/12/10	11:35
Location Code:	SPECIAL2	Received by:	LB	02/12/10	14:36
Rush Request:		Analyzed by:	see "By" below		
P.O.#:	10255.01				

Laboratory Data

SDG ID: GAS75650
Phoenix ID: AS75659

Project ID: GROTON SUB BASE

Client ID: EB-010

Parameter	Result	RL	Units	Date	Time	By	Reference
Arsenic	< 0.7	0.7	mg/Kg	02/16/10		EK	SW6010
Barium	43.5	0.37	mg/Kg	02/16/10		EK	SW6010
Cadmium	< 0.37	0.37	mg/Kg	02/16/10		EK	SW6010
Chromium	16.3	0.37	mg/Kg	02/16/10		EK	SW6010
Lead	4.32	0.37	mg/Kg	02/16/10		EK	SW6010
Mercury	< 0.06	0.06	mg/Kg	02/15/10		RS	SW-7471
Selenium	< 1.5	1.5	mg/Kg	02/16/10		EK	SW6010
Silver	< 0.37	0.37	mg/Kg	02/16/10		EK	SW6010
Percent Solid	92		%	02/12/10		M / JL	E160.3
Extraction of CT ETPH	Completed			02/12/10		MS/D	3545
Mercury Digestion	Completed			02/15/10		X	SW7471
Total Metals Digest	Completed			02/15/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	02/17/10		JRB	CT ETPH
Identification	ND		mg/Kg	02/17/10		JRB	CT ETPH
QA/QC Surrogates							
% n-Pentacosane	87		%	02/17/10		JRB	CT ETPH

Project ID: GROTON SUB BASE
Client ID: EB-010

Phoenix I.D.: AS75659

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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QA/QC Report

February 19, 2010

QA/QC Data

SDG I.D.: GAS75650

Parameter	Blank	Dup RPD	LCS %	LCSD %	LCS RPD	MS Rec %	MS Dup Rec %	RPD
QA/QC Batch 147317, QC Sample No: AS75497 (AS75650, AS75651, AS75652, AS75653, AS75654, AS75655, AS75656, AS75657, AS75658)								
Mercury	BDL	NC	97.8	117	17.9	126	118	6.6
QA/QC Batch 147279, QC Sample No: AS75650 (AS75650, AS75651, AS75652, AS75653, AS75654, AS75655, AS75656)								
ICP Metals - Soil								
Arsenic	BDL	NC	95.2	95.0	0.2	89.7	92.4	3.0
Barium	BDL	10.4	99.5	99.5	0.0	93.9	99.8	6.1
Cadmium	BDL	NC	95.6	100	4.5	94.6	96.1	1.6
Chromium	0.69	8.10	103	103	0.0	99.7	104	4.2
Lead	BDL	35.9	94.8	94.1	0.7	93.5	95.9	2.5
Selenium	BDL	NC	86.2	88.5	2.6	82.8	84.9	2.5
Silver	BDL	NC	101	97.6	3.4	95.9	98.0	2.2
QA/QC Batch 147376, QC Sample No: AS75657 (AS75657, AS75658, AS75659)								
ICP Metals - Soil								
Arsenic	BDL	NC	99.3	92.6	7.0	92.3	92.8	0.5
Barium	BDL	12.7	104	93.3	10.8	104	95.0	9.0
Cadmium	BDL	NC	96.9	99.2	2.3	95.4	97.1	1.8
Chromium	BDL	5.00	102	99.4	2.6	101	98.9	2.1
Lead	BDL	4.00	96.8	90.0	7.3	95.6	93.5	2.2
Selenium	BDL	NC	91.8	89.8	2.2	87.9	88.3	0.5
Silver	BDL	NC	99.7	90.4	9.8	98.0	97.7	0.3
QA/QC Batch 147321, QC Sample No: AS75659 (AS75659)								
Mercury	BDL	NC	98.7	110	10.8	113	107	5.5

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria

Phyllis Shiller, Laboratory Director
February 19, 2010

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Tel. (860) 645-1102 Fax (860) 645-0823

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NY # 11301

QA/QC Report

February 19, 2010

QA/QC Data

SDG I.D.: GAS75650

Parameter	Blank	LCS %	LCSD %	LCS RPD	MS Rec %	MS Dup Rec %	RPD
QA/QC Batch 147267, QC Sample No: AS75650 (AS75650, AS75651, AS75652, AS75653, AS75654, AS75655, AS75656, AS75657, AS75658, AS75659)							
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	69	97	33.7	68	112	48.9
% n-Pentacosane	70	82	103	22.7	78	122	44.0

PHOENIX Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Temp 6° Pg 1 of 1

Data Delivery:
☐ Fax #:
☒ Email: dnealon@quad3.com

Customer: Quad Three Group Inc
Address: 720 Cynwyd Natl Blvd
Moosic, PA 18507

Project: Groton Sub Base PS48, MK48 Turp. Magazine
Report to: Dan Nealon
Invoice to: " "

Project P.O: 10255.01
Phone #: 570 342 5200
Fax #: 570 342 6083

Client Sample - Information - Identification

Sampler's Signature: Daniel A. Nealon Date: 2/12/10

Matrix Code:
DW=drinking water WW=wastewater S=soil/solid O=oil
GW=groundwater SL=sludge A=air X=other

Analysis Request

Phoenix Sample #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	CT ETPH	RCRA 8 Metals
75650	S/EB-001	S	2/11	10:30	X	X
75651	S/EB-002	↓	2/11	11:00	↓	↓
75652	S/EB-003	↓	2/11	12:55	↓	↓
75653	S/EB-004	↓	2/11	12:45	↓	↓
75654	S/EB-005	↓	2/12	10:00	↓	↓
75655	S/EB-006	↓	2/12	9:00	↓	↓
75656	EB-007	↓	2/12	9:25	↓	↓
75657	EB-008	↓	2/12	11:15	↓	↓
75658	EB-009	↓	2/12	10:55	↓	↓
75659	EB-010	↓	2/12	11:35	↓	↓

Soil VOA Vials [ ] methanol [ ] Sod Bisulfate
GL Soil container ( ) oz
GL Soil container ( ) oz
40 ml VOA Vial [ ] As is [ ] HCl
GL Amber 1000ml [ ] As is [ ] H2SO4
PL As is [ ] 250ml [ ] 500ml [ ] 1000ml
PL H2SO4 [ ] 250ml [ ] 500ml
PL HNO3 250ml
PL NaOH 250ml
Bacteria Bottle

Relinquished by:	Accepted by:	Date:	Time:
D Nealon		2/12/10	13:00
	Eliz. [illegible] 13:5	2/12/10	~~14:35~~
	Lisa Paw	2/12	14:36

Comments, Special Requirements or Regulations:

Turnaround:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☒ Standard
☐ Other
* SURCHARGE APPLIES

CT/RI
☐ RCP Cert
☐ GW Protect
☐ GA Mobility
☐ GB Mobility
☐ SW Protection
☐ Res. Vol.
☐ Ind. Vol.
☐ Res. Criteria
☐ Other

MA
☐ MCP Certification
☐ GW-1
☐ GW-2
☐ GW-3
☐ S-1
☐ S-2
☐ S-3
☐ MWRA eSMART
☐ Other

Data Format
☐ Excel
☒ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ ASP-A
☐ NJ Reduced Deliv. *
☐ NJ Hazsite EDD
☒ Phoenix Std Report
☐ Other

State where samples were collected: CT

PHOENIX
Environmental Laboratories, Inc.

Monday, August 09, 2010

Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG
Sample ID#s: AZ31069 - AZ31078

This laboratory is in compliance with the QA/QC procedures outlined in EPA 600/4-79-019, Handbook for Analytical Quality in Water and Waste Water, March 1979, SW846 QA/QC and NELAC requirements of procedures used.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Telephone (860) 645-1102 Fax (860) 645-0823

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	9:35
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31069

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-14 1`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.38	0.38	mg/Kg	08/09/10		TH	SW6010
Arsenic	1.1	0.8	mg/Kg	08/09/10		TH	SW6010
Barium	35.7	0.38	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.38	0.38	mg/Kg	08/09/10		TH	SW6010
Chromium	9.90	0.38	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.06	0.06	mg/Kg	08/06/10		RS	SW-7471
Lead	4.56	0.38	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.5	1.5	mg/Kg	08/09/10		TH	SW6010
Percent Solid	94		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	360	10	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	**		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	Interference		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31069

Client ID: SB-P848-14 1`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

**Petroleum hydrocarbon chromatogram was not a perfect match with any of the standards,
but contains a distribution in the C12 to C36 range. The sample was quantitated against a C9-C36 standard.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller, Laboratory Director

August 10, 2010

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Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	10:50
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31070

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-15 2`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.37	0.37	mg/Kg	08/09/10		TH	SW6010
Arsenic	0.9	0.7	mg/Kg	08/09/10		TH	SW6010
Barium	24.1	0.37	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.37	0.37	mg/Kg	08/09/10		TH	SW6010
Chromium	9.74	0.37	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.06	0.06	mg/Kg	08/06/10		RS	SW-7471
Lead	1.66	0.37	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.5	1.5	mg/Kg	08/09/10		TH	SW6010
Percent Solid	93		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	79		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31070

Client ID: SB-P848-15 2`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

August 10, 2010

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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	10:55
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31071

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-15 4`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.40	0.40	mg/Kg	08/09/10		TH	SW6010
Arsenic	1.8	0.8	mg/Kg	08/09/10		TH	SW6010
Barium	44.2	0.40	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.40	0.40	mg/Kg	08/09/10		TH	SW6010
Chromium	11.8	0.40	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.09	0.09	mg/Kg	08/06/10		RS	SW-7471
Lead	7.21	0.40	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.6	1.6	mg/Kg	08/09/10		TH	SW6010
Percent Solid	89		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	77		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31071

Client ID: SB-P848-15 4`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

August 10, 2010

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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	11:05
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31072

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-15 6`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.42	0.42	mg/Kg	08/09/10		LK	SW6010
Arsenic	1.7	0.8	mg/Kg	08/09/10		LK	SW6010
Barium	56.9	0.42	mg/Kg	08/09/10		LK	SW6010
Cadmium	< 0.42	0.42	mg/Kg	08/09/10		LK	SW6010
Chromium	12.7	0.42	mg/Kg	08/09/10		LK	SW6010
Mercury	< 0.10	0.10	mg/Kg	08/06/10		RS	SW-7471
Lead	3.36	0.42	mg/Kg	08/09/10		LK	SW6010
Selenium	< 1.7	1.7	mg/Kg	08/09/10		LK	SW6010
Percent Solid	75		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	13	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	138		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31072

Client ID: SB-P848-15 6`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

August 10, 2010

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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	11:30
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31073

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-15 15.5`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.38	0.38	mg/Kg	08/09/10		TH	SW6010
Arsenic	< 0.8	0.8	mg/Kg	08/09/10		TH	SW6010
Barium	48.0	0.38	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.38	0.38	mg/Kg	08/09/10		TH	SW6010
Chromium	5.18	0.38	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.07	0.07	mg/Kg	08/06/10		RS	SW-7471
Lead	< 0.38	0.38	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.5	1.5	mg/Kg	08/09/10		TH	SW6010
Percent Solid	85		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	12	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	70		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31073

Client ID: SB-P848-15 15.5`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller, Laboratory Director

August 10, 2010

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587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	15:30
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31074

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-16 2`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.39	0.39	mg/Kg	08/09/10		TH	SW6010
Arsenic	< 0.8	0.8	mg/Kg	08/09/10		TH	SW6010
Barium	36.5	0.39	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.39	0.39	mg/Kg	08/09/10		TH	SW6010
Chromium	11.0	0.39	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.07	0.07	mg/Kg	08/06/10		RS	SW-7471
Lead	2.57	0.39	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.6	1.6	mg/Kg	08/09/10		TH	SW6010
Percent Solid	90		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	105		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31074

Client ID: SB-P848-16 2`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller, Laboratory Director

August 10, 2010

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587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	15:35
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31075

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-16 4`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.37	0.37	mg/Kg	08/09/10		TH	SW6010
Arsenic	0.9	0.7	mg/Kg	08/09/10		TH	SW6010
Barium	67.2	0.37	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.37	0.37	mg/Kg	08/09/10		TH	SW6010
Chromium	15.0	0.37	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.08	0.08	mg/Kg	08/06/10		RS	SW-7471
Lead	1.96	0.37	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.5	1.5	mg/Kg	08/09/10		TH	SW6010
Percent Solid	90		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	95		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31075

Client ID: SB-P848-16 4`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller, Laboratory Director

August 10, 2010

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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/02/10	16:00
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31076

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-16 6`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.32	0.32	mg/Kg	08/09/10		TH	SW6010
Arsenic	0.7	0.6	mg/Kg	08/09/10		TH	SW6010
Barium	60.2	0.32	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.32	0.32	mg/Kg	08/09/10		TH	SW6010
Chromium	7.32	0.32	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.07	0.07	mg/Kg	08/06/10		RS	SW-7471
Lead	1.55	0.32	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.3	1.3	mg/Kg	08/09/10		TH	SW6010
Percent Solid	94		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	10	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	82		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31076

Client ID: SB-P848-16 6`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller, Laboratory Director

August 10, 2010

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/03/10	9:00
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31077

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-13 2`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.37	0.37	mg/Kg	08/09/10		TH	SW6010
Arsenic	< 0.7	0.7	mg/Kg	08/09/10		TH	SW6010
Barium	38.4	0.37	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.37	0.37	mg/Kg	08/09/10		TH	SW6010
Chromium	12.1	0.37	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.06	0.06	mg/Kg	08/06/10		RS	SW-7471
Lead	3.33	0.37	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.5	1.5	mg/Kg	08/09/10		TH	SW6010
Percent Solid	93		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	11	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	82		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31077

Client ID: SB-P848-13 2`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

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Analysis Report

August 09, 2010

FOR: Attn: Mr. Dan Nealon
Quad Three Group, Inc.
72 Glenmaura National Blvd
Moosic, PA 18507

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:	D NEALON	08/03/10	9:10
Location Code:	QUADTHRE	Received by:	BA	08/05/10	10:30
Rush Request:	RUSH##	Analyzed by:	see "By" below		
P.O.#:	10255-01				

Laboratory Data

SDG ID: GAZ31069
Phoenix ID: AZ31078

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Client ID: SB-P848-13 3.5`

Parameter	Result	RL	Units	Date	Time	By	Reference
Silver	< 0.34	0.34	mg/Kg	08/09/10		TH	SW6010
Arsenic	0.8	0.7	mg/Kg	08/09/10		TH	SW6010
Barium	36.9	0.34	mg/Kg	08/09/10		TH	SW6010
Cadmium	< 0.34	0.34	mg/Kg	08/09/10		TH	SW6010
Chromium	16.1	0.34	mg/Kg	08/09/10		TH	SW6010
Mercury	< 0.07	0.07	mg/Kg	08/06/10		RS	SW-7471
Lead	3.22	0.34	mg/Kg	08/09/10		TH	SW6010
Selenium	< 1.4	1.4	mg/Kg	08/09/10		TH	SW6010
Percent Solid	94		%	08/05/10		JL	E160.3
Extraction of CT ETPH	Completed			08/05/10		FS/AD	3545
Mercury Digestion	Completed			08/06/10		K	SW7471
Total Metals Digest	Completed			08/05/10		C/AG	SW846 - 3050
TPH by GC (Extractable Products)							
Ext. Petroleum HC	ND	10	mg/Kg	08/06/10		JRB	CT ETPH/8015
Identification	ND		mg/Kg	08/06/10		JRB	CT ETPH/8015
QA/QC Surrogates							
% n-Pentacosane	76		%	08/06/10		JRB	CT ETPH/8015

Project ID: GROTON SUB BASE P848,MK48 TORPEDO MAG

Phoenix I.D.: AZ31078

Client ID: SB-P848-13 3.5`

Parameter	Result	RL	Units	Date	Time	By	Reference

Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

ND=Not detected BDL=Below Detection Level RL=Reporting Level

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Phyllis Shiller, Laboratory Director

August 10, 2010

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

QA/QC Report

August 10, 2010

QA/QC Data

SDG I.D.: GAZ31069

Parameter	Blank	Dup RPD	LCS %	LCSD %	LCS RPD	MS Rec %	MS Dup Rec %	RPD
QA/QC Batch 158806, QC Sample No: AZ30298 (AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078)								
Mercury	BDL	NC	95.1	97.1	2.1	90.3	94.3	4.3
QA/QC Batch 158750, QC Sample No: AZ31072 (AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078)								
ICP Metals - Soil								
Arsenic	BDL	NC	83.5	86.9	4.0	89.2	91.7	2.8
Barium	BDL	39.8	75.1	81.1	7.7	81.1	83.0	2.3
Cadmium	BDL	NC	92.0	90.0	2.2	93.5	94.3	0.9
Chromium	BDL	13.5	87.6	88.1	0.6	92.0	93.3	1.4
Lead	BDL	3.10	80.8	84.8	4.8	93.2	94.3	1.2
Selenium	BDL	NC	77.8	82.1	5.4	83.6	85.2	1.9
Silver	BDL	NC	86.4	88.3	2.2	93.1	94.3	1.3

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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

QA/QC Report

August 10, 2010

QA/QC Data

SDG I.D.: GAZ31069

Parameter	Blank	LCS %	LCSD %	LCS RPD	MS Rec %	MS Dup Rec %	RPD
QA/QC Batch 158532, QC Sample No: AZ30772 (AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078)							
Total Petroleum Hydrocarbons							
Total Petroleum Hydrocarbons	ND	75	76	1.3			

Comment:

*The MS/MSD could not be analyzed because of matrix interference. The LCS was within QA/QC criteria.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria

Phyllis Shiller, Laboratory Director
August 10, 2010

Reasonable Confidence Protocol
Laboratory Analysis QA/QC Certification Form

Laboratory Name: Phoenix Environmental Labs, Inc. **Client:** QUADTHRE

Project Location: GROTON SUB BASE P848,MK48 **Project Number:**

Laboratory Sample ID(s): AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078

Sampling Date(s): 8/2/2010, 8/3/2010

RCP Methods Used:

☐ 1311/1312 ☑ 6010 ☐ 7000 ☐ 7196 ☑ 7470/7471 ☐ 8081 ☐ EPH ☐ TO15

☐ 8082 ☐ 8151 ☐ 8260 ☐ 8270 ☑ ETPH ☐ 9010/9012 ☐ VPH

1.	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed (including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the CT DEP method-specific Reasonable Confidence	☑ Yes ☐ No
1a.	Were the method specified preservation and holding time requirements met?	☑ Yes ☐ No
1b.	EPH and VPH methods only: Was the VPH or EPH method conducted without significant modifications (see section 11.3 of respective RCP methods)	☐ Yes ☐ No ☑ NA
2.	Were all samples received by the laboratory in a condition consistent with that described on the associated Chain-of-Custody document(s)?	☑ Yes ☐ No
3.	Were samples received at an appropriate temperature (< 6 Degrees C)?	☑ Yes ☐ No ☐ NA
4.	Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents acheived?	☑ Yes ☐ No
5a.	Were reporting limits specified or referenced on the chain-of-custody?	☐ Yes ☑ No
5b.	Were these reporting limits met?	☐ Yes ☐ No ☑ NA
6.	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the Reasonable Confidence Protocol documents?	☑ Yes ☐ No ☐ NA
7.	Are project-specific QC samples included in the data set?	☑ Yes ☐ No ☐ NA

Note: For all questions to which the response was "No" (with the exception of question #5a, #7), additional information must be provided in an attached narrative. If the answer to question #1, #1A or 1B is "No", the data package does not meet the requirements for "Reasonable Confidence"

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowlegde and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete.

Date: Tuesday, August 10, 2010

Authorized Signature: Kathleen Cressia

Printed Name: Kathleen Cressia

Position: QA/QC Officer

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

RCP Certification Report

August 10, 2010

SDG I.D.: GAZ31069

ETPH Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

QC Comments: QC Batch 58532 08/04/10 (AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078)

*The MS/MSD could not be analyzed because of matrix interference. The LCS was within QA/QC criteria.

QC (Batch Specific)

All LCS recoveries were within 50 - 150 with the following exceptions: None.

All LCSD recoveries were within 50 - 150 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

Mercury Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

Instrument: Merlin 08/06/10-1 (AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078)

The method preparation blank contains all of the acids and reagents as the samples; the instrument blanks do not.
The initial calibration met all criteria including a standard run at or below the reporting level.
All calibration verification standards (ICV, CCV) met criteria.
All calibration blank verification standards (ICB, CCB) met criteria.
The matrix spike sample is used to identify spectral interfernce for each batch of samples, if within 85-115%, no interference is observed and no further action is taken.

Printed Name Rick Schweitzer
Position: Chemist
Date: 8/6/2010

QC (Batch Specific)

All LCS recoveries were within 80 - 120 with the following exceptions: None.

All LCSD recoveries were within 80 - 120 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

ICP Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

Instrument: Icp9 08/08/10-1 (AZ31069, AZ31070, AZ31071, AZ31072, AZ31073, AZ31074, AZ31075, AZ31076, AZ31077, AZ31078)

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

RCP Certification Report

August 10, 2010

SDG I.D.: GAZ31069

The initial calibration met criteria.
The continuing calibration standards met criteria for all the elements reported. The linear range is defined daily by the calibration range.
The continuing calibration blanks were less than the reporting level for the elements reported.
The ICSA and ICSAB were analyzed at the beginning and end of the run and were within criteria.

Printed Name Laura Kinnin
Position: Chemist
Date: 8/8/2010

QC (Site Specific)

---------- Sample No: AZ31072 ----------

All LCS recoveries were within 75 - 125 with the following exceptions: None.

All LCSD recoveries were within 75 - 125 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

All MS recoveries were within 75 - 125 with the following exceptions: None.

All MSD recoveries were within 75 - 125 with the following exceptions: None.

All MS/MSD RPDs were less than 30% with the following exceptions: None.

A matrix effect is suspected when a MS/MSD recovery is outside of criteria. No further action is required if LCS/LCSD compounds are within criteria.

PHOENIX
Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Temp 60 °C Pg 1 of 1

Data Delivery:
☐ Fax #:
☒ Email: dnealon@quad3.com

Customer: Quad Three Group, Inc.
Address: 72 Glenmaura Natl Blvd
Moosic, PA 18507

Project: Groton Sub Base P848, MK48 Torpedo Magazine
Report to: Dan Nealon
Invoice to: " "

Project P.O: 10255.01
Phone #: 570.342.5200
Fax #: 570.342.6083

Client Sample - Information - Identification

Sampler's Signature: Daniel A. Nealon Date: 8/3/10

Matrix Code:
DW=drinking water WW=wastewater S=soil/solid O=oil
GW=groundwater SL=sludge A=air X=other

Analysis Request

Phoenix Sample #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	CT ETPH +	RCRA 8 Metals +	+	+	+	+	+	+	+	+	+	Soil VOA Vials [ ] methanol [ ] Sod Bisulfate	GL Soil container (8) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle
31069	SB-P848-14 1'	S	8.2.10	9:35													1								
31070	SB-P848-15 2'	S	8.2.10	10:50													1								
31071	SB-P848-15 4'	S	8.2.10	10:55													1								
31072	SB-P848-15 6'	S	8.2.10	11:05													1								
31073	SB-P848-15 15.5'	S	8.2.10	11:30													1								
31074	SB-P848-16 2'	S	8.2.10	15:30													1								
31075	SB-P848-16 4'	S	8.2.10	15:35													1								
31076	SB-P848-16 6'	S	8.2.10	16:00													1								
31077	SB-P848-13 2'	S	8.3.10	9:00													1								
31078	SB-P848-13 3.5'	S	8.3.10	9:10													1								

Relinquished by:	Accepted by:	Date:	Time:
D. Nealon		8.4.10	15:00
Federal	Isafan	8/5	10:30

Comments, Special Requirements or Regulations:

Turnaround:
☐ 1 Day*
☐ 2 Days*
☒ 3 Days*
☐ Standard
☐ Other

* SURCHARGE APPLIES

CT/RI
☐ RCP Cert
☐ GW Protect
☐ GA Mobility
☐ GB Mobility
☐ SW Protection
☐ Res. Vol.
☐ Ind. Vol.
☐ Res. Criteria
☐ Other

MA
☐ MCP Certification
☐ GW-1
☐ GW-2
☐ GW-3
☐ S-1
☐ S-2
☐ S-3
☐ MWRA eSMART
☐ Other

Data Format
☐ Excel
☒ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ ASP-A
☐ NJ Reduced Deliv. *
☐ NJ Hazsite EDD
☐ Phoenix Std Report
☐ Other

State where samples were collected: CT

State of Connecticut, Department of Public Health

Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

PHOENIX ENVIRONMENTAL LABORATORIES, INC.

LOCATED AT 587 East Middle Turnpike IN Manchester, Connecticut 06040

AND REGISTERED IN THE NAME OF Allan E. Caffyn

THIS CERTIFICATE IS ISSUED IN THE NAME OF Phyllis Shiller (Chemistry) Kathleen Cressia (Microbiology) WHO HAS BEEN DESIGNATED

BY THE REGISTERED OWNER\AUTHORIZED AGENT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF APPROVAL AS FOLLOWS:

DRINKING WATER, NON-POTABLE/WASTEWATER, SOLID WASTE/SOIL

Examination For:
MICROBIOLOGICALS
INORGANIC CHEMICALS
ORGANIC CHEMICALS

PAINT CHIPS

Examination For:
LEAD

SEE COMPUTER PRINT-OUT FOR SPECIFIC TESTS APPROVED

THIS CERTIFICATE EXPIRES June 30, 2012 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH

DATED AT HARTFORD, CONNECTICUT, THIS 15th DAY OF July, 2010

Registration No. PH - 0618

SUZANNE BLANCAFLOR, MS
CHIEF, ENVIRONMENTAL HEALTH SECTION

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH SECTION

ENVIRONMENTAL LABORATORY CERTIFICATION PROGRAM

APPROVED ANALYTES REPORT

FOR ALL MATRICES

Phoenix Environmental Laboratories, Inc.

CT-APP-NUM **PH-0618**

LOCATION

587 EAST MIDDLE TURNPIKE

Manchester **CT** **06040-**

PHONE **(860)-645-1102**

REGISTERED OWNER/ AUTHORIZED AGENT **Allan Caffyn**

DIRECTOR **Phyllis Shiller**

CO DIRECTOR(S) **Kathleen Cressia**

APPROVED BY Dermot Jones DATE 07/14/2010 12:19:37 PM

DERMOT T. JONES

LABORATORY APPROVAL EXPIRATION DATE 06/30/2012

LABORATORY STATUS **APPROVED**

ANY QUESTIONS CONCERNING THIS DOCUMENT SHOULD BE ADDRESSED TO THE ENVIRONMENTAL LABORATORY CERTIFICATION PROGRAM AT (860) 509-7389

Jacobs

P-1102 Magazine and Ordnance Operations Facility

Final Hazardous Materials Report

10 June 2022

Naval Submarine Base, New London, CT

Contract No. N40085-18-D-8728
Delivery Order No. N4008520F4215
eProjects No. 1667770
Project Number: FDZE1628

Architect-Engineer Services Contract

Naval Facilities Engineering Command (NAVFAC) - Atlantic

FINAL

HAZARDOUS MATERIAL SURVEY REPORT

For

Buildings A94-A111, 393, and 524

at

Naval Submarine Base New London

Groton, Connecticut

Prime Contract: N40085-18-D-8728
Project Title: FY23 MILCON PROJECT P-1102
WEAPONS COMPOUND MAGAZINE RECAPITALIZATION

MAY 2022

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EXECUTIVE SUMMARY

Introduction

The Naval Facilities Engineering Command (NAVFAC) retained Jacobs Government Services Company (JACOBS) to provide Architect-Engineering Services for the development of a Design/Build Request for Proposal for the response to replace or renovate training and storage facilities at the Naval Submarine Base New London, Groton, Connecticut. JACOBS retained Michael Baker International, Inc. (Michael Baker) to perform environmental and hazardous material surveys for twenty (20) buildings associated with this project. This report documents the survey of the buildings by a certified inspector(s) for asbestos-containing material (ACM), suspected lead-containing paint (LCP), suspected polychlorinated biphenyls (PCBs), fluorescent light tube investigation, mercury light switch investigation, and other universal wastes (UW). The facilities may be scheduled for demolition/renovation, and these surveys serve to identify the potentially hazardous materials and conditions likely to be impacted by the proposed project.

Mr. Gary Case of Michael Baker conducted this field investigation and inspection. Mr. Case is a United States Environmental Protection Agency (USEPA)-certified Building Inspector, Management Planner, and Project Designer for asbestos and a certified Inspector and Risk Assessor for lead paint. Michael Baker's office is located at 100 Airside Drive, Moon Township, Pennsylvania, 15108, telephone number 412-269-6300, and fax number 412-375-3996.

The inspection involved the identification of suspect homogeneous building materials and paint, sampling and laboratory analysis, and an assessment of the conditions and location of the suspected building materials and paint, as well as other hazards. Laboratory analysis of the bulk material (for asbestos) and potential building waste samples (for lead) was conducted by EMSL Analytical, Inc. of Westmont, New Jersey.

Regulatory Background

The USEPA and State of Connecticut define ACM as any material that contains greater than one percent asbestos. Title 40 of the Code of Federal Regulations, Part 61 (40 CFR 61), Subpart M (USEPA National

Emission Standards for Hazardous Air Pollutants) requires that an asbestos inspection be conducted prior to renovation/demolition activities. The State of Connecticut also requires that asbestos inspections be conducted prior to renovation/demolition activities.

USEPA and the State of Connecticut define elevated waste debris as 5 milligrams per liter (mg/L) for Toxicity Characteristic Leaching Procedure (TCLP) for lead.

The Occupational Safety and Health Administration (OSHA) Lead Standard (29 CFR 1926.62) is applicable where paints that contain any amount of lead will be disturbed. OSHA considers all paint (since all paint has some level of lead within it) as LCP. Thus, all of the paint would be considered LCP.

Summary of Findings and Recommendations

The purpose of this environmental study was to identify hazardous materials (asbestos, paint, etc.) prior to the demolition of the buildings, so that proper procedures can be utilized to prevent creation of any potential hazards. This survey was conducted in support of the initial concept demolition design for these buildings; thus, it is assumed that all of the materials identified in this survey will have to be removed to accomplish the project.

The following chart provides details on the identified concerns within the buildings.

Building Numbers	ACM Concern	Paint Concern	Hazardous TCLP Concern	Other Hazards Concern
A94 – A111	No	Yes	No	Yes
393	Yes	Yes	No	Yes
524	No	Yes	No	Yes

Asbestos

Michael Baker's Connecticut-licensed Asbestos Inspector assessed the existing building materials suspected to contain asbestos and to be impacted during demolition/renovation. The asbestos survey was conducted during March 21, 2022. A total of twenty-five (25) homogeneous suspect materials were identified and twenty-three (23) sample analyses were conducted by the project laboratory. Based upon the review of the results of this investigation, one of the twenty buildings (Building 393) contained building components that can be classified as ACM. A total of three (3) ACM are listed for the selected buildings (see Table 1). The ACM within the surveyed areas can be currently managed in-place with little potential hazard. However, due to the proposed project, all of the ACM should be properly handled when removed, and if removed, disposed of accordingly. The development of hazardous material abatement drawings and specifications would be warranted for the safe removal of the positively identified and presumed ACM listed in Table 1.

Paint

Based upon the age of the buildings, all of the painted materials should be identified as LCP. Bulk paint samples were collected and tested for the presence of the eight (8) Resource Conservation and Recovery Act (RCRA) metals (including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by collecting composite paint chip samples from similar areas within or on the structures. General observations of the condition of the paint were documented to assist with the potential project. Table 2 presents the specific information for the paint. Numerous painted building components were observed to be damaged and deteriorated. While there is no abatement of paint planned, the proposed contractor should be aware of the LCP during the demolition activities, so that proper safety worker procedures can be performed. The requirements of the Occupational Safety and Health Administration (OSHA) Construction Standards need to be invoked if any metal content is present in the paint that may be affected by renovation activities. OSHA does not provide a minimum concentration criteria level for these metals; however, it requires precautions and protection for workers and the working environment be taken at any workplace where an exposure to airborne metals may occur. The proposed contractor shall be responsible to perform work according to all applicable federal, state, and local laws.

Toxicity Characteristic Leaching Procedure (TCLP)

Based upon the result of the TCLP samples, the painted building components of the buildings should not produce construction debris that would need to be reported and handled as a hazardous waste (see Table 3). Building A103 was sampled as a representative of the similar buildings (Buildings A94 – A111). It is assumed that all of the metal from the buildings will be salvaged and recycled during the project.

Other Hazards

Based upon the results of this investigation, the buildings contain other hazards and universal wastes, namely suspected mercury-containing thermostats and potentially hazardous materials (see Table 4). These hazards should be corrected to prevent any future problems. The survey revealed the following:

- Approximately 358 light bulbs were noted during the inspection. The existing original lighting systems have an elevated potential to contain mercury-containing florescent light bulbs and should be disposed of in accordance with the Environmental Protection Agency (EPA) Universal Waste (UW) Regulations 40 CFR 273.

- Approximately 163 light fixtures were noted during the inspection. There is a possibility that PCB-containing light ballasts exist in the buildings. Should fluorescent light ballasts that are not specifically marked "non-PCB containing" ballasts be encountered during demolition/renovation, they should be managed and disposed of in accordance with Toxic Substances Control Act (TSCA) Storage and Disposal Requirements for Fluorescent Light Ballasts.

- Approximately 15 thermostats were noted during the inspection. The thermostats are likely to contain mercury and should be disposed of in accordance with the Environmental Protection Agency (EPA) Universal Waste (UW) Regulations 40 CFR 273.

- Approximately 15 EXIT signs were noted during inspection. Self-luminous EXIT signs containing the radioactive gas, tritium, were widely used in a variety of facilities across the United States. While the current United States Department of Defense's Unified Facilities Criteria specifically prohibits tritium exit signs in military facilities, given the age of these

buildings, signs containing this gas may be present. Intact tritium EXIT signs pose little or no threat to public health and safety and do not constitute a security risk. However, the NRC requires proper accounting and disposal of all radioactive materials. Proper handling and accounting are important, because a damaged or broken sign could cause minor radioactive contamination of the immediate vicinity, requiring a potentially expensive clean up. It is recommended that these be collected intact and disposed of at a licensed recycling facility.

- Approximately 10 smoke detectors were noted during the inspection. The fire protection systems have an elevated potential to contain ionization type smoke and fire detectors that are typically constructed with an Americium-241 radioactive source. If impacted by the renovation/demolition these should be segregated and disposed of properly in accordance with Federal, state, and local regulations.

- Approximately 1 air conditioner was noted during the inspection. This unit may contain a potentially regulated refrigerant that may be classified as Ozone Depleting Substances (ODS). Section 608 of the Clean Air Act prohibits the known release of refrigerants and ODS during the maintenance, service, repair, or disposal of air-conditioning and refrigeration equipment. The EPA requires proper refrigerant management practices by owners and operators of refrigeration and air-conditioning systems, technicians, and others. The refrigerants should be managed and disposed of in accordance with 40 CFR 82 and applicable Federal, state, and local regulations.

PCB-containing Caulking

Based upon the results of the PCB samples, the caulking at the buildings (Building 393 and 524) are not identified as PCB-containing materials (see Table 5). While no PCB materials were found, the proposed contractor shall be responsible to perform work according to all applicable federal, state, and local laws.

Disclaimer

The information that is presented in this report reflects the conditions that were observed in the buildings during the time frame this inspection was conducted. However, conditions could change due to vandalism, deterioration, or maintenance activities. Although every effort was made to identify all potential suspect building materials and components, there is no guarantee that additional materials are not present. Conditions may exist in the buildings; such that inaccessible materials may only become apparent during demolition activities.

1.0 INTRODUCTION

1.1 General

Michael Baker International, Inc. (Michael Baker) performed a Hazardous Material Assessment/Survey as part of the planning for the demolition of twenty (20) buildings at the Naval Submarine Base New London in Groton, Connecticut. The hazardous material assessment/survey required an asbestos-containing materials (ACM) investigation and sampling, lead-containing paint (LCP) investigation, suspected polychorinatedbiphenyls (PCBs) material documentation, fluorescent light tube investigation, mercury light switch investigation, and general safety hazard documentation within the selected buildings. The buildings that were selected included Buildings A94-A111, 393 and 524.

Mr. Gary Case of Michael Baker conducted this field investigation and inspection during January 29, 2020. Mr. Case is a United States Environmental Protection Agency- (USEPA) certified Building Inspector, Management Planner, and Project Designer for asbestos and a certified Inspector and Risk Assessor for lead paint. Michael Baker's office is located at 100 Airside Drive, Moon Township, Pennsylvania, 15108, telephone number 412-269-6300, and fax number 412-375-3996.

This report summarizes the activities and procedures used during the project and presents the survey findings and recommendations. The text of this report is supplemented by information found within the Figures, Tables, and Attachments A through I. The Figures contain the floor plans for each of the buildings (not drawn to scale). The Tables represent the findings for ACM, Paint, TCLP, and Other Hazardous Components within the buildings. Attachment A contains field data forms that were used to document the asbestos inspections of the buildings. Attachment B contains field data forms that were used to document the paint inspections of the buildings. Attachment C contains the laboratory analytical reports for bulk materials for asbestos. Attachment D contains the laboratory analytical reports for the paint samples. Attachment E contains the laboratory analytical report for anticipate waste of the demolition materials for each building tested by TCLP. Attachment F contains the laboratory analytical reports for the caulking samples for PCBs. Attachment G contains the photographs pertinent to the asbestos inspection of these buildings. Attachment H contains the photographs pertinent to the other hazardous materials for these buildings. Attachment I contains copies of training certificates for the staff who conducted the investigation and the certificates of accreditation for the laboratories that conducted sample analysis.

1.2 Background Information

The Naval Facilities Engineering Command (NAVFAC) requested Architect-Engineering Services for the development of a Design/Build Request for Proposal for the response to replace facilities at the Naval Submarine Base New London, Groton, Connecticut. The work required environmental and hazardous material surveys of twenty (20) buildings associated with this project. The buildings that were selected included Buildings A94-A111, 393, and 524.

Previous inspection reports and studies were reviewed and used during this project to support the previous known materials and potential sources of hazardous materials.

1.3 Relevant Regulations

Relevant regulations and policies are summarized below.

- The USEPA, Federal Occupational Safety and Health Administration (OSHA), and State of Connecticut define ACM as any material that contains greater than one percent asbestos.

- Title 40 of the Code of Federal Regulations, Part 61 (40 CFR 61), Subpart M (USEPA National Emission Standards for Hazardous Air Pollutants), OSHA (29 CFR 1926.1101), and the State of Connecticut require that an asbestos inspection be conducted prior to renovation/demolition activities.

- USEPA and the State of Connecticut define elevated waste debris as 5 milligrams per liter (mg/L) for Toxicity Characteristic Leaching Procedure (TCLP) for lead.

- The OSHA Lead Standard (29 CFR 1926.62) is applicable where paints that contain any amount of lead will be disturbed. OSHA considers all paint (since all paint has some level of lead within it) as LCP. Thus, all paint will be considered LCP.

2.0 INSPECTION PROCEDURES

2.1 General

Mr. Gary Case of Baker conducted this field investigation and inspection of the buildings identified in Section 1.2. Mr. Case is an USEPA-certified Building Inspector, Management Planner, and Project Designer for asbestos and a certified Inspector and Risk Assessor for lead paint. Copies of his training certificates are included in Attachment I.

Michael Baker utilized EMSL Analytical, Inc. of Westmont, New Jersey for laboratory analysis of collected samples. EMSL Analytical is accredited in accordance with standards set by the U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP), and by the American Industrial Hygiene Association (AIHA) for both asbestos and lead analysis. Copies of their certifications are included in Attachment I.

2.2 Survey

Within these buildings, the inspector conducted a thorough search to identify potential asbestos-containing building materials, LCP, and other hazards. When a suspected material or paint was located, the bulk material sampling plan or paint screening plan was implemented. Under these plans, suspect building materials or paint were grouped into homogeneous sampling areas, which contained materials that were uniform in texture, appearance, color, physical characteristics, and function. For asbestos, each homogeneous material was given a unique identification number. Once the homogeneous material boundaries were established, core samples of the material were collected. Insulation materials that appeared to be composed of fiberglass were not considered potential (i.e., suspect) ACM. Material condition of each asbestos material was assessed as described in the chart below.

MATERIAL CONDITION DESCRIPTIONS

Condition	Description
No Damage	Material is intact and is not damaged
Damaged	Less than 10% distributed damage, or less than 25% localized damage
Significant Damage	10% or more distributed damage, or 25% or more localized damage

For each suspect homogeneous material, the material description, location(s), approximate quantity of asbestos, friability, condition, sample identification, sample location, and sample result information were recorded on the field data forms found in Attachment A. The definition of a friable material is one that can be crushed, pulverized, or reduced to powder under hand pressure when dry. The definition of a nonfriable material is one that cannot be crushed, pulverized, or reduced to powder under hand pressure when dry. Sample locations are noted in the field data. The building layout figures of the buildings are included in Figures.

For each suspect paint, the material description, location(s), approximate quantity, condition, sample identification, sample location, and sample result information were recorded on the field data forms found in Attachment B. Sample locations are noted in the field data. The building layout figures of the buildings are included in Figures.

Samples were collected by using chisels, utility knives, etc. to remove small pieces of building materials. Each sample was placed into a resealable plastic bag and given a unique sample identification number. During sampling activities, the inspector exercised care to prevent any suspected material or paint from becoming airborne. Wet wiping was used during the sampling to immediately clean up any debris generated by the sampling process.

Michael Baker collected composite samples of all of the painted building components from each of these buildings. These samples were obtained for the purpose of characterizing the waste debris that will be generated during the demolition activities with respect to lead paint disposal requirements (i.e., hazardous or non-hazardous). The components selected for inclusion in the composite sample were based on those items that may be designated for removal during the future demolition project. The percentage of the building components within the total sample was roughly based on the estimated percentage of weight that the components will represent in the total weight of the building debris. However, in order to be conservative, slightly higher percentages of the lead-based paint containing components were included in the sample than what may likely be in the actual debris. Due to the occupied use and nature of the buildings, no drilling or coring of the paint building components was conducted. All of the representative samples were collected from damaged areas or isolated areas of painted building components; thus, no apparent or additional damage to the buildings occurred. The composite samples also were sent to EMSL Analytical, Inc. for lead analysis using the TCLP.

2.3 Inspection for Other Hazards

Michael Baker visually inspected these buildings for evidence of mold and animal excrement concurrently with the asbestos survey. Michael Baker also documented any safety and/or physical concerns observed at the building.

2.4 Inspection of Caulkings for Potential PCB Content

Michael Baker inspected these buildings for evidence of caulking suspected to contain PCBs concurrently with the asbestos survey.

3.0 SUMMARY OF FINDINGS

3.1 Asbestos

Samples containing greater than one percent asbestos are considered to be asbestos-containing as defined by the USEPA. In addition to the USEPA, the National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR, Part 61, requires that any asbestos sample containing less than 10 percent asbestos when analyzed by Polarized Light Microscopy (PLM) be reanalyzed using the PLM point counting procedure. Otherwise, the material must be considered ACM. For this investigation, the Scope of Work did not require confirmation of asbestos content through additional analysis; thus, the building materials containing less than or equal to 10 percent asbestos would be assumed to be ACM.

As part of the investigation, Michael Baker identified and collected bulk material samples for twenty-six (26) suspected homogeneous materials that were present and suspected to be asbestos-containing for these buildings. A summary of the ACM for these buildings is presented in Table 1. The field data for these buildings, including a listing of the suspected homogeneous materials and the corresponding sample results, can be found in Attachment A. The laboratory analytical reports for these buildings are contained in Attachment C. Photographs of the ACM are contained in Attachment G.

3.2 Paint

The field personnel reviewed and identified the suspected painted building components with the buildings. Bulk paint samples were collected from Building A94 which was typical and representative of the storage magazines, namely Buildings A94-A111. Bulk paint samples were collected from Building 393 and Building 524. General observations of the condition and locations of the paint were documented to assist with the potential demolition project. Table 2 presents the specific information for the paint. The field data for these buildings can be found in Attachment B. The laboratory analytical reports for these buildings are contained in Attachment D.

3.3 Toxicity Characteristic Leaching Procedure (TCLP)

The anticipated waste stream of painted components for the buildings was characterized for leachable lead through a TCLP analysis. According to the USEPA, the TCLP criteria limit for leachable lead is 5 mg/L. The TCLP results for these buildings did not exceed the criteria limit for leachable lead. The results of the TCLP analyses are summarized in Table 3. The laboratory analytical report is contained in Attachment E.

3.4 Other Hazards

An investigation for evidence of mold, animal excrement, other hazardous materials, safety issues, and other hazards was conducted in these buildings. Several items, such as thermostats and fluorescent lights that may contain mercury, exit signs that may contain radioactive materials, and ballasts that may contain PCBs were searched for throughout the building. Photographs of several examples are contained in Attachment H. The results of the investigation for other hazards and the field data to support the following environmental and safety hazard concerns are documented in Table 4, and as summarized below:

- No major water damage or mold problems were observed within the buildings.

- No animal excrement or associated problems were observed at the buildings.

- Approximately 358 light bulbs were noted during the inspection. The existing original lighting systems have an elevated potential to contain mercury-containing florescent light bulbs and should be disposed of in accordance with the Environmental Protection Agency (EPA) Universal Waste (UW) Regulations 40 CFR 273.

- Approximately 163 light fixtures were noted during the inspection. There is a possibility that PCB-containing light ballasts exist in the buildings. Should fluorescent light ballasts that are not specifically marked "non-PCB containing" ballasts be encountered during demolition/renovation, they should be managed and disposed of in accordance with Toxic Substances Control Act (TSCA) Storage and Disposal Requirements for Fluorescent Light Ballasts.

- Approximately 15 thermostats were noted during the inspection. The thermostats are likely to contain mercury and should be disposed of in accordance with the Environmental Protection Agency (EPA) Universal Waste (UW) Regulations 40 CFR 273.

- Approximately 15 EXIT signs were noted during inspection. Self-luminous EXIT signs containing the radioactive gas, tritium, were widely used in a variety of facilities across the United States. While the current United States Department of Defense's Unified Facilities Criteria specifically prohibits tritium exit signs in military facilities, given the age of these buildings, signs containing this gas may be present. Intact tritium EXIT signs pose little or no threat to public health and safety and do not constitute a security risk. However, the NRC requires proper accounting and disposal of all radioactive materials. Proper handling and accounting are important, because a damaged or broken sign could cause minor radioactive contamination of the immediate vicinity, requiring a potentially expensive clean up. It is recommended that these be collected intact and disposed of at a licensed recycling facility.

- Approximately 10 smoke detectors were noted during the inspection. The fire protection systems have an elevated potential to contain ionization type smoke and fire detectors that are typically constructed with an Americium-241 radioactive source. If impacted by the renovation/demolition these should be segregated and disposed of properly in accordance with Federal, state, and local regulations.

- Approximately 1 air conditioner was noted in Building 393 during the inspection. This unit may contain a potentially regulated refrigerant that may be classified as Ozone Depleting Substances (ODS). Section 608 of the Clean Air Act prohibits the known release of refrigerants and ODS during the maintenance, service, repair, or disposal of air-conditioning and refrigeration equipment. The EPA requires proper refrigerant management practices by owners and operators of refrigeration and air-conditioning systems, technicians, and others. The refrigerants should be managed and disposed of in accordance with 40 CFR 82 and applicable Federal, state, and local regulations.

  NOTE: All quantities of the hazardous materials must be field verified and/or quantified by a licensed contractor prior to demolition/renovation activities.

4.0 RECOMMENDATIONS

The purpose of these hazardous material assessment/survey was to identify hazardous materials (ACM, LCP, etc.) prior to the demolition of these buildings, so that proper procedures can be utilized to prevent creation of any potential hazards. This survey was conducted in support of the initial concept demolition design for these buildings; thus, it is assumed that all of the materials identified in this survey may have to be removed to accomplish the project. Specific recommendations have been provided based upon discussion of the potential demolition of these buildings (plans are subject to change).

4.1 Asbestos

Based upon the review of the results of this investigation, one of the twenty buildings contained building components that can be classified as ACM (see Table 1). Most of the ACM is currently in good condition, and they can be managed in-place with little potential hazard. However, in the event of the proposed demolition project, all of the ACM that will be impacted or disturbed should be properly handled or removed, and if removed, disposed of accordingly. Abatement plans should be designed in accordance with USEPA and other federal, state, and local regulations and/or using appropriate guidelines by a certified Asbestos Designer and reviewed by a Certified Industrial Hygienist. All of the abatement activities should be overseen and managed by an experienced Asbestos Abatement Supervisor, and removal should be performed by certified, trained asbestos workers. Removal notifications, activities, and disposal must be completed in accordance with USEPA and other applicable federal, state, and local regulations.

4.2 Lead-Containing Paint

Based upon the age of the selected buildings, the buildings contain building components that are coated with LCP and other metals (see Table 2). The exterior of the selected buildings had areas of damaged or deteriorated paint. The interior of several buildings also had areas of damaged and/or deteriorate paint. Painted window components are subject to disturbance under the current project scope. If the buildings are demolished, the selected contractor should be responsible for the safe and proper handling of the painted items according to all federal, state, and local regulations. All of the activities should be overseen and managed by an experienced supervisor and trained workers. The contractor should comply with the OSHA standards, which regulates occupational exposure to the RCRA metals.

4.3 Toxicity Characteristic Leaching Procedure (TCLP)

Based upon the results of the TCLP samples, the painted building components for the buildings should not produce construction debris that would need to be reported and handled as a hazardous waste (see Table 3). However, the construction contractor will have to coordinate all waste disposal actions, in advance, with the Hazardous Waste Facility Manager.

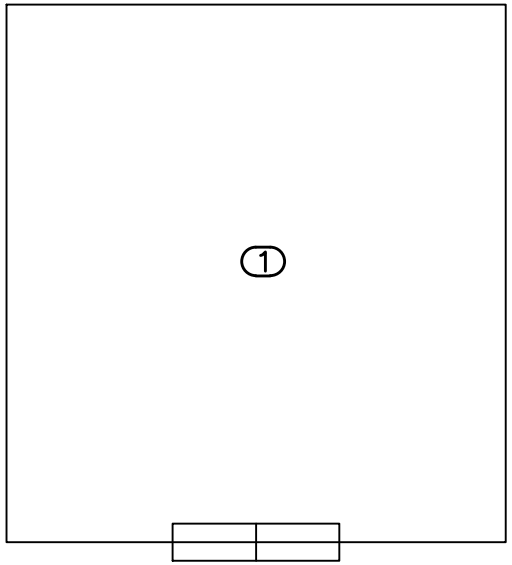
4.4 Other Hazards

Based upon the results of this investigation, there are numerous hazards associated with the components used in the buildings (see Table 4). All of the items should be corrected and/or handled prior to the proposed demolition project to ensure that the current building conditions do not represent any safety concerns during the project.

5.0 LIMITATIONS OF THE INSPECTION

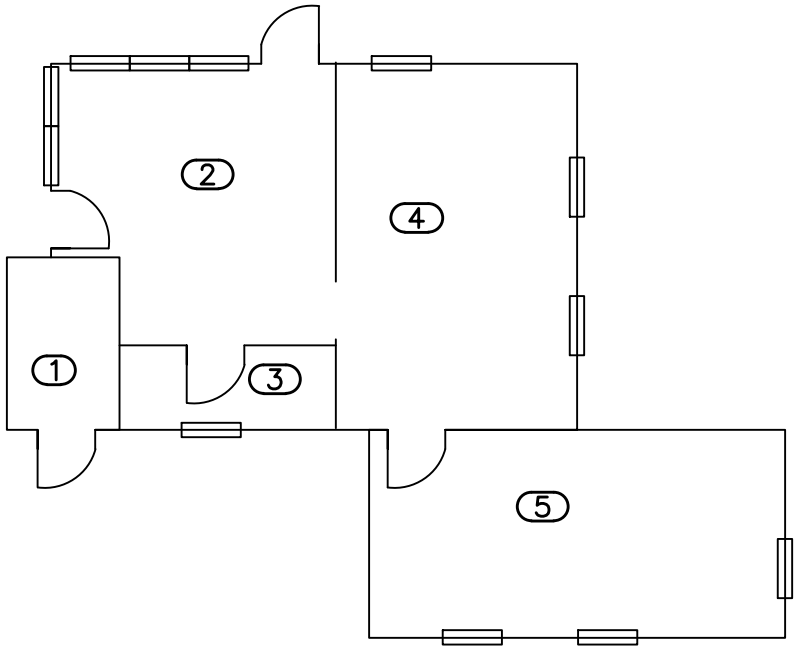
The information that is presented in this report reflects the conditions that were observed in the buildings during the time frame that this inspection was conducted. Although every effort was made to identify all of the potential suspect building materials and/or paint, there is no guarantee that additional materials are not present. Conditions may exist such that inaccessible materials may only become apparent during renovation or demolition activities. If suspect building materials or paints are identified during renovation or demolition activities, they should be sampled and analyzed prior to disturbance. If warranted, the material should be removed and handled according to all applicable USEPA, OSHA, state, and local regulations.

FIGURES



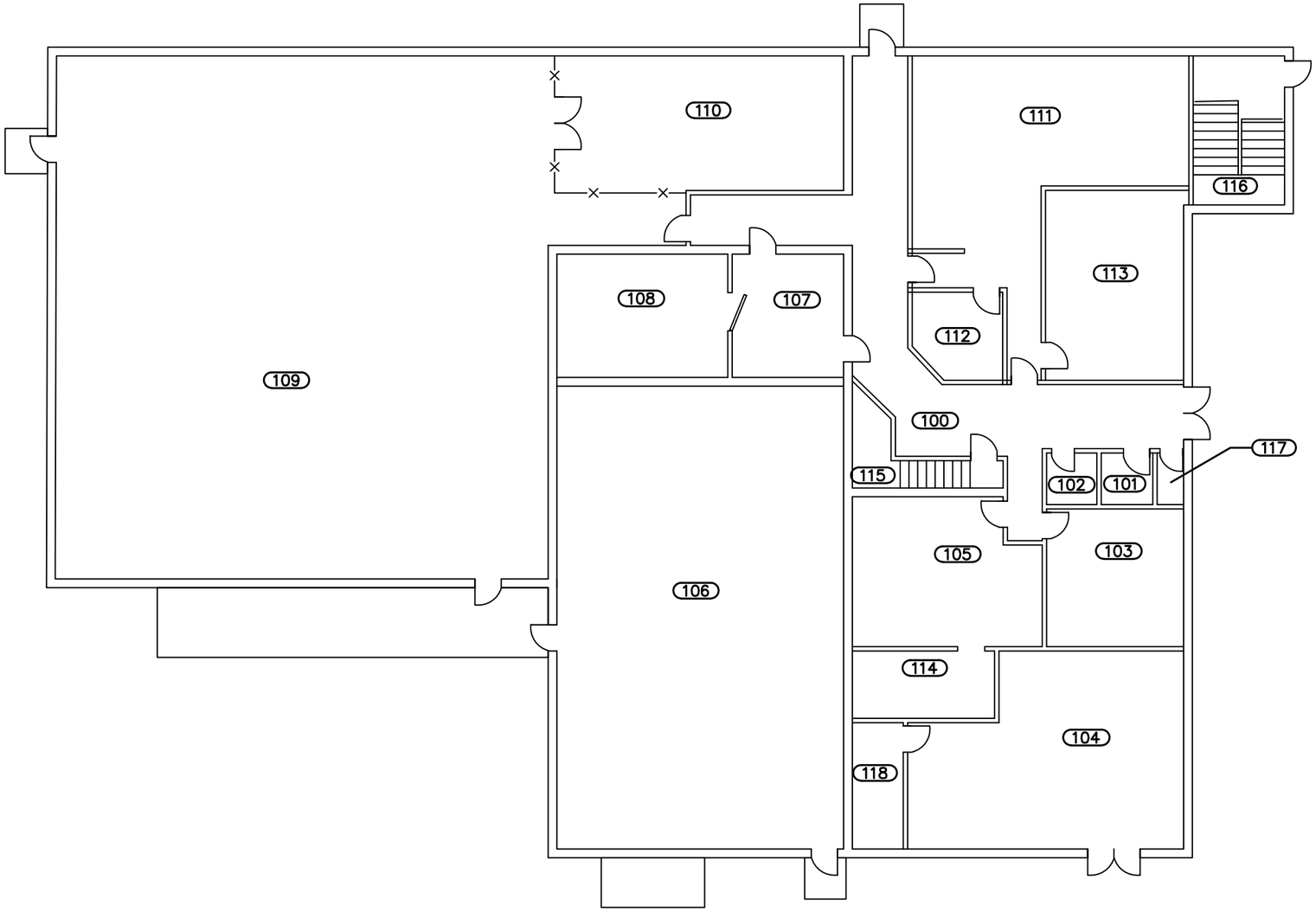
BUILDINGS A94–A111
TYPICAL MAGAZINE STORAGE

SCALE: 0 10'	DATE: FEBRUARY 2020	Michael Baker INTERNATIONAL MICHAEL BAKER INTERNATIONAL MOON TOWNSHIP, PENNSYLVANIA	BUILDINGS A94–A111 NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNECTICUT
S.O. NO.: 176840	FILE: 176840_GROTON_		
DSN/DWN:	CHK:		



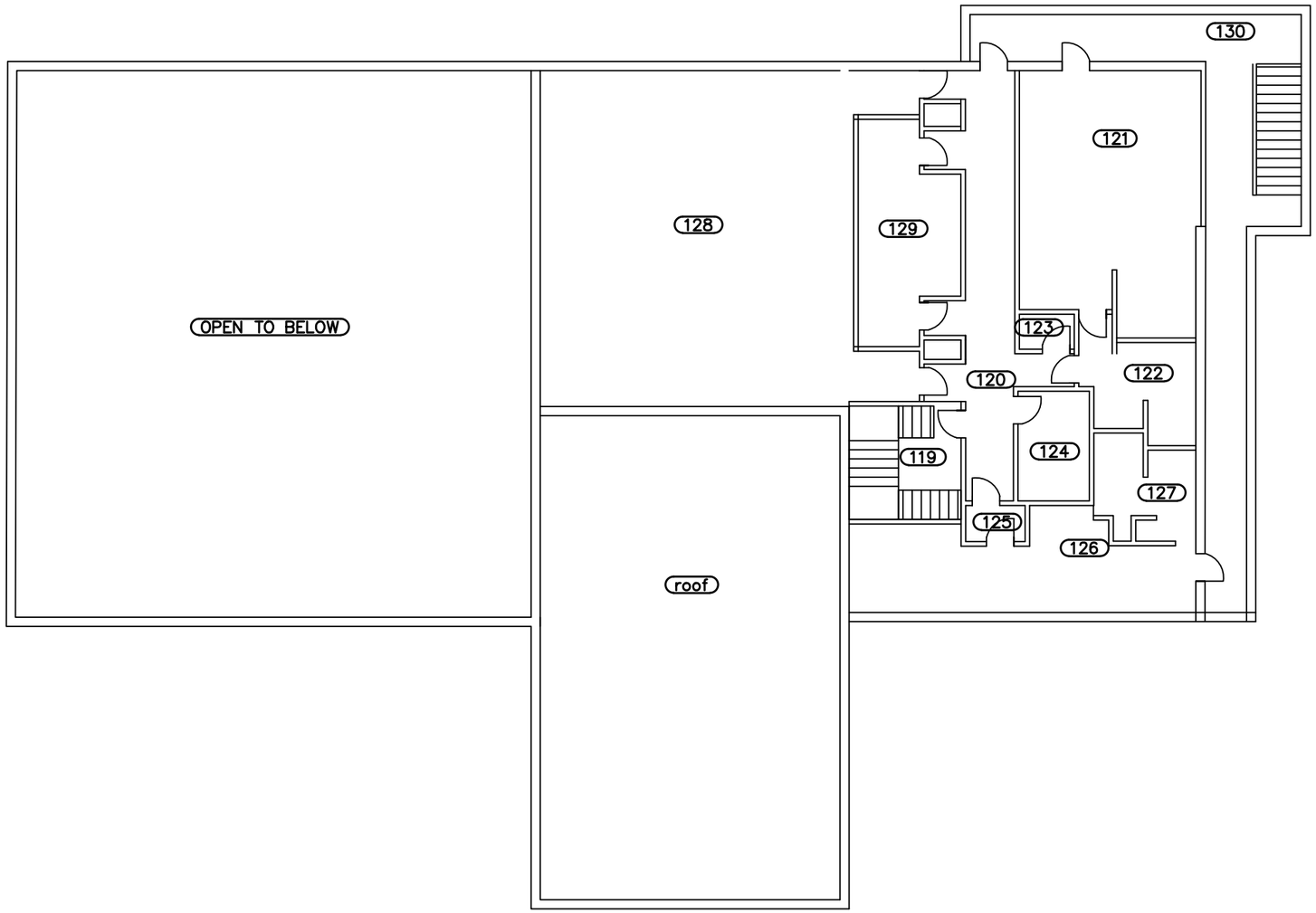
BUILDING 393
FIRST FLOOR

SCALE: 0 10'	DATE: FEBRUARY 2020	Michael Baker INTERNATIONAL MICHAEL BAKER INTERNATIONAL MOON TOWNSHIP, PENNSYLVANIA	BUILDING 393 NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNECTICUT
S.O. NO.: 176840	FILE: 176840_GROTON_		
DSN/DWN:	CHK:		

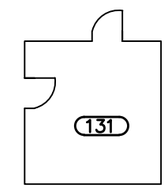


BUILDING 524
FIRST FLOOR PLAN

SCALE: 0 15	DATE: FEBRUARY 2020	Michael Baker INTERNATIONAL	MICHAEL BAKER INTERNATIONAL MOON TOWNSHIP, PENNSYLVANIA	BUILDING 524 NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNECTICUT
S.O. NO.: 176840	FILE: 176840_GROTON_			
DSN/DWN:	CHK:			



BUILDING 524
SECOND FLOOR PLAN



BUILDING 524
ROOF ACCESS

SCALE: 0 15	DATE: FEBRUARY 2020	Michael Baker INTERNATIONAL	MICHAEL BAKER INTERNATIONAL MOON TOWNSHIP, PENNSYLVANIA	BUILDING 524 NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNECTICUT
S.O. NO.: 176840	FILE: 176840_GROTON_			
DSN/DWN:	CHK:			

TABLES

TABLE 1

ASBESTOS SURVEY MATERIAL SUMMARY

BUILDINGS A94 - A11

Homogeneous Material Number	Material Type	Material Description	Category of ACM	Approximate Quantity of Asbestos	Condition of Material
NO ASBESTOS-CONTAINING MATERIALS FOUND					

BUILDING 393

Homogeneous Material Number	Material Type	Material Description	Category of ACM	Approximate Quantity of Asbestos	Condition of Material
03	Asphaltic Roofing Material	Black Tar and Chip	Category I, Non-Friable ACM	756 Square Feet	No Damage
04	Vinyl Floor Tile with Floor Adhesive	Four Layers of Various Size Vinyl Floor Tiles and Black Floor Adhesives	Category I, Non-Friable ACM	642 Square Feet (5 layers)	No Damage
05	Window Sills	Transite-Like Material	Category I, Non-Friable ACM	160 Square Feet (12 windows)	Damaged

BUILDING 524

Homogeneous Material Number	Material Type	Material Description	Category of ACM	Approximate Quantity of Asbestos	Condition of Material
NO ASBESTOS-CONTAINING MATERIALS PRESUMED TO BE PRESENT					

According to EPA, asbestos-containing material (ACM) is defined as any material containing greater than 1% asbestos using laboratory analysis or, by NESHAP, contains less than 10% asbestos is considered positive, unless re-analyzed by PLM point count.

TABLE 2

PAINT SURVEY SUMMARY

Buildings	Component	Locations	Color	Substrate	Condition	Findings	Recommendations
Buildings A94-A111	All painted components	Interior and Exterior	All Paint Colors	All Substrates	All Conditions	All paint contains at least a trace of lead and must be addressed according to OSHA requirements.	If impacted by renovation activities, proper handling and/or removal of the lead-containing paint is needed.
Building 393							
Building 524							

* The requirements of the Occupational Safety and Health Administration (OSHA) Construction Standards need to be invoked if any metal content is present in the paint that may be affected by renovation activities. OSHA does not provide a minimum concentration criteria level for lead; however, it requires precautions and protection for workers and the working environment be taken at any work place where an exposure to airborne metals may occur.

TABLE 3

WASTE SAMPLING VIA TCLP

Buildings	Material Content	Test Type	Material Description	Sample Numbers	Sample Results	Hazardous or Non-Hazardous
Buildings A94-A111	Anticipated Waste Debris from Facility	TCLP (lead)	Building components	CT-393-TCLP	<0.40 mg/L	Non-Hazardous
Building 393	Anticipated Waste Debris from Facility	TCLP (lead)	Building components	CT-393-TCLP	<0.40 mg/L	Non-Hazardous
Building 524	Anticipated Waste Debris from Facility	TCLP (lead)	Building components	CT-524-TCLP	<0.40 mg/L	Non-Hazardous

According to the EPA, TCLP criteria limit for leachable lead is defined as 5 milligrams per liter (mg/L) using laboratory analysis.

TABLE 4

OTHER POTENTIALLY HAZARDOUS WASTE SUMMARY

Buildings	Light Bulbs	Ballasts	Thermostats	Exit Signs	Smoke Detectors	A/C Units	Recommendations
Buildings A94-A111	22 Mercury	22	0	0	0	0	If impacted by demolition activities, proper handling and/or removal of these components is needed.
Building 393	26 - 4' bulbs	9	0	0	1	1	
Building 524	296 - 4' bulbs 14 Mercury	132	15	15	9	0	

NOTE: These are approximate quantities tallied at the time of the survey. Actual quantities should be field verified upon removal and/or demolition of the buildings.

TABLE 5

PCB SURVEY SUMMARY

Buildings	Component	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Recommendations
Buildings A94-A111	None	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	If impacted by renovation activities, proper handling and/or removal of the material is needed.
Building 393	Window Caulking (CT-393-PCB)	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	
Building 524	Exterior Caulking (CT-524-PCB)	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	

* The requirements of the Occupational Safety and Health Administration (OSHA) Construction Standards need to be invoked when PCB materials are present and may be affected by renovation activities. OSHA does not provide a minimum concentration criteria level for PCBs; however, it requires precautions and protection for workers and the working environment be taken at any work place where an exposure to PCBs metals may occur.

ATTACHMENT A

ASBESTOS SURVEY MATERIAL SUMMARY

BUILDING A94
GROTON, CONNECTICUT

Homogeneous Material Number	Material Type	Material Description	Material Locations	Friable	Sample Numbers	Sample Results	Sample Locations	Asbestos-Containing Material	Approximate Quantity of Asbestos	Condition of Material
01	Concrete	Gray	Throughout the Building	No	CT-A94-01A CT-A94-01B	None Detected None Detected	Room 1 Room 1	No	Not Applicable	Not Applicable
02	Tar Sealant	Black, on concrete roof	Exterior Roof	No	CT-A94-02A CT-A94-02B	None Detected None Detected	Roof Roof	No	Not Applicable	Not Applicable
03	Tarp	Black Canvas, used as ground cover on magazine	Exterior of Building	No	CT-A94-03A CT-A94-03B	None Detected None Detected	Exterior Exterior	No	Not Applicable	Not Applicable

According to EPA, asbestos-containing material (ACM) is defined as any material containing greater than 1% asbestos using laboratory analysis or, by NESHAP, contains less than 10% asbestos is considered positive, unless re-analyzed by PLM point count.

ASBESTOS SURVEY MATERIAL SUMMARY

BUILDING 393
GROTON, CONNECTICUT

Homogeneous Material Number	Material Type	Material Description	Material Locations	Friable	Sample Numbers	Sample Results	Sample Locations	Asbestos-Containing Material	Approximate Quantity of Asbestos	Condition of Material
01	Vinyl Floor Tile and Floor Adhesive	12" x 12" White Vinyl Floor Tiles and Clear Floor Adhesive	Rooms 2, 4, and 5	No	CT - 393 - 01A CT - 393 - 01B	None Detected None Detected	Room 2 Room 4	No	Not Applicable	Not Applicable
02	Window Caulking	Gray, on Exterior Windows	Exterior	No	CT - 393 - 02A CT - 393 - 02B	None Detected None Detected	Exterior Exterior	No	Not Applicable	Not Applicable
03	Asphaltic Roofing Material	Black Tar and Chip	Exterior Roof	No	CT - 393 - 03A CT - 393 - 03A* CT - 393 - 03B	2% Chrysotile 5.1% Chrysotile Not Analyzed	Exterior Exterior Exterior	Yes	756 Square Feet	No Damage
04	Vinyl Floor Tile and Floor Adhesive	4 Layers of Various Size of Vinyl Floor Tiles and Black Floor Adhesives	Rooms 2, 4, and 5	No	CT - 393 - 04A (FT) CT - 393 - 04A (M) CT - 393 - 04A (FT) CT - 393 - 04A (FT)* CT - 393 - 04A (M) CT - 393 - 04B	None Detected None Detected 2% Chrysotile 1.4% Chrysotile Not Analyzed Not Analyzed	Room 5 Room 5 Room 5 Room 5 Room 5 Room 5	Yes	642 Square Feet (4 Layers)	No Damage
05	Window Sills	Transite-like Material	Rooms 2, 3, 4, and 5	No	CT - 393 - 05A CT - 393 - 05A* CT - 393 - 05B	2% Chrysotile 3% Chrysotile Not Analyzed	Room 4 Room 4 Room 4	Yes	18 Square Feet (12 Windows)	Damage
06	Fire Doors	Insulation within Doors	Rooms 2, 4, and 5	Yes	Not Sampled	No Results	Not Sampled	Material Presumed to be Non-ACM	Not Applicable	Not Applicable

* denotes that the sample was re-analyzed by PLM Point Count Method

According to EPA, asbestos-containing material (ACM) is defined as any material containing greater than 1% asbestos using laboratory analysis or, by NESHAP, contains less than 10% asbestos is considered positive, unless re-analyzed by PLM point count.

ASBESTOS SURVEY MATERIAL SUMMARY

BUILDING 524
GROTON, CONNECTICUT

Homogeneous Material Number	Material Type	Material Description	Material Locations	Friable	Sample Numbers	Sample Results	Sample Locations	Asbestos-Containing Material	Approximate Quantity of Asbestos	Condition of Material
01	Vinyl Floor Tile and Floor Adhesive	12" x 12" Gray Mottle Vinyl Floor Tiles and Tan Floor Adhesive	Rooms 100, 103, 107, 111. and 115	No	CT - 524 - 01A CT - 524 - 01B	None Detected None Detected	Room 100 Room 103	No	Not Applicable	Not Applicable
02	Wall and Ceiling Board	White, with White Joint Compound	Throughout the Building	No	CT - 524 - 02A CT - 524 - 02B	None Detected None Detected	Room 100 Room 120	No	Not Applicable	Not Applicable
03	Ceiling Tile	2' x 2' Fissured/Pinhole	Throughout the Building	Yes	CT - 524 - 03A CT - 524 - 03B	None Detected None Detected	Room 102 Room 121	No	Not Applicable	Not Applicable
04	Cove Base Adhesive	Tan, under cove base	Throughout the Building	No	CT - 524 - 04A CT - 524 - 04B	None Detected None Detected	Room 100 Room 120	No	Not Applicable	Not Applicable
05	Carpet Adhesive	Yellow, under carpet	Rooms 103, 105, 107, 111, 112, 113, and 114	No	CT - 524 - 05A CT - 524 - 05B	None Detected None Detected	Room 103 Room 112	No	Not Applicable	Not Applicable
06	Vinyl Floor Tile and Floor Adhesive	12" x 12" White with Colored Streaks Vinyl Floor Tiles and Tan Floor Adhesive	Rooms 101 and 102	No	CT - 524 - 06A CT - 524 - 06B	None Detected None Detected	Room 101 Room 102	No	Not Applicable	Not Applicable
07	Fire Proofing	White, Spray-on	Throughout the Building	Yes	CT - 524 - 07A CT - 524 - 07B CT - 524 - 07C CT - 524 - 07D CT - 524 - 07E CT - 524 - 07F CT - 524 - 06G	None Detected None Detected None Detected None Detected None Detected None Detected None Detected	Room 116 Room 130 Room 120 Room 121 Room 122 Room 129 Room 126	No	Not Applicable	Not Applicable

According to EPA, asbestos-containing material (ACM) is defined as any material containing greater than 1% asbestos using laboratory analysis or, by NESHAP, contains less than 10% asbestos is considered positive, unless re-analyzed by PLM point count.

ASBESTOS SURVEY MATERIAL SUMMARY

BUILDING 524
GROTON, CONNECTICUT

Homogeneous Material Number	Material Type	Material Description	Material Locations	Friable	Sample Numbers	Sample Results	Sample Locations	Asbestos-Containing Material	Approximate Quantity of Asbestos	Condition of Material
08	Vinyl Floor Tile and Floor Adhesive	12" x 12" White Vinyl Floor Tiles and Tan Floor Adhesive	Rooms 117 and 122	No	CT - 524 - 08A (FT)	None Detected	Room 117	No	Not Applicable	Not Applicable
					CT - 524 - 08A (M)	None Detected	Room 117			
					CT - 524 - 08B (FT)	None Detected	Room 122			
					CT - 524 - 08B (M)	None Detected	Room 122			
09	Vinyl Floor Tile and Floor Adhesive	12" x 12" Tan Mottle Vinyl Floor Tiles and Tan Floor Adhesive	Rooms 117, 119, 120, 123, 124, 125, 126, 128, and 129	No	CT - 524 - 09A (FT)	None Detected	Room 117	No	Not Applicable	Not Applicable
					CT - 524 - 09A (M)	None Detected	Room 117			
					CT - 524 - 09B (FT)	None Detected	Room 125			
					CT - 524 - 09B (M)	None Detected	Room 125			
10	Vinyl Floor Tile and Floor Adhesive	12" x 12" Green Vinyl Floor Tiles and Tan Floor Adhesive	Room 121	No	CT - 524 - 10A (FT)	None Detected	Room 121	No	Not Applicable	Not Applicable
					CT - 524 - 10A (M)	None Detected	Room 121			
					CT - 524 - 10B (FT)	None Detected	Room 121			
					CT - 524 - 10B (M)	None Detected	Room 121			
11	Vinyl Floor Tile and Floor Adhesive	12" x 12" Pink Mottle Vinyl Floor Tiles and Tan Floor Adhesive	Room 127	No	CT - 524 - 11A (FT)	None Detected	Room 127	No	Not Applicable	Not Applicable
					CT - 524 - 11A (M)	None Detected	Room 127			
					CT - 524 - 11B (FT)	None Detected	Room 127			
					CT - 524 - 11B (M)	None Detected	Room 127			
12	Vinyl Floor Tile and Floor Adhesive	12" x 12" White with Green Streaks Vinyl Floor Tiles and Tan Floor Adhesive	Room 131	No	CT - 524 - 12A	None Detected	Room 131	No	Not Applicable	Not Applicable
					CT - 524 - 12B	None Detected	Room 131			

According to EPA, asbestos-containing material (ACM) is defined as any material containing greater than 1% asbestos using laboratory analysis or, by NESHAP, contains less than 10% asbestos is considered positive, unless re-analyzed by PLM point count.

ASBESTOS SURVEY MATERIAL SUMMARY

BUILDING 524
GROTON, CONNECTICUT

Homogeneous Material Number	Material Type	Material Description	Material Locations	Friable	Sample Numbers	Sample Results	Sample Locations	Asbestos-Containing Material	Approximate Quantity of Asbestos	Condition of Material
13	Vinyl Floor Sheeting and Floor Adhesive	Blue/Gray Vinyl Floor Sheeting and Tan Floor Adhesive	Room 108	No	CT - 524 - 13A CT - 524 - 13B	None Detected None Detected	Room 108 Room 108	No	Not Applicable	Not Applicable
14	Asphaltic Roofing	Rubber Membrane	Exterior Roof	No	CT - 524 - 14A CT - 524 - 14B	None Detected None Detected	Exterior Exterior	No	Not Applicable	Not Applicable
15	Fire Doors and Vault Door	Insulation within Doors	Throughout the Building	Yes	Not Sampled	No Results	- - - - -	Material Presumed to be Non-ACM	Not Applicable	Not Applicable
16	Caulking	Gray, on Exterior Doors	Exterior	No	CT - 524 - 16A CT - 524 - 16B	None Detected None Detected	Exterior Exterior	No	Not Applicable	Not Applicable

* denotes that the sample was re-analyzed by PLM Point Count Method

According to EPA, asbestos-containing material (ACM) is defined as any material containing greater than 1% asbestos using laboratory analysis or, by NESHAP, contains less than 10% asbestos is considered positive, unless re-analyzed by PLM point count.

ATTACHMENT B

PAINT SURVEY SUMMARY

BUILDING 524
GROTON, CONNECTICUT

BUILDING 524

PAINT NUMBER	MATERIAL	PAINT DESCRIPTION	LOCATIONS	SAMPLE NUMBERS	Lead Concentration (% wt.)	Lead-Containing Paint (LCP)	Lead-Based Paint (LBP)	Comments
P01	Wall Board	White	Interior	CT - 524 - P01	0.00011	Yes	No	Paint was intact.
P02	Wall Board	Blue	Interior	CT - 524 - P02	None Detected	Yes	No	Paint was intact.
P03	Wall Board	Gray	Interior	CT - 524 - P03	0.00063	Yes	No	Paint was intact.
P04	Doors	Gray	Interior	CT - 524 - P03	0.05200	Yes	No	Paint was intact.
P05	Wall Board	Green	Interior Walls in Room 109	CT - 524 - P03	0.00012	Yes	No	Paint was intact.
P06	Exterior	Gray	Exterior Trim	CT - 524 - P03	0.00510	Yes	No	Paint was damaged and flaking.
P07	Exterior	White	Exterior Walls	CT - 524 - P03	0.01900	Yes	No	Paint was damaged and flaking.

PAINT SURVEY SUMMARY

BUILDING 393
GROTON, CONNECTICUT

BUILDING 393

PAINT NUMBER	MATERIAL	PAINT DESCRIPTION	LOCATIONS	SAMPLE NUMBERS	Lead Concentration (% wt.)	Lead-Containing Paint (LCP)	Lead-Based Paint (LBP)	Comments
P08	Exterior Wall	White	Interior Ceilings	CT - 393 - P08	0.00510	Yes	No	Paint was damaged and flaking.
P09	Interior Walls	White	Interior Walls	CT - 393 - P09	0.06800	Yes	No	Paint was damaged and flaking.
P10	Doors	White	Interior Door	CT - 393 - P10	0.09400	Yes	No	Paint was damaged and flaking.
P11	Interior Walls	Gray	Interior Walls	CT - 393 - P10	0.02200	Yes	No	Paint was damaged and flaking.
P12	Doors	Blue	Interior Door	CT - 393 - P10	0.13000	Yes	No	Paint was damaged and flaking.

ATTACHMENT C

EMSL Analytical, Inc.

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EMSL Order: 042003256
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Project ID:

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Bloomfield, IN 47424

Project: Groton, CT / 148012279

Phone: (812) 863-4401
Fax:
Received Date: 02/06/2020 10:00 AM
Analysis Date: 02/09/2020
Collected Date: 01/29/2020

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
CT-A94-01A *042003256-0001*	Suspect Material	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-A94-01B *042003256-0002*	Suspect Material	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-A94-02A *042003256-0003*	Suspect Material	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-A94-02B *042003256-0004*	Suspect Material	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-A94-03A *042003256-0005*	Suspect Material	Black Fibrous Homogeneous	20% Synthetic	80% Non-fibrous (Other)	None Detected
CT-A94-03B *042003256-0006*	Suspect Material	Black Fibrous Homogeneous	25% Synthetic	75% Non-fibrous (Other)	None Detected

Analyst(s)

Daniel Blake (3)
Seri Smith (3)

Samantha Rundstrom, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method"), but augmented with procedures outlined in the 1993 ("final") version of the method. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. All samples received in acceptable condition unless otherwise noted. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. EMSL recommends gravimetric reduction for all non-friable organically bound materials prior to analysis. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA-LAP, LLC-IHLAP Lab 100194, NYS ELAP 10872, NJ DEP 03036, PA ID# 68-00367, LA #04127

Initial report from: 02/10/2020 07:16:56

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Customer ID: 32CJSS78A
Customer PO:
Project ID:

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Odon, IN 47562

Project: Groton CT

Phone: (930) 350-0400
Fax:
Received Date: 03/29/2022 10:25 AM
Analysis Date: 04/05/2022
Collected Date: 03/21/2022

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
CT-393-01A *162206530-0001*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-01B *162206530-0002*		Gray/Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-02A *162206530-0003*		Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-02B *162206530-0004*		Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-03A *162206530-0005*		Gray/Black Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
CT-393-03B *162206530-0006*					Positive Stop (Not Analyzed)
CT-393-04A-Floor Tile *162206530-0007*		Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-04A-Mastic *162206530-0007A*		Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-04A-Floor Tile *162206530-0007B*		Black Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
CT-393-04A-Mastic *162206530-0007C*		Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-393-04B *162206530-0008*					Positive Stop (Not Analyzed)
CT-393-05A *162206530-0009*		Gray Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
CT-393-05B *162206530-0010*					Positive Stop (Not Analyzed)

Initial report from: 04/05/2022 17:39:42

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Customer ID:	32CJSS78A
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Project ID:	

Analyst(s)

Lauren Welch (2)
Maggie Hayden (8)

Melissa Newkirk

Asbestos Laboratory Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN NVLAP Lab Code 200188-0, AZ0939, CA 2575, CO AL-15132, TX 300262

Initial report from: 04/05/2022 17:39:42

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Phone:	(930) 350-0400
Fax:	
Received:	3/29/2022 10:25 AM
Analysis Date:	4/6/2022
Collected:	3/21/2022

Project: **Groton CT**

Test Report: Polarized Light Microscopy (PLM) - Point Count Performed by EPA 600/R-93/116 Method with Gravimetric Reduction and 400 Point Count

SAMPLE ID	DESCRIPTION	APPEARANCE	(%) Matrix Organic	(%) Matrix Acid	NON- ASBESTOS % Fibrous	NON- ASBESTOS % NON-FIBROUS	ASBESTOS % TYPES
CT-393-03A *162206530-0005*		Gray/Black Non-Fibrous Homogeneous	52.7	0.0		42.2 Non-fibrous (other)	5.1 Chrysotile
CT-393-04A- Floor Tile *162206530-0007B*		Black Non-Fibrous Homogeneous	27.7	0.0		70.9 Non-fibrous (other)	1.4 Chrysotile

Analyst(s)
Maggie Hayden (2)

Melissa Newkirk
Asbestos Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN NVLAP Lab Code 200188-0

Initial report from 04/06/2022 10:00:52

THIS IS THE LAST PAGE OF THE REPORT.

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Project: Groton CT

Phone: (930) 350-0400
Fax:
Received: 03/29/2022 10:25 AM
Analysis Date: 04/05/2022
Collected: 03/21/2022

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy. Quantitation using 400 Point Count Procedure

				Non-Asbestos	Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
CT-393-05A *162206530-0009*		Gray Non-Fibrous Homogeneous		97.0% Non-fibrous (Other)	**3.00% Chrysotile**

Analyst(s)

Maggie Hayden (1)

Asbestos Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN NVLAP Lab Code 200188-0

Initial report from: 04/05/2022 17:39:38

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Project: Groton CT

Phone: (930) 350-0400
Fax:
Received Date: 03/29/2022 10:25 AM
Analysis Date: 04/05/2022
Collected Date: 03/21/2022

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
CT-524-01A *162206532-0001*	BULK	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-01B *162206532-0002*	BULK	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-02A *162206532-0003*	BULK	White Non-Fibrous Homogeneous	2% Glass	95% Gypsum 3% Non-fibrous (Other)	None Detected
CT-524-02B *162206532-0004*	BULK	White Non-Fibrous Homogeneous	2% Glass	95% Gypsum 3% Non-fibrous (Other)	None Detected
CT-524-03A *162206532-0005*	BULK	Tan/White Fibrous Homogeneous	60% Cellulose 20% Min. Wool	15% Perlite 5% Non-fibrous (Other)	None Detected
CT-524-03B *162206532-0006*	BULK	Gray/White Fibrous Homogeneous	60% Cellulose 20% Min. Wool	15% Perlite 5% Non-fibrous (Other)	None Detected
CT-524-04A *162206532-0007*	BULK	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-04B *162206532-0008*	BULK	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-05A *162206532-0009*	BULK	Black/Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-05B *162206532-0010*	BULK	Black/Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-06A *162206532-0011*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-06B *162206532-0012*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-07A *162206532-0013*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected
CT-524-07B *162206532-0014*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected
CT-524-07C *162206532-0015*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected
CT-524-07D *162206532-0016*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected

Initial report from: 04/05/2022 15:03:18

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EMSL Order: 162206532
Customer ID: 32CJSS78A
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
CT-524-07E *162206532-0017*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected
CT-524-07F *162206532-0018*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected
CT-524-07G *162206532-0019*	BULK	Gray Fibrous Homogeneous	40% Min. Wool	60% Non-fibrous (Other)	None Detected
CT-524-08A-Floor Tile *162206532-0020*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-08A-Mastic *162206532-0020A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-08B-Floor Tile *162206532-0021*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-08B-Mastic *162206532-0021A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-09A-Floor Tile *162206532-0022*	BULK	Beige Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-09A-Mastic *162206532-0022A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-09B-Floor Tile *162206532-0023*	BULK	Beige Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-09B-Mastic *162206532-0023A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-10A-Floor Tile *162206532-0024*	BULK	Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-10A-Mastic *162206532-0024A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-10B-Floor Tile *162206532-0025*	BULK	Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-10B-Mastic *162206532-0025A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-11A-Floor Tile *162206532-0026*	BULK	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-11A-Mastic *162206532-0026A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-11B-Floor Tile *162206532-0027*	BULK	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-11B-Mastic *162206532-0027A*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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EMSL Order: 162206532
Customer ID: 32CJSS78A
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
CT-524-12A *162206532-0028*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-12B *162206532-0029*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-13A *162206532-0030*	BULK	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-13B *162206532-0031*	BULK	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-14A *162206532-0032*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-14B *162206532-0033*	BULK	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-16A *162206532-0034*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CT-524-16B *162206532-0035*	BULK	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)
Alison Pacey (22)
Maggie Hayden (21)

Melissa Newkirk
Asbestos Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN NVLAP Lab Code 200188-0, AZ0939, CA 2575, CO AL-15132, TX 300262

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ATTACHMENT D

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13980 E. CAPT WJ Nelson Dr
Odon, IN 47562
Phone: (930) 350-0400
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4/5/2022

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 3/29/2022. The results are tabulated on the attached data pages for the following client designated project:

GROTON, CT

The reference number for these samples is EMSL Order #162206540. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (317) 803-2997.

Approved By:

Aleksandrea Kuchenbrod

Aleksandrea Kuchenbrod, Inorganic Chemisry Lab Manager

Chemical Testing
2845.25

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. This report may not be reproducted except in full and without written approval by EMSL Analytical, Inc. A2LA accredited chemical testing laboratory for Metals in Solids and Liquids by Inductively Coupled Plasma (ICP), as well as Mercury by Cold Vapor Atomic Absorption (CVAA).

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EMSL Order: 162206540
CustomerID: 32CJSS78A
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ProjectID:

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Phone: (930) 350-0400
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Received: 3/29/2022 10:25 AM
Collected: 3/21/2022

Project: **GROTON, CT**

Analytical Results

Client Sample Description CT-524-P01 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury	ND	0.71	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	2.2	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	31	9.9	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	ND	0.40	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	9.1	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	1.1	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	1.8	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-524-P02 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B Sample weight too low to analye	Mercury		0.50	µg/L	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	8.6	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	3900	43	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	ND	1.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	ND	4.3	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	ND	4.3	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	8.6	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	4.3	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-524-P03 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0003*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B Sample weight too low to analye	Mercury		0.50	µg/L	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	8.4	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	3000	42	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	ND	1.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	ND	4.2	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	6.3	4.2	mg/Kg	4/1/2022	JW	4/1/2022	JW

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Analytical Results

Client Sample Description CT-524-P03 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0003*

Method	Parameter	Result	RL	Units	Prep Date & Analyst		Analysis Date & Analyst	
METALS								
3050B/6010D	Selenium	ND	8.4	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	4.2	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-524-P04 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0004*

Method	Parameter	Result	RL	Units	Prep Date & Analyst		Analysis Date & Analyst	
METALS								
Mercury by EPA 7471B Sample weight too low to analye	Mercury		0.50	µg/L	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	11	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	ND	57	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	ND	2.3	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	61	5.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	520	5.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	11	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	5.7	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-524-P05 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0005*

Method	Parameter	Result	RL	Units	Prep Date & Analyst		Analysis Date & Analyst	
METALS								
Mercury by EPA 7471B	Mercury	ND	0.23	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	1.9	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	25	9.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	ND	0.39	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	1.9	0.97	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	1.2	0.97	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	1.9	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	0.97	mg/Kg	4/1/2022	JW	4/1/2022	JW

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Project: **GROTON, CT**

Analytical Results

Client Sample Description CT-524-P06 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0006*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury		0.50	µg/L	4/5/2022	WF	4/5/2022	WF
Sample weight too low to analye								
3050B/6010D	Arsenic	11	4.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	260	20	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	180	0.80	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	940	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	51	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	4.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-524-P07 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0007*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury	ND	0.24	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	7.8	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	400	9.9	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	320	0.39	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	730	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	190	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-393-P08 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0008*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury	0.40	0.25	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	3000	10	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	4.8	0.40	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	51	1.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	530	1.0	mg/Kg	4/1/2022	JW	4/1/2022	JW

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Project: **GROTON, CT**

Analytical Results

Client Sample Description CT-393-P08 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0008*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
3050B/6010D	Selenium	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	1.0	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-393-P09 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0009*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury	0.58	0.24	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	2900	9.9	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	7.3	0.40	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	61	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	680	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-393-P10 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0010*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury	0.35	0.23	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	4500	9.9	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	9.1	0.39	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	49	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	940	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	1.2	0.99	mg/Kg	4/1/2022	JW	4/1/2022	JW

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Phone: (930) 350-0400
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Received: 3/29/2022 10:25 AM
Collected: 3/21/2022

Project: **GROTON, CT**

Analytical Results

Client Sample Description CT-393-P11 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0011*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury	2.6	0.24	mg/Kg	4/5/2022	WF	4/5/2022	WF
3050B/6010D	Arsenic	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	500	10	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	1.6	0.40	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	15	1.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	220	1.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	2.0	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	1.0	mg/Kg	4/1/2022	JW	4/1/2022	JW

Client Sample Description CT-393-P12 ***Collected:*** 3/21/2022 ***Lab ID:*** *162206540-0012*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
Mercury by EPA 7471B	Mercury		0.50	µg/L	4/5/2022	WF	4/5/2022	WF
Sample weight too low to analye								
3050B/6010D	Arsenic	6.4	5.4	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Barium	2700	27	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Cadmium	14	1.1	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Chromium	19	2.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Lead	1300	2.7	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Selenium	ND	5.4	mg/Kg	4/1/2022	JW	4/1/2022	JW
3050B/6010D	Silver	ND	2.7	mg/Kg	4/1/2022	JW	4/1/2022	JW

Definitions:

MDL - method detection limit
J - Result was below the reporting limit, but at or above the MDL
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)
D - Dilution Sample required a dilution which was used to calculate final results

ATTACHMENT E

EMSL Analytical, Inc.
6340 CastlePlace Dr., Indianapolis, IN 46250
Phone/Fax: (317) 803-2997 / (317) 803-3047
http://www.EMSL.com indianapolislab@emsl.com

EMSL Order: 162206504
CustomerID: 32CJSS78A
CustomerPO:
ProjectID:

Attn: **Kimberly Paurazas**
CJ Seto Support Services LLC
13980 E. CAPT WJ Nelson Dr
Odon, IN 47562

Phone: (930) 350-0400
Fax:
Received: 3/29/2022 10:25 AM
Collected: 3/21/2022

Project: **GROTON, CT**

Test Report: Toxicity Characteristic Leachate Procedure (1311/7000B)

Client SampleDescription	*Collected*	*Analyzed*	*RDL*	*Lead Concentration*
CT-393-TCLP *162206504-0001*	3/21/2022	4/5/2022	0.40 mg/L	<0.40 mg/L
CT-524-TCLP *162206504-0002*	3/21/2022	4/5/2022	0.40 mg/L	<0.40 mg/L
CT-A108-TCLP *162206504-0003*	3/21/2022	4/5/2022	0.40 mg/L	<0.40 mg/L

Aleksandrea Kuchenbrod

Aleksandrea Kuchenbrod, Inorganic Chemisry
Lab Manager
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN

Initial report from 04/05/2022 19:07:19

ATTACHMENT F

EMSL Analytical, Inc.
6340 CastlePlace Dr., Indianapolis, IN 46250
Phone: (317) 803-2997 Fax: (317) 803-3047 Email: indianapolislab@emsl.com

Attn: **Kimberly Paurazas**
CJ Seto Support Services LLC
13980 E. CAPT WJ Nelson Dr
Odon, IN 47562
Phone: (930) 350-0400
Fax:

4/5/2022

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 3/29/2022. The results are tabulated on the attached data pages for the following client designated project:

GROTON, CT

The reference number for these samples is EMSL Order #162206507. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (317) 803-2997.

Approved By:

Aleksandrea Kuchenbrod

Aleksandrea Kuchenbrod, Inorganic Chemisry Lab Manager

Chemical Testing
2845.25

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. This report may not be reproducted except in full and without written approval by EMSL Analytical, Inc. A2LA accredited chemical testing laboratory for Metals in Solids and Liquids by Inductively Coupled Plasma (ICP), as well as Mercury by Cold Vapor Atomic Absorption (CVAA).

EMSL Analytical, Inc.
6340 CastlePlace Dr., Indianapolis, IN 46250
Phone/Fax: (317) 803-2997 / (317) 803-3047
http://www.EMSL.com indianapolislab@emsl.com

EMSL Order: 162206507
CustomerID: 32CJSS78A
CustomerPO:
ProjectID:

Attn: **Kimberly Paurazas**
CJ Seto Support Services LLC
13980 E. CAPT WJ Nelson Dr
Odon, IN 47562

Phone: (930) 350-0400
Fax:
Received: 3/29/2022 10:25 AM
Collected: 3/21/2022

Project: **GROTON, CT**

Analytical Results

Client Sample Description CT-393-PCB ***Collected:*** 3/21/2022 ***Lab ID:*** *162206507-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3546/8082A	Aroclor-1016	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1221	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1232	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1242	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1248	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1254	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1260	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1262	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1268	ND	3.5	mg/Kg	3/30/2022	WF	3/31/2022	WF

Client Sample Description CT-524-PCB ***Collected:*** 3/21/2022 ***Lab ID:*** *162206507-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3546/8082A	Aroclor-1016	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1221	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1232	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1242	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1248	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1254	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1260	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1262	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF
3546/8082A	Aroclor-1268	ND	0.44	mg/Kg	3/30/2022	WF	3/31/2022	WF

Definitions:

MDL - method detection limit
J - Result was below the reporting limit, but at or above the MDL
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)
D - Dilution Sample required a dilution which was used to calculate final results

ATTACHMENT G

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **1**	
Building A94	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

PHOTOGRAPH **2**	
Building A95	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **3**	
Building A96	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

PHOTOGRAPH **4**	
Building A97	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **5**	
Building A98	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

PHOTOGRAPH **6**	
Building A99	
PHOTOGRAPHS BY **Baker**	

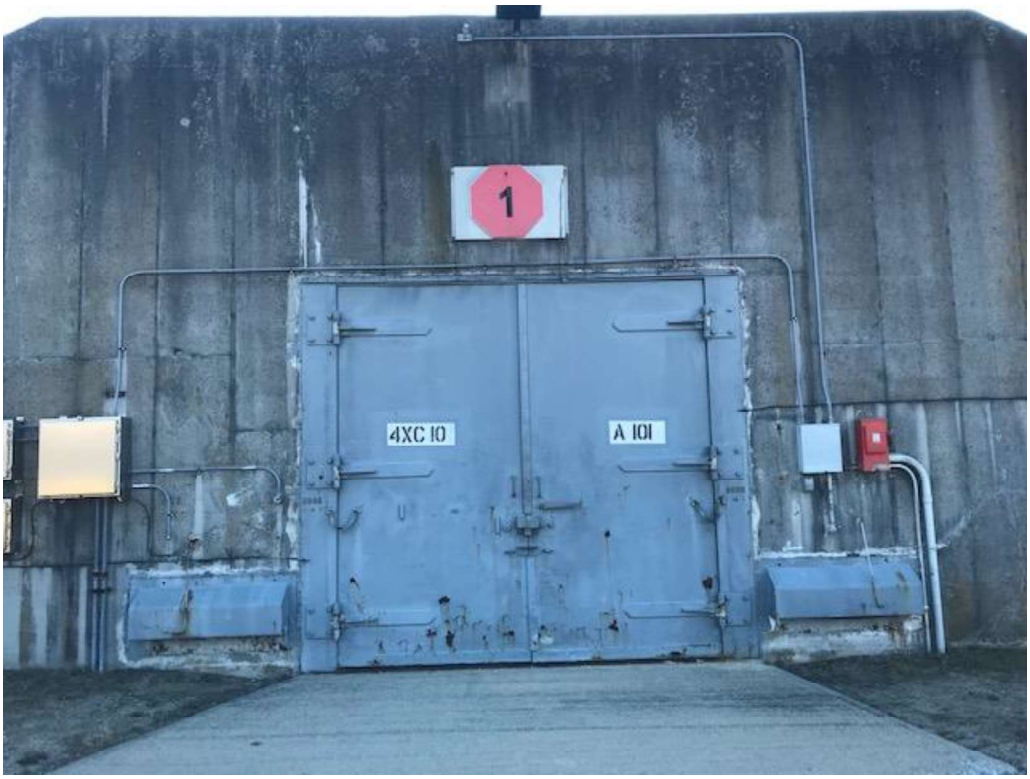
Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **7**	
Building A100	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

PHOTOGRAPH **8**	
Building A101	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **9**	
Building A102	
PHOTOGRAPHS BY **Baker**	

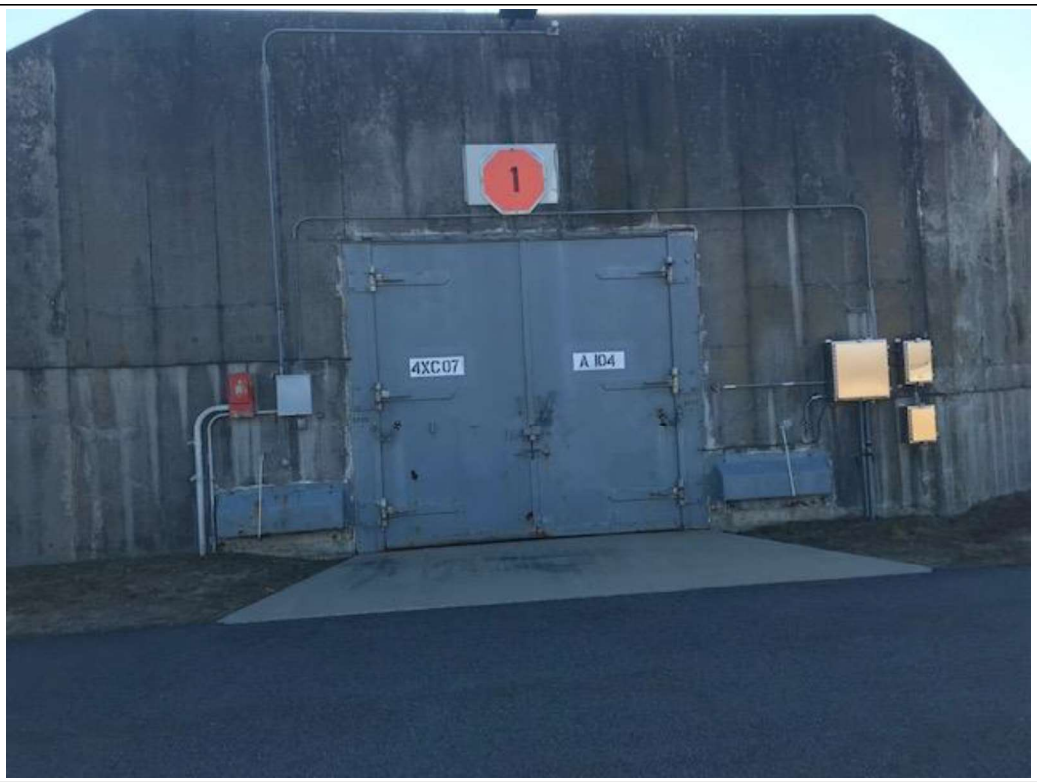
Comments: Front of Building

PHOTOGRAPH **10**	
Building A103	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **11**	
Building A104	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

PHOTOGRAPH **12**	
Building A105	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **13**	
Building A106	
PHOTOGRAPHS BY **Baker**	

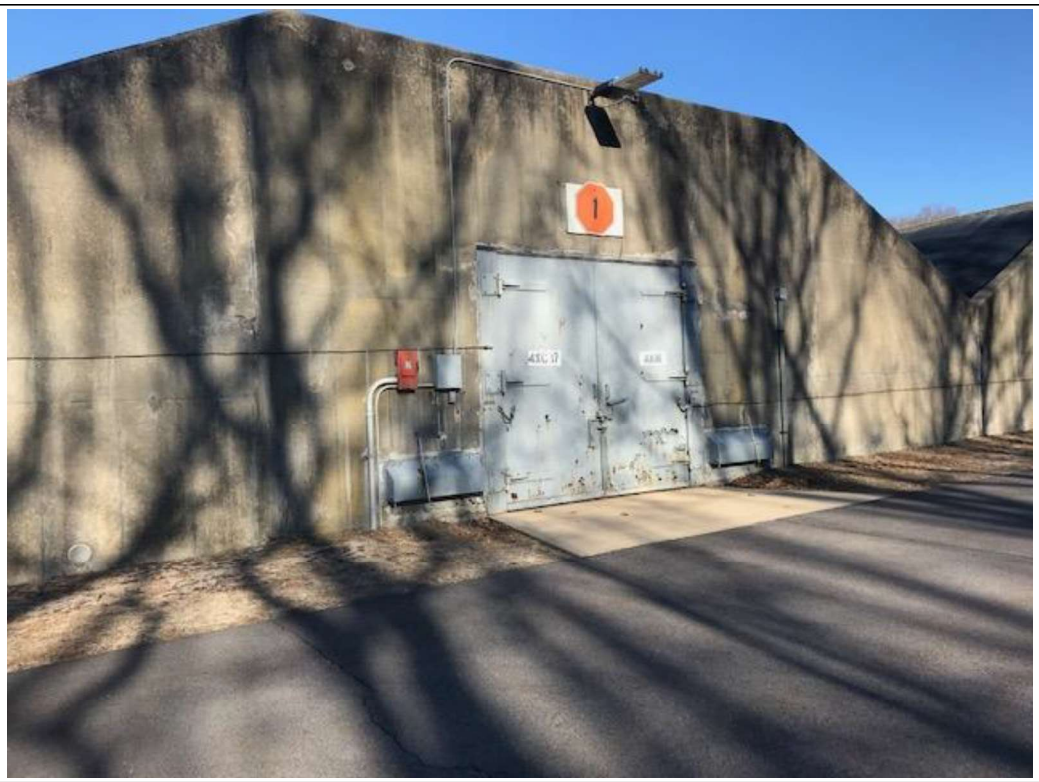
Comments: Front of Building

PHOTOGRAPH **14**	
Building A107	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **15**	
Building A108	
PHOTOGRAPHS BY **Baker**	

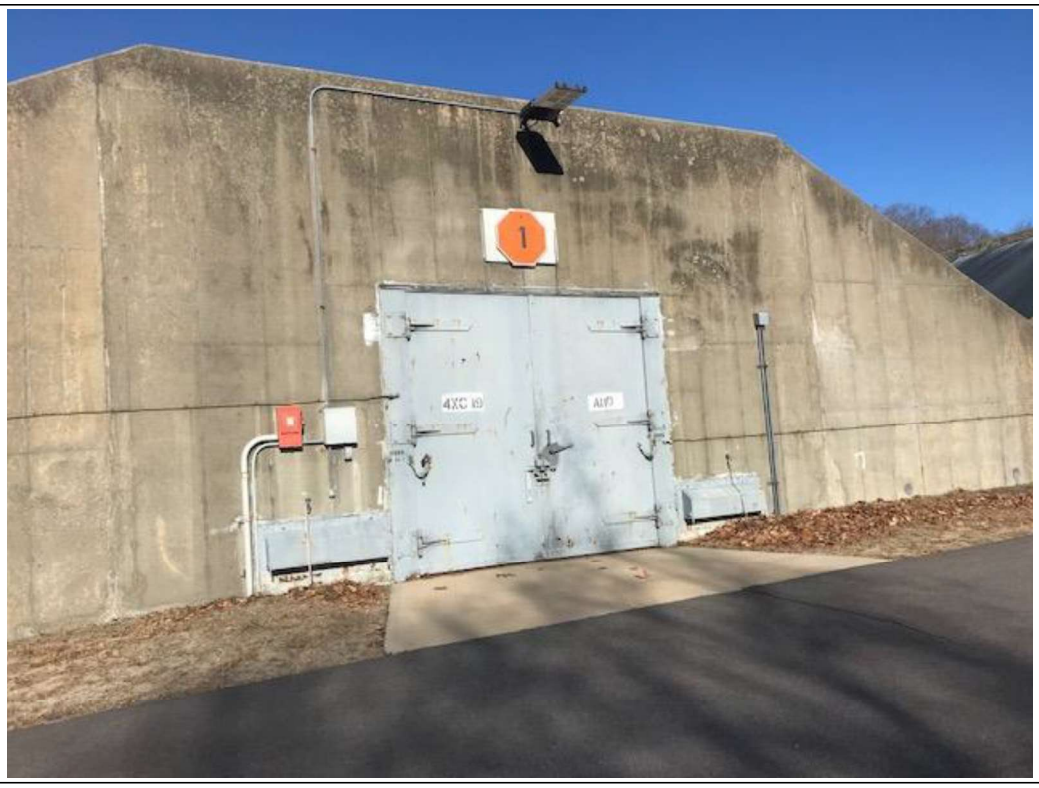
Comments: Front of Building

PHOTOGRAPH **16**	
Building A109	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **17**	
Building A110	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

PHOTOGRAPH **18**	
Building A111	
PHOTOGRAPHS BY **Baker**	

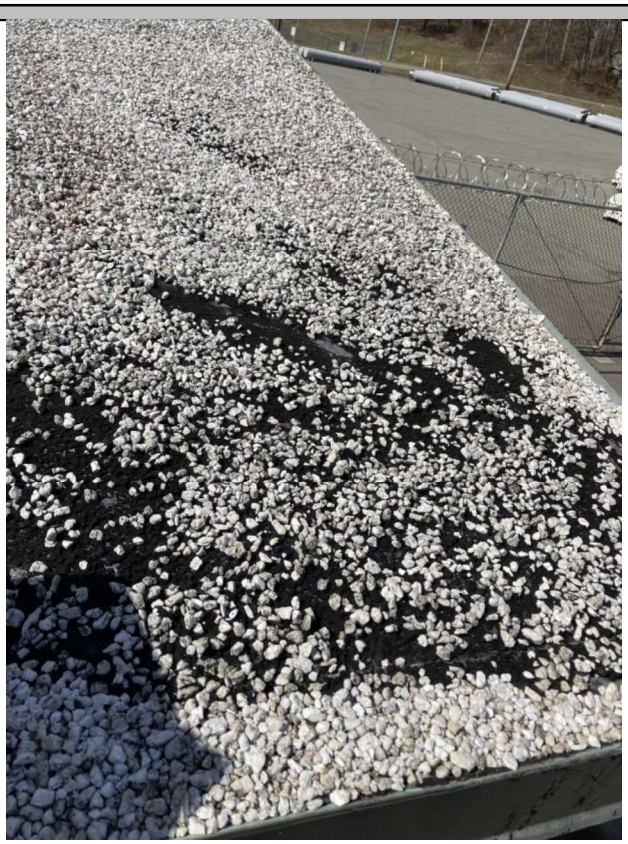
Comments: Front of Building

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH 1	
Building 393	
PHOTOGRAPHS BY Baker	

Comments: Front of Building

PHOTOGRAPH 2	
Building 393	
PHOTOGRAPHS BY Baker	

Comments: ACM – Material 03 – Asphaltic Roofing Material (Black Tar and Chip)

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **3**	
Building 393	
PHOTOGRAPHS BY **Baker**	

Comments: ACM – Material 04 – Vinyl Floor Tile and Floor Adhesive (Various VFT & Black FA)

PHOTOGRAPH **4**	
Building 393	
PHOTOGRAPHS BY **Baker**	

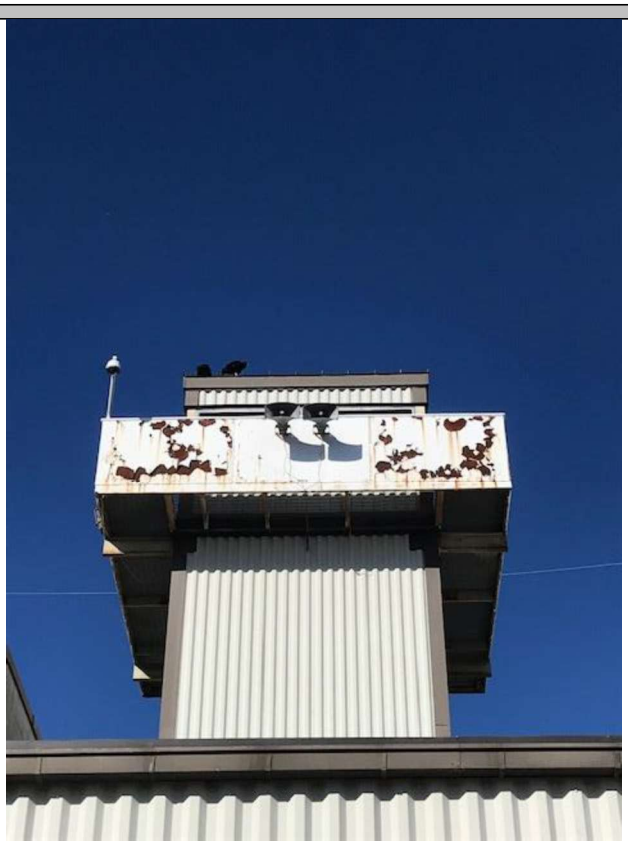
Comments: ACM – Material 05 – Windowsills (Black Transite-like Material)

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **1**	
Building 524	
PHOTOGRAPHS BY **Baker**	

Comments: Front of Building

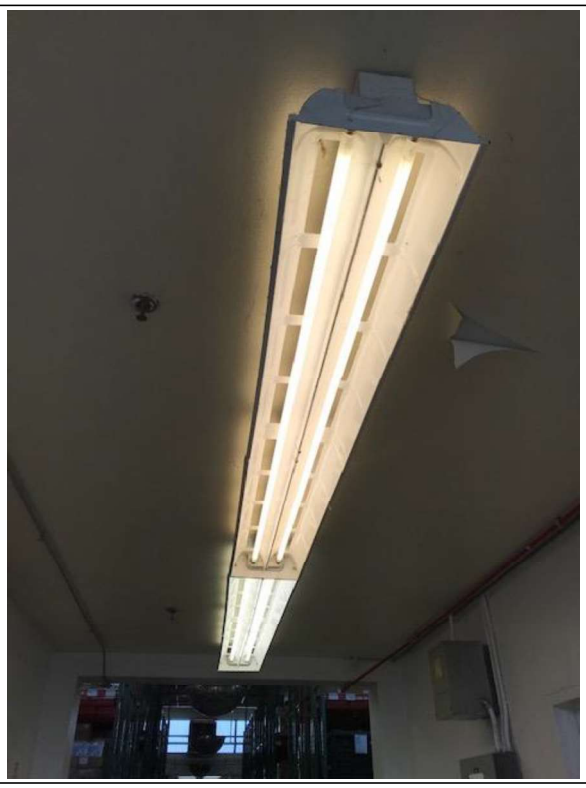
PHOTOGRAPH **2**	
Building 524	
PHOTOGRAPHS BY **Baker**	

Comments: Tower

ATTACHMENT H

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **1**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: Light Bulb and Ballast Example

PHOTOGRAPH **2**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: Light Bulb and Ballast Example

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **3**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

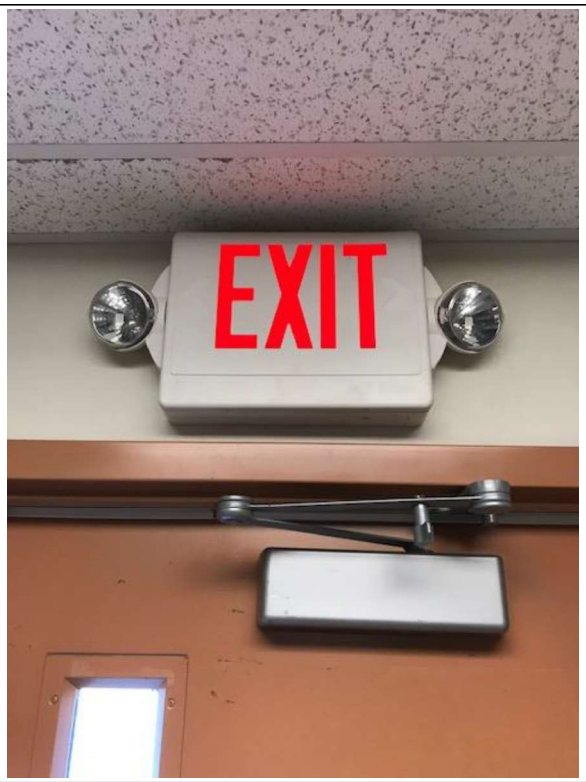
Comments: Thermostat Example

PHOTOGRAPH **4**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: Thermostat Example

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **5**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: Exit Sign Example

PHOTOGRAPH **6**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: Exit Sign Example

MICHAEL BAKER INTERNATIONAL, INC. – PHOTOGRAPHIC RECORD

PROJECT IDENTIFICATION: Naval Submarine Base New London

PHOTOGRAPH **7**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: Smoke Detector Example

PHOTOGRAPH **8**	
Various Buildings	
PHOTOGRAPHS BY **Baker**	

Comments: A/C Unit Example

ATTACHMENT I

Cinnaminson, New Jersey Testing Laboratory

Laboratory Cinnaminson, NJ (LAB List in Description)
Address 200 Route 130 North, Cinnaminson, NJ, 08077
Phone 1-800-220-3675, Fax: (856) 786-5974
Email c@emsl.com
Click here for map/directions (courtesy Google Maps)
Hours Mon-Fri 8AM-12AM, Sat. 8AM - 6PM, Sun. On-Call
Department hours may vary - see below

EMERGENCY ANALYSIS
AFTER HOURS,
WEEKENDS or HOLIDAYS

Customer Service

Talk To An Expert

Customer Survey

(Chemistry LAB 01) (Asbestos LAB 04) (Lead LAB 20) (Food Chemistry LAB 21) (Industrial Hygiene LAB 28) (Materials LAB 36) (Microbiology LAB 37) - **NOW CLOSED SATURDAY (Radon LAB 38) (TO-15 LAB 49) (PCR LAB 61) (Food Microbiology LAB 63) (Radiochemistry LAB 78)

Services Performed	Department Hours
Asbestos Lab Services	
DNA and PCR Testing Laboratory	
Environmental Chemistry Lab Services	
Fire & Smoke Testing Lab	
Food and Beverage Testing	
Industrial Hygiene (IH) Lab Services	M-F 8:30AM-5:00PM
Lead and Metals Lab Services	
Legionella Testing Lab Services	M-F 9:00AM-6:00PM, Saturday Prep Avail
Materials Testing Lab	
Microbiology Laboratory	M-F 9:00AM-6:00PM, Saturday Prep Avail
Radiological Testing	
Silica Lab Services	M-F 9:00AM-5:30PM
USP 797	M-F 9:00AM-6:00PM, Saturday Prep Avail

Qualifications	Certificate #	Expires
AIHA LAP, LLC ELLAP	100194	11/01/2022
AIHA LAP, LLC EMLAP	100194	11/01/2022
AIHA LAP, LLC IHLAP	100194	11/01/2022
A2LA Asbestos, Lead, Chemistry, IH, Materials and Radiochemistry	2845.01	05/31/2023
A2LA Chemistry (Food Chemistry/Materials Science)	2845.15	05/31/2023
A2LA Food Micro	2845.14	05/31/2023
A2LA Material Science/Mechanical	2845.16	05/31/2023
NVLAP - Air and Bulk	101048-0	06/30/2022
IRSST Recognition - PLM and TEM	See list	
NJ - Dept. of Labor and Workforce Development	32871	07/09/2021
National Radon Proficiency Program - Residential Measurement Provider	110140	10/31/2022
National Radon Proficiency Program - Radon	NRPP ID 109000 AL	05/31/2023
National Radon Safety Board - Radon Measurement Specialist	NRSB 19SS026	07/30/2023
National Radon Safety Board - Radon	NRSB-ARL6006	07/30/2023
NSF Material Program (Brake Pads) - SAE J2975:2011	CO192670-AL006	02/28/2023
CDC ELITE - Legionella Certificate of Proficiency	Certificate	12/01/2022
NJ - Radioactive Materials License	535776-	10/31/2030

	RAD210001	
Consumer Product Safety Commission (CPSC) - Cinnaminson - Metals, Lead, Phthalates	Letter - ID #1140	
DOECAP - DOE/DOD - Cinnaminson	2845.01	05/31/2021
EPA - UCMR - Inorganic anions (Chlorate)	Approval letter	
FDA - Drug Firm Registration	3003933331	12/31/2022
US Dept. of Agriculture - Soil Permit	P330-20-00038	02/10/2023
US Dept. of Justice - DEA Certificate	RE0419716	08/31/2022
US Dept. of Justice - Explosives License/Permit	8-NJ-005-33-3F-00326	06/01/2023
AL - Metals, Inorganics, Microbiological and Asbestos in DW	41260	06/30/2022
AL - Radon	NRSB-ARL6006	07/30/2023
AK - Radon	NRSB-ARL6006	07/30/2023
AZ - Airborne and Bulk Asbestos	Letter - AZ0955	06/30/2022
AZ - Radon	NRSB-ARL6006	07/30/2023
AR- Radon	NRSB-ARL6006	07/30/2023
CA - Asbestos, Lead and Chemistry for Metals in Drinking Water; Bulk Asbestos	1877	06/30/2022
CA - Radon	NRSB-ARL6006	07/30/2023
CO - PCM, PLM and TEM	AL-15133	01/30/2023
CO - Asbestos and Lead in Drinking Water	Letter	05/31/2022
CO - Cryptosporidium in Drinking Water	Letter	05/31/2022
CO - Radiochemistry in Drinking Water	Letter	05/31/2022
CO - Radon	NRSB-ARL6006	07/30/2023
CT - Asbestos, Lead, Micro, Legionella, Env. Chemistry, Radiochemicals and Cryptosporidium	PH-0270	06/30/2022
CT - Radon	NRSB-ARL6006	07/30/2023
DE - Asbestos, Chemistry, Radon, Micro, Cryptosporidium and Giardia in Drinking Water	Letter	06/30/2022
FL - Asbestos, Lead, Chemistry, Microbiology, Crypto and Giardia, TO-15, PFAS in Drinking Water	E87975	06/30/2022
FL - Radon	RB2034	07/22/2022
FL - Radon Measurement Specialist	R2687	10/14/2022
GA - Asbestos, Lead, Micro and Cryptosporidium-Giardia	972	06/30/2022
GA - Radon	NRSB-ARL6006	07/30/2023
HI - Asbestos in Drinking Water 100.2	Letter	06/30/2022
HI - PLM, TEM	L-01-032	07/10/2022
HI - Radon	NRSB-ARL6006	07/30/2023
ID - Asbestos in Drinking Water	NJ00337	06/30/2022
ID - Radon	NRSB-ARL6006	07/30/2023
IL - Cryptosporidium	1703036	06/30/2022
IL - Radon	RNL2008202	07/31/2022
IN - Lead, Chemistry and Asbestos in Drinking Water	C-NJ-04	06/30/2022
IN - Radon Lab Tester License	RTL00935	12/31/2022
IA - Asbestos in Drinking Water	419	02/01/2023
IA - Radon Measurement license	RNLAB10005	02/28/2023
KS - Radon	KS-LB-0005	09/30/2023
KS - Radon Measurement Technician	KS-MS-0482	11/30/2023
KY - Asbestos and Metals in Drinking Water	90123	12/31/2022
KY - Radon	NRSB-ARL6006	07/30/2023
LA - Asbestos and Radiochemistry in Drinking Water	LA004	12/31/2022

Customer Service
Talk To An Expert
Customer Survey

LA - Chemistry, Asbestos in Air, Non-potable Water and Solid Hazardous Waste, Fungi Direct and Cultures, Radiochemistry	04127	06/30/2022
LA - Radon	NRSB-ARL6006	07/30/2023
ME - Analyst Individual Certification List	See list	
ME - Asbestos, Radiochemistry, Env. Lead, E. coli, Crypto and Giardia in DW	2020020	08/16/2022
ME - Radon	SPC202	09/30/2022
ME - Air Asbestos Analysis	LA-0038	10/31/2022
ME - Bulk Asbestos Analysis	LB-0039	10/31/2022
MD - Asbestos, Chemistry and Radiochemistry in Drinking Water	331	06/30/2022
MD - Radon	NRSB-ARL6006	07/30/2023
MA - PCM, PLM, TEM	AA000056	09/28/2022
MA - Asbestos, Lead, Micro, Radiochemistry and PFAS in Drinking Water	M-NJ337	06/30/2022
MA - Cryptosporidium	See letter	06/30/2022
MA - Radon	NRSB-ARL6006	07/30/2023
MI - Asbestos, Microbiology, PFAs, Organics, and Radiochemistry in Drinking Water	9970	06/30/2022
MI - Radon	NRSB-ARL6006	07/30/2023
MN - Asbestos, Lead, and Radiochemistry in Drinking Water; PCBs	2197863	12/31/2022
MN - Radon	RL-00005	01/01/2023
MS - Asbestos in Drinking Water	Letter	06/30/2022
MS - Radon	NRSB-ARL6006	07/30/2023
MO - Radon	NRSB-ARL6006	07/30/2023
MT - Asbestos, Chemistry and Radiochemistry in Drinking Water	CERT0016	01/01/2023
MT - Radon	NRSB-ARL6006	07/30/2023
NE - Micro, Asbestos, Radiochemistry and PFAS in Drinking Water	NE-OS-19-08	06/30/2022
NE - Radon Measurement Specialist	474	03/31/2023
NE - Radon Measurement License	RMB-1083	03/31/2023
NV - Asbestos in DW, Bulk Asbestos (PLM), PFAS, and Radiochemistry	NJ003372022-1	07/31/2022
NV - Radon	NRSB-ARL6006	07/30/2023
NH - Asbestos, Radiochemistry, TCLP and PFAS in Drinking Water	298820	10/22/2021
NH - Radon	NRSB-ARL6006	07/30/2023
NJ - Asbestos, Chemistry, Gravimetric, TO-15, Microbiology, Radon, Cryptosporidium and Giardia (NELAP)	03036	06/30/2022
NJ - Office of Attorney General - Controlled Dangerous Substances	CA00030200	03/31/2023
NJ - Radioactive Materials License	535776-RAD210001	10/31/2030
NJ - Radon Measurement License	MEB92525	04/24/2022
NJ - Radon Measurement Specialist	MES13910	09/18/2022
NJ - Dept. of Labor and Workforce Development	32871	07/09/2023
NJ - DLWD OSC - Permit to Store Explosives	14086	03/31/2022
NM - Micro, Asbestos, Metals, Radiochemistry and PFAs in Drinking Water	NJ00337	06/30/2022
NM - Radon	NRSB-ARL6006	07/30/2023
NY - Asbestos, Metals, TCLP, Lead, Chemistry, PCBs, Radon, Total Coliform, TO-15, and TO-10A, PFOS, PFOA	10872	04/01/2023
NY - Legionella, Potable and Non-potable	10872	04/01/2023
NC - Asbestos, Cryptosporidium, Metals and Radiochemistry in Drinking Water	34700	07/31/2022
NC - Radon	NRSB-ARL6006	07/30/2023
ND - Radon	NRSB-ARL6006	07/30/2023
ND - TCLP, Metals and Pesticides	R-208	06/30/2022
OH - Cryptosporidium	Letter	06/30/2022
OH - Lead in Paint Chips, Wipes, Soil and Air	E10002	06/02/2023

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OH - Radon	RL39	07/11/2023
OH - Ohio VAP - Asbestos	CL105	03/11/2023
OK - Asbestos, Lead, Radiochemistry and PFAs in Drinking Water	D9952	08/31/2022
OK - Radon	NRSB-ARL6006	07/30/2023
OR - Radon	NRSB-ARL6006	07/30/2023
PA - Radon	2573	03/19/2023
PA - Radon Analyst Certification	3393	09/18/2023
PA - Asbestos, Chemistry, Radon, Micro and Cryptosporidium	68-00367	11/30/2022
PA - City of Philadelphia - PCM, PLM and TEM	ALL-137	04/30/2022
RI - Asbestos, Chemistry and Radiochemistry in DW	LAO00318	12/30/2022
RI - PCM	PCM00075	04/30/2023
RI - PLM	PLM00075	04/30/2023
RI - Radon Analytical Services	CLS00049	08/31/2022
RI - TEM	TEM00075	04/30/2023
SC - Asbestos in Drinking Water and Cryptosporidium	94017001	06/30/2022
SC - Radon	NRSB-ARL6006	07/30/2023
SD - Asbestos in Drinking Water	Letter	06/30/2022
SD - Radon	NRSB-ARL6006	07/30/2023
TN - Asbestos in Drinking Water	TN02856	06/30/2022
TN - Radon	NRSB-ARL6006	07/30/2023
TX - TO-15; Asbestos, Lead, Chemistry and Micro in Drinking Water	T104704177-21-20	08/31/2022
TX - PCM, PLM and TEM	300161	11/02/2023
TX - Mold	LAB1002	01/08/2024
TX - Radon	NRSB-ARL6006	07/30/2023
UT - Radon	NRSB-ARL6006	07/30/2023
VT - Analyst Individual Certification List	See list	
VT - PCM, PLM, TEM	AL818603	08/06/2022
VT - Asbestos, Metals and Radiological in Drinking Water	400621	10/03/2022
VT - Lead	LL379642	08/06/2022
VT - Radon	NRSB-ARL6006	07/30/2023
VA - PCM, PLM and TEM	3333000075	02/28/2023
VA - Radon	NRSB-ARL6006	07/30/2023
VA - NELAC - Asbestos, Lead, Cryptosporidium, Organics, Metals and Inorganics	460184	09/14/2022
WA - Asbestos in Air, Water, Solids; Lead, Methamphetamine and PCBs in Solid and Chemical Materials	C922	07/14/2022
WA - Radon	NRSB-ARL6006	07/30/2023
WV - Air and Bulk Asbestos	LT000621	07/31/2022
WV - Cryptosporidium and Radiochemistry	9967 M	12/31/2022
WV - Radon	RL000220	07/31/2022
WI - Radon	NRSB-ARL6006	07/30/2023
WI - Oneida Nation Vendor	121065	04/30/2023
WY - Radon	NRSB-ARL6006	07/30/2023

Chain of Custody Forms

Asbestos Lab Services
DNA and PCR Testing Laboratory
Environmental Chemistry Lab Services
Fire & Smoke Testing Lab
Food and Beverage Testing
Industrial Hygiene (IH) Lab Services
Lead and Metals Lab Services

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Legionella Testing Lab Services
Materials Testing Lab
Microbiology Laboratory
Radiological Testing
Silica Lab Services
USP 797

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1004641 SP 1064 -C01-P04647-I

GARY R CASE
343 SEMINOLE RD
SEMINOLE PA 16253-1207

1004641-0004654-0000001 of 0000001-C01-a1d00101-1064-04647

Dear GARY R CASE,

Attached you will find your validated certificate for the coming year. Should you have any questions about your certificate renewal, please do not hesitate to write or call:

Department of Public Health
P.O. Box 340308
M.S.#12MQA
Hartford, CT 06134-0308

(860) 509-7603
oplc.dph@ct.gov
www.ct.gov/dph/license

Sincerely,

Deidre S. Gifford

DEIDRE S. GIFFORD, MD, MPH, ACTING COMMISSIONER
DEPARTMENT OF PUBLIC HEALTH

EMPLOYER'S COPY

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME
GARY R CASE

VALIDATION NO.	CERTIFICATE NO.	CURRENT THROUGH
03-892538	001062	05/31/22

PROFESSION
ASBESTOS CONSULTANT-INSPECTOR

SIGNATURE — ACTING COMMISSIONER

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT

THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THIS DEPARTMENT AS A
ASBESTOS CONSULTANT-INSPECTOR

GARY R CASE

CERTIFICATE NO.
001062

CURRENT THROUGH
05/31/22

VALIDATION NO.
03-892538

SIGNATURE — ACTING COMMISSIONER

INSTRUCTIONS:

1. Detach and sign each of the cards on this form
2. Display the large card in a prominent place in your office or place of business.
3. The wallet card is for you to carry on your person. If you do not wish to carry the wallet card, place it in a secure place.
4. The employer's copy is for persons who must demonstrate current licensure/certification in order to retain employment or privileges. The employer's card is to be presented to the employer and kept by them as a part of your personnel file. Only one copy of this card can be supplied to you.

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STATE OF CONNECTICUT
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NAME
GARY R CASE

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE
02/19, CHG 4: 08/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 213R	(2014; E2017) Guide for Structural Lightweight-Aggregate Concrete
ACI 301	(2016) Specifications for Structural Concrete
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(2017) Guide to Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI 347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI SP-2	(2007; Abstract: 10th Edition) ACI Manual of Concrete Inspection
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A53/A53M	(2022) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A184/A184M	(2019) Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615/A615M	(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	(2016) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A934/A934M	(2016) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A996/A996M	(2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A1022/A1022M	(2016b) Standard Specification for Deformed and Plain Stainless Steel Wire and Welded Wire for Concrete Reinforcement
ASTM A1044/A1044M	(2016a) Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete
ASTM A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2022) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2018) Standard Test Method for Compressive Strength of Cylindrical

	Concrete Specimens
ASTM C42/C42M	(2020) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C78/C78M	(2022) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C94/C94M	(2021b) Standard Specification for Ready-Mixed Concrete
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C138/C138M	(2017a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2021) Standard Specification for Portland Cement
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C311/C311M	(2022) Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C331/C331M	(2017a) Standard Specification for Lightweight Aggregates for Concrete Masonry Units
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2021) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2019) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C803/C803M	(2018) Standard Test Method for

	Penetration Resistance of Hardened Concrete
ASTM C845/C845M	(2018) Standard Specification for Expansive Hydraulic Cement
ASTM C873/C873M	(2015) Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds
ASTM C900	(2015) Standard Test Method for Pullout Strength of Hardened Concrete
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C989/C989M	(2018a) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1012/C1012M	(2018b) Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution
ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1074	(2019) Standard Practice for Estimating Concrete Strength by the Maturity Method
ASTM C1077	(2017) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1116/C1116M	(2010a; R 2015) Standard Specification for Fiber-Reinforced Concrete
ASTM C1157/C1157M	(2020a) Standard Performance Specification for Hydraulic Cement
ASTM C1218/C1218M	(2020c) Standard Test Method for Water-Soluble Chloride in Mortar and Concrete
ASTM C1240	(2020) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2021) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
ASTM C1567	(2021) Standard Test Method for Potential

	Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2018) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C1778	(2016) Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2628	(1991; R 2016) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	(1989; R 2017) Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D3042	(2017) Standard Test Method for Insoluble Residue in Carbonate Aggregates
ASTM D5759	(2012; R 2020) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E96/E96M	(2022) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E329	(2021) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E1155	(2020) Standard Test Method for Determining Floor Flatness and Floor

	Levelness Numbers
ASTM E1643	(2018a) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2018) Manual of Standard Practice
CRSI RB4.1	(2016) Supports for Reinforcement Used in Concrete

CSA GROUP (CSA)

CSA Z809-08	(R2013) Sustainable Forest Management

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(2015) Principles and Criteria for Forest Stewardship

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2020	(2020) PEFC International Standard Chain of Custody of Forest Based Products Requirements

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1113	(2016) Architectural Coatings
SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019	(2015) Standards, Rules for Label Use, Procedures and Guidance

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 DEFINITIONS

a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, slag cement, and silica fume.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Supplementary cementing materials" (SCM) include coal fly ash, silica fume, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.

e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.

f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.

g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.

h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.

i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Plan; G

Quality Control Personnel Certifications; G

Quality Control Organizational Chart

Laboratory Accreditation; G

Form Removal Schedule; G

Maturity Method Data

SD-02 Shop Drawings

Formwork; G

Reinforcing Steel; G

SD-03 Product Data

Joint Sealants

Joint Filler

Formwork Materials

Recycled Aggregate Materials

Cementitious Materials

Vapor Retarder

Concrete Curing Materials

Reinforcement

Liquid Chemical Floor Hardeners and Sealers

Admixtures

Reinforcing Fibers

Plate Dowels; G

Waterstops

Biodegradable Form Release Agent

Nonshrink Grout

Recycled Content for Portland Cement replacement in Concrete Mix; S

Recycled Content for Aggregate in Concrete Mix; S

Recycled Content for Steel Reinforcing Bars; S

Recycled Content for Steel Wire Reinforcement; S

Biobased Form Release Agent; S

SD-05 Design Data

Concrete Mix Design; G

Formwork and Shoring Calculations; G

SD-06 Test Reports

Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Compressive Strength Tests; G

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

Silica Fume Manufacturer's Representative

VOC Content for Form Release Agents, Curing Compounds, and Concrete Penetrating Sealers

Safety Data Sheets

Field Testing Technician and Testing Agency

Indoor Air Quality for Adhesives and Sealants; S

Indoor Air Quality for Concrete Curing Compound; S

Indoor Air Quality for Waterproofing Sealer; S

Indoor Air Quality for Form Release Agent; S

Certified Sustainably Harvested Wood Formwork; S

SD-08 Manufacturer's Instructions

Liquid Chemical Floor Hardeners and Sealers

Joint Sealants

Curing Compound

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until vapor retarder, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Formwork and Shoring Calculations

ACI 347R. Include design calculations indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components. Furnish drawings and calculations of shoring and re-shoring methods proposed for floor and roof slabs, spandrel beams, and other horizontal concrete members. Calculations must indicate concrete pressure with both live and dead loads, along with material types. Formwork and shoring calculations must be signed and sealed by the Contractor's licensed structural engineer.

1.6.1.2 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, fibers, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture,

which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. Required average strength can be documented by field experience if field strength test data are available and represent a single group of at least 10 consecutive strength tests for one mixture, using materials and conditions similar to those expected for work, and encompassing a period of not less than 45 days. The average of field strength tests shall equal or exceed fcr'. Changes in materials, conditions, and proportions within the test record shall not have been more closely restricted than those for the proposed work. Test records shall not be more than 24 months old. Obtain mix design approval from the contracting officer prior to concrete placement. Submit product data for Recycled Content for Portland Cement replacement in Concrete Mix (fly ash, slag, pozzolans). Submit product data product data for Recycled Content for Aggregate in Concrete Mix.

1.6.2 Shop Drawings

1.6.2.1 Formwork

Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of contract drawings are unacceptable. Submit form removal schedule indicating element and minimum length of time for form removal.

Design, fabricate, erect, support, brace, and maintain formwork so that it is able to support, without failure, all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

1.6.2.2 Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

1.6.3 Control Submittals

1.6.3.1 Silica Fume Manufacturer's Representative

The manufacturer's representative must be present at mix plant to ensure proper mix, including high range water reducer as indicated on the Drawings, and batching methods during the first 3 days of concrete mix preparation and placement. After which the manufacturer's representative must designate a representative at the concrete producer's plant to ensure the concrete mix procedures meet the silica fume manufacturer's recommendations.

1.6.3.2 VOC Content for form release agents, curing compounds, and concrete penetrating sealers

Submit certification for the form release agent, curing compounds, and concrete penetrating sealers that indicate the VOC content of each product.

1.6.3.3 Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.4.2 Slag Cement

Submit test results in accordance with ASTM C989/C989M for slag cement. Submit test results performed within 6 months of submittal date.

1.6.4.3 Aggregates

Submit test results in accordance with ASTM C33/C33M, or ASTM C331/C331M for lightweight aggregate, and ASTM C1293 or ASTM C1567 as required in the paragraph titled ALKALI-AGGREGATE REACTION.

1.6.5 Field Samples

1.6.5.1 Slab Finish Sample

Install minimum of 10 foot by 10 foot slab. Slab finish sample must not be part of the final project. Finish as required by specification.

1.6.5.2 Surface Finish Samples

Provide a minimum of three sample concrete panels for each finish for each mix design, 3 feet by 3 feet, 3 inches thick. Use the approved concrete mix design(s). Provide sample panels on-site at locations directed. Once approved, each set of panels must be representative of each of the finishes specified and of the workmanship and finish(es) required. Do not remove or destroy samples until directed by the Contracting Officer.

1.6.6 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the Contracting Officer, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site.

1.6.7 Quality Control Personnel Certifications

The Contractor must submit for approval the responsibilities of the

various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

Submit American Concrete Institute certification for the following:

a. CQC personnel responsible for inspection of concrete operations.

b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.

c. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

1.6.7.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

1.6.7.2 Field Testing Technician and Testing Agency

Submit data on qualifications of proposed testing agency and technicians for approval by the Contracting Officer prior to performing testing on concrete.

a. Work on concrete under this contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with ACI SP-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI SP-2.

b. Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.

c. Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

1.6.8 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected.

1.6.9 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory

and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C31/C31M.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

1.7 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to material manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

a. Supply 100 percent outside air 24 hours a day.

b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 84 degrees F and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.7.1 Submittals for Environmental Performance

a. Provide data indication the percentage of pre-consumer pozzolan (fly ash, slag cement) cement substitution as a percentage of the full product composite by weight.

b. Provide data indicating the percentage of pre-consumer and post-consumer recycled content aggregate.

c. Provide product data indicating the percentage of post-consumer recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.

d. For projects using certified sustainably harvested wood formwork, provide chain-of-custody documentation for all certified wood products.

e. For projects using reusable formwork, provide data showing how formwork is reused.

f. Provide SDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.

g. Provide SDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Indoor Air Quality Certification

Provide coatings applied within the building waterproofing envelope certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or other third-party program or VOC content requirements of Green Seal GS-11, California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings, or SCAQMD Rule 1113. Submit product data for indoor air quality for concrete curing compound, indoor air quality for waterproofing sealer, and indoor air quality for form release agent.

Provide adhesives and sealants applied within the building waterproofing envelope certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party program or VOC content requirements of SCAQMD Rule 1168. Submit product data for indoor air quality for adhesives and sealants.

1.8.2 Certified Sustainably Harvested Wood Formwork

Provide wood formwork that is permanently installed certified as sustainably harvested by FSC STD 01 001, ATFS STANDARDS, CSA Z809-08 (R2013), SFI 2015-2019, or other third-party program certified by PEFC ST 2002:2020. Provide a letter of certification of sustainably harvested wood signed by the wood supplier. Identify certifying organization and their third-party program name and indicate compliance with chain-of-custody program requirements. Submit product data for certified sustainably harvested wood formwork.

1.9 QUALIFICATIONS FOR WELDING WORK

Welding procedures must be in accordance with AWS D1.4/D1.4M.

Verify that Welder qualifications are in accordance with AWS D1.4/D1.4M for welding of reinforcement or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

PART 2 PRODUCTS

2.1 FORMWORK MATERIALS

a. Form-facing material in contact with concrete must be lumber, plywood, tempered concrete-form-grade hardboard, metal, plastic, or treated paper that creates specified appearance and texture of concrete surface. Submit product information on proposed form-facing materials if different from that specified herein.

b. Design formwork, shores, reshores, and backshores to support loads transmitted to them and to comply with applicable building code requirements.

c. Design formwork and shoring for load redistribution resulting from stressing of post-tensioned reinforcement. Ensure that formwork allows movement resulting from application of prestressing force.

d. Design formwork to withstand pressure resulting from placement and

vibration of concrete and to maintain specified tolerances.

e. Design formwork to accommodate waterstop materials in joints at locations indicated in Contract Documents.

f. Provide temporary openings in formwork if needed to facilitate cleaning and inspection.

g. Design formwork joints to inhibit leakage of mortar.

h. Limit deflection of facing materials for concrete surfaces exposed to view to 1/240 of center-to-center spacing of facing supports.

i. Do not use earth cuts as forms for vertical or sloping surfaces.

j. Submit product information on proposed form-facing materials if different from that specified herein.

k. Submit procedure for reshoring and backshoring, including drawings signed and sealed by a licensed design engineer. Include on shop drawings the formwork removal procedure and magnitude of construction loads used for design of reshoring or backshoring system. Indicate in procedure the magnitude of live and dead loads assumed for required capacity of the structure at time of reshoring or backshoring.

l. Submit manufacturer's product data on form liner proposed for use with each formed surface.

2.1.1 Wood Forms

Use lumber as specified in Section 06 10 00 ROUGH CARPENTRY and as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining.

2.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.1.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.1.2 Plastic Forms

Plastic lumber as specified in Section 06 10 00 ROUGH CARPENTRY. Provide plastic forms that contain a minimum of 50 percent post-consumer recycled content, or a minimum of 50 percent pre-consumer recycled content.

2.1.3 Carton Forms

Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete until initial set. Provide carton forms that contain a minimum of 10 percent post-consumer recycled content, or a minimum of 20 percent pre-consumer recycled content.

2.1.4 Steel Forms

Provide steel form surfaces that do not contain irregularities, dents, or sags.

2.2 FORMWORK ACCESSORIES

a. Use commercially manufactured formwork accessories, including ties and hangers.

b. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.2.1 Form Ties

a. Use form ties with ends or end fasteners that can be removed without damage to concrete.

b. Where indicated in Contract Documents, use form ties with integral water barrier plates or other acceptable positive water barriers in walls.

c. The breakback distance for ferrous ties must be at least 2 in. for Surface Finish-2.0 or Surface Finish-3.0, as defined in ACI 301.

d. Submit manufacturer's data sheet on form ties.

2.2.2 Waterstops

Submit manufacturer's data sheet on waterstop materials and splices.

2.2.2.1 PVC Waterstop

Polyvinylchloride waterstops must conform to COE CRD-C 572.

2.2.2.2 Rubber Waterstop

Rubber waterstops must conform to COE CRD-C 513.

2.2.2.3 Thermoplastic Elastomeric Rubber Waterstop

Thermoplastic elastomeric rubber waterstops must conform to ASTM D471.

2.2.2.4 Hydrophilic Waterstop

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water must conform to the following requirements when tested in accordance to ASTM D412: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness must be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F must be 3 to 1 minimum.

2.2.3 Biodegradable Form Release Agent

a. Provide form release agent that is colorless, biodegradable, and rapeseed oil-based, soy oil-based, water-based, with a low (maximum of 55 grams/liter (g/l)) VOC content. Submit documentation for biobased form release agent.

b. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

c. Provide form release agent that reduces formwork moisture absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

d. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

2.2.4 Chamfer Materials

Use lumber materials with dimensions of 3/4 x 3/4 in.

2.2.5 Construction joints

a. Submit details and locations of construction joints in accordance with the requirements herein.

b. Provide joints where indicated in Contract Documents or in accepted alternate locations.

c. Submit location and detail of joints if different from those indicated in Contract Documents.

d. Submit manufacturer's data sheet on expansion joint materials.

e. Provide keyways where indicated in Contract Documents. Longitudinal keyways indicated in Contract Documents must be at least 1-1/2 in. deep, measured perpendicular to the plane of the joint.

2.2.6 Other Embedded items

Use sleeves, inserts, anchors, and other embedded items of material and design indicated in Contract Documents.

2.3 CONCRETE MATERIALS

2.3.1 Cementitious Materials

2.3.1.1 Portland Cement

a. Unless otherwise specified, provide cement that conforms to ASTM C150/C150M Type I or II.

b. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

c. Supplier must certify that the hazardous waste is neutralized by the manufacturing process and that no additional pollutants are discharged.

d. Submit information along with evidence demonstrating compliance with referenced standards. Submittals must include types of cementitious

materials, manufacturing locations, shipping locations, and certificates showing compliance.

e. Cementitious materials must be stored and kept dry and free from contaminants.

2.3.1.2 Fly Ash

a. ASTM C618, Class F, except that the maximum allowable loss on ignition must not exceed 3 percent.

b. If fly ash is used it must range from 15 to 20 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, it shall not be used. Report the chemical analysis of the fly ash in accordance with ASTM C311/C311M. Evaluate and classify fly ash in accordance with ASTM D5759.

2.3.1.3 Slag Cement

ASTM C989/C989M, Grade 100.

2.3.1.4 Silica Fume

Silica fume must conform to ASTM C1240, including the optional limits on reactivity with cement alkalis. Silica fume may be furnished as a dry, densified material or as slurry. Proper mixing is essential to accomplish proper distribution of the silica fume and avoid agglomerated silica fume which can react with the alkali in the cement resulting in premature and extensive concrete damage. Supervision at the batch plant, finishing, and curing is essential. Provide at the Contractor's expense the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative must be present on the project prior to and during at least the first 4 days of concrete production and placement using silica fume. Use a High Range Water Reducing admixture (HRWRA) when silica fume is the only pozzolan used.

2.3.1.5 Other Supplementary Cementitious Materials

Natural pozzolan must be raw or calcined and conform to ASTM C618, Class N, including the optional requirement for uniformity.

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) must conform to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age must be at least 95 percent of the control specimens.

b. The average particle size must not exceed 6 microns.

c. The sum of $SiO_2 + Al_2O_3 + Fe_2O_3$ must be greater than 77 percent.

2.3.2 Water

a. Water or ice must comply with the requirements of ASTM C1602/C1602M.

b. Minimize the amount of water in the mix. Improve workability by

adjusting the grading of the aggregate and using admixture rather than by adding water.

c. Water must be potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

d. Protect mixing water and ice from contamination during storage and delivery.

e. Submit test report showing water complies with ASTM C1602/C1602M.

2.3.3 Aggregate

2.3.3.1 Normal-Weight Aggregate

a. Aggregates must conform to ASTM C33/C33M.

b. Aggregates used in concrete must be obtained from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.

c. Provide sand that is at least 50 percent acid insoluble based on ASTM D3042.

d. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain freely. Do not use aggregates that contain frozen lumps.

e. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with ASTM C33/C33M, and ASTM C1293 expansion data not more than 18 months old.

2.3.3.2 Lightweight Aggregate

Lightweight aggregate in accordance with ASTM C331/C331M.

2.3.3.3 Recycled Aggregate Materials

Use a minimum of 25 percent recycled aggregate, depending on local availability and conforming to requirements of the mix design. Recycled aggregate to include: recovered glass, recovered concrete, recovered porcelain, or recovered stone that meets the aggregate requirements specified. Submit recycled material request with the aggregate certification submittals and do not use until approved by the Contracting Officer.

2.3.4 Admixtures

a. Chemical admixtures must conform to ASTM C494/C494M.

b. Air-entraining admixtures must conform to ASTM C260/C260M.

c. Chemical admixtures for use in producing flowing concrete must conform to ASTM C1017/C1017M.

d. Do not use calcium chloride admixtures.

e. Use an ASR-inhibiting admixture for concrete containing aggregate susceptible to ASR.

f. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.

g. Protect stored admixtures against contamination, evaporation, or damage.

h. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.

i. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards required herein.

2.4 MISCELLANEOUS MATERIALS

2.4.1 Concrete Curing Materials

Provide concrete curing material in accordance with ACI 301 Section 5 and ACI 308.1 Section 2. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound.

2.4.2 Nonshrink Grout

Nonshrink grout in accordance with ASTM C1107/C1107M.

2.4.3 Floor Finish Materials

2.4.3.1 Liquid Chemical Floor Hardeners and Sealers

a. Hardener must be a colorless aqueous solution containing a blend of inorganic silicate or siliconate material and proprietary components combined with a wetting agent; that penetrates, hardens, and densifies concrete surfaces. Submit manufactures instructions for placement of liquid chemical floor hardener.

b. Use concrete penetrating sealers with a low (maximum 100 grams/liter, less water and less exempt compounds) VOC content. Submit manufactures instructions for placement of sealers.

2.4.3.2 Abrasive Aggregate for Nonslip Aggregate Finish

Aggregate must be well-graded in size from particles retained on No. 30 sieve 0.0236 inch to particles passing No. 8 sieve 0.0929 inch.

2.4.4 Expansion/Contraction Joint Filler

ASTM D1751 or ASTM D1752 Type I or Type II. Material must be 1/2 inch thick, unless otherwise indicated.

2.4.5 Joint Sealants

Submit manufacturer's product data, indicating VOC content.

2.4.5.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D6690 or ASTM C920, Type M, Class 25, Use T.

2.4.5.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C920, Type M, Grade NS, Class 25, Use T.

2.4.5.3 Preformed Polychloroprene Elastomeric Type

ASTM D2628.

2.4.5.4 Lubricant for Preformed Compression Seals

ASTM D2835.

2.4.6 Vapor Retarder

Typical: ASTM E1745 Class B polyethylene sheeting, minimum 10 mil thickness or other equivalent material with a maximum permeance rating of 0.04 perms per ASTM E96/E96M.

CLWS ECM: ASTM E1745 Class B polyethylene sheeting, minimum 15 mil thickness or other equivalent material with a maximum permeance rating of 0.04 perms per ASTM E96/E96M.

Consider plastic vapor retarders and adhesives with a high recycled content, low toxicity low VOC (Volatile Organic Compounds) levels.

2.4.7 Dovetail Anchor Slot

Preformed metal slot approximately 1 inch by 1 inch of not less than 22 gage galvanized steel cast in concrete. Coordinate actual size and throat opening with dovetail anchors and provide with removable filler material.

2.5 CONCRETE MIX DESIGN

2.5.1 Properties and Requirements

a. Use materials and material combinations listed in this section and the contract documents.

b. Cementitious material content must be adequate for concrete to satisfy the specified requirements for strength, w/cm, durability, and finishability described in this section and the contract documents.

c. Selected target slump must meet the requirements this section, the contract documents, and must not exceed 9 in. Concrete must not show visible signs of segregation.

d. The target slump must be enforced for the duration of the project. Determine the slump by ASTM C143/C143M. Slump tolerances must meet the requirements of ACI 117.

e. The typical nominal maximum size of coarse aggregate for a mixture must not exceed three-fourths of the minimum clear spacing between reinforcement, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings. At the earth covered magazine headwalls, the maximum aggregate size is #8.

f. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must be in accordance with the requirements of the paragraph titled DURABILITY.

g. Measure air content at the point of delivery in accordance with ASTM C173/C173M or ASTM C231/C231M.

h. Concrete for slabs to receive a hard-troweled finish must not contain an air-entraining admixture or have a total air content greater than 3 percent.

i. Concrete properties and requirements for each portion of the structure are specified in the table below. Refer to the paragraph titled DURABILITY for more details on exposure categories and their requirements.

	Minimum *f'c* psi	**Exposure Categories^**	**Miscellaneous Requirements**
Grade Beams and Footings, Typical (Sentry and Operations Buildings)	4500 at 28 days	S0; C0; W0; F2	Max. slump: 4 in. Nominal maximum aggregate size must be 3/4 in.
Slabs-on-ground (Sentry and Operations Buildings)	4000 at 28 days	S0; C0; W0; F1	
Earth Covered Magazines - Structural Concrete, (CLWS, Type G & Type H)	5000 at 28 days	S0; C0; W0; F1	
Earth Covered Magazines - Lean Concrete (CLWS, Type G & Type H)	3000 at 28 days	S0; C0; W0; F1	
Concrete Toppings (Sentry and Operations Buildings)	4000 at 28 days	S0; C0; W0; F0	Max. slump: 4 in.

	Minimum *f'c* psi	Exposure Categories^	Miscellaneous Requirements
Walls and elevated slabs (Sentry and Operations Buildings)	4000 at 28 days	S0; C0; W0; F1	Nominal maximum aggregate size must be 3/4 in.
Lightweight Concrete for door fill (CLWS, Type G & Type H)	4000 at 28 days	S0; C0; W0; F1	Max density of 115 pounds per cubic foot Min dosage 0.70 pounds per cubic yard for synthetic fibers Refer to general notes on Drawings for additional mix design properties

2.5.2 Durability

2.5.2.1 Alkali-Aggregate Reaction

Do not use any aggregate susceptible to alkali-carbonate reaction (ACR). Use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction (ASR):

a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.

b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 must not exceed 0.10 percent at an age of 16 days.

c. Alkali content in concrete (LBA) must not exceed 4 pounds per cubic yard for moderately reactive aggregate or 3 pounds per cubic yard for highly reactive aggregate. Reactivity must be determined by testing in accordance with ASTM C1293 and categorized in accordance with ASTM C1778. Alkali content is calculated as follows:

LBA = (cement content, pounds per cubic yard) × (equivalent alkali content of portland cement in percent/100 percent)

2.5.2.2 Freezing and Thawing Resistance

a. Provide concrete meeting the following requirements based on exposure class assigned to members for freezing-and-thawing exposure in Contract Documents:

Exposure class	Maximum *w/cm**	Minimum *f'c*, psi	Air content	Additional Requirements
F0	N/A	2500	N/A	

Exposure class	**Maximum *w/cm****	**Minimum *f'c*, psi**	**Air content**	**Additional Requirements**
F1	0.55	3500	Depends on aggregate size	N/A
F2	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass
F3	0.40	5000	Depends on aggregate size	See limits on maximum cementitious material by mass
F3 plain concrete	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass

*The maximum *w/cm* limits do not apply to lightweight concrete.

b. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must meet the requirements of the following table:

Nominal maximum aggregate size, in.	**Total air content, percent*^**	
	Exposure Class F2 and F3	**Exposure Class F1**
3/8	7.5	6.0
1/2	7.0	5.5
3/4	6.0	5.0
1	6.0	4.5
1-1/2	5.5	4.5
2	5.0	4.0
3	5.5	3.5

*Tolerance on air content as delivered must be plus/minus 1.5 percent.

^For f'c greater than 5000 psi, reducing air content by 1.0 percentage point is acceptable.

c. Submit documentation verifying compliance with specified requirements.

d. For sections of the structure that are assigned Exposure Class F3, submit certification on cement composition verifying that concrete mixture meets the requirements of the following table:

Cementitious material	Maximum percent of total cementitious material by mass*
Fly ash or other pozzolans conforming to ASTM C618	25
Slag cement conforming to ASTM C989/C989M	50
Silica Fume conforming to ASTM C1240	10
Total of fly ash or other pozzolans, slag cement, and silica fume	50^
Total of fly ash or other pozzolans and silica fume	35^

*Total cementitious material also includes ASTM C150/C150M, ASTM C595/C595M, ASTM C845/C845M, and ASTM C1157/C1157M cement. The maximum percentages above must include:

i. Fly ash or other pozzolans present in ASTM C1157/C1157M or ASTM C595/C595M Type IP blended cement.

ii. Slag cement present in ASTM C1157/C1157M or ASTM C595/C595M Type IS blended cement.

iii. Silica fume conforming to ASTM C1240 present in ASTM C1157/C1157M or ASTM C595/C595M Type IP or Type IT blended cement.

^Fly ash or other pozzolans and silica fume must constitute no more than 25 percent and 10 percent, respectively, of the total mass of the cementitious materials.

2.5.2.3 Corrosion and Chloride Content

a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members requiring protection against reinforcement corrosion in Contract Documents.

b. Submit documentation verifying compliance with specified requirements.

c. Water-soluble chloride ion content contributed from constituents including water, aggregates, cementitious materials, and admixtures must be determined for the concrete mixture by ASTM C1218/C1218M at age between 28 and 42 days.

d. The maximum water-soluble chloride ion (Cl-) content in concrete, percent by mass of cement is as follows:

Exposure class	**Maximum *w/cm****	**Minimum f'c, psi**	**Maximum water-soluble chloride ion (CL-) content in concrete, percent by mass of cement**
Reinforced concrete			
C0	N/A	2500	0.15
C1	N/A	2500	0.15
C2	0.4	5000	0.15
Prestressed concrete			
C0	N/A	2500	0.06
C1	N/A	2500	0.06
C2	0.4	5000	0.06

*The maximum w/cm limits do not apply to lightweight concrete.

2.5.2.4 Sulfate Resistance

a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members for sulfate exposure.

Exposure class	**Maximum w/cm**	**Minimum f'c, psi**	**Required cementitious materials-types**			**Calcium chloride admixture**
			ASTM C150/C150M	**ASTM C595/C595M**	**ASTM C1157/C1157M**	
S0	N/A	2500	N/A	N/A	N/A	No restrictions
S1	0.50	4000	II*^	Types with (MS) designation	MS	No restrictions
S2	0.45	4500	V^	Types with (HS) designation	HS	Not permitted
S3	0.45	4500	V + pozzolan or slag cement**	Types with (HS) designation plus pozzolan or slag cement**	HS + pozzolan or slag cement**	Not permitted
S3	0.40	5000	V***	Types with (HS) designation	HS	Not permitted

* For seawater exposure, other types of portland cements with tricalcium aluminate (C3A) contents up to 10 percent are acceptable if the w/cm does not exceed 0.40.

** The amount of the specific source of the pozzolan or slag cement to be used shall be at least the amount determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slag used shall not be less than the amount tested in accordance with ASTM C1012/C1012M and meeting the requirements maximum

expansion requirements listed herein.

*** If Type V cement is used as the sole cementitious material, the optional sulfate requirement of 0.040 percent maximum expansion in ASTM C150/C150M shall be required.

^ Other available types of cement, such as Type III or Type I, are acceptable in exposure classes S1 or S2 if the C3A contents are less than 8 or 5 percent, respectively.

b. The maximum w/cm limits do not apply to lightweight concrete.

c. Alternative combinations of cementitious materials of those listed in this paragraph are acceptable if they meet the maximum expansion requirements listed in the following table:

Exposure class	**Maximum expansion when tested using ASTM C1012/C1012M**		
	At 6 months	**At 12 months**	**At 18 months**
S1	0.10 percent	N/A	N/A
S2	0.05 percent	0.10 percent^	N/A
S3	N/A	N/A	0.10 percent

^The 12-month expansion limit applies only when the measured expansion exceeds the 6-month maximum expansion limit.

2.5.2.5 Concrete Temperature

The temperature of concrete as delivered must not exceed 95°F.

2.5.2.6 Concrete permeability

a. Provide concrete meeting the requirements of the following table based on exposure class assigned to members requiring low permeability in the Contract Documents.

Exposure class	**Maximum *w/cm****	**Minimum f'c, psi**	**Additional minimum requirements**
W0	N/A	2500	None
W1	0.5	4000	None

*The maximum w/cm limits do not apply to lightweight concrete.

b. Submit documentation verifying compliance with specified requirements.

2.5.3 Trial Mixtures

Trial mixtures must be in accordance to ACI 301.

2.5.4 Ready-Mix Concrete

Provide concrete that meets the requirements of ASTM C94/C94M.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by ASTM C94/C94M:

a. Type and brand cement

b. Cement and supplementary cementitious materials content in 94-pound bags per cubic yard of concrete

c. Maximum size of aggregate

d. Amount and brand name of admixtures

e. Total water content expressed by water cementitious material ratio

2.6 REINFORCEMENT

a. Bend reinforcement cold. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117.

b. Submit manufacturer's certified test report for reinforcement.

c. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Placing drawings must indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.

d. Submit request with locations and details of splices not indicated in Contract Documents.

e. Submit request to place column dowels without using templates.

f. Submit request for field cutting, including location and type of bar to be cut and reason field cutting is required.

2.6.1 Reinforcing Bars

a. Reinforcing bars must be deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.

b. ASTM A615/A615M with the bars marked S, Grade 60; or ASTM A996/A996M with the bars marked R, Grade 60, or marked A, Grade 60. Cold drawn wire used for spiral reinforcement must conform to ASTM A1064/A1064M.

c. Provide reinforcing bars that contain a minimum of 90 percent recycled content. Reinforcing bars may contain post-consumer or pre-consumer recycled content. Submit documentation indicating percentage of pre-consumer and post-consumer recycled content for steel reinforcing bars.

d. Submit mill certificates for reinforcing bars.

2.6.1.1 Bar Mats

a. Bar mats must conform to ASTM A184/A184M.

2.6.1.2 Headed Shear Stud Reinforcement

Headed studs and headed stud assemblies must conform to ASTM A1044/A1044M.

2.6.2 Wire

a. Provide wire reinforcement that contains a minimum of 90 percent recycled content. Submit documentation indicating percentage of pre-consumer and post-consumer recycled content for steel wire reinforcement.

b. Plain or deformed steel wire must conform to ASTM A1064/A1064M.

c. Stainless steel wire must conform to ASTM A1022/A1022M.

2.6.3 Welded wire reinforcement

a. Use welded wire reinforcement specified in Contract Documents and conforming to one or more of the specifications given herein.

b. Plain welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 12 in. apart in direction of principal reinforcement.

c. Deformed welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 16 in. apart in direction of principal reinforcement.

2.6.4 Reinforcing Bar Supports

a. Provide reinforcement support types within structure as required by Contract Documents. Reinforcement supports must conform to CRSI RB4.1. Submit description of reinforcement supports and materials for fastening coated reinforcement if not in conformance with CRSI RB4.1.

b. Legs of supports in contact with formwork must be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

c. Provide reinforcing bar supports that contain a minimum of 25 percent recycled content. Reinforcing bar supports may contain post-consumer or pre-consumer recycled content. Submit documentation indicating percentage of pre-consumer and post-consumer recycled content for steel reinforcing bar supports.

2.6.5 Reinforcing Fibers

2.6.5.1 Synthetic Fibers

In addition to the requirements specified above, provide fiber reinforced concrete in accordance with ASTM C1116/C1116M Type III, synthetic fiber reinforced concrete, and as follows. Provide synthetic reinforcing fibers of monofilament polypropylene fibers, with a minimum of 5 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content. See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for cumulative total recycled content requirements. Fibers may contain post-consumer or post-industrial recycled content.

Provide fibers that have a specific gravity of 0.855, a minimum tensile

strength of 480 MPa 70 ksi, graded per manufacturer, and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement. Add fibers at the batch plant. Provide the services of a qualified technical representative to instruct the concrete supplier in proper batching and mixing of materials to be provided.

2.6.6 Dowels for Load Transfer in Floors

Provide greased dowels for load transfer in floors of the type, design, weight, and dimensions indicated. Provide dowel bars that are plain-billet steel conforming to ASTM A615/A615M, Grade 40. Provide dowel pipe that is steel conforming to ASTM A53/A53M.

Plate dowels must conform to ASTM A36/A36M, and must be of size and spacing indicated. Plate dowel system must minimize shrinkage restraint by using a tapered shape.

2.6.7 Welding

a. Provide weldable reinforcing bars that conform to ASTM A706/A706M and ASTM A615/A615M and Supplement S1, Grade 60, except that the maximum carbon content must be 0.55 percent.

b. Comply with AWS D1.4/D1.4M unless otherwise specified. Do not tack weld reinforcing bars.

c. Welded assemblies of steel reinforcement produced under factory conditions, such as welded wire reinforcement, bar mats, and deformed bar anchors, are allowed.

PART 3 EXECUTION

3.1 EXAMINATION

a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.

b. If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.

c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

3.2.1 General

a. Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

b. Remove standing water without washing over freshly deposited concrete.

Divert flow of water through side drains provided for such purpose.

3.2.2 Subgrade Under Foundations and Footings

a. When subgrade material is semi-porous and dry, sprinkle subgrade surface with water as required to eliminate suction at the time concrete is deposited, or seal subgrade surface by covering surface with specified vapor retarder.

b. When subgrade material is porous, seal subgrade surface by covering surface with specified vapor retarder.

3.2.3 Subgrade Under Slabs on Ground

a. Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.

b. Previously constructed subgrade or fill must be cleaned of foreign materials

c. Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of 1/4 inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.

d. Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot below elevation indicated.

3.2.4 Edge Forms and Screed Strips for Slabs

a. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment.

b. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

3.2.5 Reinforcement and Other Embedded Items

a. Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

b. When concrete is placed, reinforcement must be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

3.3 FORMS

a. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade.

b. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch. Place chamfer strips in corners of formwork to

produce beveled edges on permanently exposed surfaces.

c. Provide formwork with clean-out openings to permit inspection and removal of debris.

d. Inspect formwork and remove foreign material before concrete is placed.

e. At construction joints, lap form-facing materials over the concrete of previous placement. Ensure formwork is placed against hardened concrete so offsets at construction joints conform to specified tolerances.

f. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in formwork after concrete has reached initial setting. Brace formwork to resist lateral deflection and lateral instability.

g. Fasten form wedges in place after final adjustment of forms and before concrete placement.

h. Provide anchoring and bracing to control upward and lateral movement of formwork system.

i. Construct formwork for openings to facilitate removal and to produce opening dimensions as specified and within tolerances.

j. Provide runways for moving equipment. Support runways directly on formwork or structural members. Do not support runways on reinforcement. Loading applied by runways must not exceed capacity of formwork or structural members.

k. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with removable material to prevent concrete entry into voids.

l. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete placement.

3.3.1 Coating

a. Cover formwork surfaces with an acceptable material that inhibits bond with concrete.

b. If formwork release agent is used, apply to formwork surfaces in accordance with manufacturer's recommendations before placing reinforcement. Remove excess release agent on formwork prior to concrete placement.

c. Do not allow formwork release agent to contact reinforcement or hardened concrete against which fresh concrete is to be placed.

3.3.2 Reshoring

a. Do not allow structural members to be loaded with combined dead and construction loads in excess of loads indicated in the accepted procedure.

b. Install and remove reshores or backshores in accordance with accepted

procedure.

c. For floors supporting shores under newly placed concrete, either leave original supporting shores in place, or install reshores or backshores. Shoring system and supporting slabs must resist anticipated loads. Locate reshores and backshores directly under a shore position or as indicated on formwork shop drawings.

d. In multistory buildings, place reshoring or backshoring over a sufficient number of stories to distribute weight of newly placed concrete, forms, and construction live loads.

3.3.3 Reuse

a. Reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised.

b. Wood forms must not be clogged with paste and must be capable of absorbing high water-cementitious material ratio paste.

c. Remove leaked mortar from formwork joints before reuse.

3.3.4 Forms for Standard Rough Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction, excluding magazines.

3.3.5 Forms for Standard Smooth Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view. Magazine wall and roof surfaces receiving waterproofing membrane must be SF-3.0.

3.3.6 Form Ties

a. After ends or end fasteners of form ties have been removed, repair tie holes in accordance with ACI 301 Section 5 requirements.

3.3.7 Tolerances for Form Construction

a. Construct formwork so concrete surfaces conform to tolerances in ACI 117.

b. Position and secure sleeves, inserts, anchors, and other embedded items such that embedded items are positioned within ACI 117 tolerances.

c. To maintain specified elevation and thickness within tolerances, install formwork to compensate for deflection and anticipated settlement in formwork during concrete placement. Set formwork and intermediate screed strips for slabs to produce designated elevation, camber, and contour of finished surface before formwork removal. If specified finish requires use of vibrating screeds or roller pipe screeds, ensure that edge forms and screed strips are strong enough to support such equipment.

3.3.8 Removal of Forms and Supports

a. If vertical formed surfaces require finishing, remove forms as soon as removal operations will not damage concrete.

b. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform repairs and finishing operations required. If forms are removed before end of specified curing period, provide curing and protection.

c. Do not damage concrete during removal of vertical formwork for columns, walls, and sides of beams. Perform needed repair and finishing operations required on vertical surfaces. If forms are removed before end of specified curing period, provide curing and protection.

d. Leave formwork and shoring in place to support construction loads and weight of concrete in beams, slabs, and other structural members until in-place required strength of concrete is reached.

e. Form-facing material and horizontal facing support members may be removed before in-place concrete reaches specified compressive strength if shores and other supports are designed to allow facing removal without deflection of supported slab or member.

3.3.9 Strength of Concrete Required for Removal of Formwork

If removal of formwork, reshoring, or backshoring is based on concrete reaching a specified in-place strength, mold and field-cure cylinders in accordance with ASTM C31/C31M. Test cylinders in accordance with ASTM C39/C39M. Alternatively, use one or more of the methods listed herein to evaluate in-place concrete strength for formwork removal.

a. Tests of cast-in-place cylinders in accordance with ASTM C873/C873M. This option is limited to slabs with concrete depths from 5 to 12 in.

b. Penetration resistance in accordance with ASTM C803/C803M.

c. Pullout strength in accordance with ASTM C900.

d. Maturity method in accordance with ASTM C1074. Submit maturity method data using project materials and concrete mix proportions used on the project to demonstrate the correlation between maturity and compressive strength of laboratory cured test specimens to the Contracting Officer.

3.4 WATERSTOP INSTALLATION AND SPLICES

a. Provide waterstops in construction joints as indicated.

b. Install formwork to accommodate waterstop materials. Locate waterstops in joints where indicated in Contract Documents. Minimize number of splices in waterstop. Splice waterstops in accordance with manufacturer's written instructions. Install factory-manufactured premolded mitered corners.

c. Install waterstops to form a continuous diaphragm in each joint. Make adequate provisions to support and protect waterstops during progress of work. Protect waterstops protruding from joints from damage.

3.4.1 PVC Waterstop

Make splices by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. Reform waterstops at splices with a remolding iron with ribs or corrugations to match the pattern of the waterstop. The spliced area, when cooled, must show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

3.4.2 Rubber Waterstop

Rubber waterstops must be spliced using cold bond adhesive as recommended by the manufacturer.

3.4.3 Thermoplastic Elastomeric Rubber Waterstop

Fittings must be shop made using a machine specifically designed to mechanically weld the waterstop. A portable power saw must be used to miter or straight cut the ends to be joined to ensure good alignment and contact between joined surfaces. Maintain continuity of the characteristic features of the cross section of the waterstop (for example ribs, tabular center axis, and protrusions) across the splice.

3.4.4 Hydrophilic Waterstop

Miter cut ends to be joined with sharp knife or shears. The ends must be adhered with adhesive.

3.5 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

a. Unless otherwise specified, placing reinforcement and miscellaneous materials must be in accordance to ACI 301. Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement.

b. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

c. Nonprestressed cast-in-place concrete members must have concrete cover for reinforcement as indicated on Drawings:

3.5.1 General

Provide details of reinforcement that are in accordance with the Contract Documents.

3.5.2 Vapor Retarder

a. Install in accordance with ASTM E1643. Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12 inches and tape.

b. Remove torn, punctured, or damaged vapor retarder material and provide with new vapor retarder prior to placing concrete. Concrete placement must not damage vapor retarder. Place vapor retarder directly on underlying subgrade, base course, or capillary water barrier, unless it consists of crushed material or large granular material which could puncture the vapor barrier. In this case, a thin layer of approximately1/2 inch of fine graded material should be rolled or compacted over the fill before installation of the vapor retarder to reduce the possibility of puncture. Control concrete placement so as to prevent damage to the vapor barrier.

3.5.3 Perimeter Insulation

Install perimeter insulation at locations indicated. Adhesive must be used where insulation is applied to the interior surface of foundation walls and may be used for exterior application.

3.5.4 Reinforcement Supports

Provide reinforcement support in accordance with CRSI RB4.1 and ACI 301 Section 3 requirements. Supports for coated or galvanized bars must also be coated with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bars.

3.5.5 Splicing

As indicated in the Contract Documents. For splices not indicated follow ACI 301. Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus 2 inches.
AWS D1.4/D1.4M. Approve welded splices prior to use.

3.5.6 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

3.5.7 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.5.8 Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

a. Provide fabrication tolerances that are in accordance with ACI 117.

b. Provide hooks and bends that are in accordance with the Contract Documents.

Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with

standard approved practice and by approved machine methods.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

a. Bar lengths, depths, and bends beyond specified fabrication tolerances

b. Bends or kinks not indicated on drawings or approved shop drawings

c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.5.9 Placing Reinforcement

Place reinforcement in accordance with ACI 301.

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

For slabs other than on grade, supports for which any portion is less than 1 inch from concrete surfaces that are exposed to view or to be painted must be of precast concrete units, plastic-coated steel, or stainless steel protected bar supports. Precast concrete units must be wedge shaped, not larger than 3-1/2 by 3-1/2 inches, and of thickness equal to that indicated for concrete protection of reinforcement. Provide precast units that have cast-in galvanized tie wire hooked for anchorage and blend with concrete surfaces after finishing is completed.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

a. Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 301 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

b. Equip supports on ground and similar surfaces with sand-plates.

c. Support welded wire reinforcement as required for reinforcing bars.

d. Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

e. Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to the Contract Documents.

f. Ensure spacers, chairs, and other approved supports are in place prior to the forms being installed to allow for proper inspection.

g. Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract Documents.

3.5.10 Spacing of Reinforcing Bars

a. Spacing must be as indicated in the Contract Documents.

b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

3.5.11 Concrete Protection for Reinforcement

Additional concrete protection must be in accordance with the Contract Documents.

3.5.12 Welding

Welding must be in accordance with AWS D1.4/D1.4M.

3.6 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

In accordance with ASTM C94/C94M, ACI 301, ACI 302.1R and ACI 304R, except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.6.1 Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

3.6.2 Mixing

a. Mix concrete in accordance with ASTM C94/C94M, ACI 301 and ACI 304R.

b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the concrete temperature is less than 84 degrees F.

c. When fibers are used, add fibers together with the aggregates and never as the first component in the mixer. Dispense fibers into the mixing system using appropriate dispensing equipment and procedure as recommended by the manufacturer.

d. Place concrete within 60 minutes if the concrete temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and submitted

water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required.

e. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture, within the manufacturer's recommended dosage, to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

f. When fibers are used, add fibers together with the aggregates and never as the first component in the mixer. Fibers must be dispensed into the mixing system using appropriate dispensing equipment and procedure as recommended by the manufacturer.

3.6.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.7 PLACING CONCRETE

Place concrete in accordance with ACI 301 Section 5. Concrete shall be placed within 15 minutes of discharge into non-agitating equipment.

3.7.1 Pumping

ACI 304R and ACI 304.2R. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well-rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.7.1.1 Pumping Lightweight Concrete

In accordance with ACI 213R unless otherwise specified. Presoak or presaturate aggregates. Cement content must be minimum of 564 pounds per cubic yard and be sufficient to accommodate a 2 to 2 1/4 inch slump.

3.7.2 Cold Weather

Cold weather concrete must meet the requirements of ACI 306.1 unless otherwise specified. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any one hour and 50 degrees F per 24 hours after heat application.

3.7.3 Hot Weather

Hot weather concrete must meet the requirements of ACI 301 unless otherwise specified. Maintain required concrete temperature using Figure 4.2 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.7.4 Bonding

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, nor damaged concrete at the surface.

Obtain bonding of fresh concrete that has set as follows:

a. At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; roughened and cleaned surface of set concrete must be dampened, but not saturated, immediately prior to placing of fresh concrete.

b. At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; the roughened and cleaned surface of set concrete must be dampened but not saturated and covered with a cement grout coating.

c. Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

3.8 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

3.8.1 Mixing Equipment

Before concrete pours, designate on-site area to be paved later in project for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

3.8.2 Hardened, Cured Waste Concrete

Crush and reuse hardened, cured waste concrete as fill or as a base course for pavement.

3.8.3 Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

3.8.4 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and/or packaging material. Return excess cement to supplier.

3.9 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.9.1 Defects

Repair surface defects in accordance with ACI 301 Section 5.

3.9.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified must be finished with wood floats to even surfaces. Finish must match adjacent finishes.

3.9.3 Formed Surfaces

3.9.3.1 Tolerances

Tolerances in accordance with ACI 117 and as indicated.

3.9.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0. Patch holes and defects in accordance with ACI 301.

3.9.3.3 Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with ACI 301.

3.10 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

In accordance with ACI 301 and ACI 302.1R, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Depress the concrete base slab where quarry tile, ceramic tile, or walk off mats are indicated. Steel trowel and fine-broom finish concrete slabs that are to receive quarry tile, ceramic tile, or paver tile. Where straightedge measurements are specified, Contractor must provide straightedge.

3.10.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater. Grate tampers

("jitterbugs") shall not be used.

3.10.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious applications. Finish concrete in accordance with ACI 301 Section 5 for a scratched finish.

3.10.1.2 Floated

Use for surfaces to receive roofing, waterproofing membranes, sand bed terrazzo, and exterior slabs where not otherwise specified. Finish concrete in accordance with ACI 301 Section 5 for a floated finish.

3.10.1.3 Steel Troweled

Use for floors intended as walking surfaces, and for reception of floor coverings. Finish concrete in accordance with ACI 301 Section 5 for a steel troweled finish.

3.10.1.4 Broomed

Use on surfaces of exterior walks, platforms, patios, and ramps, unless otherwise indicated. Finish concrete in accordance with ACI 301 Section 5 for a broomed finish.

3.10.2 Flat Floor Finishes

ACI 302.1R. Construct in accordance with one of the methods recommended in Table 10.15.3a, "Slab-on-ground flatness/levelness construction guide" or Table 10.15.3b, "Suspended slab flatness/levelness construction guide" appropriate for the type of construction. ACI 117 for tolerance tested by ASTM E1155.

a. Specified Conventional Value:

Floor Flatness (Ff)	20	13 minimum
Floor Levelness (FL)	15	10 minimum

3.10.2.1 Measurement of Floor Tolerances

Test slab within 24 hours of the final troweling. Provide tests to Contracting Officer within 12 hours after collecting the data. Floor flatness inspector is required to provide a tolerance report which must include:

a. Key plan showing location of data collected.

b. Results required by ASTM E1155.

3.10.2.2 Remedies for Out of Tolerance Work

Contractor is required to repair and retest any floors not meeting specified tolerances. Prior to repair, Contractor must submit and receive approval for the proposed repair, including product data from any materials proposed. Repairs must not result in damage to structural integrity of the floor. For floors exposed to public view, repairs must prevent any uneven or unusual coloring of the surface.

3.10.3 Concrete Walks

Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet unless otherwise indicated. Cut contraction joints 1 inch deep, or one fourth the slab thickness whichever is deeper, with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space expansion joints every 50 feet maximum. Give walks a broomed finish. Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 1/4 inch in 5 feet.

3.10.4 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

3.10.5 Splash Blocks

Provide at outlets of downspouts emptying at grade. Splash blocks may be precast concrete, and must be 24 inches long, 12 inches wide and 4 inches thick, unless otherwise indicated, with smooth-finished countersunk dishes sloped to drain away from the building.

3.11 JOINTS

3.11.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate construction joints as follows:

3.11.1.1 Construction Joints for Constructability Purposes

a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.

b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.

c. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used for slabs.

3.11.2 Isolation Joints in Slabs on Ground

a. Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

b. Fill joints with premolded joint filler strips 1/2 inch thick,

extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor must clean groove of foreign matter and loose particles after surface has dried.

3.11.3 Contraction Joints in Slabs on Ground

a. Provide joints to form panels as indicated.

b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.

c. Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5.

d. Joints must be 1/8-inch wide by 1/5 to 1/4 of slab depth and formed by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured for at least 7 days, the Contractor must remove inserts and clean groove of foreign matter and loose particles.

3.11.4 Sealing Joints in Slabs on Ground

a. Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

b. Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

3.12 CURING AND PROTECTION

Curing and protection in accordance with ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer, hardener, or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that adsorb VOCs.

Prevent concrete with silica fume from drying by one or more of the following:

a. Misting surface of concrete with fog nozzle;

b. Liquid membrane-forming compound;

c. Pervious or impervious sheeting.

Increase curing time per manufacturer's recommendations and in accordance with the Drawings.

3.12.1 Curing Periods

ACI 301 Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

3.12.2 Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.12.3 Curing Unformed Surfaces

a. Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

b. Accomplish final curing of unformed surfaces by any of curing methods specified, as applicable.

c. Accomplish final curing of concrete surfaces to receive liquid floor hardener of finish flooring by moisture-retaining cover curing.

3.12.4 Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 37 degrees F in any one hour nor 80 degrees F in any 24-hour period.

3.12.5 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.12.6 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.13 FIELD QUALITY CONTROL

3.13.1 Aggregate Testing

3.13.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C136/C136M and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.13.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C136/C136M for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.13.2 Concrete Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C31/C31M for making test specimens.

3.13.3 Concrete Testing

3.13.3.1 Slump Tests

ASTM C143/C143M. Take concrete samples during concrete placement/discharge. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.13.3.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.13.3.3 Compressive Strength Tests

ASTM C39/C39M. Make six 6 inch by 12 inch test cylinders for each set of tests in accordance with ASTM C31/C31M, ASTM C172/C172M and applicable requirements of ACI 305R and ACI 306R. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold two cylinders in reserve. Take samples for strength tests of each mix design of concrete placed each day not less than once a day, nor less than once for each 100 cubic yards of concrete for the first 500 cubic yards, then every 500 cubic yards thereafter, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. Concrete compressive tests must meet the requirements of this section, the Contract Document, and ACI 301. Retest locations represented by erratic core strengths. Where retest does not meet concrete compressive strength requirements submit a mitigation or remediation plan for review and approval by the contracting officer. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.13.3.4 Air Content

ASTM C173/C173M or ASTM C231/C231M for normal weight concrete and ASTM C173/C173M for lightweight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.13.3.5 Unit Weight of Structural Concrete

ASTM C138/C138M. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

3.13.3.6 Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

a. Failure to meet compressive strength tests as evaluated.

b. Reinforcement not conforming to requirements specified.

c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.

d. Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified.

e. Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.

f. Poor workmanship likely to result in deficient strength.

Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the contracting officer.

3.13.3.7 Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.13.3.8 Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with ASTM C42/C42M, and as follows:

a. Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.

b. Test cores after moisture conditioning in accordance with ASTM C42/C42M if concrete they represent is more than superficially wet under service.

c. Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.

d. Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

e. Core specimens will be taken and tested by the Government. If the

results of core-boring tests indicate that the concrete as placed does not conform to the drawings and specification, the cost of such tests and restoration required must be borne by the Contractor.

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

3.14 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the Contracting Officer for approval before any corrective work is accomplished.

3.14.1 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

3.14.2 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the Contracting Officer prior to proceeding.

-- End of Section --

SECTION 03 70 00

MASS CONCRETE
02/10, CHG 2: 08/20

PART 1 GENERAL

1.1 UNIT PRICES

1.1.1 Concrete for thicknesses 3 feet or more.

1.1.1.1 Payment

Payment will be made for costs associated with completing the concrete work for concrete placed in the Earth covered magazine foundations.. However, these costs will not include the cost of the cement, pozzolan, slag, reinforcement, water-reducing admixture, high range water reducer, and embedded parts that are specified to be paid for separately. No payment will be made for concrete, as such, that is placed in structures of which payment is made as a lump sum.

1.1.1.2 Measurement

Concrete will be measurement for payment based upon the actual volume of concrete within the pay lines of the structures as indicated on the drawings. Measure concrete placed against the sides of any excavation without the use of intervening forms only within the pay lines of the structure. Do not make deductions for rounded or beveled edges, space occupied by metal work, electrical conduits or reinforcing steel, nor for voids or embedded items that are either less than 5 cubic feet in volume or 1 square foot in cross section.

1.1.1.3 Unit of Measure

Unit of measure: cubic yards.

1.1.2 Portland Cement

1.1.2.1 Payment

Payment will be made for costs associated with Portland cement, which includes the cost of required unloading, hauling, handling, and storage at the site, of all portland cement used in the work.

1.1.2.2 Measurement

Portland cement will be measured for payment based upon the number of tons of portland cement used unless specifically excepted, wasted, or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight in pounds/cubic yard of portland cement in each type of concrete used by the number of cubic yards of concrete types placed within the pay lines of the structure, as determined in accordance with the concrete bid items, and dividing by 2,000.

1.1.2.3 Unit of Measure

Unit of measure: tons (2000 lb).

1.1.3 Pozzolan

1.1.3.1 Payment

Payment will be made for costs associated with pozzolan, which includes the cost of required unloading, hauling, handling, and storage at the site, of all pozzolan used in the concrete bid items.

1.1.3.2 Measurement

Pozzolan will be measured for payment based upon the number of cubic feet solid volume of pozzolan used unless specifically excepted, wasted, or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight in pounds/cubic yard of pozzolan in each type of concrete used by the number of cubic yards of concrete of the types placed within the pay lines of the structure, as determined in accordance with the concrete bid items, and dividing by the product of the average specific gravity of the pozzolan multiplied by 62.4 pounds/cubic foot. The average specific gravity is the average of the test results for all material accepted during the period covered by the payment.

1.1.3.3 Unit of Measure

Unit of measure: cubic feet solid volume.

1.1.4 Ground Granulated Blast-Furnace Slag

1.1.4.1 Payment

Payment will be made for costs associated with ground granulated blast-furnace slag, which includes the cost of required unloading, hauling, handling, and storage at the site, of all ground granulated blast-furnace slag used in the concrete bid items.

1.1.4.2 Measurement

Ground granulated blast-furnace slag will be measured for payment based upon the number of tons of ground granulated blast-furnace slag used excluding the amount specifically excepted, wasted, or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight in pounds/cubic yard of ground granulated blast-furnace slag in each type of concrete used by the number of cubic yards of concrete types placed within the pay lines of the structure, as determined in accordance with the concrete bid items, and dividing by 2,000.

1.1.4.3 Unit of Measure

Unit of measure: tons (2000 lb).

1.1.5 Water-Reducing Admixture (WRA)

1.1.5.1 Payment

Payment will be made for costs associated with water-reducing admixture (WRA) at the applicable contract unit price per cubic yard of concrete containing water-reducing admixture.

1.1.5.2 Measurement

Water-reducing admixture (WRA) will be measured for payment based upon the actual volume of concrete containing the admixture and within the pay lines of the structures, as determined in accordance with the concrete bid items.

1.1.5.3 Unit of Measure

Unit of measure: cubic yards.

1.1.6 High-Range Water-Reducing Admixture (HRWR)

1.1.6.1 Payment

Payment will be made for costs associated with high-range water-reducing admixture (HRWR) at the applicable contract unit price per cubic yard of concrete containing water-reducing admixture.

1.1.6.2 Measurement

High-Range water-reducing admixture (HRWR) will be measured for payment based upon the actual volume of concrete containing the admixture and within the pay lines of the structures, as determined in accordance with the concrete bid items.

1.1.6.3 Unit of Measure

Unit of measure: cubic yards.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005; R 2017) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 214R	(2011) Evaluation of Strength Test Results of Concrete
ACI 306R	(2016) Guide to Cold Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM C31/C31M	(2022) Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C39/C39M	(2018) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C40/C40M	(2020) Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
ASTM C94/C94M	(2021b) Standard Specification for Ready-Mixed Concrete
ASTM C117	(2017) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C123/C123M	(2023) Standard Test Method for Lightweight Particles in Aggregate
ASTM C127	(2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C128	(2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C131/C131M	(2020) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C142/C142M	(2017) Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2021) Standard Specification for Portland Cement
ASTM C171	(2020) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C295/C295M	(2019) Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM C309	(2019) Standard Specification for Liquid

	Membrane-Forming Compounds for Curing Concrete
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C535	(2016) Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C566	(2013) Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM C618	(2019) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666/C666M	(2015) Resistance of Concrete to Rapid Freezing and Thawing
ASTM C881/C881M	(2020a) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C928/C928M	(2020a) Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs
ASTM C989/C989M	(2018a) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1059/C1059M	(2021) Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C1064/C1064M	(2023) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	(2017) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D4791	(2019) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(2018) Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(2000; R 2006) Concrete Plant Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 55	(1992) Test Method for Within-Batch Uniformity of Freshly Mixed Concrete
COE CRD-C 94	(1995) Corps of Engineers Specification for Surface Retarders
COE CRD-C 100	(1975) Method of Sampling Concrete Aggregate and Aggregate Sources, and Selection of Material for Testing
COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 130	(2001) Standard Recommended Practice for Estimating Scratch Hardness of Coarse Aggregate Particles
COE CRD-C 143	(1962) Specifications for Meters for Automatic Indication of Moisture in Fine Aggregate
COE CRD-C 144	(1992) Standard Test Method for Resistance of Rock to Freezing and Thawing
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Concrete Lifts; G

Equipment; G

SD-03 Product Data

Batch Plant; G

Mixers

Construction Joint Treatment; G

Curing and Protection; G

Cold-Weather Protection; G

Hot-weather Placing; G

SD-07 Certificates

Sheet Curing

Nonshrink Grout; G

Bonding Agents

1.4 QUALITY ASSURANCE

1.4.1 Government Preconstruction Testing

1.4.1.1 Aggregate Sources

The aggregate sources listed in paragraph COMMERCIAL CONCRETE AGGREGATE SOURCES, have been tested, and at the time testing was performed, these sources were capable of producing materials of the quality and quantity required for this project provided suitable processing is performed. Deliver samples from any source selected, taken under the supervision of the Contracting Officer in accordance with COE CRD-C 100, within 15 days after notice to proceed. Sampling and shipment of samples is the Contractor's expense. 14 days will be required to complete evaluation of the aggregates. Testing will be performed by the Government in accordance with the applicable COE CRD-C or ASTM test methods. Tests to which aggregate may be subjected are listed in paragraph AGGREGATES. The material from the proposed source must meet the quality requirements of this paragraph to be used for the project. The Government test data and other information on aggregate quality of those sources listed in paragraph COMMERCIAL CONCRETE AGGREGATE SOURCES and are available for review in the District Office. Quality assurance testing of aggregates by the Government does not relieve the Contractor of quality control requirements.

1.4.1.2 Cementitious Materials, Admixtures, and Curing Materials

Notify the Contracting Officer of the source, brand name, type, and quantity of all materials (other than aggregates) to be used in the manufacture and curing of the concrete at least 60 days in advance of submitting samples for mixture proportioning studies. Assist the Contracting Officer in obtaining samples of each material. Sampling and testing as determined appropriate will be performed by and at the expense of the Government. If cement or pozzolan are to be obtained from more than one source, state the estimated amount of cement or pozzolan to be obtained from each source and the proposed schedule of shipments in the notification. When pozzolan other than fly ash is used, it must be from one source.

1.4.1.3 Materials for Mixture-Proportioning Studies

At least 30 days in advance of the time when placing of concrete is expected to begin, deliver samples of representative materials proposed for this project and meeting all the requirements of this specification by the Contractor at its expense. Take samples of aggregates under the supervision of the Contracting Officer in accordance with COE CRD-C 100, accompanied by test reports indicating conformance with grading and

quality requirements hereinafter specified. Provide samples of materials other than aggregates that are representative of those proposed for the project and submit accompanied by manufacturer's test reports indicating compliance with applicable specified requirements. Quantities of the following materials must be submitted:

MATERIAL	QUANTITY
6 inch nominal maximum-size coarse aggregate	
3 inch nominal maximum-size coarse aggregate	
1-1/2 inch nominal maximum-size coarse aggregate	
3/4 inch nominal maximum-size coarse aggregate	
Fine aggregate	
Cement	
Pozzolans	
Air-entraining admixture	
Other admixtures (each)	

Mixture-proportioning studies will be made by the Government.

1.4.2 Construction Testing by the Government

1.4.2.1 General

The Government will sample and test cementitious materials, admixtures, aggregates, and concrete during construction as considered appropriate to determine compliance with the specifications. Provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with COE CRD-C 100. Slump and air content will be determined in accordance with ASTM C143/C143M and ASTM C231/C231M, respectively, except the point of sampling will be as directed. Compression test specimens will be made and laboratory cured in accordance with ASTM C31/C31M and will be tested in accordance with ASTM C39/C39M.

1.4.2.2 Testing Aggregates

Testing performed by the Government will not relieve the Contractor of its responsibility for testing as appropriate for quality control. During construction, aggregates will be sampled for acceptance testing as delivered to the mixer to determine compliance with specification provisions. Provide necessary facilities and labor for the ready procurement of representative samples under Contracting Officer supervision. The Government will test such samples at its expense using appropriate COE CRD-C and ASTM methods.

1.4.2.3 Cementitious Materials

Furnish cement or pozzolan or both from a prequalified source or, if not, it (they) will be sampled at the mill, shipping point, or site of the work by the Contracting Office. A list of prequalified cement sources and prequalified pozzolan sources is available from the Director, U.S. Army Corps of Engineers, Engineer Research and Development Center - Structures Laboratory, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, ATTN: CEERD-SC. If tests prove that a material which has been delivered is unsatisfactory, promptly remove it from the site of the work. Cementitious materials that have not been used within 6 months after being tested will be retested by the Government at the expense of the Contractor when directed.

1.4.2.4 Cement from Prequalified Sources

Deliver and use cement directly from a mill of a producer designated as a prequalified source for the type of cement being used. Samples of cement for quality-assurance testing will be taken at the project site or cement-producing plant by the Contracting Officer for testing at the expense of the Government. Furnish a copy of the mill tests from the cement manufacturer to the Contracting Officer for each lot.

1.4.2.5 Pozzolan from Prequalified Sources

Deliver and use pozzolan directly from a producer designated as a prequalified source. Samples of pozzolan for check testing will be taken at the project site by the Contracting Officer for testing at the expense of the Government. Furnish a copy of the test results from the pozzolan manufacturer to the Contracting Officer for each lot.

1.4.2.6 Cement from Nonprequalified Sources

Cement, if not from a prequalified source, will be sampled and tested by or under the supervision of the Contracting Officer and at Government expense. Do not use cement until notice has been given by the Contracting Officer that test results are satisfactory. In the event of failure, the cement may be resampled and tested at the request of the Contractor and at the Contractor's expense. When the point of sampling is other than at the site of the work, the fill gate or gates of the sampled bin will be sealed and kept sealed until shipment from the bin has been completed. The fill gate or gates of conveyances used in shipment will be sealed by or under the supervision of the Contracting Officer. Conveyances will not be accepted at the site of the work unless received with all seals intact. If tested cement is rehandled at transfer points, the extra cost of inspection will be at the Contractor's expense. The cost of testing cement excess to project requirements will also be at the Contractor's expense and will be deducted from payments due the Contractor.

1.4.2.7 Pozzolan from Nonprequalified Sources

Pozzolan, if not from a prequalified source, will be sampled at the source or at the site of the work and will be stored in sealed bins pending completion of acceptance tests. Pozzolan may be resampled at the site when determined necessary. All sampling and testing will be performed by and at the expense of the Government. Release for shipment and approval for use will be based on compliance with seven day lime-pozzolan strength requirements and other physical, chemical, and uniformity requirements for which tests can be completed by the time the seven day lime-pozzolan

strength test is completed. Release for shipment and approval for use on this basis will be contingent on continuing compliance with the other requirements of the specifications. If test results of a bin fail, the contents may be resampled and tested at the Contractor's expense. The Government will supervise or perform the unsealing and resealing of bins and shipping conveyances. If tested pozzolan is rehandled at transfer points, the extra cost of inspection will be at the Contractor's expense. The cost of testing excess pozzolan in excess of project requirements will be at the Contractor's expense. The amount will be deducted from payment to the Contractor.

1.4.2.8 Ground Granulated Blast-Furnace Slag

Ground granulated blast-furnace slag will be sampled and tests at the mill or shipping point by and at the expense of the Government to determine that the material meets the requirements of the specification under which it is furnished. Do not use ground granulated blast-furnace slag until notice of acceptance has been given by the Contracting Officer. Ground granulated blast-furnace slag will be subject to check testing from samples obtained at the project site, as scheduled, and such sampling will be by or under the supervision of the Contracting Officer and at Government expense. Remove material not meeting specifications promptly from the site of work.

1.4.2.9 Chemical Admixtures

Provide satisfactory facilities for ready procurement of test samples. All sampling and testing of a chemical admixture will be by and at the expense of the Government. Tests will be conducted using samples of materials proposed for the project.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Cementitious Materials

1.5.1.1 Transportation

When bulk cement, pozzolan, or ground granulated blast-furnace slag is not unloaded from primary carriers directly into weather-tight hoppers at the batching plant, accomplish transportation from the railhead, mill, or intermediate storage to the batching plant in weather-tight trucks, conveyors, or other means that will protect the material from exposure to moisture. Transportation facilities for dry bulk silica fume must be approved in advance.

1.5.1.2 Storage

Furnish cementitious materials in bulk except that cement used for finishing and patching may be packaged, and silica fume may be packaged or in slurry form. Immediately upon receipt at the site of the work, store all cementitious materials in separate dry, weather-tight, and properly ventilated structures. All storage facilities must permit easy access for inspection and identification. Maintain sufficient materials in storage to complete any lift of concrete started. In order that cement may not become unduly aged after delivery, use any cement that has been stored at the site for 60 days or more before using cement of lesser age. Do not use silica fume in slurry form that has been in storage at the project site for longer than recommended by the manufacturer or that has been subjected to freezing in the work and remove from the site.

1.5.1.3 Separation of Materials

Provide separate facilities for unloading, transporting, and handling each cementitious material. Provide separate appropriate storage facilities for each type of cement and each source of pozzolan, or slag. Plainly mark the contents of each storage facility marked with a large permanent sign posted near the loading port.

1.5.2 Aggregates Storage

Store fine aggregate and each size of coarse aggregate in separate size groups adjacent to the batch plant and in such a manner as to prevent the intermingling of size groups or the inclusion of foreign materials in the concrete. Maintain sufficient fine and coarse aggregate at the site at all times to permit continuous placement and completion of any lift of concrete started.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide concrete composed of cementitious materials, water, fine and coarse aggregates, and admixtures. Use cementitious materials that are portland cement, portland cement in combination with pozzolan, portland blast-furnace slag cement, portland cement in combination with ground granulated blast-furnace slag, or portland-pozzolan cement. Use a retarding admixture, a WRA, a HRWRA, or an accelerating admixture. A retarding admixture may be used at the request of the Contractor when approved. Do not use chemical admixtures other than those listed above.

2.1.1 Proportioning Responsibility

The concrete mixtures will be proportioned by the Contracting Officer. Preliminary mixture-proportioning studies or thermal studies which include mixture proportions are available for review in the District Office. Some mixtures, especially those containing higher amounts of pozzolans, may have slow strength gain which may impact form design and form removal time.

2.1.2 Design Requirements

The proportions of all material entering into each concrete mixture will be furnished to the Contractor. The proportions will be changed by the Contracting Officer as necessary. Make adjustments to the batch weights of aggregates and water as necessary to compensate for free moisture in the aggregates. Adjust the quantity of air-entrainment admixture to maintain the specified air content.

2.1.3 Air Content

Determine the air content by volume by ASTM C231/C231M. When the nominal maximum size of coarse aggregate is 1-1/2 inches or larger, the air content of the sample measured in accordance with ASTM C231/C231M must be 5-1/2 ± 1-1/2 percent. When the nominal maximum-size coarse aggregate is 3/4 inch, the air content must be 6 ± 1 percent. The specified air content must be present in the concrete when the concrete has been placed in the forms.

2.1.4 Slump

Determine slump in accordance with ASTM C143/C143M of 2 inches ± 1 inch for massive features and between 1 and 4 inches for all others except where placement by pump is approved, in which case the slump must be 4-1/2 ± 1-1/2 inches. In addition, the range of each set of two consecutive tests for each mixture must be no more than 2 inches. The above specified slump is that required at the forms.

2.1.5 Construction Tolerances

Make level and grade tolerance measurements of slabs as soon as possible after finishing. When forms or shoring are used, make the measurements prior to removal. Tolerances are not cumulative. The most restrictive tolerance controls. Do not allow tolerances to extend the structure beyond legal boundaries. Except as specified otherwise, plus tolerance increases the amount or dimension to which it applies, or raises a level alignment and minus tolerance decreases the amount or dimension to which it applied, or lowers a level alignment. A tolerance without sign means plus or minus. Where only one signed tolerance is specified, there is no limit in the other direction. Finish unformed finished surfaces subject to high-velocity flow (40 fps) to meet the tolerances for A-HV surfaces specified in Table, "TOLERANCES FOR FINISHED FORMED CONCRETE SURFACES".

2.1.6 Tabulations and Definitions

The definitions of the terms used in the following tabulations are used as defined and used in ACI 117. Make level and grade tolerance measurements of slabs as soon as possible after finishing.

TOLERANCES FOR FOUNDATIONS		
(1)	Lateral alignment	
	As cast to the center of gravity as specified; 0.02 times width of footing in direction of misplacement but not more than	2 inches
	Supporting masonry construction	1/2 inch
(2)	Level alignment	
	Top of footings supporting masonry	1/2 inch
	Top of other footings	+1/2 inch, -2 inch

TOLERANCES FOR FOUNDATIONS		
(3)	Cross-sectional dimensions	
	Horizontal dimensions of formed members	+2 in.,-1/2 in.
	Horizontal dimensions of unformed members cast against soil	
	2 feet or less	+3 in., -1/2 in.
	Greater than 2 feet but less than 6 feet	+6 in., -1/2 in.
	Over 6 feet	+12 in., -1/2 in.
	Vertical dimension (thickness)	-5 percent
(4)	Relative alignment	
	Slope of footing side and top surfaces with respect to the specified plan	1 in./10 ft

TOLERANCES FOR CAST-IN-PLACE REINFORCED CONCRETE FOR BUILDINGS			
(1)	Vertical alignment		
	For heights 100 feet		
		Lines, surfaces, and arrises	1 inch
		Outside corner of exposed corner columns and control joint grooves in concrete exposed to view	1/2 inch
	For heights greater than 100 ft		
		Lines, surfaces, and arrises, 1/1,000 times the height at any point but not more than	6 inches
		Outside corner of exposed corner columns and control joint grooves in concrete, 1/2,000 times the height at any point but not more than	3 inches
(2)	Lateral alignment		
	Members		1 inch
	In slabs, centerline location of openings 12 in. or smaller and edge location of larger openings		1/2 inch
	Sawcuts, joints, and weakened plane embedment in slabs		3/4 inch

TOLERANCES FOR CAST-IN-PLACE REINFORCED CONCRETE FOR BUILDINGS			
(3)	Level alignment		
	Top of slabs		
		Elevation of slabs-on-grade	3/4 inch
		Elevation of top surfaces of formed slabs before removal of supporting shores	3/4 inch
	Elevation of formed surfaces before removal of shores		3/4 inch
	Lintels, sills, parapets, horizontal grooves, and other lines exposed to view		1/2 inch
(4)	Cross-sectional dimensions		
	Members, such as columns, beams, piers, walls (thickness only) and slabs (thickness only)		
		12 inches dimension or less	+3/8, -1/4 inch
		More than 12 inches but not over 3 feet dimension	+1/2, -3/8 inch
		Over 3 feet dimension	+1, -3/4 inch
(5)	Relative alignment		
	Stairs		
		Different in height between adjacent risers	1/8 inch
		Different in width between adjacent treads	1/4 inch
	Grooves		
		Specified width 2 inches or less	1/8 inch
		Specified width more than 2 inches but not more than 12 inches	1/4 inch
	Sawcuts, joints, and weakened plane on slab		
		Lateral, gradual	3/4 inch in 10 feet
		Lateral, abrupt	0 inch
(6)	Openings through members		
	Cross-sectional size of opening		+1, -1/4 inch
	Location of centerline of opening		1/2 inch

TOLERANCE FOR FINISHED FORMED CONCRETE SURFACES		
(1)	Vertical alignment: Formed surfaces slope with respect to the specified plane	
	Vertical alignment of outside corner of exposed corner columns and control joint grooves in concrete exposed to view	1/4 in. in 10 ft
	All other conditions	3/8 in. in 10 ft
(2)	Abrupt variation: The offset between concrete surfaces under adjacent pieces of formwork for the following classes of surface: (For Class A-HV, positive means raise of elevation in the direction of waterflow, negative means drop of elevation in the direction of waterflow)	
	Class A-HV, in the direction of waterflow	+0, -1/8 inch
	*Class A-HV, perpendicular to the direction of waterflow	1/8 inch
	Class A	1/8 inch
	Class B	1/4 inch
	Class C	1/4 inch
	Class D	1 inch
(3)	Gradual variation: Surface finish tolerances as measured by placing a freestanding (unleveled), 5 foot straightedge for plane surface or curved template for curved surface anywhere on the surface and allowing it to rest upon two high spots within 72 hr after concrete placement. The gap at any point between the straightedge or template and the surface must not exceed:	
	*Class A (including Class A-HV)	1/8 inch
	Class B	1/4 inch
	Class C	1/2 inch
	Class D	1 inch
*Includes any high-velocity flow surface.		

TOLERANCES FOR CAST-IN-PLACE, VERTICALLY SLIPFORMED BUILDING ELEMENTS		
(1)	Translation and rotation from a fixed point at the base of the structure:	
	For heights 100 feet or less	2 inches
	For heights greater than 100 feet, 1/600 times the height but not more than	8 inches

TOLERANCES FOR CAST-IN-PLACE, VERTICALLY SLIPFORMED BUILDING ELEMENTS		
(2)	Lateral alignment	
	Between adjacent elements	2 inches
(3)	Cross-sectional dimensions	
	Wall thickness	+3/4 inch, -3/8 inch
(4)	Relative alignment	
	Formed surface slope with respect to the specified plane	3/4 in. in 10 ft

TOLERANCES FOR MASS CONCRETE STRUCTURES OTHER THAN BUILDINGS		
(1)	Vertical alignment	
	Visible surfaces	1-1/4 inch
	Concealed surfaces	2-1/2 inches
	Side walls for radial gates and similar watertight joints	3/16 inch
(2)	Lateral alignment	
	Visible surfaces	1-1/4 inch
	Concealed surfaces	2-1/2 inches
(3)	Level alignment	
	Visible flatwork and formed surfaces	1/2 inch
	Concealed flatwork and formed surfaces	1 inch
	Sills for radial gates and similar watertight joints	3/16 inch

TOLERANCES FOR MASS CONCRETE STRUCTURES OTHER THAN BUILDINGS			
(4)	Relative alignment: Formed surface slope with respect to the specified plane		
	Slopes in lateral and level alignments		
		Visible surfaces	1/4 in. in 10 ft
		Concealed surfaces	1/2 in. in 10 ft
	Slopes in vertical alignment		
		Visible surfaces	1/2 in. in 10 ft
		Concealed surfaces	1 in. in 10 ft

TOLERANCES FOR CANAL LINING		
(1)	Lateral alignment	
	Alignment of tangents	2 inches
	Alignment of curves	4 inches
	Width of section at any height	0.0025W + 1 inch
(2)	Level alignment	
	Profile grade	1 inch
	Surface of invert	1/4 inch
	Surface of side slope	1/2 inch
	Height of lining	0.005H + 1 inch
(3)	Cross-sectional dimensions	
	Thickness of lining cross section: percent of specified thickness provided average thickness is maintained as determined by daily batch volumes	10

TOLERANCES FOR TUNNEL LININGS, CONDUITS, AND FILLING AND EMPTYING CULVERTS			
(1)	Lateral alignment		
	Centerline alignment		
		Water conveying tunnels, conduits, and culverts	1/2 inch
		Other	1 inch
	Inside dimensions		0.005 times inside dimension

(2)	Level alignment		
	Profile grade		
		Water conveying tunnels, conduits, and culverts	1/2 inch
		Other	1 inch
	Surface of invert		1/4 inch
	Surface of side slope		1/2 inch
(3)	Cross-sectional dimension		
	Thickness at any point		
		Tunnel and culvert lining	-0 inch
		Conduits	+5 percent thickness but not less than1/2 inch
			-2.5 percent thickness but not less than 1/4 inch

2.2 MATERIALS

2.2.1 Cementitious Materials

2.2.1.1 Portland Cement

Provide portland cement conforming to ASTM C150/C150M, Type I or II, including the heat of hydration requirement at 7 days .

2.2.1.2 Pozzolan Other

Provide pozzolan conforming to ASTM C618, Class C or F, including low alkali. Uniformity Requirements (for entrained air) must apply to all fly ash.

2.2.1.3 Ground Granulated Blast-Furnace Slag

Provide ground granulated blast-furnace slag conforming to ASTM C989/C989M, Grade 100.

2.2.1.4 Temperature of Cementitious Materials

The temperature of the cementitious materials as delivered to the site must not exceed 150 degrees F.

2.2.2 Admixtures

All chemical admixtures furnished as liquids must be in a solution of suitable viscosity for field use as determined by the Contracting Officer.

2.2.2.1 Air-Entraining Admixtures

Provide air-entraining admixture conforming to ASTM C260/C260M and consistently entrain air in the specified ranges under field conditions.

2.2.2.2 Accelerating Admixture

Do not use calcium chloride. Use accelerators that meet the requirements of ASTM C494/C494M, Type C.

2.2.2.3 Retarding Admixture

Provide retarding admixture meeting the requirements of ASTM C494/C494M, Type B, or D, except that the 6-month and 1-year compressive strength tests are waived. The admixture may be added to the concrete mixture only when approved. Do not use Type D as the reason to reduce the cementitious material content unless used in mixture proportioning studies.

2.2.2.4 Water-Reducing Admixture

Provide a water-reducing admixture meeting the requirements of ASTM C494/C494M, Type A , except that the 6-month and 1-year compressive strength tests are waived. The admixture may be added to the concrete mixture only when its use is approved or directed and after mixture proportioning studies.

2.2.2.5 High-Range Water-Reducing Admixture (HRWRA)

Use high-range water-reducing admixture that meets the requirements of ASTM C494/C494M, Type F , except the 6-month and 1-year strength requirements are waived.

2.2.3 Curing Materials

2.2.3.1 Sheet Materials

Provide sheet curing materials conforming to ASTM C171, type optional, except do not use polyethylene sheet. Submit a manufacturer's certificate certifying that the materials comply with the requirements of ASTM C171, if sheet curing is used.

2.2.3.2 Membrane-Forming Curing Compound

Provide membrane-forming curing compound conforming to ASTM C309, Type 1D or 2, except a styrene acrylate or chlorinated rubber compound meeting ASTM C309, Class B, requirements may be used for surfaces that are to be painted or are to receive subsequent coatings, or floors that are to receive adhesive applications of resilient flooring. Select curing compound selected that is compatible with any subsequent paint, roofing, coating, or flooring specified.

2.2.3.3 Burlap

Provide burlap for curing purposes conforming to AASHTO M 182.

2.2.4 Water

Use water for washing aggregates and for mixing and curing concrete that is free from injurious amounts of oil, acid, salt, alkali, organic matter,

or other deleterious substances and in compliance with COE CRD-C 400.

2.2.5 Aggregates

2.2.5.1 Aggregate Composition

Provide fine aggregate consisting of natural sand, manufactured sand, or a combination of natural and manufactured sands. Provide coarse aggregate consisting of gravel, crushed gravel, crushed stone, air-cooled blast-furnace slag, or a combination thereof. ""

2.2.5.2 Grading

2.2.5.2.1 Fine Aggregate

Deliver fine aggregate to the mixers with a grading such that the individual percent retained on any sieve does not vary more than 3 percent from the percent retained on that sieve in a fixed grading selected by the Contractor with the approval of the Contracting Officer. The fixed grading may be selected at the start of concrete placement and based upon 30 days fine aggregate production or selected after the first 30 days of concrete placement. The minimum individual percent retained on the 2.36 mm (No. 8) sieve must be 5 percent and on all smaller sieves, except the 75 µm (No. 200), must be 10 percent. In addition to the grading limits, the fine aggregate, as delivered to the mixer, must have a fineness modulus of no less than 2.25 nor more than 2.85. Also control the grading of the fine aggregate so that the fineness moduli groups (average of the current test and the previous two tests) of the fine aggregate as delivered to the mixer do not vary more than 0.10 from the target fineness modulus of the fixed grading selected by the Contractor and approved by the Contracting Officer. The range of each group must not exceed 0.20. Determine the fineness modulus in accordance with COE CRD-C 104. At the option of the Contractor, fine aggregate may be separated into two or more sizes or classifications, but control the uniformity of grading of the separate sizes so that they may be combined throughout the job in fixed proportions established during the first 30 days of concrete placement. The selected fixed grading must be within the following limits, except any individual test result may be outside these limits if within the allowable 3 percent variation from the selected grading.

SIEVE DESIGNATION U.S. STANDARD SQUARE MESH	PERMISSIBLE LIMITS PERCENT BY MASS, PASSING
3/8 inch	100
No. 4	95 - 100
No. 8	80 - 95
No. 16	60 - 80
No. 30	35 - 60
No. 50	15 - 30

SIEVE DESIGNATION U.S. STANDARD SQUARE MESH	PERMISSIBLE LIMITS PERCENT BY MASS, PASSING
No. 100	5 - 10
No. 200	0 - 5

2.2.5.2.2 Coarse Aggregate

Rescreen coarse aggregate just prior to delivery to the concrete batch plant bins. The grading of the coarse aggregate within the separate size groups must conform to the following requirements as delivered to the mixer.

PERCENT BY MASS PASSING INDIVIDUAL SIEVES				
U.S. STANDARD SIEVE SIZE	No. 4 to 3/4 inch	3/4 inch to 1-1/2 inch	1-1/2 inch to 3 inch	3 inch to 6 inch
7 inch				100
6 inch				90 - 100
4 inch			100	20 - 55
3 inch			90 - 100	0 - 15
2 inch		100	20 - 55	0 - 5
1-1/2 inch		90 - 100	0 - 10	
1 inch	100	20 - 45	0 - 5	
3/4 inch	90 - 100	0 - 10		
3/8 inch	20 - 55	0 - 5		
No. 4	0 - 10			
No. 8	0 - 5			

2.2.5.3 Particle Shape

The quantity of flat and elongated particles in the separate size groups of coarse aggregate, as determined by ASTM D4791, using a value of 3 for width-thickness ratio and length-width ratio must not exceed 25 percent in any size group.

2.2.5.4 Nominal Maximum-Size of Aggregate

Use nominal maximum-size of coarse aggregate in the various parts of the work in accordance with the following tabulation except as directed. The NMSA may be changed for sections requiring a special quality of concrete as directed.

FEATURES	NOMINAL MAXIMUM-SIZE AGGREGATE
Sections 7-1/2 inches or less in width or slabs 4 inches or less in thickness or any section with a clear distance between reinforcement less than 2-1/4 inches	3/4 inch
Sections over 7-1/2 inches or slabs at least 4 inch in thickness. However, do not use this size in any section in which the clear distance between reinforcement is less than 2-1/4 inch	1-1/2 inch
Unreinforced sections over 12 inches in width and reinforced sections over 18 inches in width or slabs 10 inches or greater in thickness. However, do not use this size in any section in which the clear distance between reinforcing bars is less than 4-1/2 inches	3 inches
Massive sections exceeding 6 feet in width and slabs 24 inches in thickness, in which the clear distance between reinforcing bars is at least 9 inches	6 inches

2.2.5.5 Moisture Content

Do not place fine aggregate in bins at the batch plant until it is in a stable state of moisture content. Reach a stable moisture content when the variation in the percent of total moisture tested in accordance with ASTM C566 and when sampled at the same location will not be more than 0.5 percent during 1 hour of the 2 hours prior to placing the material in the batch plant bins and the variation in moisture content when sampled at the same location must not be more than 2.0 percent during the last 8 hour period that the aggregate remains in the stockpile. Deliver coarse aggregate to the mixers with the least amount of free moisture and the least variation in free moisture practicable under the job conditions. Under no conditions deliver coarse aggregate to the mixer "dripping wet".

2.2.5.6 Commercial Concrete Aggregate Sources

Concrete aggregates may be furnished from any source capable of meeting the quality requirements stated in paragraph AGGREGATES above.

a. Selection of Source - After the award of the contract, designate in writing only one source or combination of sources from which the Contractor proposes to furnish aggregates. Regardless of the source selected, provide samples for quality-assurance testing as required by paragraphs GOVERNMENT PRECONSTRUCTION TESTING and MATERIALS FOR MIXTURE-PROPORTIONING STUDIES IN part 1. If a source for coarse or

fine aggregate so designated by the Contractor does not meet the quality requirements stated above, do not submit for approval other sources but furnish the coarse or fine aggregate, as the case may be, from one or a combination of the sources listed at no additional cost to the Government.

2.2.6 Nonshrink Grout

Use nonshrink grout for use in setting base plates and machinery conforming to ASTM C1107/C1107M, and is a commercial formulation suitable for the application proposed. Submit descriptive literature of the grout proposed for use containing certified laboratory test results showing that it meets ASTM C1107/C1107M 60 days prior to its use together with a certificate from the manufacturer stating that the grout is suitable for the application or exposure for which it is being considered. In addition, a detailed plan for review, showing equipment and procedures for use in mixing and placing the grout.

2.2.7 Packaged Dry Repair Materials

Provide packaged dry rapid-hardening cementitious materials for concrete repairs that is a commercial formulation conforming to ASTM C928/C928M requiring only the addition of water.

2.2.8 Bonding Agents

Submit descriptive literature and certification in advance of their use. Bonding agents must meet the following requirements:

2.2.8.1 Latex Bonding Agent

Provide latex agents for bonding fresh to hardened concrete conforming to ASTM C1059/C1059M, Type II.

2.2.8.2 Epoxy Resin

Provide epoxy resins for use in repairs conforming to ASTM C881/C881M, Type V, Grade I or II.

2.2.9 Surface Retarder

Provide surface retarder conforming to COE CRD-C 94.

2.3 PLANT AND EQUIPMENT

Submit the methods and description of the equipment proposed for transporting, handling, and depositing the concrete for review, 60 days before concrete placement begins. Include site drawings or sketches with locations of equipment and placement site.

2.3.1 Batch Plant

Submit details and data on the concrete plant, within 60 days prior to assembly, to the Contracting Officer for conformance review with the requirements of paragraph PLANT AND EQUIPMENT. Batch plant must meet the following requirements:

2.3.2 Location

The concrete plant may be located at the site of the work in the general area indicated on the drawings, or may be located offsite.

2.3.3 Bins and Silos

Provide separate bins, compartments, or silos for each size or classification of aggregate and for each of the cementitious materials. Provide compartments of ample size and constructed so that the various materials will be maintained separately under all working conditions. Separate all compartments containing bulk cement, pozzolan, ground granulated blast-furnace slag, or silica fume from each other by a free-draining air space. Clearly mark all filling ports with a permanent sign stating the contents.

2.3.4 Batching Equipment

2.3.4.1 Batchers

Weigh aggregate in separate weigh batchers with individual scales. Weigh each bulk cement and/or other cementitious materials on a separate scale in a separate weigh batcher. Measure water by weight or by volume. If measured by weight, do not weigh cumulatively with another ingredient. Measure ice separately by weight. Batch admixtures separately and batch by weight or by volume in accordance with the manufacturer's recommendations.

2.3.4.2 Water Batcher

Provide a suitable water-measuring and batching device that will be capable of measuring and batching the mixing water within the specified tolerances for each batch. Use mechanism for delivering water to the mixers that is free from leakage when the valves are closed. Interlock the filling and discharge valves for the water batcher so that the discharge valve cannot be opened before the filling valve is fully closed. When a water meter is used, provide a suitable strainer ahead of the metering device.

2.3.4.3 Admixture Dispensers

Provide a separate batcher or dispenser for each admixture. Equip each plant with the necessary calibration devices that will permit convenient checking of the accuracy of the dispensed volume of the particular admixture. Use batching or dispensing devices capable of repetitively controlling the batching of the admixtures to the accuracy specified. Use piping for liquid admixtures that are free from leaks and properly valved to prevent backflow or siphoning. Include a device or devices that will detect and indicate the presence or absence of the admixture or provide a means of visually observing the admixture in the process of being batched or discharged in the dispensing system. Ensure each system is capable of ready adjustment to permit varying the quantity of admixture to be batched. Interlock each dispenser with the batching and discharge operations so that each admixture is added separately to the batch in solution in a separate portion of the mixing water or in fine aggregate in a manner to ensure uniform distribution of the admixtures throughout the batch during the required mixing period. Store and handle admixtures in accordance with the manufacturers recommendations.

2.3.4.4 Moisture Control

Provide plant which is capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched. Provide a moisture meter complying with the provisions of COE CRD-C 143 for measurement of moisture in the fine aggregate. Arrange the sensing element so that the measurement is made near the batcher charging gate of the fine aggregate bin or in the fine aggregate batcher.

2.3.4.5 Scales

Provide facilities for the accurate measurement and control of each of the materials entering each batch of concrete. Use weighing equipment and controls conforming to the applicable requirements of NIST HB 44, except that the accuracy must be within 0.2 percent of the scale capacity. Provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring device. Make tests at the frequency required in paragraph TESTS AND INSPECTIONS in PART 3, and in the presence of a Government quality assurance representative. Include a visible indicator for each weighing unit that indicates the scale load at all stages of the weighing operation and shows the scale in balance at zero load. Arrange weighing equipment so that the concrete plant operator can observe the indicators.

2.3.4.6 Operation and Accuracy

Start weighing operation of each material automatically when actuated by a single starter switch and end automatically when the designated amount of each material has been reached. These requirements can be met by providing an automatic batching system as defined in NRMCA CPMB 100. Provide equipment to permit the selection of preset mixes each by the movement of not more than two switches or other control devices. Cumulative weighing will not be permitted. Construct and arrange weigh batchers so that the sequence and timing of batcher discharge gates can be controlled to produce a ribboning and mixing of the aggregates, water, admixtures, and cementitious materials as the materials pass through the charging hopper into the mixer. Include provisions to facilitate the inspection of all operations at all times. Deliver materials from the batching equipment within the following limits of accuracy:

MATERIAL	PERCENT
Cementitious materials	± 1
Water	± 1
Aggregate smaller than 1-1/2 inch size	± 2
Aggregate larger than 1-1/2 inch size	± 3
Chemical admixtures	± 3

2.3.4.7 Interlocks

Interlock batchers and mixers so that:

a. The charging device of each batcher cannot be actuated until all scales have returned to zero balance within ± 0.2 percent of the scale capacity and each volumetric device has reset to start or has signaled empty.

b. The charging device of each batcher cannot be actuated if the discharge device is open.

c. The discharge device of each batcher cannot be actuated if the charging device is open.

d. The discharge device of each batcher cannot be actuated until the indicated material is within the allowable tolerances.

e. One admixture is batched automatically with the water.

f. Each additional admixture is batched automatically with a separate portion of the water or with the fine aggregate.

g. The mixers cannot be discharged until the required mixing time has elapsed.

2.3.4.8 Recorder

Provide an accurate recorder or recorders conforming to the following detailed requirements:

a. Produce a graphical or digital record on a single visible chart or tape of the weight or volume of each material in the batchers at the conclusion of the batching cycle. Produce record prior to delivery of the materials to the mixer. After the batchers have been discharged, show the return to empty condition.

b. House graphical recording or digital printout unit completely in a single cabinet that is capable of being locked.

c. Mark the chart or tape so that each batch may be permanently identified and so that variations in batch weights of each type of batch can be readily observed. Provide chart or tape which is easily interpreted in increments not exceeding 0.5 percent of each batch weight.

d. Show time of day at intervals of no more than 15 minutes.

e. The recorder chart or tape will become the property of the Government.

f. Place recorder in a position convenient for observation by the concrete plant operator and the Government inspector.

g. The recorded weights or volumes when compared to the weights or volumes actually batched must be accurate within ± 2 percent.

2.3.4.9 Batch Counters

Include devices for automatically counting the total number of batches of all concrete batched and the number of batches of each preset mixture.

2.3.4.10 Rescreening Plant

Locate, arrange, and operate rescreening plant in a manner that all coarse aggregate will be routed through the plant and that its operation will ensure delivery to the mixers of graded coarse aggregate free from excessive variation and conforming to the size groups and grading of paragraph AGGREGATES above and with moisture content conforming to the provisions of paragraph MOISTURE CONTENT above. Coarse aggregate may be rescreened and delivered to the batch plant bins one size group at a time or two or more adjacent size groups at a time. Simultaneous rescreening of nonadjacent size groups is not permitted. Waste all material passing the bottom screen of the smallest size of coarse aggregate being screened.

2.3.4.11 Washing Plant

Wash all coarse aggregates immediately prior to entering the rescreening plant. Provide rewashing plant containing water nozzles and vibrating screens to remove foreign materials and coatings from aggregate particles. Use water for washing meeting the requirements of paragraph WATER above.

2.3.4.12 Trial Operation

Not less than 7 days prior to commencement of concrete placing, make a test of the batching and mixing plant in the presence of the Contracting Officer to check operational adequacy. Produce the number of full-scale concrete batches required in trial runs as directed, do not exceed 20, and proportion as directed. Waste or use all concrete produced in these tests for purposes other than inclusion in structures covered by this specification. Correct all deficiencies found in plant operation prior to the start of concrete placing operations. No separate payment will be made to the Contractor for labor or materials required by provisions of this paragraph. Notify the Contracting Officer of the trial operation not less than 7 days prior to the start of the trial operation.

2.3.4.13 Protection

Protect weighing, indicating, recording, and control equipment against exposure to dust, moisture, and vibration so that there is no interference with proper operation of the equipment.

2.3.5 Laboratory Areas

Provide a room in the plant to house the moisture and grading testing equipment for aggregate and to provide working space. Provide another room for testing fresh concrete and for fabricating and initial curing of concrete test specimens in accordance with ASTM C31/C31M. The size, arrangement, and location of these rooms will be subject to approval. Provide electricity, air conditioning, heat, and water as required for use in these laboratory areas.

2.3.6 Mixers

Provide stationary mixers or truck mixers. Each mixer must combine the materials into a uniform mixture and discharge this mixture without segregation. Do not charge mixers in excess of the capacity recommended by the manufacturer on the nameplate. Excessive over-mixing requiring introduction of additional water will not be permitted. Maintain mixers in satisfactory operating condition, and keep mixer drums free of hardened

concrete. Replace mixer blades or paddles when worn down more than 10 percent of their depth when compared with the manufacturer's dimension for new blades. Should any mixer at any time produce unsatisfactory results, discontinue its use promptly ntil it is repaired or replaced. Submit the make, type, capacity, and number of the concrete mixers proposed for use, 60 days prior to installation for review by the Contracting Officer for conformance with the requirements of paragraph PLANT AND EQUIPMENT.

2.3.6.1 Stationary Mixer Uniformity Requirements

Adjust the size of the batch, the mixing time, the charging sequence, and other factors to provide concrete that meets the uniformity limits specified herein and in paragraph MIXER UNIFORMITY IN PART 3. Perform all testing in accordance with COE CRD-C 55. When regular testing is performed, the concrete must meet the limits of any five of the six uniformity requirements. When abbreviated testing is performed, the concrete must meet only those requirements listed for abbreviated testing. The initial mixer evaluation test is a regular test and perform prior to the start of concrete placement. Use concrete proportions for the evaluation that contains the largest size aggregate on the project and as directed. Regular testing consists of performing all six tests on three batches of concrete. The range for regular testing is the average of the ranges of the three batches. Abbreviated testing consists of performing the three required tests on a single batch of concrete. The range for abbreviated testing is the range for one batch. If more than one mixer is used and all are identical in terms of make, type, capacity, condition, speed of rotation, etc., the results of tests on one of the mixers applies to the others, subject to approval. Perform mixer evaluations as specified herein.

	ABBREVIATED	
PARAMETER	REGULAR TESTS ALLOWABLE MAXIMUM RANGE FOR AVERAGE OF 3 BATCHES	TESTS ALLOWABLE MAXIMUM RANGE FOR 1 BATCH
Unit weight of air-free mortar, lb/cu ft	2.0	2.0
Air content, percent	1.0	---
Slump, inches	1.0	---
Coarse aggregate, percent	6.0	6.0
Compressive strength at 7 days, percent	10.0	10.0
Water content, percent	1.5	---

2.3.6.2 Truck Mixers

Provide truck mixers and the mixing of concrete therein conforming to the requirements of ASTM C94/C94M. A truck mixer may be used for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Equip each truck with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Do not use truck mixers to mix or agitate concrete with greater than 1-1/2 inch nominal maximum-size aggregate or concrete with a slump of 2 inches or less. Determine the acceptability of truck mixers by uniformity tests in

accordance with ASTM C94/C94M.

2.3.7 Sampling Facilities

Provide suitable facilities and labor for obtaining representative samples of concrete in accordance with ASTM C172/C172M for Contractor quality control (QC) and Government quality control (QA) testing.

2.3.8 Coarse Aggregate

Provide suitable facilities for readily obtaining representative samples of coarse aggregate for test purposes immediately prior to the material entering the mixer.

2.3.9 Transporting Equipment

Design, operate, and maintain transporting equipment so that it does not cause or permit segregation or loss of material. Do not drop concrete vertically more than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized.

2.3.9.1 Buckets

Use bottom-dump buckets conforming to the following requirements: the interior hopper slope must be no less than 70 degrees from the horizontal; the minimum dimension of the clear gate opening must be at least five times the nominal maximum size of the aggregate, and the area of the gate opening must not be less than 2 square feet; the bucket gates must be grout-tight when closed, the double clamshell type, and manually, pneumatically, or hydraulically operated; and design the gate-opening mechanism to close the gates automatically when the control is released or when the air or hydraulic line is broken. If gate actuation is dependent on integral air or hydraulic reservoirs, the capacity of the reservoirs must be sufficient to open and close the gates three times without recharging the reservoir.

2.3.9.2 Trucks

Use truck mixers or agitators for transporting central-mixed concrete conforming to the applicable requirements of ASTM C94/C94M. Do not use truck mixers to transport concrete with larger than 1-1/2 inch nominal maximum-size aggregate or 2 inch or lower slump. Nonagitating trucks may be used for transporting central-mixed concrete over a smooth road when the hauling time is less than 15 minutes and the slump is less than 3 inches. Bodies of nonagitating trucks must be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

2.3.9.3 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating truck, the chutes supplied by the truck manufacturer as standard equipment may be used. Use a discharge deflector when required by the Contracting Officer. Separate chutes and other similar equipment are not permitted for conveying concrete except when specifically approved and do not increase slump to accommodate their use.

2.3.9.4 Belt Conveyors

Design and operate belt conveyors to assure a uniform flow of concrete from mixer or delivery truck to final place of deposit without segregation of ingredients or loss of mortar and provide with positive means for preventing segregation of the concrete or loss of mortar at the transfer point(s) and the point of placing. Do not exceed idler spacing of 36 inches. Use a minimum belt speed of 300 feet per minute and a maximum of 750 feet per minute. Belt width must be a minimum of 24 inches if the NMSA is 6 inches and must be a minimum of 16 inches if the NMSA is 3 inches or less. The NMSA required in mixture proportions furnished by the Government will not be changed to accommodate the belt width.

2.3.9.5 Pump Placement

Concrete may be conveyed by positive-displacement pump when approved. Pump placement will be approved only for areas where placement by bucket or conveyor is difficult or impractical. Provide piston or squeeze-pressure type pumping equipment. Provide rigid-steel pipe or heavy-duty flexible hose pipeline. Do not use aluminum pipe. Use pipe with an inside diameter at least 3 times the nominal maximum size of the coarse aggregate in the concrete to be pumped but no less than 4 inches.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

3.1.1 Vibrators

Keep an adequate number of vibrators on hand to meet placing requirements, and spare vibrators available to maintain production in the event of breakdown. Make adequate air pressure available for air vibrators and adequate voltage for electric vibrators. Use vibrators of the proper size, frequency, and amplitude for the type of work being performed in conformance with the following requirements:

APPLICATION	HEAD DIAMETER (inch)	FREQUENCY VPM	AMPLITUDE (inch)
Thin walls, beams, etc.	1-1/4 - 2-1/2	9,000 - 13,500	0.020 - 0.04
General construction	2 - 3-1/2	8,000 - 12,000	0.025 - 0.05
Heavy sections	3 - 6	7,000 - 10,500	0.030 - 0.06
Mass concrete	5 - 7	5,500 - 8,500	0.04 - 0.08

Use frequency and amplitude within the range indicated in the tabulation as determined in accordance with paragraph TESTS AND INSPECTIONS below.

3.1.2 Embedded Items

Before placing concrete, take care to determine that all embedded items are securely fastened in place as indicated in the drawings or required. Provide embedded items that are free of oil and other foreign matter such as loose coatings of rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Provide any air or water lines or other materials embedded in structures, as authorized construction expedients, conforming to the above

requirements and upon completion of their use backfill with concrete or mortar as directed. Welding will not be permitted on embedded or otherwise exposed metals which are in contact with concrete surfaces. Tack welding of or to embedded items will not be permitted.

3.1.3 Concrete on Earth Foundations

Place concrete on earth foundations that are clean, damp, and free from frost, ice, and standing or running water. Prior to placement of concrete, compact the earth foundation satisfactorily in accordance with the provisions of Section 31 00 00 EARTHWORK.

3.1.4 Concrete on Rock Foundations

Place concrete on rock surfaces that are clean and free from oil, standing or running water, ice, mud, drummy rock, coatings, debris, and loose, semidetached, overhanging, or unsound fragments. Clean faults or joints to a satisfactory depth and to firm rock on the sides as directed by the Contracting Officer. Immediately before concrete is placed, clean all rock surfaces thoroughly by the use of air-water jet, high-pressure water jet, or sandblasting as described in the paragraph below. Keep all rock surfaces continuously wet for at least 24 hours immediately prior to placing concrete thereon. Cover all approximately horizontal surfaces immediately before the concrete is placed with a 1/2 inch layer of mortar composed of the same sand and cementitious materials used in the concrete. The sand-cementitious materials ratio and the water-cementitious material ratio of the mortar must be approximately the same as those used in the concrete mixture. Cover mortar with concrete before the mortar has reached its initial time of setting.

3.1.5 Construction Joint Treatment

Submit the method and equipment proposed for joint cleanup and waste disposal, for review 30 days before concrete placement begins.

3.1.5.1 Joint Preparation

Prepare concrete surfaces to which other concrete is to be bonded for receiving the next lift or adjacent concrete by cleaning by sandblasting, high-pressure water jet, or air-water cutting. Surface cutting by air-water jets will not be permitted for concrete surfaces congested with reinforcing steel or if they are relatively inaccessible. If, for any other reason, it is considered undesirable to disturb the surface of a lift before it has hardened, the use of sandblasting or high-pressure water jet after hardening will be required. Regardless of the method used, the resulting surface must be free from all laitance and inferior concrete so that clean, well-bonded coarse aggregate particles are exposed uniformly over the lift surface. Apply joint treatment method such that the edges of the larger particles of aggregate are not undercut. Where joint preparation occurs more than 2 days prior to placing the next lift or where the work in the area subsequent to the joint preparation causes dirt or debris to be deposited on the surface, clean the surface as the last operation prior to placing the next lift. Keep the surface of the construction joint continuously wet for the first 12 hours of the 24 hours prior to placing concrete, except that the surface must be damp with no free water at the time of placement.

3.1.5.2 Air-Water Cutting

Perform air-water cutting of a construction joint at the proper time, generally between 4 and 12 hours after placement and only on horizontal construction joints. This period may be modified if a retarder is used to prolong the setting of the cement at surface of the concrete. Use an air pressure of 90 to 110 psi in the jet, and use sufficient water pressure to bring the water into effective influence of the air pressure. When approved a surface retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift to prolong the period of time during which air-water cutting is effective. Prior to receiving approval, furnish samples of the material to be used and demonstrate the method to be used in its application. After cutting, wash and rinse the surface until the wash water is no longer cloudy. If air-water cutting does not produce acceptable results, prepare the surface by high-pressure water jet or sandblasting.

3.1.5.3 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 psi may be used for cleaning. Delay its use until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the high-pressure water jet is incapable of a satisfactory cleaning, clean the surface by sandblasting.

3.1.5.4 Wet Sandblasting

This method of joint preparation may be used when the concrete has reached sufficient strength to prevent undercutting of coarse aggregate particles. Continue the operation until all accumulated laitance, coatings, stains, debris, and foreign materials are removed. Then wash the surface of the concrete thoroughly to remove all loose material. This method may be used on both horizontal and vertical surfaces.

3.1.5.5 Waste Water Disposal

Use a method in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal must meet all requirements of Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

3.2 TRANSPORTING AND PLACING

3.2.1 Transporting

Methods and equipment for conveying and depositing the concrete into the form are subject to approval. Provide transporting system with sufficient capacity to supply concrete at a rate to prevent cold joints forming during placement. A properly designed and sized elephant trunk and rigid drop chute bottom section which will prevent free-fall within the elephant trunk and rigid drop chute will be used if concrete is to drop more than 5 feet. If concrete is to be placed through installed horizontal or sloping reinforcing bars, discharge the concrete into a pipe or elephant trunk that is long enough to extend through the reinforcing bars to within 5 feet of the placing surface. In no case will concrete be discharged to free fall through the reinforcing bars.

3.2.1.1 Transporting by Bucket

Provide indicating and signaling devices to control the identification of types or classes of concrete as they are mixed and discharged into buckets for transfer to the forms. Identify each type or class of concrete visually by placing a colored tag or marker on a bucket as it leaves the mixing plant so that the concrete may be positively identified in the forms and placed in the structure in the desired position.

3.2.1.2 Transporting by Pump

The nominal maximum-size coarse aggregate will not be reduced or mixture proportions changed to accommodate a pump except as specifically determined appropriate. The distance and height to be pumped must not exceed limits recommended by the pump manufacturer. Supply concrete to the pump continuously. When pumping is completed, eject concrete remaining in the pipeline without contamination of concrete in place. After each operation clean the equipment thoroughly and waste flushing water outside the forms.

3.2.1.3 Transporting by Belt Conveyor

Methods and equipment for transporting the concrete by belt conveyor into the form are subject to approval.

3.2.2 Placing

Provide placing system with sufficient capacity to supply concrete at a rate which will prevent cold joints in any placement. Work concrete into the corners and angles of the forms and around all reinforcement and embedded items without permitting the material to segregate. Deposit concrete as close as possible to its final position in the forms, and in so depositing, there must be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Regulate depositing of concrete so that it will be effectively placed and consolidated in horizontal layers not exceeding 5 feet in thickness with a minimum of lateral movement. Deposit amount of concrete such that it can be readily and thoroughly consolidated and do not exceed 4 cubic yards in one pile. All concrete-placing equipment and methods are be subject to approval. Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation.

3.2.2.1 Time Interval Between Mixing and Placing

Place concrete mixed in stationary mixers and transported by nonagitating equipment within 30 minutes after it has been mixed, unless otherwise authorized. When concrete is truck mixed or when a truck mixer or agitator is used for transporting concrete mixed by stationary mixers, deliver the concrete to the site of the work, and complete discharge within 1 hour after introduction of the cement to either the water or aggregate.

3.2.2.2 Hot-Weather Placing

The temperature of the concrete when deposited in the forms during hot weather must not exceed 90 degrees F at humidity greater than 60%, 85 degrees F at humidity between 40%-60%, and 80 degrees F at humidity less than 40 percent except as further required above. An approved retarding

admixture may be used in accordance with paragraph RETARDING ADMIXTURE to facilitate placing and finishing. Cool steel forms and reinforcement and conveying and placing equipment if necessary to assist in maintaining specified concrete-placing temperature. Measure the temperature of the fresh concrete in accordance with ASTM C1064/C1064M. Submit a description of the materials and methods proposed for protection of the concrete 60 days in advance of anticipated need date for review, when concrete is to be placed under hot-weather conditions.

3.2.2.3 Cold Weather Placing

The temperature of the concrete when deposited in the forms must not be less than 40 degrees F. The ambient temperature of the placement area and all surfaces to receive concrete must be above 32 degrees F. Materials entering the mixer must be free from ice, snow, and frozen lumps. Closely regulate heating of mixing water or aggregates necessary to keep the concrete temperature above 40 degrees F so that the concrete temperature does not exceed 60 degrees F. An accelerator may be used when approved in advance.

3.2.2.4 Concrete Lifts

The depth of concrete placed in each lift will be as shown in the drawings. Deposit all concrete in approximately horizontal layers about 1-1/2 feet in thickness in stepped progression at such a rate that the formation of cold joints will be prevented. Place slabs in one lift, unless 2.5 foot or more deep. Where 7.5 foot or greater lift depths are permitted, furnish approved cantilever forms that are jointed or hinged approximately midheight to facilitate placement against surfaces sloping more than 10 degrees from vertical. At the beginning of the placing of a lift, retract the top half of a hinged or jointed form to such a position that it does not interfere with the operation of buckets placing concrete adjacent to the form. Use a minimum of five successive horizontal layers in stepped progression for 7.5 foot lifts. Where 5 foot lifts are required, use a minimum of three successive horizontal layers in stepped progression. Place each new layer of concrete on the oldest exposed layer. Do not exceed 40 feet maximum exposed bulkhead face of concrete between adjacent monoliths except as otherwise approved. Submit a lift drawing and bill of materials for each lift of concrete. (Show only one lift on a drawing). These drawings must be to scale and show all embedded items in sufficient detail for the proper installation and prosecution of the work. Identify all embedded electrical and/or mechanical items. The drawings must not be less than 22 by 34 inches in size and use a sufficiently large scale to clearly show all details of the structure covered by these drawings. Include a note on each lift drawing indicating all contract drawings from which the lift drawing was prepared. Submit 2 copies of each drawing for review at least 60 days prior to scheduling the lift for placement.

3.2.2.5 Consolidation

Immediately after placing, consolidate each layer of concrete by internal vibrating equipment. Do not use vibrators to cause concrete to flow for significant distances within the forms. Hand spading may be used if necessary together with internal vibration along formed surfaces permanently exposed to view. Do not use form vibrators unless forms are specifically designed for this use and unless specifically approved. Insert vibrator vertically at uniform spacing over the entire area of placement. Use distance between insertions that is approximately 1.5

times the radius of action of the vibrator. The vibrator must penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding unhardened layer if such exists. Hold it stationary until the concrete is consolidated and then withdraw slowly. Consolidate slabs 8 inches or less in depth by approved methods.

3.3 FINISHING

Finish concrete in accordance with Specification Section 03 30 00 CAST-IN-PLACE CONCRETE

3.4 CURING AND PROTECTION

Submit the curing media and methods to be used for review 30 days before concrete placement begins.

3.4.1 Curing Time

Cure all concrete by one of the following methods or combination of methods for the period of time given below corresponding to the cementing materials used in the concrete:

Type III portland cement	3 days
Type I portland cement	7 days
Portland cement in combination with silica fume	7 days
Type II portland cement	14 days
Portland cement blended with 25 percent or less fly-ash or GGBF slag	14 days
Portland cement blended with more than 25 percent fly-ash or GGBF slag	21 days

Begin curing immediately after placing. Provide all equipment needed for curing and protection of the concrete on hand and ready to install before actual concrete placement begins. Use curing medium and method, or the combination of media and methods, as approved in accordance with paragraph SUBMITTALS, SD-03 Product Data, submittal item "Curing".

3.4.2 Moist Curing

Moist cure horizontal and nearly horizontal surfaces by ponding, by covering with a minimum uniform thickness of 2 inches of continuously saturated sand, or by covering with saturated nonstaining burlap or cotton mats. Rinse burlap and cotton mats to remove soluble substances before using. Moist cure other surfaces when approved or directed. Maintain concrete that is moist cured continuously, not periodically, wet for the duration of the entire curing period. Use water for curing complying with the requirements of the paragraph WATER in PART 2. If the water, sand, mats, etc. cause staining or discoloration of permanently exposed concrete surfaces, clean the surfaces by an approved method. When wood forms are left in place during curing, keep the forms continuously wet except for sealed insulation curing in cold weather. When steel forms are left in

place on vertical surfaces during curing of concrete, carefully break loose the forms from the hardened concrete and continuously introduce curing water into the void. The temperature of the water should be tepid. Allow horizontal construction joints to dry sufficiently to remove free water immediately prior to placing the next lift.

3.4.3 Membrane Curing

Membrane curing may be used on surfaces that are not specified or directed to receive moist curing and that are not to receive a grout-cleaned finish. Do not use membrane-forming curing compound on surfaces that contain protruding steel reinforcing, that are heated by free steam, that will have additional concrete bonded to them, or that are to be grout-cleaned.

3.4.3.1 Nonpigmented Curing Compound

Nonpigmented compound conforming to ASTM C309, Type ID, containing a fugitive dye may be used on surfaces that will be exposed to view when the project is completed. The reflective requirements of ASTM C309 are waived. Shield surfaces cured with nonpigmented compound from direct rays of the sun for 3 days.

3.4.3.2 Application

Apply curing compound to formed surfaces immediately after the forms are removed. Moisten surfaces thoroughly with water, and apply the curing compound as soon as free water disappears. Apply curing compound to unformed surfaces as soon as free water has disappeared provided steps have been taken when necessary to prevent premature loss of free water due to excessive evaporation as described in paragraph UNFORMED SURFACES above. Apply curing compound in a two-coat continuous operation by motorized power-spraying equipment or pressure-tank equipment operating at a minimum pressure of 75 psi with provisions for continuous agitation. The application equipment must be approved in advance. Do not use hand-operated pressure applicators ("garden sprayers") except in small, isolated areas as approved. Apply compound at a uniform coverage of no more than 400 square feet/gallon for each coat. Apply the second coat perpendicular to the first coat. Respray concrete surfaces that have been subjected to rainfall within 3 hours after the curing compound has been applied by the method and at the coverage specified. Protect all concrete surfaces on which the curing compound has been applied for the duration of the entire curing period from pedestrian and vehicular traffic and from any other influence that will disrupt the continuity of the curing membrane.

3.4.4 Sheet Curing

Use sheets only on horizontal or near horizontal surfaces. Use sheets complying with the requirements of ASTM C171, except do not use polyethylene sheet. Wet all surfaces thoroughly and completely cover with waterproof paper, or polyethylene-coated burlap. Lay covering with light-colored side up. Lap covering no less than 4 inches and tape to form a continuous cover with completely closed joints. Use weighted sheet to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Fold coverings down over exposed edges of slabs and secure by approved means. Repair sheets immediately or replace if tears or holes appear during the curing period.

3.4.5 Sealed Insulation Curing

Between dates listed in paragraph COLD WEATHER PROTECTION below where cold weather protection is provided entirely by insulation, seal all joints in the insulation to retard moisture loss and maintain a seal throughout the curing period.

3.4.6 Protection

No fire or excessive heat is permitted near or in direct contact with concrete at any time. Do not operate vibratory earth compaction equipment or pile-driving equipment within 100 feet horizontally of concrete less than 5 days old. Blasting is not permitted within 100 feet horizontally of concrete less than 90 days old. Blasting plans must be approved by the Contracting Officer. Keep all galleries, conduits, and other openings through the concrete closed or sealed during the entire construction period. Protect the surface of the concrete from rain or snow during placing.

3.4.7 Cold Weather-Protection

During cold weather, as defined by ACI 306R, cover all concrete less than 30 days old . Submit a description of the materials and methods proposed for protection of the concrete, 60 days in advance of anticipated need date for review, when concrete is to be placed under cold-weather conditions.

a. Maintain insulation in such a condition that the R value does not diminish during the period of protection. Protect edges and corners of the placement with a double layer of the insulation specified above for a minimum distance of 2 feet in all directions.

b. Insulate concrete placed prior to the starting date from the starting date until it reaches an age of 5 days. Insulate concrete placed after the starting date continuously during and subsequent to placement.

c. Insulate forms in such a manner that the combined form-insulation system has a thermal resistance (R value) no less than that specified. Keep insulation and the combined form-insulation system in place for at least 5 days after placement of the concrete. After 5 days, forms and insulation on vertical surfaces may be removed for periods not to exceed 4 hours in a 24 hour period to allow forms to be moved, and insulation on horizontal surfaces may be removed for periods not to exceed 8 hours in a 24 hour period to allow reinforcement to be installed, insulation to be installed, lift joints to be prepared, etc. provided that suitable precautions are taken to prevent the concrete from being subjected at any time to ambient temperatures of 20 degrees F or below.

d. Insulate the first 6 feet of all steel protruding from insulated concrete with material having an R value as stated. Insulate all form bolts and metal ribs on the forms in a like manner. During the period of protection there must be no holes or openings in the insulation or between the insulation and concrete which permit ambient air to penetrate the insulation except as noted for construction purposes. Give special attention to seams, corners, and edges to prevent holes or openings in the insulation.

3.5 BASE PLATES AND BEARING PLATES

3.5.1 Setting of Plates

After being plumbed and properly positioned, provide full bearing column base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates using nonshrink grout. The space between the top of the concrete bearing surface and the bottom of the plate must not be less than 1/24 of the width of the plate or 1/2 inch, whichever is greater. Concrete surfaces must be clean, free of oil, grease, and laitance, and damp. Metal surfaces must be clean and free of oil, grease, and rust.

3.5.2 Nonshrink Grout

Use nonshrink grout conforming to the requirement of paragraph NONSHRINK GROUT. Water content must be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

3.5.2.1 Mixing and Placing

Perform mixing and placing in conformance with the material manufacturer's instructions and as specified. Dry-mix ingredients thoroughly before adding water. After adding water, mix the batch for 3 minutes. Size batches to allow continuous placement of freshly mixed grout. Discard grout not used within 30 minutes after mixing. Fill the space between the top of the concrete or masonry bearing surface and the plate with the grout. Use forms consisting of wood or other suitable material for retaining the grout and remove after the grout has hardened. If Grade "A" grout is used, form all surfaces, including top surfaces, to provide restraint. Work placed grout to eliminate voids; however, avoid overworking and breakdown of the initial set. Do not retemper or subject grout to vibration from any source. Where clearances are unusually small, make placement under pressure with a grout pump. Maintain temperature of the grout, and of surfaces receiving the grout, at 65 to 85 degrees F until after setting.

3.5.2.2 Treatment of Exposed Surfaces

Those types of grout containing metallic aggregate, Grade B or C grout, must, after setting, have exposed surfaces under cut back 1 inch from the edge of the base plate and immediately cover with a thick coat of mortar proportioned by weight of one part portland cement, two parts sand, and sufficient water to make the mixture placeable. The parge coat must have a smooth, dense finish. The exposed surface of other types of nonshrink grout must have a smooth, dense finish.

3.5.2.3 Curing

Cure grout and parge coats in conformance with paragraph CURING AND PROTECTION above.

3.6 TESTS AND INSPECTIONS

3.6.1 General

Perform the following inspection and tests as described, and, based upon the results of these inspections and tests, take the action required and

submit reports as required. When, in the opinion of the Contracting Officer, the concreting operation is out of control, cease concrete placement. The laboratory performing the tests must be onsite and conform with the requirements given in ASTM C1077. The individuals who sample and test concrete or the constituents of concrete as required in this specification will have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per year thereafter for conformance with ASTM C1077. The individual who performs the inspection will have demonstrated a knowledge and ability equivalent to the ACI minimum guidelines for certification of Concrete Transportation Construction Inspector (CTCI) .

3.6.2 Testing and Inspection Requirements

3.6.2.1 Fine Aggregate

3.6.2.1.1 Grading

At least once during each shift when the concrete plant is operating, there make one sieve analysis and fineness modulus determination in accordance with ASTM C136/C136M and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. Recoed the results on a sheet on which are also shown the specification limits applicable to the project.

3.6.2.1.2 Fineness Modulus Control Chart

Group results for fineness modulus in sets of three consecutive tests, and plot the average and range of each group on a control chart. Draw the upper and lower control limits for average 0.10 units above and below the target fineness modulus, and the upper control limit for range 0.20 units above the target fineness modulus.

3.6.2.1.3 Corrective Action for Fine Aggregate Grading

When the amount passing any sieve is outside the specification limits, resample and retest the fine aggregate immediately. If there is another failure for any sieve, report the fact immediately. Whenever a point on the fineness modulus control chart, either for average or range, is beyond one of the control limits, double the frequency of testing. If two consecutive points are beyond the control limits, consider the process out of control and stop concreting. Notify the Contracting Officer, and take immediate steps to rectify the situation. After two consecutive points have fallen within the control limits, testing at the normal frequency may be resumed.

3.6.2.1.4 Moisture Content Testing

When in the opinion of the Contracting Officer the electric moisture meter is not operating satisfactorily, perform at least four tests for moisture content in accordance with ASTM C566 during each 8-hour period of mixing plant operation. Select times for the tests randomly within the 8-hour period. Make an additional test whenever the slump is shown to be out of

control or excessive variation in workability is reported by the placing foreman. When an electric moisture meter is operating satisfactorily, make at least two direct measurements of moisture content per week to check the calibration of the meter. Use results of tests for moisture content to adjust the added water in the control of the batch plant.

3.6.2.1.5 Moisture Content Corrective Action

Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, adjust the scale settings for the fine-aggregate batcher and water batcher (directly or by means of a moisture compensation device).

3.6.2.2 Coarse Aggregate

3.6.2.2.1 Grading

At least once during each shift in which the concrete plant is operating, perform a sieve analysis in accordance with ASTM C136/C136M for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor is responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations must show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When facilities are available to test samples five times as large as those required in ASTM C136/C136M, averaging is not permitted.

3.6.2.2.2 Corrective Action for Grading

When the amount passing any sieve is outside the specification limits, resample and retest the coarse aggregate immediately. If the second sample fails on any sieve, report that fact. Where two consecutive averages of five tests (or two consecutive tests where large samples are used) are outside specification limits, consider the operation out of control, and report that fact, stop concreting, and take immediate steps to correct the grading.

3.6.2.2.3 Coarse Aggregate Moisture Content

Make a test for moisture content of each size group of coarse aggregate at least once a shift. When two consecutive readings for smallest size coarse aggregate differ by more than 1.0 percent, increase frequency of testing to that specified previously for fine aggregate.

3.6.2.2.4 Coarse Aggregate Moisture Corrective Action

Whenever the moisture content of any size of coarse aggregate changes by 0.5 percent or more, adjust the scale setting for the coarse aggregate batcher and the water batcher to compensate for this.

3.6.2.2.5 Particle Shape Testing

When directed, a problem exists in connection with aggregate particle shape, make tests in accordance with ASTM D4791. Testing frequency must not be ess than one per day, when directed.

3.6.2.2.6 Particle Shape Corrective Action

When testing for particle shape is required, report two consecutive failures in the same sieve size immediately, and determine what corrective action is needed.

3.6.2.2.7 Material Finer than the No. 200 Sieve

When in the opinion of the Contracting Officer, a problem exists in connection with the cleanliness of aggregate, make tests in accordance with ASTM C117. Testing frequency must be as directed.

3.6.2.2.8 Corrective Action for Material Finer than the No. 200 Sieve

When material finer than the No. 200 sieve exceeds 1.0 percent of the weight of the aggregate finer than 1-1/2 inches or 0.5 percent of the weight of the aggregate coarser than 1-1/2 inches, notify the Contracting Officer and initiate steps, such as washing or other corrective action, immediately.

3.6.2.3 Quality of Aggregates

3.6.2.3.1 Frequency of Quality Tests

Prior to submitting samples for mixture proportioning studies and 30 days prior to the start of concrete placement, perform the tests for aggregate quality in the following list. In addition, after the start of concrete placement, perform tests for aggregate quality in accordance with the following frequency schedule. Take samples tested after the start of concrete placement immediately prior to entering the concrete mixer.

PROPERTY	FINE AGGREGATE	FREQUENCY COARSE AGGREGATE	TEST
Specific Gravity	Every 3 months	Every 3 months	ASTM C127 ASTM C128
Absorption	Every 3 months	Every 3 months	ASTM C127 ASTM C128
Durability (Procedure A)	Factor using Every 12 months	Every 12 months	COE CRD-C 144 ASTM C666/C666M
Clay Lumps and Friable Particles	Every 3 months	Every 3 months	ASTM C142/C142M
Material Finer than the 75-µm (No. 200) Sieve	Every 3 months	Every 3 months	ASTM C117
Organic Impurities	Every 3 months	Not applicable	ASTM C40/C40M

PROPERTY	FINE AGGREGATE	FREQUENCY COARSE AGGREGATE	TEST
L.A. Abrasion	Not applicable	Every 6 months	ASTM C131/C131M ASTM C535
Soft and Friable (Scratch Hardness)	Not applicable	Every 6 months	COE CRD-C 130
Petrographic Examination	Every 6 months	Every 6 months	ASTM C295/C295M
Chert, less than 2.40 specific gravity	Every 6 months	Every 6 months	ASTM C123/C123M
Coal and lignite, less than 2.00 specific gravity	Every 6 months	Every 6 months	ASTM C123/C123M

3.6.2.3.2 Corrective Action for Aggregate Quality

If the result of a quality test fails to meet the requirements for quality during submittal of samples for mixture-proportioning studies or immediately prior to start of concrete placement, change production procedures or materials and perform additional tests until the material meets the quality requirements prior to proceeding with either mixture-proportioning studies or starting concrete placement. After concrete placement commences, whenever the result of a test for quality fails the requirements, rerun the test immediately. If the second test fails the quality requirement, report the fact and take immediate steps to rectify the situation.

3.6.2.4 Scales

3.6.2.4.1 Weighing Accuracy

Check accuracy of the scales by test weights at least once a month for conformance with the applicable requirements of paragraph PLANT AND EQUIPMENT. Also make such tests as directed whenever there are variations in properties of the fresh concrete that could result from batching errors.

3.6.2.4.2 Batching and Recording Accuracy

Check the accuracy of each batching and recording device once a week during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. Confirm that the calibration devices described in paragraph PLANT AND EQUIPMENT in PART 2, for checking the accuracy of dispensed admixtures, are operating properly.

3.6.2.4.3 Scales Corrective Action

When either the weighing accuracy or batching accuracy does not comply with specification requirements, do not operate the plant until necessary adjustments or repairs have been made. Correct discrepancies in recording accuracies immediately.

3.6.2.5 Batch-Plant Control

Control the measurement of all constituent materials including cementitious materials, each size of aggregate, water, and admixtures continuously. Adjust aggregate weights and amount of added water as necessary to compensate for free moisture in the aggregates. Adjust the amount of air-entraining agent to control air content within specified limits. Prepare a report indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during plant operation.

3.6.2.6 Concrete

3.6.2.6.1 Air Content

Make at least two tests for air content on randomly selected batches of each concrete mixture produced during each 8 hour period of concrete production. Make additional tests when excessive variation in workability is reported. Make tests in accordance with ASTM C231/C231M. Plot the average of each set of two tests for each mixture on control charts on which the average percent and upper and lower limits are set in accordance with paragraph MATERIALS FOR MIXTURE PROPORTIONING STUDIES, in PART 1, for each NMSA. Plot the range between two consecutive tests for each mixture on a control chart on which the upper control limit is 3.0 percent. Normally take samples for air content at the mixer, however the Contractor is responsible for delivering the concrete to the forms at the proper air content. Take samples at the placement site as often as required, depending on the Contractor's delivery method, to determine any air loss.

3.6.2.6.2 Air Content Corrective Action

Whenever points on the control chart approach the upper or lower control limits, an adjustment should be made in the amount of air-entraining admixture batched. If a single test result is outside the specification limit, immediate adjustment is mandatory. As soon as practical after each adjustment, make another test to verify the correction of the adjustment. Whenever a point falls above the upper control for range, calibrate the dispenser to ensure that it is operating correctly and with good reproducibility. Whenever two consecutive points either for average or range are outside the control limits, notify the Contracting Officer.

3.6.2.6.3 Slump Testing

Make at least two slump tests in accordance with ASTM C143/C143M on each concrete mixture produced during each 8-hour period or less of concrete production each day. Make additional tests when excessive variation in workability is reported. Plot the result of each test for each mixture on a control chart on which the upper and lower limits are set as specified in paragraph SLUMP. Plot the range on a control chart on which the upper control limit is 2 inches. Take samples for slump at the mixer, however the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, take samples at the placement site as often as required by the Contracting Officer.

3.6.2.6.4 Slump Corrective Action

Whenever points on the control chart approach the upper or lower control limits, make an adjustment in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount specified in the mixture proportions provided based on the free water available with the aggregates and that amount of water batched. If the adjustments to the batch weights of water and aggregates do not satisfactorily produce the required slump, the Contracting Officer may adjust the mixture proportions if the fine-aggregate moisture content is stable and within the required limits. When a single slump is outside the control limits, such adjustment is mandatory. As soon as practical after each adjustment, make another test to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range above the upper control limits, consider the slump to be out of control, halt the concreting operation, and undertake additional testing for aggregate moisture content required, and take action immediately to correct the problem.

3.6.2.6.5 Compression Test Cylinders

Make at least one set of test cylinders each shift on each different concrete mixture placed during the shift. Make additional sets of test cylinders, as directed, when the mixture proportions are changed or when low strengths have been detected. Develop a random sampling plan for approval by the Contracting Officer prior to start of construction. Assure that sampling is done in a completely random and unbiased, not just haphazard, manner. Provide a set of test cylinders for structural concrete containing Type I or Type II portland cement only consisting of four cylinders, two to be tested at 7 days and two at 28 days. Provide a set of test cylinders for all other concrete consisting of six cylinders, two to be tested at 7 days, two at 28 days, and two at 90 days. In addition, for all concrete except that containing Type I or Type II portland cement only, every 2 months make four additional cylinders and test two at 6 months of age and test two at 12 months of age. Mold and cure all test specimens in accordance with ASTM C31/C31M and test in accordance with ASTM C39/C39M. Report all compressive strength tests immediately. Keep quality control charts for individual strength tests, moving average for strength and moving average for range for each mixture. The charts must be similar to those found in ACI 214R.

3.6.2.7 Inspection Before Placing

Inspect foundation or construction joints, forms, and embedded items in sufficient time prior to each concrete placement in order to certify that they are ready to receive concrete. Report results of each inspection in writing.

3.6.2.8 Concrete Placement

3.6.2.8.1 Placing Inspection

The placing foreman must supervise all placing operations, must determine that the correct quality of concrete or grout is placed in each location as directed, and is responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, yardage placed, and method of

placement.

3.6.2.8.2 Placing Corrective Action

Do not permit placing to begin until an adequate number of vibrators in working order with competent operators are available is verified. Do not continue placing if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, take immediate steps to improve temperature controls.

3.6.2.9 Vibrators

3.6.2.9.1 Vibrator Testing and Use

Determine frequency and amplitude of each vibrator in accordance with COE CRD-C 521prior to initial use and at least once a month when concrete is being placed. Make additional tests as directed when a vibrator does not appear to be adequately consolidating the concrete. Determine the frequency while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. Determine the amplitude with the head vibrating in air. Take two measurements, one near the tip and another near the upper end of the vibrator head, and average these results. Report make, model, type, and size of the vibrator and frequency and amplitude results in writing.

3.6.2.9.2 Vibrator Corrective Action

Remove any vibrator not meeting the requirements of paragraph PREPARATION FOR PLACING above immediately from service and repair or replace.

3.6.2.10 Curing

3.6.2.10.1 Moist Curing Inspections

At least twice each shift, and twice per day on nonwork days, inspect all areas subject to moist curing. Note and record the surface moisture condition.

3.6.2.10.2 Moist Curing Corrective Action

When a daily inspection report lists an area of inadequate moistness, take immediate corrective action, and extend the required curing period for those areas by one (1) day.

3.6.2.10.3 Membrane Curing Inspection

Do not apply curing compound until the Contractor's authorized representative has verified that the compound is properly mixed and ready for spraying. At the end of each operation, estimate the quantity of compound used by measurement of the container and the area of concrete surface covered and compute the rate of coverage in square feet per gallon. Note whether or not coverage is uniform.

3.6.2.10.4 Membrane Curing Corrective Action

When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, spray the entire surface again.

3.6.2.10.5 Sheet Curing Inspection

At least once each shift and once per day on nonwork days, inspect all areas being cured using sheets. Note and record the condition of the covering and the tightness of the laps and tapes.

3.6.2.10.6 Sheet Curing Corrective Action

When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, repair the tears and holes promptly or replace the sheets, close the joints, and extend the required curing period for those areas by one day.

3.6.2.11 Cold Weather Protection and Sealed Insulation Curing

At least once each shift and once per day on nonwork days inspect all areas subject to cold weather protection. Inspect the protection system for holes, tears, unsealed joints, or other incongruities which could result in damage to the concrete. Take special attention at edges, corners, and thin sections. Note, correct, and report any deficiencies.

3.6.2.12 Cold Weather Protection Corrective Action

When a daily inspection report lists any holes, tears, unsealed joints, or other incongruities, correct the deficiency immediately and extend the period of protection for one (1) day.

3.6.2.13 Mixer Uniformity

3.6.2.13.1 Stationary Mixers

Prior to the start of concrete placing and once every 3 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the longest time, determine interval uniformity of concrete mixing in accordance with paragraph PLANT AND EQUIPMENT in PART 2. The initial and every fourth set of tests must be regular tests performed on three batches of concrete. Intermediate uniformity tests must be abbreviated tests performed on a single batch of concrete. If the mixer fails the abbreviated test, perform a regular test immediately. Whenever adjustments in a mixer or increased mixing time are required because of failure of a uniformity test, reevaluate the mixer by a regular test after the adjustments have been completed. If the Contractor proposes to reduce a mixing time, perform a regular test to evaluate the proposed time. Perform additional testing when directed when there is visible evidence of possible improper mixer performance. Report results of all uniformity tests in writing.

3.6.2.13.2 Truck Mixers

Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, determine uniformity of concrete in accordance with ASTM C94/C94M. Select truck mixers randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory. Report results of tests in writing.

3.6.2.14 Mixer Uniformity Corrective Action

When a mixer fails to meet mixer uniformity requirements, either increase

the mixing time, change batching sequence, reduce batch size, or make adjustments to the mixer until compliance is achieved.

3.6.3 Reports

Report all results of tests or inspections conducted informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold weather protection, make daily reports of pertinent temperatures. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Confirm such reports of failures and the action taken in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

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SECTION 04 20 00

UNIT MASONRY
11/15, CHG 2: 05/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 216.1	(2014) Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A167	(2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A615/A615M	(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A641/A641M	(2019) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A951/A951M	(2011) Standard Specification for Steel Wire for Masonry Joint Reinforcement
ASTM A996/A996M	(2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars

	for Concrete Reinforcement
ASTM A1008/A1008M	(2021a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM B370	(2022) Standard Specification for Copper Sheet and Strip for Building Construction
ASTM C90	(2021) Standard Specification for Loadbearing Concrete Masonry Units
ASTM C129	(2017) Standard Specification for Nonloadbearing Concrete Masonry Units
ASTM C207	(2018) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C270	(2019a; E 2019) Standard Specification for Mortar for Unit Masonry
ASTM C476	(2020) Standard Specification for Grout for Masonry
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C641	(2017) Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates
ASTM C780	(2020) Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C979/C979M	(2016) Standard Specification for Pigments for Integrally Colored Concrete
ASTM C1019	(2019) Standard Test Method for Sampling and Testing Grout
ASTM C1384	(2012a) Standard Specification for Admixtures for Masonry Mortars
ASTM C1611/C1611M	(2021) Standard Test Method for Slump Flow of Self-Consolidating Concrete
ASTM D2000	(2018) Standard Classification System for Rubber Products in Automotive Applications
ASTM D2287	(2019) Nonrigid Vinyl Chloride Polymer and

Copolymer Molding and Extrusion Compounds

THE MASONRY SOCIETY (TMS)

TMS MSJC	(2016) Masonry Standard Joint Committee's (MSJC) Book - Building Code Requirements and Specification for Masonry Structures, Containing TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6, and Companion Commentaries

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Cut CMU Drawings; G

Reinforcement Detail Drawings; G

SD-03 Product Data

Hot Weather Procedures; G

Cold Weather Procedures; G

Cement; G

Cementitious Materials; G

Insulation; G

Recycled Content for Steel Reinforcement; S

Recycled Content for CMU; S

SD-04 Samples

Concrete Masonry Units (CMU); G

Admixtures for Masonry Mortar; G

Anchors, Ties, and Bar Positioners; G

Joint Reinforcement; G

Insulation; G

SD-05 Design Data

Masonry Compressive Strength; G

Fire-Rated Concrete Masonry Units

Bracing Calculations; G

SD-06 Test Reports

Fire-Rated Concrete Masonry Units

Field Testing of Mortar

Field Testing of Grout

SD-07 Certificates

Special Masonry Inspector Qualifications

Concrete Masonry Units (CMU)

Precast Concrete Units

Cementitious Materials

Admixtures for Masonry Mortar

Admixtures for Grout

Anchors, Ties, and Bar Positioners

Joint Reinforcement

Insulation

SD-08 Manufacturer's Instructions

Admixtures for Masonry Mortar

Admixtures for Grout

SD-10 Operation and Maintenance Data

Take-Back Program

1.3 QUALITY ASSURANCE

1.3.1 Special Masonry Inspector Qualifications

Refer to Section 01 45 35 SPECIAL INSPECTIONS for qualifications and responsibilities of the masonry special inspector.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver, store, handle, and protect material to avoid chipping, breakage, and contact with soil or contaminating material. Store and prepare materials in already disturbed areas to minimize project site disturbance and size of project site.

1.4.1 Masonry Units

Cover and protect masonry units from precipitation. Conform to handling and storage requirements of TMS MSJC.

a. Pack glazed brick, glazed structural clay tile, and prefaced concrete

masonry units in the manufacturer's standard paper cartons, trays, or shrink wrapped pallets with a divider between each unit. Do not stack pallets. Do not remove units from cartons until cartons are placed on scaffolds or in the location where units are to be laid.

b. Mark prefabricated lintels on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.4.2 Reinforcement, Anchors, and Ties

Store steel reinforcing bars, coated anchors, ties, and joint reinforcement above the ground. Maintain steel reinforcing bars and uncoated ties free of loose mill scale and loose rust.

1.4.3 Cementitious Materials, Sand and Aggregates

Deliver cementitious and other packaged materials in unopened containers, plainly marked and labeled with manufacturers' names and brands. Store cementitious material in dry, weathertight enclosures or completely cover. Handle cementitious materials in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Store sand and aggregates in a manner to prevent contamination and segregation.

1.5 PROJECT/SITE CONDITIONS

Conform to TMS MSJC for hot and cold weather masonry erection.

1.5.1 Hot Weather Procedures

When ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F and the wind velocity is greater than 8 mph, comply with TMS MSJC Article 1.8 D for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

1.5.2 Cold Weather Procedures

When ambient temperature is below 40 degrees F, comply with TMS MSJC Article 1.8 C for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

2.1.1 Design - Specified Compressive Strength of Masonry

The specified compressive strength of masonry, f'm, is 2,000 psi.

2.1.2 Performance - Verify Masonry Compressive Strength

Verify specified compressive strength of masonry using the "Unit Strength Method" of TMS MSJC. Submit calculations and certifications of unit and mortar strength.

Verify specified compressive strength of masonry using the "Prism Test Method" of TMS MSJC when the "Unit Strength Method" cannot be used. Submit test results.

2.2 MANUFACTURED UNITS

2.2.1 General Requirements

Do not change the source of materials, which will affect the appearance of the finished work, after the work has started except with Contracting Officer's approval. Submit test reports from an approved independent laboratory. Certify test reports on a previously tested material as the same materials as that proposed for use in this project. Submit certificates of compliance stating that the materials meet the specified requirements.

2.2.2 Concrete Units

2.2.2.1 Aggregates

Test lightweight aggregates, and blends of lightweight and heavier aggregates in proportions used in producing the units, for stain-producing iron compounds in accordance with ASTM C641,visual classification method. Do not incorporate aggregates for which the iron stain deposited on the filter paper exceeds the "light stain" classification.

Use industrial waste by-products (air-cooled slag, cinders, or bottom ash), ground waste glass and concrete, granulated slag, and expanded slag in aggregates.

2.2.2.2 Concrete Masonry Units (CMU)

2.2.2.2.1 Cement

Use only cement that has a low alkali content and is of one brand.

2.2.2.2.2 Recycled Content

Provide units with a minimum of 20 percent post-consumer recycled content, or a minimum of 40 percent pre-consumer recycled content, based on mass, cost, or volume. Units may contain post-consumer or pre-consumer recycled content. Submit product data for recycled content for CMU.

2.2.2.2.3 Size

Provide units with specified dimension of 8 inches wide, 8 inches high, and 16 inches long.

2.2.2.2.4 Surfaces

Provide units with exposed surfaces that are smooth and of uniform texture.

2.2.2.2.5 Weather Exposure

Provide concrete masonry units with water-repellant admixture added during manufacture where units will be exposed to weather.

2.2.2.2.6 Unit Types

a. Hollow Load-Bearing Units: ASTM C90, medium weight or normal weight. Provide load-bearing units for exterior walls, foundation walls,

load-bearing walls, and shear walls.

b. Hollow Non-Load-Bearing Units: ASTM C129, normal weight. Load-bearing units may be provided in lieu of non-load-bearing units.

2.2.2.2.7 Jamb Units

Provide jamb units of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved.

Provide sash jamb units with a 3/4 by 3/4 inch groove near the center at end of each unit.

2.2.2.3 Architectural Units

Provide architectural units with patterned face shell: Ground, Rock, and Chisel Face.

Provide units that are integrally colored during manufacture, with color Buff and Alabaster.

2.2.2.4 Fire-Rated Concrete Masonry Units

For indicated fire-rated construction, provide concrete masonry units of minimum equivalent thickness for the fire rating indicated and the corresponding type of aggregates indicated in TABLE I. Units containing more than one of the aggregates listed in TABLE I will be rated by linear interpolation based on the percent by dry-rodded volume of each aggregate used in manufacturing the units.

TABLE I
FIRE-RATED CONCRETE MASONRY UNITS

Aggregate Type	Minimum Equivalent Thickness for Fire-Resistance Rating, inch						
	1/2 hour	3/4 hour	1 hour	1-1/2 hour	2 hours	3 hours	4 hours
Calcareous or siliceous gravel (other than limestone)	2.0	2.4	2.8	3.6	4.2	5.3	6.2
Limestone, cinders, or air-cooled slag	1.9	2.3	2.7	3.4	4.0	5.0	5.9
Expanded clay, expanded shale, or expanded slate	1.8	2.2	2.6	3.3	3.6	4.4	5.1
Expanded slag or pumice	1.5	1.9	2.1	2.7	3.2	4.0	4.7

Determine equivalent thickness in accordance with ACI 216.1. Where walls are to receive plaster or be faced with brick, or otherwise form an assembly; include the thickness of plaster or brick or other material in the assembly in determining the equivalent thickness. Submit calculation results.

2.2.3 Precast Concrete Units

2.2.3.1 General

a. Provide precast concrete trim, lintels, copings, splashblocks and sills that are factory-made units in a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, provide precast concrete with minimum 4,000 psi compressive strength, conforming to Section 03 30 00 CAST-IN-PLACE CONCRETE using 1/2 inch to No. 4 nominal-size coarse aggregate, and with reinforcement required for handling of the units. Maintain minimum clearance of 3/4 inch between reinforcement and faces of units.

b. Unless precast-concrete items have been subjected during manufacture to saturated-steam pressure of at least 120 psi for at least 5 hours, either damp-cure for 24 hours or steam-cure and then age under cover for 28 days or longer. In precast concrete members weighing over 80 pounds provide built-in loops of galvanized wire or other approved provisions for lifting and anchoring.

c. Fabricate units with beds and joints at right angles to the face, with sharp true arises and with drip grooves on the underside where units overhang walls. Form exposed-to-view surfaces free of surface voids, spalls, cracks, and chipped or broken edges and with uniform appearance and color. Unless otherwise specified, provide units with a smooth dense finish.

d. Prior to installation, wet and inspect each unit for crazing. Items showing evidence of dusting, spalling, crazing, or having surfaces treated with a protective coating will be rejected.

e. Submit specified factory certificates.

f. Provide architectural cast stone masonry trim, copings, heads, and sills that are manufactured in a plant by a producer regularly engaged in producing cast stone. Provide cast stone units that comply with ASTM C1364. Submit test reports and three exemplars of the same cast stone product installed in similar projects in similar climatic conditions.

2.2.3.2 Precast Concrete Lintels

Provide precast concrete lintels, unless otherwise shown, of a thickness equal to the wall and reinforced with minimum two No. 4 bars for the full length. Provide top and bottom bars for lintels over 36 inches in length. Provide at least 8 inches bearing at each end. Label the top of lintels and clearly mark each lintel to show location in the structure. Design reinforced lintels in conformance with ACI 318 for flexural and shear strength, using concrete with a minimum 28 day compressive strength of 4,000 psi. Limit lintel deflection due to dead plus live load to L/600 or 0.3 inches.

2.3 EQUIPMENT

2.3.1 Vibrators

Maintain at least one spare vibrator on site at all times.

2.3.2 Grout Pumps

Pumping through aluminum tubes is not permitted.

2.4 MATERIALS

2.4.1 Mortar Materials

2.4.1.1 Cementitious Materials

Provide cementitious materials that conform to those permitted by ASTM C270.

2.4.1.2 Hydrated Lime and Alternates

Provide lime that conforms to one of the materials permitted by ASTM C207 for use in combination with portland cement, hydraulic cement, and blended hydraulic cement. Do not use lime in combination with masonry cement or mortar cement.

2.4.1.3 Colored Mortar

Use mortar pigment that conforms to ASTM C979/C979M. Add pigment to mortar to produce a uniform color matching as indicated on drawings. Furnish pigments in accurately pre-measured and packaged units that can be added to a measured amount of cementitious materials or supply pigments via preblended cementitious materials or dry mortar mix.

2.4.1.4 Admixtures for Masonry Mortar

In cold weather, use a non-chloride based accelerating admixture that conforms to ASTM C1384, unless Type III portland cement is used in the mortar.

In showers and kitchens, use mortar that contains a water-repellent admixture that conforms to ASTM C1384. Provide a water-repellent admixture, conforming to ASTM C1384 and of the same brand and manufacturer as the block's integral water-repellent, in the mortar used to place concrete masonry units that have an integral water-repellent admixture.

2.4.1.5 Aggregate and Water

Provide aggregate (sand) and water that conform to materials permitted by ASTM C270.

2.4.2 Grout and Ready-Mix Grout Materials

2.4.2.1 Cementitious Materials for Grout

Provide cementitious materials that conform to those permitted by ASTM C476.

2.4.2.2 Admixtures for Grout

Water-reducing admixtures that conform to ASTM C494/C494M Type F or G and viscosity-modifying admixtures that conform to ASTM C494/C494M Type S are permitted for use in grout. Other admixtures require approval by the Contracting Officer.

In cold weather, a non-chloride based accelerating admixture may be used subject to approval by the Contracting Officer; use accelerating admixture

that is non-corrosive and conforms to ASTM C494/C494M, Type C.

2.4.2.3 Aggregate and Water

Provide fine and coarse aggregates and water that conform to materials permitted by ASTM C476.

2.5 MORTAR AND GROUT MIXES

2.5.1 Mortar Mix

a. Provide mortar Type N unless specified otherwise herein.

b. For field-batched mortar, measure component materials by volume. Use measuring boxes for materials that do not come in packages, such as sand, for consistent batching. Mix cementitious materials and aggregates between 3 and 5 minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Do not hand mix mortar unless approved by the Contracting Officer. Maintain workability of mortar by remixing or retempering. Discard mortar that has begun to stiffen or is not used within 2-1/2 hours after initial mixing.

c. For preblended mortar, follow manufacturer's mixing instructions.

2.5.2 Grout and Ready Mix Grout Mix

Use grout that conforms to ASTM C476. Use conventional grout with a slump between 8 and 11 inches. Use self-consolidating grout with slump flow of 24 to 30 inches and a visual stability index (VSI) not greater than 1. Provide minimum grout strength of 2000 psi in 28 days, as tested in accordance with ASTM C1019. Do not change proportions and do not use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that grout meets the specified requirements. Use ready-mixed grout that conforms to ASTM C476.

2.6 ACCESSORIES

2.6.1 Grout Barriers

Grout barriers for vertical cores that consist of fine mesh wire, fiberglass, or expanded metal.

2.6.2 Anchors, Ties, and Bar Positioners

2.6.2.1 General

a. Fabricate anchors and ties without drips or crimps. Size anchors and ties to provide a minimum of 5/8 inch mortar cover from each face of masonry.

b. Fabricate steel wire anchors and ties from wire conforming to ASTM A1064/A1064M and hot-dip galvanize in accordance with ASTM A153/A153M.

c. Fabricate joint reinforcement in conformance with ASTM A951/A951M. Hot dip galvanize joint reinforcement in exterior walls and in interior walls exposed to moist environment in conformance with ASTM A153/A153M. Galvanize joint reinforcement in other interior

walls in conformance with ASTM A641/A641M; coordinate with paragraph JOINT REINFORCEMENT below.

d. Fabricate sheet metal anchors and ties in conformance with ASTM A1008/A1008M. Hot dip galvanize sheet metal anchors and ties in exterior walls and in interior walls exposed to moist environment in compliance with ASTM A153/A153M Class B. Galvanize sheet metal anchors and ties in other interior walls in compliance with ASTM A653/A653M, Coating Designation G60.

e. Submit two anchors, ties and bar positioners of each type used, as samples.

2.6.2.2 Wire Mesh Anchors

Provide wire mesh anchors of 1/4 inch mesh galvanized hardware cloth, conforming to ASTM A185/A185M, with length not less than 12 inches, at intersections of interior non-bearing masonry walls.

2.6.2.3 Wall Ties for Multi-Wythe Masonry Construction

Provide rectangular-shaped wall ties, fabricated of hot-dipped galvanized W2.8 diameter steel wire. Provide rectangular wall ties no less than 4 inches wide.

Provide adjustable type wall ties, if approved for use, that consist of two essentially U-shaped elements fabricated of minimum W2.8 diameter steel wire or pintle type ties that are inserted to eyes of horizontal joint reinforcement, hot-dip galvanized. Provide adjustable ties with double pintle legs and allows a maximum offset of 1-1/4 inch between each element of the tie and maximum distance between connecting parts no more than 1/16 inch. Form the pintle and eye elements so that both can be in the same plane. Wall ties may also be of a continuous type conforming to paragraph JOINT REINFORCEMENT.

2.6.2.4 Dovetail Anchors

Provide dovetail anchors of 3/16 inch diameter steel wire, triangular shaped, and attached to a 12 gauge or heavier steel dovetail section. Use these anchors to connect the exterior masonry wythe as it passes over the face of concrete columns, beams, or walls. Fill cells immediately above and below these anchors unless solid units are used. Furnish dovetail slots, which are specified to be installed by others, in accordance with Section 03 30 00 CAST-IN-PLACE CONCRETE.

2.6.2.5 Adjustable Anchors

2.6.2.6 Veneer Anchor Screws

Provide screws for attachment of veneer anchors to cold-formed steel framing members of size No. 12 . Provide length of screws such that the screws penetrate the holding member by not less than 5/8 inch.

2.6.2.7 Bar Positioners

Factory-fabricate bar positioners, used to prevent displacement of reinforcing bars during the course of construction, from 9 gauge steel wire or equivalent, and hot-dip galvanized. Bar positioners must be suitable for intended use and be corrosion resistant steel. Bar

positioners not fully contained within the wythe must be hot-dip galvanized.

2.6.3 Joint Reinforcement

Factory fabricate joint reinforcement in conformance with ASTM A951/A951M, welded construction. Provide ladder type joint reinforcement, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units and with all wires a minimum of 9 gauge. Size joint reinforcement to provide a minimum of 5/8 inch cover from each face. Space crosswires not more than 16 inches. Provide joint reinforcement for straight runs in flat sections not less than 10 feet long. Provide joint reinforcement with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features. Submit one piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

2.6.4 Reinforcing Steel Bars

Provide reinforcing steel bars and rods conforming to ASTM A615/A615M or ASTM A996/A996M, Grade 60. Provide minimum 50 percent post-consumer recycled content, or minimum 90 percent pre-consumer recycled content. Submit product data for recycled content for steel reinforcement.

2.6.5 Concrete Masonry Control Joint Keys

Provide control joint keys of a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D2000 M2AA-805 with a minimum durometer hardness of 80 or polyvinyl chloride conforming to ASTM D2287 Type PVC 654-4 with a minimum durometer hardness of 85. Form the control joint key with a solid shear section not less than 5/8 inch thick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch, to fit neatly, but without forcing, in masonry unit jamb sash grooves.

2.6.6 Through Wall Flashing and Weeps

2.6.6.1 General

Provide stainless steel sheet, self-adhesive rubberized sheet, or reinforced membrane sheet flashing except that flashing indicated to terminate in reglets must be metal or coated-metal flashing and except that the material must be one which is not adversely affected by dampproofing material.

2.6.6.2 Stainless Steel Flashing

Provide copper sheet, complying with ASTM B370, minimum 16 ounce weight; or stainless steel, ASTM A167, Type 304 or 316, 0.015 inch thick, No. 2D finish. Where indicated, provide with factory-fabricated deformations that mechanically bond flashing against horizontal movement in all directions, where deformations consist of dimples, diagonal corrugations, or a combination of dimples and transverse corrugations.

2.6.6.3 Reinforced Membrane Flashing

Provide polyester film core with a reinforcing fiberglass scrim bonded to one side. Provide membrane that is impervious to moisture, flexible, is

not affected by caustic alkalis, and after being exposed for not less than 1/2 hour to a temperature of 32 degrees F, shows no cracking when, at that temperature, it is bent 180 degrees over a 1/16 inch diameter mandrel and then bent at the same point over the same size mandrel in the opposite direction 360 degrees.

2.6.6.4 Rubberized Flashing

Provide self-adhesive rubberized asphalt sheet flashing consisting of 32-mil thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8-mil thick, high density, cross-laminated polyethylene film to produce an overall thickness of 40 mils. Provide rubberized, asphalt-based mastic and surface conditioner that are each approved by flashing manufacturer for use with flashing material.

2.6.6.5 Weep Ventilators

Provide weep ventilators that are prefabricated from stainless steel or plastic. Provide inserts with grill or louver-type openings designed to allow the passage of moisture from cavities and to prevent the entrance of insects, and with a rectangular closure strip to prevent mortar droppings from clogging the opening. Provide ventilators with compressible flanges to fit in a standard 3/8 inch wide mortar joint and with height equal to the nominal height of the unit.

2.6.6.6 Single-Wythe Exterior Wall CMU Flashing System

In single-wythe exterior CMU walls, provide a system of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. For exterior CMU walls, provide a flashing/weep system in open cores that do not receive grout. Cell flashing pans are to have integral weep spouts built into mortar bed joints that extend into the cell to prevent clogging with mortar.

2.6.6.7 Metal Drip Edge

Provide stainless steel drip edge, 15-mil thick, hemmed edges, with down-turned drip at the outside edge and upturned dam at the inside edge for use with membrane flashings.

2.6.7 RIGID BOARD-TYPE INSULATION

Provide rigid board-type insulation as specified in Section 07 21 13 BOARD AND BLOCK INSULATION.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to start of work, verify the applicable conditions as set forth in TMS MSJC, inspection.

3.2 PREPARATION

3.2.1 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and

wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.2.2 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.2.3 Concrete Surfaces

Where masonry is to be placed, clean concrete of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 1/8 inch. Sandblast, if necessary, to remove laitance from pores and to expose the aggregate.

3.2.4 Shelf Angles

Adjust shelf angles as required to keep the masonry level and at the proper elevation.

3.2.5 Bracing

Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by OSHA and local codes and submit bracing calculations, sealed by a registered professional engineer. Do not remove bracing in less than 10 days.

3.3 ERECTION

3.3.1 General

a. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Lay masonry units in running bond pattern. Lay facing courses level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances is plus or minus 1/2 inch. Adjust each unit to its final position while mortar is still soft and has plastic consistency.

b. Remove and clean units that have been disturbed after the mortar has stiffened, and relay with fresh mortar. Keep air spaces, cavities, chases, expansion joints, and spaces to be grouted free from mortar and other debris. Select units to be used in exposed masonry surfaces from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work.

c. When necessary to temporarily discontinue the work, step (rack) back the masonry for joining when work resumes. Toothing may be used only when specifically approved by the Contracting Officer. Before resuming work, remove loose mortar and thoroughly clean the exposed joint. Cover the top of walls subjected to rain or snow with nonstaining waterproof covering or membrane when work is not in process. Extend the covering a minimum of 2 feet down on each side of the wall and hold securely in place.

d. Ensure that units being laid and surfaces to receive units are free of water film and frost. Lay solid units in a nonfurrowed full bed of mortar. Bevel mortar for veneer wythes and slope down toward the

cavity side. Shove units into place so that the vertical joints are tight. Completely fill vertical joints between solid units with mortar, except where indicated at control, expansion, and isolation joints. Place hollow units so that mortar extends to the depth of the face shell at heads and beds, unless otherwise indicated. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Provide means to prevent mortar from dropping into the space below or clean grout spaces prior to grouting.

e. In multi-wythe construction with collar joints no more than 3/4 inch wide, bring up the inner wythe not more than 16 inches ahead of the outer wythe. Fill collar joints with mortar during the laying of the facing wythe, and do not lag the laying of the facing wythe by back-buttering each unit as it is laid.

3.3.1.1 Jointing

Tool mortar joints when the mortar is thumbprint hard. Tool horizontal joints after tooling vertical joints. Brush mortar joints to remove loose and excess mortar.

3.3.1.1.1 Tooled Joints

Tool mortar joints in exposed exterior and interior masonry surfaces concave , using a jointer that is slightly larger than the joint width so that complete contact is made along the edges of the unit. Perform tooling so that the mortar is compressed and the joint surface is sealed. Use a jointer of sufficient length to obtain a straight and true mortar joint. No exterior joints are to be left un-tooled.

3.3.1.1.2 Flush Joints

Flush cut mortar joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas. Finish flush cut joints by cutting off the mortar flush with the face of the wall. Point joints in unparged masonry walls below grade tight. For architectural units, such as fluted units, completely fill both the head and bed joints and flush cut.

3.3.1.1.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, rake joints between frames and abutting masonry walls to a depth of 3/8 inch. On the exterior side of exterior frames, rake joints between frames and abutting masonry walls to a depth of 3/8 inch.

3.3.1.1.4 Joint Widths

a. Construct brick masonry with mortar joint widths equal to the difference between the specified and nominal dimensions of the unit, within tolerances permitted by TMS MSJC.

b. Provide 3/8 inch wide mortar joints in concrete masonry, except for prefaced concrete masonry units.

c. Provide 3/8 inch wide mortar joints on unfaced side of prefaced concrete masonry units and not less than 3/16 inch nor more than 1/4 inch wide on prefaced side.

d. Maintain mortar joint widths within tolerances permitted by TMS MSJC

3.3.1.2 Cutting and Fitting

Use full units of the proper size wherever possible, in lieu of cut units. Locate cut units where they would have the least impact on the architectural aesthetic goals of the facility. Perform cutting and fitting, including that required to accommodate the work of others, by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Before being placed in the work, dry wet-cut units to the same surface-dry appearance as uncut units being laid in the wall. Provide cut edges that are clean, true and sharp.

a. Carefully make openings in the masonry so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Provide reinforced masonry lintels above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

b. Do not reduce masonry units in size by more than one-third in height and one-half in length. Do not locate cut products at ends of walls, corners, and other openings.

3.3.1.3 Unfinished Work

Rack back unfinished work for joining with new work. Toothing may be resorted to only when specifically approved by the Contracting Officer. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.3.1.4 Control Joints

Provide control joints in concrete masonry as indicated. Construct by raking out mortar within the head joint, using special control-joint units, using sash jamb units with control joint key, and using open end stretcher units placed with the closed end at the joint. Form a continuous vertical joint at control joint locations, including through bond beams, by utilizing half blocks in alternating courses on each side of the joint. Interrupt the control joint key in courses containing continuous bond beam reinforcement. Do not interrupt the horizontal reinforcement and grout at the control joint.

Where mortar was placed in the joint, rake both faces of the control joints to a depth of 3/4 inch. Install backer rod and sealant on both faces in accordance with Section 07 92 00 JOINT SEALANTS.

3.3.1.5 Decorative Architectural Units

Place decorative masonry units with the patterned face shell properly aligned in the completed wall.

3.3.2 Anchored Veneer Construction

a. Construct exterior masonry wythes to the thickness indicated on the drawings. Provide a minimum 1 inch air space behind the masonry veneer. Provide means to ensure that the cavity space and flashings are kept clean of mortar droppings and other loose debris. Maintain chases and raked-out joints free from mortar and debris.

b. Place masonry as indicated on drawings.

c. Provide anchors (ties) to connect the veneer to its backing in sufficient quantity to comply with the following requirements: maximum wall area per anchor {tie) of 1.87 square feet, and maximum vertical spacing of 18 inches, and maximum horizontal spacing of 18 inches. Provide additional anchors around openings larger than 16 inch in either direction. Space anchors around perimeter of opening at a maximum of 24 inches on center. Place anchors within 12 inches of openings. Anchors with drips are not permitted.

d. With solid units, embed anchors in mortar joint and extend into the veneer a minimum of 1-1/2 inch, with at least 5/8 inch mortar cover to the outside face.

e. With hollow units, embed anchors in mortar or grout and extend into the veneer a minimum of 1-1/2 inch, with at least 5/8 inch mortar or grout cover to outside face.

3.3.3 Reinforced, Single Wythe Concrete Masonry Units Walls

3.3.3.1 Concrete Masonry Unit Placement

a. Fully bed units used to form piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout in mortar under both face shells and webs. Provide mortar beds under both face shells for other units. Mortar head joints for a distance in from the face of the unit not less than the thickness of the face shell.

b. Solidly grout foundation walls below grade.

c. Stiffen double walls at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of each wall within the double wall. Adequately reinforce walls and partitions for support of wall-hung plumbing fixtures when chair carriers are not specified.

d. Submit drawings showing elevations of walls exposed to view and indicating the location of all cut CMU products.

3.3.3.2 Preparation for Reinforcement

Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be grouted. Remove mortar protrusions extending 1/2 inch or more into cells before placing grout. Position reinforcing bars accurately as indicated before placing grout. Where vertical reinforcement occurs, fill cores solid with grout in accordance with paragraph PLACING GROUT in this Section.

3.3.4 ANCHORAGE

3.3.4.1 Anchorage to Concrete

Anchor masonry to the face of concrete columns, beams, or walls with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.3.4.2 Anchorage to Structural Steel

Anchor masonry to vertical structural steel framing with adjustable steel wire anchors spaced not over 16 inches on centers vertically, and if applicable, not over 24 inches on centers horizontally.

3.3.4.3 Anchorage at Intersecting Walls

Provide wire mesh anchors at maximum 16 inches spacing at intersections of interior non-bearing masonry walls.

3.3.5 Lintels

3.3.5.1 Masonry Lintels

Construct masonry lintels with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated. Extend lintel reinforcement beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Support reinforcing bars in place prior to grouting and locate 1/2 inch above the bottom inside surface of the lintel unit.

3.3.5.2 Precast Concrete and Steel Lintels

Provide precast concrete and steel lintels as shown on the Drawings. Set lintels in a full bed of mortar with faces plumb and true. Provide steel and precast lintels with a minimum bearing length of 8 inches unless otherwise indicated. In partially grouted masonry, provide fully grouted units under the full lintel bearing length, unless otherwise indicated.

3.3.6 Sills and Copings

Set sills and copings in a full bed of mortar with faces plumb and true. Slope sills and copings to drain water. Mechanically anchor copings and sills longer than 4 feet as indicated.

3.4 INSTALLATION

3.4.1 Bar Reinforcement Installation

3.4.1.1 Preparation

Submit detail drawings showing bar splice locations. Identify bent bars on a bending diagram and reference and locate such bars on the drawings. Show wall dimensions, bar clearances, and wall openings. Utilize bending details that conform to the requirements of ACI SP-66. No approval will be given to the shop drawings until the Contractor certifies that all openings, including those for mechanical and electrical service, are shown. If, during construction, additional masonry openings are required, resubmit the approved shop drawings with the additional openings shown along with the proposed changes. Clearly highlight location of these additional openings. Provide wall elevation drawings with minimum scale of 1/4 inch per foot. Submit drawings including plans, elevations, and details of wall reinforcement; details of reinforcing bars at corners and wall intersections; offsets; tops, bottoms, and ends of walls; control and expansion joints; lintels; and wall openings.

Clean reinforcement of loose, flaky rust, scale, grease, mortar, grout, and other coatings that might destroy or reduce its bond prior to placing

grout. Do not use bars with kinks or bends not shown on the approved shop drawings. Place reinforcement prior to grouting. Unless otherwise indicated, extend vertical wall reinforcement to within 2 inches of tops of walls.

3.4.1.2 Positioning Bars

a. Accurately place vertical bars within the cells at the positions indicated on the drawings. Maintain a minimum clearance of 1/2 inch between the bars and masonry units. Provide minimum clearance between parallel bars of 1/2 inch between the bars and masonry units for coarse grout and a minimum clearance of 1/4 inch between the bars and masonry units for fine grout. Provide minimum clearance between parallel bars of 1 inch or one diameter of the reinforcement, whichever is greater. Vertical reinforcement may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement or by other means to prevent displacement beyond permitted tolerances. As masonry work progresses, secure vertical reinforcement to prevent displacement beyond allowable tolerances.

b. Wire column and pilaster lateral ties in position around the vertical reinforcing bars. Place lateral ties in contact with the vertical reinforcement and do not place in horizontal mortar bed joints.

c. Position horizontal reinforcing bars as indicated. Stagger splices in adjacent horizontal bars, unless otherwise indicated.

d. Form splices by lapping bars as indicated. Do not cut, bend or eliminate reinforcing bars. Foundation dowel bars may be field-bent when permitted by TMS MSJC.

3.4.1.3 Splices of Bar Reinforcement

Lap splice reinforcing bars as indicated. When used, provide welded or mechanical connections that develop at least 125 percent of the specified yield strength of the reinforcement.

3.4.2 Placing Grout

3.4.2.1 General

Fill cells containing reinforcing bars with grout. Solidly grout hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces. Solidly grout cells under lintel bearings on each side of openings for full height of openings. Solidly grout walls below grade, lintels, and bond beams. Units other than open end units may require grouting each course to preclude voids in the units.

Discard site-mixed grout that is not placed within 1-1/2 hours after water is first added to the batch or when the specified slump is not met without adding water after initial mixing. Discard ready-mixed grout that does not meet the specified slump without adding water other than water that was added at the time of initial discharge. Allow sufficient time between grout lifts to preclude displacement or cracking of face shells of masonry units. Provide a grout shear key between lifts when grouting is delayed and the lower lift loses plasticity. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, tear down the

wall and rebuild.

3.4.2.2 Vertical Grout Barriers for Multi-Wythe Composite Walls

In multi-wythe composite walls, provide grout barriers in the collar join not more than 30 feet apart, or as required, to limit the horizontal flow of grout for each pour.

3.4.2.3 Horizontal Grout Barriers

Embed horizontal grout barriers in mortar below cells of hollow units receiving grout.

3.4.2.4 Grout Holes and Cleanouts

3.4.2.4.1 Grout Holes

Provide grouting holes in slabs, spandrel beams, and other in-place overhead construction. Locate holes over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Provide additional openings spaced not more than 16 inches on centers where grouting of hollow unit masonry is indicated. Form such openings not less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, plug and finish grouting holes to match surrounding surfaces.

3.4.2.4.2 Cleanouts for Hollow Unit Masonry Construction

For hollow masonry units. provide cleanout holes at the bottom of every grout pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet 4 inches. Where all cells are to be grouted, construct cleanout courses using bond beam units in an inverted position to permit cleaning of all cells. Provide cleanout holes at a maximum spacing of 32 inches where all cells are to be filled with grout.

Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Provide cleanouts not less than 3 by 3 inch by cutting openings in one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Do not cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

3.4.2.5 Grout Placement

A grout pour is the total height of masonry to be grouted prior to erection of additional masonry. A grout lift is an increment of grout placement within a grout pour. A grout pour is filled by one or more lifts of grout.

a. Lay masonry to the top of a pour permitted by TMS MSJC Table 7, based on the size of the grout space and the type of grout. Prior to grouting, remove masonry protrusions that extend 1/2 inch or more into cells or spaces to be grouted. Provide grout holes and cleanouts in accordance with paragraph GROUT HOLES AND CLEANOUTS above when the grout pour height exceeds 5 feet 4 inches. Hold reinforcement, bolts, and embedded connections rigidly in position before grouting is started. Do not prewet concrete masonry units.

b. Place grout using a hand bucket, concrete hopper, or grout pump to fill the grout space without segregation of aggregate. Operate grout pumps to produce a continuous stream of grout without air pockets, segregation, or contamination.

c. If the masonry has cured at least 4 hours, grout slump is maintained between 10 to 11 inches, and no intermediate reinforced bond beams are placed between the top and bottom of the pour height, place conventional grout in lifts not exceeding 12 feet 8 inches. For the same curing and slump conditions but with intermediate bond beams, limit conventional grout lift to the bottom of the lowest bond beam that is more than 5 feet 4 inches above the bottom of the lift, but do not exceed 12 feet 8 inches. If masonry has not cured at least 4 hours or grout slump is not maintained between 10 to 11 inches, place conventional grout in lifts not exceeding 5 feet 4 inches.

d. Consolidate conventional grout lift and reconsolidate after initial settlement before placing next lift. For grout pours that are 12 inches or less in height, consolidate and reconsolidate grout by mechanical vibration or puddling. For grout pours that are greater than 12 inches in height, consolidate and reconsolidate grout by mechanical vibration. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation. If previous lift is not permitted to set, dip vibrator into previous lift. Do not insert vibrators into lower lifts that are in a semi-solidified state. If lower lift sets prior to placement of subsequent lift, form a grout key by terminating grout a minimum of 1-1/2 inch below a mortar joint. Vibrate each vertical cell containing reinforcement in partially grouted masonry. Do not form grout keys within beams.

e. If the masonry has cured 4 hours, place self-consolidating grout (SCG) in lifts not exceeding the pour height. If masonry has not cured for at least 4 hours, place SCG in lifts not exceeding 5 feet 4 inches. Do not mechanically consolidate self-consolidating grout. Place self-consolidating grout in accordance with manufacturer's recommendations.

f. Upon completion of each day's grouting, remove waste materials and debris from the equipment, and dispose of outside the masonry.

3.4.3 Joint Reinforcement Installation

Install joint reinforcement at 16 inches on center unless otherwise indicated. Lap joint reinforcement not less than 6 inches. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement in mortar beds to provide not less than 5/8 inch cover to either face of the unit.

3.4.4 Bond Beams

Reinforce and grout bond beams as indicated and as described in paragraphs above. Install grout barriers under bond beam units to retain the grout as required, unless wall is fully grouted or solid bottom units are used. For high lift grouting in partially grouted masonry, provide grout retaining material on the top of bond beams to prevent upward flow of grout. Ensure that reinforcement is continuous, including around corners, except through control joints or expansion joints, unless otherwise

indicated.

3.4.5 Flashing and Weeps

a. Install through-wall flashing at obstructions in the cavity and where indicated on Drawings. Ensure continuity of the flashing at laps and inside and outside corners by splicing in a manner approved by the flashing manufacturer. Ensure that the top edge of the flashing is sealed by lapping a minimum of 6 inches under the weather resistive barrier . Terminate the horizontal leg of the flashing terminating the fabric flashing 1/2 inch short of the outside face of masonry and adhering the flashing to a sheet metal drip edge . Provide sealant below the drip edge of through-wall flashing.

b. Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior at acceptable locations as indicated. Provide weeps of weep ventilators. Locate weeps not more than 24 inches on centers in mortar joints of the exterior wythe directly on the horizontal leg of through-wall flashing over foundations, bond beams, and any other horizontal interruptions of the cavity. Place weep holes perfectly horizontal or slightly canted downward to encourage water drainage outward and not inward. Other methods may be used for providing weeps when spacing is reduced to 16 inches on center and approved by the Contracting Officer. Maintain weeps free of mortar and other obstructions.

c. Install single-wythe CMU flashing system in bed joints of CMU walls where CMU cells are open. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall on the exterior side. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.5 APPLICATION

3.5.1 Insulation

Insulate cavity walls (multi-wythe noncomposite masonry walls), where shown, by installing board-type insulation on the cavity side of the inner wythe. Apply board type insulation directly to the masonry or thru-wall flashing with adhesive. Neatly fit insulation between obstructions without impaling insulation on ties or anchors. Apply insulation in parallel courses with vertical joints breaking midway over the course below and in moderate contact with adjoining units without forcing. Cut to fit neatly against adjoining surfaces. Tape or seal the joints between the boards.

3.5.2 Interface with Other Products

3.5.2.1 Built-In Items

Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses. Fully embed anchors, ties and joint reinforcement in the mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout, unless otherwise indicated.

3.5.2.2 Door and Window Frame Joints

On the exposed interior and exterior sides of exterior frames, rake joints between frames and abutting masonry walls to a depth of 3/8 inch.

3.5.2.3 Bearing Plates

Set bearing plates for beams, joists, joist girders and similar structural members to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Provide bedding mortar and non-shrink grout s specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.5.3 Tolerances

Lay masonry plumb, true to line, with courses level within the tolerances of TMS MSJC, Article 3.3 F.

3.6 FIELD QUALITY CONTROL

3.6.1 Tests

3.6.1.1 Field Testing of Mortar

Perform mortar testing at the following frequency: 1 time per day. For each required mortar test, provide a minimum of three mortar samples. Perform initial mortar testing prior to construction for comparison purposes during construction.

Prepare and test mortar samples for mortar aggregate ratio in accordance with ASTM C780 Appendix A4.

3.6.1.2 Field Testing of Grout

a. Perform grout testing at the following frequency: 1 time per day. For each required grout property to be evaluated, provide a minimum of three specimens.

b. Sample and test conventional and self-consolidating grout for compressive strength and temperature in accordance with ASTM C1019.

c. Evaluate slump in conventional grout in accordance with ASTM C1019.

d. Evaluate slump flow and visual stability index of self-consolidating grout in accordance with ASTM C1611/C1611M.

3.6.2 Special Inspection

Perform special inspections and testing in accordance with Section 01 45 35 SPECIAL INSPECTIONS.

3.7 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, completely remove mortar and grout daubs and splashings from masonry-unit surfaces that will be exposed or painted. Before completion of the work, rake out defects in joints of masonry to be exposed or painted, fill with mortar, and tool to match existing joints. Immediately after grout work is completed, remove scum and stains that have percolated through the masonry work using a low pressure stream of water and a stiff

bristled brush. Do not clean masonry surfaces, other than removing excess surface mortar, until mortar in joints has hardened. Leave masonry surfaces clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Do not use metal tools and metal brushes for cleaning.

3.7.1 Dry-Brushing Concrete Masonry

Dry brush exposed concrete masonry surfaces at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.8 CLOSE-OUT TAKE-BACK PROGRAM

Collect information from manufacturer for take-back program options. Set aside masonry units, full and partial, scrap, and packaging to be returned to manufacturer for recycling into new product. When such a service is not available, seek local recyclers to reclaim the materials. Submit documentation that includes contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

3.9 PROTECTION

Protect facing materials against staining. Cover top of walls with nonstaining waterproof covering or membrane to protect from moisture intrusion when work is not in progress. Continue covering the top of the unfinished walls until the wall is waterproofed with a complete roof or parapet system. Extend covering a minimum of 2 feet down on each side of the wall and hold securely in place. Before starting or resuming work, clean top surface of masonry in place of loose mortar and foreign material.

-- End of Section --

SECTION 05 05 20

POST-INSTALLED CONCRETE AND MASONRY ANCHORS
05/22

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 355.2	(2007) Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary
ACI 355.4	(2011) Qualification of Post-Installed Adhesive Anchors in Concrete (ACI 355.4) and Commentary

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A193/A193M	(2020) Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service and Other Special Purpose Applications
ASTM A615/A615M	(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM E488/E488M	(2022) Standard Test Methods for Strength of Anchors in Concrete Elements
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

1.2 APPLICABILITY

This guide specification covers the requirements for all anchors that are post-installed into hardened concrete, concrete masonry, or brick. This guide specification does not cover through bolts, powder or pneumatic actuated nails, or cast in anchors. Refer to Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS for requirements of through bolts, powder or pneumatic actuated nails, or cast in anchors.

1.3 DEFINITIONS

1.3.1 Anchor

"Anchor" includes steel elements post-installed into hardened concrete, concrete masonry, or brick and used to transmit applied loads.

1.3.2 Periodic Special Inspections

"Periodic Special Inspection" as used herein means that, as a minimum, the Post-Installed Anchor Special Inspector must perform inspections in accordance with this specification.

1.3.3 Continuous Special Inspections

"Continuous Special Inspection" as used herein means that the Post-Installed Anchor Special Inspector observes the drilling and cleaning of holes, the injection of adhesive into the holes, and the insertion of anchors into the holes. When applicable for the type of installation, or as indicated in the project drawings, "Continuous Special Inspection" also includes observation of measures to secure the anchor during the adhesive curing period.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Installer Qualifications; G

Post-Installed Anchor Special Inspector Qualifications; G

SD-03 Product Data

Mechanical Anchors in Concrete; G

Adhesive Anchor System in Concrete; G

Mechanical and Adhesive Anchors in Masonry; G

Non-Shrink, Non-Metallic Grout; G

Recycled Content for Metal; S

SD-06 Test Reports

Post-Installed Anchor Special Inspections Report; G

SD-07 Certificates

Post-Installed Anchor Certification; G

SD-08 Manufacturer's Instructions

Manufacturer's Printed Installation Instructions; G

Non-Shrink, Non-Metallic Grout; G

Manufacturer's Material Safety Data Sheets

1.5 QUALITY ASSURANCE

Perform all work in accordance with EM 385-1-1 and all manufacturer's instructions and recommendations. To protect personnel from overexposure to toxic materials, conform to the applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation. Submit the MSDS for epoxies and other potentially hazardous materials.

1.5.1 Qualifications

The submittals must identify individuals who will be working on this contract and their relevant experience and training. Do not make changes in approved personnel without prior approval of the Contracting Officer.

1.5.1.1 Installer Qualifications

Each worker engaged in the installation of post-installed anchors must have satisfactorily completed an applicable certification program or equivalent instruction program through the manufacturer or manufacturer's representative for all anchoring products they will install. A manufacturer's representative must train all installers per the installation instructions as listed in the ICC-ES Evaluation Report for the anchor being installed. Training must consist of a review and performance test of the complete installation process, including but not limited to:

(1) Hole drilling procedure

(2) Hole preparation & cleaning technique

(3) Adhesive injection technique & dispenser training / maintenance

(4) Anchor/threaded rod preparation and installation

(5) Rebar dowel preparation and installation

(6) Proof loading/torquing

(7) Installation in horizontal and upward orientations

Submit certification for each worker showing that they have completed the above training within three years prior to onsite work. Certification must include organization or manufacturer's name, instructor's name and qualifications, trainee's name, list of instruction received, date of instruction, and confirmation of successful performance tests.

1.5.1.2 Post-Installed Anchor Special Inspector Qualifications

The Contractor must retain the services of a third party Special Inspector independent of the installing contractor and manufacturer. The individual(s) who perform special inspections for post-installed anchors must meet all Installer Qualification requirements and have a minimum of 3 years of experience as a Special Inspector on previous projects involving similar scope of work. Submit resumes, pertinent information, past experience, and training.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Packing, Shipping, Handling, and Unloading

Deliver products to job site in manufacturer's or distributor's original packaging undamaged, complete with installation instructions. Inspect materials delivered to site for damage. Unload and store with minimal handling.

1.6.2 Storage

Protect, store, and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration. Do not allow chemical materials to freeze. Remove materials that have not be stored in accordance with the manufacturer's recommendations, including expired materials, from the job site.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Post-Installed Anchors

Provide anchors of the type, effective embedment, and diameter indicated on contract drawings. Minimum spacing and concrete edge distances must be as shown on contract drawings. Design values listed must be as tested according to ASTM E488/E488M for the substrate type, substrate moisture condition, concrete aggregate type (normal weight or lightweight concrete), and concrete/masonry strength. Minimum allowable strength tension and shear values must be as indicated on contract drawings. If more than one type of anchor is to be used on a project, clearly indicate on the submittal where each type of anchor will be used. Provide metal containing a minimum of 25 percent recycled content. Submit data identifying percentage of recycled content for metal.

2.1.1.1 Post-Installed Anchor Certification

Submit product information with recommended design values and physical characteristics for each type anchor shown on the drawings.

Provide certified test reports showing compliance with specified performance characteristics and physical properties. Anchors must have one of the following certifications:

(1) ICC-ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria

(2) Third party Evaluation Report in conformance with ACI 355.2 or

ACI 355.4, as applicable. Third party must be accredited under ISO/IEC 17025 by a recognized accreditation body conforming to the requirements of ISO/IEC 17011 in accordance with ACI 355.4."

2.1.1.2 Manufacturer's Printed Installation Instructions

Submit manufacturer's instructions for each anchor type shown on the drawings.

2.1.1.3 Mechanical Anchors in Concrete

Anchors must have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.2.

Anchors must be galvanized in accordance with ASTM A153/A153M or stainless steel in accordance with ASTM A193/A193M unless otherwise indicated.

2.1.1.4 Adhesive Anchor System in Concrete

Use an adhesive to bond steel anchors to concrete. The adhesive must be a moisture insensitive, structural adhesive. Anchors must have been tested and qualified for performance in cracked and uncracked concrete, horizontal and overhead applications, and long term creep in accordance with ACI 355.4.

Threaded rod anchors must meet the requirements of ASTM F1554 Grade 36 or ASTM A36/A36M. Threaded rods must be galvanized in accordance with ASTM A153/A153M or stainless steel in accordance with ASTM A193/A193M unless otherwise indicated. Reinforcing bars must meet the requirements of ASTM A615/A615M Grade 60.

2.1.1.5 Mechanical and Adhesive Anchors in Masonry

Anchors must have been tested and qualified, by a third party, specifically for performance in filled concrete masonry to match the project's actual base material.

Adhesives must be moisture insensitive, low creep, structural adhesive. Threaded rods must meet the requirements of ASTM F1554 Grade 36 or ASTM A36/A36M.

Anchors must be galvanized in accordance with ASTM A153/A153M or stainless steel in accordance with ASTM A193/A193M unless otherwise indicated.

2.2 EQUIPMENT

Assemble at the site of the work, sufficient equipment that is dependable, appropriate and adequate to accomplish the work specified. Maintain the equipment in good working condition.

PART 3 EXECUTION

3.1 ANCHORING AND REINFORCING

Install anchors in accordance with the spacing and edge clearances indicated on the drawings. Anchor capacity is also highly dependent on proper installation. Follow all manufacturer and Evaluation Report installation instructions.

3.1.1 Drilling and Installing Mechanical Anchors

Drill holes for anchors using drilling equipment and bits suitable for the intended purpose, in accordance with Manufacturer's published installation instructions. Diameter of holes must be as recommended by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes must be drilled perpendicular to the concrete surface. Deviations more than 6 degrees from perpendicular are not acceptable. Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength. Mechanical anchors must not be installed in concrete that is less than 7 days old.

Clean holes, install anchors and set anchors in place in accordance with the manufacturer's recommendations. Protect threads and anchor from damage during anchor installation. Ensure proper embedment and placement in accordance with contract documents and all other work. Aim wedges away from any concrete edges that are less than 9 inches from centerline of hole.

Tighten nuts against smooth washers to the manufacturer's recommended torque, using a calibrated torque wrench. Following attainment of 10 percent of the specified torque, 100 percent of the specified torque must be reached within 7 or less complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor must be removed and replaced unless otherwise directed by the Engineer of Record.

3.1.2 Drilling and Installing Adhesive Anchors

Drill holes for anchors using drilling equipment and bits suitable for the intended purpose, in accordance with Manufacturer's Printed Installation Instructions and Evaluation Report installation instructions. Diameter of holes must be as recommended by the anchor manufacturer. Unless otherwise shown on the drawings, all holes must be drilled perpendicular to the concrete surface. Deviations more than 10 degrees from perpendicular are not acceptable. Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength. Adhesive anchors must not be installed in concrete that is less than 21 days old.

Clean holes, place grout, and install anchors in accordance with anchor manufacturer's recommendations. Remove excess adhesive after the anchor has been set in place. Remove spills on adjacent surfaces. Protect threads and anchor from damage during anchor installation. Ensure proper embedment and placement in accordance with contract documents and all other work. Do not disturb or load anchors before manufacturer specified cure time has elapsed.

Adhesives must be stored at temperatures prescribed by the manufacturer and must not be used beyond the expiration date.

3.1.3 Unused or Repairs to Drilled Holes

Any holes made for anchors that are not used must be filled with non-shrink, non metallic grout suitable for the orientation and size of hole and have a minimum compressive strength of 4000 psi. Repair must completely fill hole and be flush with existing concrete or masonry. Place in accordance with manufacturer's recommended instructions. Final anchor positions must not be within1 inch of repair patches.

3.2 EMBEDDED ITEMS

Existing reinforcing bars or other embedded items in the structure may conflict with specified anchor locations. Existing reinforcing and embedded items must not be damaged during installation of post-installed anchors.

The contractor must review the project drawings to accurately locate the position of reinforcing bars and embedded items at the locations of the anchors in the field.

Create a template at each anchor connection location prior to fabricating holes in connection plates. Template must be made by locating existing reinforcing with an approved reinforcement detection system.

3.3 TESTS AND INSPECTIONS

3.3.1 Mechanical Anchors

For mechanical anchors, periodic special inspections are required. Inspections must be in accordance with ICC IBC and the Evaluation Report.

Mechanical Anchors must be inspected during installation, to verify anchor type, anchor dimensions, base material type, drill bit, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, base material thickness, base material age, effective embedment, tightening torque, adherence to the manufacturer's printed installation instructions, and any additional items recommended in the Evaluation Report.

For mechanical anchors whose strength is dependent on a minimum installation torque, the installer under the supervision of the Special Inspector must torque test the anchors with a calibrated torque wrench. Perform torque testing immediately on the first three anchors of each type and size, for each installer, and a minimum of 5 percent of randomly selected anchors. Anchor selection will be determined by the Contracting Officer.

For mechanical anchors whose strength is not dependent on a minimum installation torque, the Special Inspector must perform proof loading on the first three anchors of each type and size, for each installer and a minimum of 5 percent of randomly selected anchors. Anchor selection will be determined by the Contracting Officer. Perform confined tension proof load testing in accordance with ASTM E488/E488M. Use incremental loading for tensile test. Maintain proof load for a minimum of 10 seconds. Consider anchors to have failed if displacement exceeds 0.1 inch D/10, where D is the nominal anchor diameter, or if any of the failure modes listed in ASTM E488/E488M occur.

Proof loads must be the minimum of the value shown on the Drawings or 50 percent of the tension capacity of the anchor.

3.3.2 Adhesive Anchors

For adhesive anchors, periodic special inspections are required as a minimum. Where adhesive anchors are used to resist sustained tension in horizontal or upwardly inclined orientations, or where the findings of the Evaluation Report for the adhesive anchor product require it, continuous special inspection is needed. Inspections must be in accordance with

ICC IBC and the Evaluation Report.

Adhesive anchors must be inspected during installation, to verify anchor type, anchor dimensions, base material type, base material age, drill bit, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, base material thickness, effective embedment, tightening torque, adhesive mixing, filling of the hole with adhesive, adherence to the manufacturer's printed installation instructions, and any additional items recommended in the Evaluation Report.

The Special Inspector must perform proof loading on the following SER determined anchors: the first three anchors of each type and size, for each installer. In addition, the Special Inspector must perform proof loading on a minimum of 5 percent of randomly selected anchors which will be determined by the Contracting Officer. Perform confined tension proof load testing in accordance with ASTM E488/E488M. Use incremental loading for tensile test. Maintain proof load for a minimum of 10 seconds. Consider anchors to have failed if displacement exceeds 0.1 inch D/10, where D is the nominal anchor diameter, or if any of the failure modes listed in ASTM E488/E488M occur.

Adhesive anchors and capsule anchors must not be torque tested.

Proof load determined by the SER is 50 percent of the tension capacity of the anchor recommended by the anchor manufacturers ICC report.

3.3.3 Action Required from Failed Tests/Inspections

Immediately report failed anchor locations and test results to the Contracting Officer. Anchors that fail to meet proof/torque load or installation requirements must be regarded as malfunctioning. Do not re-use holes unless specifically allowed by manufacturer's published instructions and approved by the Post-Installed Anchor Special Inspector.

If any of the tested anchors fail to achieve the specified torque or proof load within the limits of the contract documents, test a minimum of two adjacent anchors for each anchor that fails.

Continuously special inspect and proof load/torque test any replacement anchors.

Fill unused anchor holes and patch failed anchor locations in accordance with this specification. Prior to performing the repair, the Contractor must submit to the Contracting Officer for approval, the proposed fill and patch materials.

Additional tests, repairs, delays, or modification of work to accommodate failed tests will be at no cost to the Government.

3.3.4 Post-Installed Anchor Special Inspections Report

Report the results of all inspections weekly. Submit report as an electronic PDF file to the Contracting Officer for review by the Engineer of Record. The report must include the following:

(1) Exact locations of the inspected and tested work

(2) Inspector's name

(3) Date of inspection

(4) Summary of work completed during the inspection period

(5) Test results

(6) Statement by the Special Inspector that clearly identifies the tested anchors as being acceptable or rejected.

(7) Statement by the Special Inspector confirming that the materials and installation procedures conform with the approved contract documents and the manufacturer's published installation instructions.

3.4 DUST CONTROL

Control dust resulting from demolition to prevent the spread of dust and avoid creation of a nuisance in the surrounding area. Do not use water when it will result in, or create, hazardous or objectionable conditions such as ice, flooding, or pollution.

-- End of Section --

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SECTION 05 12 00

STRUCTURAL STEEL
08/18, CHG 2: 05/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 207	(2016; R 2017) Certification Standard for Steel Fabrication and Erection, and Manufacturing of Metal Components
AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2017) Steel Construction Manual
AISC 326	(2009) Detailing for Steel Construction
AISC 360	(2016) Specification for Structural Steel Buildings
AISC 420	(2010) Certification Standard for Shop Application of Complex Protective Coating Systems
AISC DESIGN GUIDE 10	(1997) Erection Bracing of Low-Rise Structural Steel Buildings

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ANSI/ASNT CP-189	(2020) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B46.1	(2020) Surface Texture, Surface Roughness, Waviness and Lay

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel
AWS QC1	(2016) Specification for AWS Certification of Welding Inspectors

ASTM INTERNATIONAL (ASTM)

ASTM A6/A6M	(2021) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A29/A29M	(2020) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A53/A53M	(2022) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A143/A143M	(2007; R 2020) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2021a) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A563	(2015) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A992/A992M	(2020) Standard Specification for Structural Steel Shapes
ASTM B695	(2021) Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM C827/C827M	(2016) Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM F436/F436M	(2019) Standard Specification for Hardened Steel Washers Inch and Metric Dimensions

ASTM F844	(2019) Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F959/F959M	(2017a) Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series
ASTM F1136/F1136M	(2011) Standard Specification for Zinc/Aluminum Corrosion Protective Coatings for Fasteners
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F2329/F2329M	(2015) Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
ASTM F2833	(2011; R 2017) Standard Specification for Corrosion Protective Fastener Coatings with Zinc Rich Base Coat and Aluminum Organic/Inorganic Type
ASTM F3125/F3125M	(2019) Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength

CRANE MANUFACTURERS ASSOCIATION OF AMERICA (CMAA)

CMAA 70	(2020) Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC Paint 20	(2019) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)
SSPC Paint 29	(2002; E 2004) Zinc Dust Sacrificial Primer, Performance-Based
SSPC SP 3	(2018) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01 (2019, with Change 1, 2022) Structural Engineering

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR Part 1926, Subpart R Steel Erection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Erection and Erection Bracing Drawings; G

SD-02 Shop Drawings

Fabrication Drawings Including Details of Connections; G

SD-03 Product Data

Shop Primer

Welding Electrodes and Rods

Direct Tension Indicator Washers

Non-Shrink Grout

Tension Control Bolts

Recycled Content for Structural Steel; S

Recycled Content for Structural Steel Tubing; S

Recycled Content for Steel Pipe; S

SD-06 Test Reports

Class B Coating

Bolts, Nuts, and Washers

Weld Inspection Reports

Direct Tension Indicator Washer Inspection Reports

Bolt Testing Reports

Embrittlement Test Reports

SD-07 Certificates

Steel

Bolts, Nuts, and Washers

Galvanizing

AISC Structural Steel Fabricator Quality Certification

AISC Structural Steel Erector Quality Certification

Welding Procedures and Qualifications

Welding Electrodes and Rods

Certified Welding Inspector

NDT Technician

Welding Procedure Specifications (WPS)

Overhead, Top Running Crane Runway Rail

1.3 AISC QUALITY CERTIFICATION

Work must be fabricated by an AISC Certified Structural Steel Fabricator, in accordance with AISC 207, Category BU. Submit AISC Structural Steel Fabricator quality certification.

Work must be erected by an AISC Structural Steel Certified Erector, in accordance with AISC 207, Category CSE. Submit AISC Structural Steel erector quality certification.

1.4 QUALITY ASSURANCE

1.4.1 Preconstruction Submittals

1.4.1.1 Erection and Erection Bracing Drawings

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing. The erection drawings must conform to AISC 303.

1.4.2 Fabrication Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 303, AISC 326 and AISC 325. Fabrication drawings must not be reproductions of contract drawings. Sign and seal fabrication drawings by a registered professional engineer. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS A2.4 standard welding symbols. Clearly highlight any deviations from the details shown on the contract drawings highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

1.4.3 Certifications

1.4.3.1 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of

welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welder or welding operator is more than 6 months old, the welding operator's qualification certificate must be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in AWS D1.1/D1.1M.

1.4.3.2 Overhead, Top Running Crane Runway Rail

Submit written field survey results for overhead, top running crane runway rail verifying tolerance requirements per CMAA 70.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide the structural steel system, including shop primer and galvanizing, complete and ready for use. Provide structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing in accordance with AISC 303, AISC 360, and UFC 3-301-01 except as modified in this contract.

2.2 STEEL

2.2.1 Structural Steel

Wide flange and WT shapes, ASTM A992/A992M. Angles, Channels and Plates, ASTM A36/A36M. Provide structural steel containing a minimum of 80 percent recycled content. Submit data identifying percentage of recycled content for structural steel.

2.2.2 Structural Steel Tubing

ASTM A500/A500M, Grade C. Provide structural steel tubing containing a minimum of 25 percent recycled content. Submit data identifying percentage of recycled content for structural steel tubing.

2.2.3 Steel Pipe

ASTM A53/A53M, Type E or S, Grade B, weight class STD (Standard) or as indicated. Provide steel pipe containing a minimum of 50 percent recycled content. Submit data identifying percentage of recycled content for steel pipe.

2.3 BOLTS, NUTS, AND WASHERS

Submit the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

2.3.1 Common Grade Bolts

2.3.1.1 Bolts

ASTM A307, Grade A, plain finish hot dipped zinc coating. The bolt heads

and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2.3.1.2 Nuts

ASTM A563, Grade A, heavy hex style.

2.3.1.3 Washers

ASTM F844.

2.3.2 High-Strength Bolts

High strength bolts and nuts must be shipped together in the same shipping container. Fasteners indicated to be galvanized shall be tested by the supplier to show that the galvanized nut with the supplied lubricant provided may be rotated from the snug tight condition well in excess of the rotation required for pretensioned installation without stripping. The supplier shall supply nuts that have been lubricated and tested with the supplied bolts.

2.3.2.1 Bolts

ASTM F3125/F3125M, Grade A325M A325, Type 1 Heavy Hex Head Style, plain finish.

2.3.2.2 Nuts

ASTM A563, Grade and Style as specified in the applicable ASTM bolt standard.

2.3.2.3 Direct Tension Indicator Washers

ASTM F959/F959M. Submit product data for direct tension indicator washers.

2.3.2.4 Washers

ASTM F436/F436M, plain carbon steel.

2.3.3 Tension Control Bolts

ASTM F3125/F3125M, Grade F1852, Type 1, twist-off style assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon steel nuts, and hardened carbon steel washers. Assembly finish must be plain. Submit product data for tension control bolts.

2.3.4 Foundation Anchorage

2.3.4.1 Anchor Rods

ASTM F1554 Gr 36 , Class 1A.

2.3.4.2 Anchor Nuts

ASTM A563, Grade A, hex style.

2.3.4.3 Anchor Washers

ASTM F844.

2.3.4.4 Anchor Plate Washers

ASTM A36/A36M.

2.4 STRUCTURAL STEEL ACCESSORIES

2.4.1 Welding Electrodes and Rods

AWS D1.1/D1.1M. Submit product data for welding electrodes and rods.

2.4.2 Non-Shrink Grout

ASTM C1107/C1107M, with no ASTM C827/C827M shrinkage. Grout must be nonmetallic. Submit product data for non-shrink grout.

2.4.3 Welded Shear Stud Connectors

ASTM A29/A29M, Grades 1010 through 1020. AWS D1.1/D1.1M, Table 7.1, Type B.

2.5 GALVANIZING

ASTM F2329/F2329M, ASTM F1136/F1136M, ASTM F2833 or ASTM B695 for threaded parts or ASTM A123/A123M for structural steel members, as applicable, unless specified otherwise galvanize after fabrication where practicable.

Structural steel to be galvanized is indicated on Drawings.

2.6 FABRICATION

Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member.

Compression joints depending on contact bearing must have a surface roughness not in excess of 500 micro inch as determined by ASME B46.1, and ends must be square within the tolerances for milled ends specified in ASTM A6/A6M.

Shop splices of members between field splices will be permitted only where indicated on the Contract Drawings. Splices not indicated require the approval of the Contracting Officer.

2.6.1 Markings

Prior to erection, identify members by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections must be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

2.6.2 Shop Primer

SSPC Paint 20 or SSPC Paint 29, (zinc rich primer). Shop prime structural steel, except as modified herein, in accordance with SSPC PA 1. Do not prime steel surfaces embedded in concrete, galvanized surfaces, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking and shear studs are to be welded). If flash rusting occurs, re-clean the surface prior to application of primer. Apply primer in accordance with endorsement "SPE-P1" of AISC 420 or approved equal NACE or SSPC certification to a minimum dry film thickness of 2.0 mil. Submit shop primer product data.

Prime slip critical surfaces with a Class B coating in accordance with AISC 325. Submit test report for Class B coating.

Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Contracting Officer. Repair damaged primed surfaces with an additional coat of primer.

2.6.2.1 Cleaning

SSPC SP 6/NACE No.3, except steel exposed in spaces above ceilings, attic spaces, furred spaces, and chases that will be hidden to view in finished construction may be cleaned to SSPC SP 3 when recommended by the shop primer manufacturer. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

2.7 DRAINAGE HOLES

Drill adequate drainage holes to eliminate water traps. Hole diameter must be 1/2 inch and location indicated on the detail drawings. Hole size and locations must not affect the structural integrity.

PART 3 EXECUTION

3.1 ERECTION

a. Erection of structural steel, except as indicated in item b. below, must be in accordance with the applicable provisions of AISC 325, AISC 303 and 29 CFR Part 1926, Subpart R.

b. For low-rise structural steel buildings (60 feet tall or less and a maximum of 2 stories), erect the structure in accordance with AISC DESIGN GUIDE 10.

After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.1.1 STORAGE

Store the material out of contact with the ground in such manner and location as to minimize deterioration.

3.2 CONNECTIONS

Except as modified in this section, design connections indicated in accordance with AISC 360. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Holes must not be cut or enlarged by burning. Bolts, nuts, and washers must be clean of dirt and rust, and lubricated immediately prior to installation.

3.2.1 Common Grade Bolts

Tighten ASTM A307 bolts to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the Contracting Officer for further instructions.

3.2.2 High-Strength Bolts

Provide direct tension indicator washers in all ASTM F3125/F3125M, Grade A325 and Grade A490 bolted connections. Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, fully tension bolts, progressing from the most rigid part of a connection to the free edges.

Fastener components shall be protected from dirt and moisture in closed containers at the site of the installation. Fastener components that are not incorporated into the work shall be returned to protected storage at the end of the work shift.

3.2.2.1 Installation of Direct Tension Indicator Washers (DTIW)

Where possible, install the DTIW under the bolt head and tighten the nut. If the DTIW is installed adjacent to the turned element, provide a flat washer between the DTIW and nut when the nut is turned for tightening, and between the DTIW and bolt head when the bolt head is turned for tightening. In addition to the LIW, provide flat washers under both the bolt head and nut when ASTM F3125/F3125M, Grade A490 bolts are used.

3.2.3 Tension Control Bolts

Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, fully tension bolts, progressing from the most rigid part of a connection to the free edges.

3.3 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors is not permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

3.4 WELDING

Welding must be in accordance with AWS D1.1/D1.1M. Grind exposed welds smooth as indicated. Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

Develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Submit for

approval all WPS, whether prequalified or qualified by testing.

3.4.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

3.5 SHOP PRIMER REPAIR

Repair shop primer in accordance with the paint manufacturer's recommendation for surfaces damaged by handling, transporting, cutting, welding, or bolting.

3.5.1 Field Priming

Field prime steel exposed to the weather, or located in building areas without HVAC for control of relative humidity. After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat must be cleaned and primed with paint of the same quality as that used for the shop coat.

3.6 GALVANIZING REPAIR

Repair damage to galvanized coatings using ASTM A780/A780M zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. Notify the Contracting Officer in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of the inspection.

3.7.1 Welds

3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. A Certified Welding Inspector must perform visual inspection on 100 percent of all welds. Document this inspection in the Visual Weld Inspection Log. Submit certificates indicating that certified welding inspectors meet the requirements of AWS QC1.

3.7.1.2 Nondestructive Testing

Nondestructive testing must be in accordance with AWS D1.1/D1.1M. Ultrasonic testing must be performed in accordance with Table 6.2 or 6.3 of AWS D1.1/D1.1M. Test locations must be selected by the Contracting Officer. All personnel performing NDT must be certified in accordance with ANSI/ASNT CP-189 in the method of testing being performed. Submit certificates showing compliance with ANSI/ASNT CP-189 for all NDT technicians. If more than 20 percent of welds made by a welder contain defects identified by testing, then all groove welds made by that welder must be tested by ultrasonic testing, and all fillet welds made by that welder must be inspected by magnetic particle testing (MT) or dye penetrant testing (PT) as approved by the Contracting Officer. When groove welds made by an individual welder are required to be tested, magnetic particle or dye penetrant testing may be used only in areas

inaccessible to ultrasonic testing. Retest all repaired areas. Submit weld inspection reports.

Testing frequency: Provide the following types and number of tests:

Test Type	Number of Tests
Ultrasonic	50 percent of CJP Welds
Magnetic Particle	50 percent of PJP and Fillet Welds

3.7.2 Direct Tension Indicator Washers

3.7.2.1 Direct Tension Indicator Washer Compression

Test direct tension indicator washers in place to verify that they have been compressed sufficiently to provide the 0.015 inch gap, as required by ASTM F959/F959M. Submit direct tension indicator washer inspection reports.

3.7.3 High-Strength Bolts

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in AISC 360, depending on bolt size and grade. The bolt tension must be developed by tightening the nut. A representative of the manufacturer or supplier must be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements. Submit bolt testing reports.

3.7.3.2 Inspection

Inspection procedures must be in accordance with AISC 360. Confirm and report to the Contracting Officer that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

Inspect calibration of torque wrenches for high-strength bolts.

3.7.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. Provide the required access for the Government to perform the tests. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations must be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, must be tested at the Contractor's

expense. Retest new bolts after installation at the Contractor's expense.

3.7.4 Testing for Embrittlement

ASTM A143/A143M for steel products hot-dip galvanized after fabrication. Submit embrittlement test reports.

3.7.5 Inspection and Testing of Steel Stud Welding

Perform verification inspection and testing of steel stud welding conforming to the requirements of AWS D1.1/D1.1M, Stud Welding Clause. The Contracting Officer will serve as the verification inspector. Bend test studs that do not show a full 360 degree weld flash or have been repaired by welding as required by AWS D1.1/D1.1M, Stud Welding Clause. Studs that crack under testing in the weld, base metal or shank will be rejected and replaced by the Contractor at no additional cost.

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SECTION 05 21 00

STEEL JOIST FRAMING
05/15, CHG 1: 08/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC Paint 15	(1999; E 2004) Steel Joist Shop Primer/Metal Building Primer
SSPC SP 2	(2018) Hand Tool Cleaning

STEEL JOIST INSTITUTE (SJI)

SJI LOAD TABLES	(2020) Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders - 45th Edition

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.757	Steel Erection; Open Web Steel Joists

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Welder Qualification

SD-02 Shop Drawings

Steel Joist Framing; G

SD-03 Product Data

Recycled Content Of Steel Products; S

SD-05 Design Data

Design Calculations; G

SD-06 Test Reports

Erection Inspection

Welding Inspections

SD-07 Certificates

Certification of Compliance

1.3 QUALITY ASSURANCE

Perform all work in compliance with the requirements set forth in 29 CFR 1926.

1.3.1 Drawing Requirements

Submit drawings of steel joist framing including fabrication, specifications for shop painting, and identification markings of joists. Show joist type and size, layout in plan, all applicable loads, deflection criteria, and erection details including methods of anchoring, framing at openings, type, size, and location and connections for and spacing of bridging, requirements for field welding, and details of accessories as applicable.

1.3.2 Certification of Compliance

Prior to construction commencement, submit certification for welder qualification, in compliance with AWS D1.1/D1.1M, welding operation, and tacker, stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. Submit certification of compliance for the following:

a. Steel Joist Institute Member Fabricator

b. 29 CFR 1926

c. 29 CFR 1926.757

d. Statement from steel joist manufacturer, that work was performed in accordance with approved construction documents and with SJI standard specifications, in accordance with ICC IBC Section 1704.2.5.2.

1.4 DELIVERY, STORAGE, AND HANDLING

Handle, transport, and store joists in a manner to prevent damage affecting their structural integrity. Verify piece count of all joist products upon delivery and inspect all joists products for damage. Report any damage to the joist supplier. Store all items off the ground in a well drained location protected from the weather and easily accessible for inspection and handling. Store joists with top chord down and with joists in a vertical position. Store deep joists horizontally if they were shipped on their sides.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Designate steel joists on the drawings in accordance with the standard designations of the Steel Joist Institute. Joists of other standard designations or joists with properties other than those shown may be substituted for the joists designated provided the structural properties are equal to or greater than those of the joists shown and provided all other specified requirements are met.

2.2 STEEL JOISTS

Provide steel joists conforming to SJI LOAD TABLES. Design joists designated K, KCS, LH and DLH to support the loads given in the applicable standard load tables of SJI LOAD TABLES. Submit design calculations for net uplift loads, non-SJI standard details, and field splices. Include cover letter signed and sealed by the joist manufacturer's registered design professional.

2.2.1 Steel Joist Camber

Camber joists according to SJI LOAD TABLES.

2.2.2 Special Steel Joists

Provide special joists and connections capable of withstanding the design loads indicated with a live-load deflection less than L/240 for roof joists.

2.2.3 Steel Joist Substitutes and Outriggers

Provide joist substitutes and outriggers conforming to SJI LOAD TABLES with steel angle or channel members.

2.3 RECYCLED CONTENT

Provide products with an average recycled content of steel products of postconsumer recycled content plus one half of preconsumer recycled content not less than 25 percent.

2.4 ACCESSORIES AND FITTINGS

2.4.1 Bridging

Provide bridging of material, size, and type required by SJI LOAD TABLES for type of joist, chord size, spacing and span. Furnish additional erection bridging if required for stability.

2.4.2 Bearing Plates

Fabricate steel bearing plats from ASTM A36/A36M steel of size and thickness indicated.

2.4.3 Ceiling Extensions

Furnish ceiling extensions, either bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.

2.5 SHOP PAINTING

SSPC Paint 15. Shop prime joists, except as modified herein, in accordance with SSPC PA 1. Clean joists in accordance with SSPC SP 2 before priming. If flash rusting occurs, re-clean the surface prior to application of primer. For joists which require finish painting under Section 09 90 00 PAINTS AND COATINGS, the primer paint must be compatible with the finish paint.

PART 3 EXECUTION

3.1 ERECTION

Install joists in conformance with SJI LOAD TABLES for the joist series indicated, and the requirements of 29 CFR 1926 and 29 CFR 1926.757. Handle and set joists avoiding damage to the members. Place the "tag end" of joists as shown on the joists placement plans. Ensure that square-end joists are erected right side up. Distribute temporary loads so that joist capacity is not exceeded. Remove damaged joists from the site, except when field repair is approved and such repairs are satisfactorily made in accordance with the manufacturer's recommendations. Do not repair, field modify, or alter any joists without specific written instructions from the Designer of Record and/or joist manufacturer.

Install and connect bridging concurrently with joist erection, before construction loads are applied. Do not apply loads to bridging. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams. Do not cut away vertical leg of bridging where bridging makes an elevation transition; weld a separate piece of bridging at the transition. Perform all welding in accordance with AWS D1.1/D1.1M.

3.2 BEARING PLATES

Provide bearing plates to accept full bearing after the supporting members have been plumbed and properly positioned, but prior to placing superimposed loads. The area under the plate must be damp-packed solidly with bedding mortar, except where nonshrink grout is indicated on the drawings. Provide bedding mortar and grout as specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.3 PAINTING

3.3.1 Touch-Up Painting

After erection of joists , touch-up connections and areas of abraded shop coat with paint of the same type used for the shop coat.

3.3.2 Field Painting

Paint joists requiring a finish coat in conformance with the requirements of Section 09 90 00 PAINTS AND COATINGS.

3.4 VISUAL INSPECTIONS

Perform the following visual inspections:

a. Verify that all joists are spaced properly.

b. Verify that there is sufficient joist bearing on steel beams, concrete, and masonry.

c. Verify all bridging lines are properly spaced and anchored.

d. Verify that damage has not occurred to the joists during erection.

e. Verify the joists are aligned vertically and there is no lateral sweep in the joists.

f. Where concentrated loads are present on the joists verify that they are located in accordance with the joists placement plan.

g. Verify welding of bridging and joist seats in accordance with AWS D1.1/D1.1M, Section 6. Perform erection inspection and field welding inspections with AWS certified welding inspectors.

h. Verify proper bolting of diagonal bridging and joist seats where the bolts are snug-tight.

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SECTION 05 30 00

STEEL DECKS
05/15, CHG 2: 08/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100	(2017) Cold-Formed Steel Design Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel
AWS D1.3/D1.3M	(2018) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A792/A792M	(2021a) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM A1008/A1008M	(2021a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM D746	(2014) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D1056	(2020) Standard Specification for Flexible

	Cellular Materials - Sponge or Expanded Rubber
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/
FM DS 1-28R	(1998) Data Sheet: Roof Systems

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(2019) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)

STEEL DECK INSTITUTE (SDI)

ANSI/SDI C	(2017) Standard for Composite Steel Floor Deck - Slabs
ANSI/SDI NC	(2017) Standard for Non-Composite Steel Floor Deck
ANSI/SDI QA/QC	(2017) Standard for Quality Control and Quality Assurance for Installation of Steel Deck
SDI DDM04	(2015; Errata 1-3 2016; Add 1 2015; Add 2 20162006) Diaphragm Design Manual; 4th Edition
SDI DDP	(1987; R 2000) Deck Damage and Penetrations
SDI MOC3	(2016) Manual of Construction with Steel Deck (3rd Edition)

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019, with Change 1, 2022) Structural Engineering

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction

UNDERWRITERS LABORATORIES (UL)

UL 580	(2006; Reprint Mar 2019) UL Standard for Safety Tests for Uplift Resistance of Roof Assemblies

UL Fire Resistance (2014) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G

SD-03 Product Data

Accessories

Deck Units

Galvanizing Repair Paint

Mechanical Fasteners

Touch-Up Paint

Welding Equipment

Welding Rods and Accessories

Recycled Content of Steel Products; S

SD-04 Samples

Metal Roof Deck Units

Flexible Closure Strips

SD-05 Design Data

Deck Units; G

SD-07 Certificates

Welder Qualifications

Welding Procedures

Fire Safety

Wind Storm Resistance

Manufacturer's Certificate

1.3 QUALITY ASSURANCE

1.3.1 Deck Units

Furnish deck units and accessory products from a manufacturer regularly

engaged in manufacture of steel decking. Provide manufacturer's certificates attesting that the decking material meets the specified requirements.

1.3.2 Qualifications for Welding Work

Follow Welding Procedures of AWS D1.3/D1.3M for sheet steel and AWS D1.1/D1.1M for stud welding.
Submit qualified Welder Qualifications in accordance with AWS D1.3/D1.3M for sheet steel and AWS D1.1/D1.1M for stud welding, or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. Test specimens shall be made in the presence of Contracting Officer and shall be tested by an approved testing laboratory at the Contractor's expense. If a test weld fails to meet requirements, perform an immediate retest of two test welds until each test weld passes. Failure in the immediate retest will require the welder be retested after further practice or training, performing a complete set of test welds.

Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories.

1.3.3 Regulatory Requirements

1.3.3.1 Fire Safety

Test roof deck as a part of a roof deck construction assembly of the type used for this project, listing as fire classified in the UL Fire Resistance, or listing as Class I construction in the FM APP GUIDE, and so labeled.

1.3.3.2 Wind Storm Resistance

Provide roof construction assembly capable of withstanding a nominal uplift pressure indicated on the structural Drawings when tested in accordance with the uplift pressure test described in the FM DS 1-28R or as described in UL 580 and in general compliance with UFC 3-301-01.

1.3.4 Fabrication Drawings

Show type and location of units, location and sequence of connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, cant strips, ridge and valley plates, metal closure strips, size and location of holes to be cut and reinforcement to be provided, the manufacturer's erection instructions and other pertinent details.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver deck units to the site in a dry and undamaged condition. Store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage. Do not use decking for storage or as working platform until units have been fastened into position. Exercise care not to damage material or overload decking during construction. The maximum uniform distributed storage load must not exceed the design live load. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide drainage. Maintain deck finish at all times to prevent formation of rust. Repair deck finish using touch-up paint. Replace damaged material.

1.5 DESIGN REQUIREMENTS FOR ROOF DECKS

1.5.1 Properties of Sections

Properties of metal roof deck sections must comply with engineering design width as limited by the provisions of AISI D100.

1.5.2 Allowable Loads

Indicate total uniform dead and live load for detailing purposes.

PART 2 PRODUCTS

2.1 DECK UNITS

Submit manufacturer's design calculations, or applicable published literature for the structural properties of the proposed deck units.

Provide products with an average recycled content of steel products so postconsumer recycled content plus one half of preconsumer recycled content not less than 25 percent.

2.1.1 Roof Deck

Conform to ASTM A792/A792M or ASTM A1008/A1008M for deck used in conjunction with insulation and built-up roofing. Fabricate roof deck units of the steel design thickness required by the design drawings and galvanized. Furnish sample of Metal Roof Deck Units used to illustrate actual cross section dimensions and configurations.

2.1.2 Composite Deck

Conform to ASTM A653/A653M or ASTM A1008/A1008M for composite deck assembly. Fabricate deck used as the tension reinforcing in composite deck of the steel design thickness required by the design drawings. Zinc-coat in conformance with ASTM A653/A653M, G90 coating class.

2.1.3 Length of Deck Units

Provide deck units of sufficient length to span three or more spacings where possible.

2.1.4 Shop Priming

Shop prime accessories and underside of deck at the factory after coating. Clean surfaces in accordance with the manufacturer's standard procedure followed by a spray, dip or roller coat of rust-inhibitive primer, oven cured.

2.1.5 Touch-Up Paint

Provide a high zinc-dust content paint for regalvanizing welds in galvanized steel conforming to ASTM A780/A780M.

Provide touch-up paint for shop-painted units of the same type used for the shop painting, and touch-up paint for zinc-coated units of an approved galvanizing repair paint with a high-zinc dust content. Touch-up welds with paint conforming to SSPC Paint 20 in accordance with ASTM A780/A780M.

Maintain finish of deck units and accessories by using touch-up paint whenever necessary to prevent the formation of rust.

2.2 ACCESSORIES

Provide accessories of same material as deck, unless specified otherwise. Provide manufacturer's standard type accessories, as specified.

2.2.1 Adjusting Plates

Provide adjusting plates, or segments of deck units, of same thickness and configuration as deck units in locations too narrow to accommodate full size units. Provide factory cut plates of predetermined size where possible.

2.2.2 End Closures

Fabricated of sheet metal by the deck manufacturer. Provide end closures minimum 0.0295 inch thick to close open ends at exposed edges of floors, parapets, end walls, eaves, and openings through deck.

2.2.3 Partition Closures

Provide closures for closing voids above interior walls and partitions that are perpendicular to the direction of the configurations. Provide rubber, plastic, or sheet steel closures above typical partitions. Provide sheet steel closures above fire-resistant interior walls and partitions located on both sides of wall or partition. Provide glass fiber blanket insulation in the space between pairs of closures at acoustical partitions.

2.2.4 Flexible Closure Strips for Roof Decks

Provide strips made of vulcanized, closed-cell, synthetic rubber material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Conforming to ASTM D1056, Grade 2A1, with the following additional properties:

Brittleness temperature of minus 40 degrees F when tested in accordance with ASTM D746.

Flammability resistance with a flame spread rating of less than 25 when tested in accordance with ASTM E84.

Resistance to ozone must be "no cracks" after exposure of a sample kept under a surface tensile strain of 25 percent to an ozone concentration of 100 parts per million of air by volume in air for 100 hours at 104 degrees F and tested in accordance with ASTM D1149.

Provide a elastomeric type adhesive as recommended by the manufacturer of the flexible closure strips.

2.2.5 Closure Plates for Composite Deck

Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in composite steel

deck 1/4 inch and over.

2.2.6 Sheet Metal Collar

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.2.7 Cover Plates

Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominal 18 gage thick before galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

2.2.8 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

2.2.9 Hanger

Provide clips or loops for utility systems and suspended ceilings of one or more of the following types:

a. Lip tabs or integral tabs where noncellular decking or flat plate of cellular section is 0.0474 inch thick or more, and a structural concrete fill is used over deck.

b. Slots or holes punched in decking for installation of pigtails.

c. Tabs driven from top side of decking and arranged so as not to pierce electrical cells.

d. Decking manufacturer's standard as approved by the Contracting Officer.

2.2.10 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0358 inch thick before galvanizing. Bend strips to form a 45-degree cant not less than 5 inch wide, with top and bottom flanges a minimum 3 inch wide. Length of strips 10 feet.

2.2.11 Ridge and Valley Plates for Roof Decks

Fabricate plates from the specified structural-quality steel sheets, not less than nominal 0.0358 inch thick before galvanizing. Provide plates of minimum 4-1/2 inch wide and bent to provide tight fitting closures at ridges and valleys. Provide a minimum length of ridge and valley plates of 10 feet.

2.2.12 Metal Closure Strips for Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not

less than nominal 0.0358 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

2.2.13 Galvanized Steel Angles for Roof Decks

Provide hot-rolled carbon steel angles conforming to ASTM A36/A36M, and hot-dip galvanized in accordance with ASTM A123/A123M.

2.2.14 Mechanical Fasteners

Provide self-drilling screws, for anchoring the deck to adjoining units as indicated.

2.2.15 Miscellaneous Accessories

Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch welding washers, 0.0598 inch other metal accessories, 0.0358 inch unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to installation of decking units and accessories, examine worksite to verify that as-built structure will permit installation of decking system without modification.

3.2 INSTALLATION

Install steel deck units in accordance with 29 CFR 1926, Subpart R – Steel Erection, ANSI/SDI QA/QC, SDI DDM04 and approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports before permanently securing in place. Damaged deck and accessories including material which is permanently stained or contaminated, deformed, or with burned holes shall not be installed. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Contracting Officer and make necessary corrections before permanently anchoring deck units. Locate deck ends over supports only. Lap 2 inch deck ends. Do not use unanchored deck units as a work or storage platform. Do not fill unanchored deck with concrete. Permanently anchor units placed by the end of each working day. Do not support suspended ceilings, light fixtures, ducts, utilities, or other loads by steel deck unless indicated. Distribute loads by appropriate means to prevent damage.

3.2.1 Attachment

Immediately after placement and alignment, and after correcting inaccuracies, permanently fasten steel deck units to structural supports and to adjacent deck units by welding with normal 5/8 inch diameter puddle welds, or fastened with screws as indicated on the design drawings and in accordance with manufacturer's recommended procedure. Clamp or weight deck units to provide firm contact between deck units and structural supports while performing welding or fastening. Attachment of adjacent deck units by button-punching is prohibited.

3.2.1.1 Welding

Perform welding in accordance with AWS D1.3/D1.3M using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Ensure only operators previously qualified by tests prescribed in AWS D1.3/D1.3M make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Conform to the recommendations of the Steel Deck Institute and the steel deck manufacturer for location, size, and spacing of fastening. Do not use welding washers at the connections of the deck to supports. Do not use welding washers at sidelaps. Holes and similar defects will not be acceptable. Attach all partial or segments of deck units to structural supports in accordance with Section 2.5 of SDI DDM04. Attach shear connectors as shown and welded as per AWS D1.1/D1.1M through the steel deck to the steel member. Immediately clean welds by chipping and wire brushing. Heavily coat welds, cut edges and damaged portions of coated finish with zinc-dust paint conforming to ASTM A780/A780M.

3.2.1.2 Sidelap Fastening

Lock sidelaps between composite roof deck units together by welding or screws as indicated.

3.2.2 Openings

Cut or drill all holes and openings required and be coordinated with the drawings, specifications, and other trades. Frame and reinforce openings through the deck in conformance with SDI DDP. Reinforce holes and openings 6 to 12 inch across by 0.0474 inch thick steel sheet at least 12 inch wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inch on center. Reinforce holes and openings larger than 12 inch by steel channels or angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Install steel channels or angles perpendicular to the deck ribs and fasten to the channels or angles perpendicular to the steel joists. Openings must not interfere with seismic members such as chords and drag struts.

3.2.3 Deck Damage

SDI MOC3, for repair of deck damage.

3.2.4 Touch-Up Paint

3.2.4.1 Roof Deck

After roof decking installation, wire brush, clean, and touchup paint the scarred areas on top and bottom surfaces of metal roof decking. The scarred areas include welds, weld scars, bruises, and rust spots. Touchup galvanized surfaces with galvanizing repair paint. Touchup painted surfaces with repair paint of painted surfaces.

3.2.5 Accessory Installation

3.2.5.1 Adjusting Plates

Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.

3.2.5.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.

3.2.5.3 Closures Above Partitions

Provide for closing voids between cells over partitions that are perpendicular to direction of cells. Provide a one-piece closure strip for partitions 4 inch nominal or less in thickness and two-piece closure strips for wider partitions. Provide sheet metal closures above fire-rated partitions at both sides of partition with space between filled with fiberglass insulation. Provide flexible rubber closures above acoustic-rated partitions at both sides of partition with space between filled with blanket insulation.

3.2.5.4 Cover Plates

Provide metal cover plates, or joint tape, at joints between cellular decking sheets to be used as electrical raceways. Where concrete leakage would be a problem, provide metal cover plates, or joint tape, at joints between decking sheets, cellular or noncellular, to be covered with concrete fill.

3.2.5.5 Access Hole Covers

Provide access whole covers to seal holes cut in decking to facilitate welding of the deck to structural supports.

3.2.5.6 Hangers

Provide as indicated to support utility system and suspended ceilings. Space devices as indicated and so as to provide one device per 6.25 square feet.

3.2.6 Concrete Work

Prior to placement of concrete, inspect installed decking to ensure that there has been no permanent deflection or other damage to decking. Replace decking which has been damaged or permanently deflected as approved by the Contracting Officer. Place concrete on metal deck in accordance with Construction Practice of ANSI/SDI C or ANSI/SDI NC.

3.3 CANT STRIPS FOR ROOF DECKS

Provide strips to be fusion welded to surface of roof decking, secured to wood nailers by galvanized screws or to steel framing by galvanized self-tapping screws or welds. Do not exceed spacing of welds and fasteners of 12 inch. Lap end joints a minimum 3 inch and secure with galvanized sheet metal screws spaced a maximum 4 inch on center.

3.4 RIDGE AND VALLEY PLATES FOR ROOF DECKS

Provide plates to be fusion welded to top surface of roof decking. Lap end joints a minimum 3 inch. For valley plates, provide endlaps to be in the direction of water flow.

3.5 CLOSURE STRIPS FOR ROOF DECKS

Provide closure strips at open, uncovered ends and edges of the roof decking and in voids between roof decking and top of walls and partitions where indicated. Install closure strips in position in a manner to provide a weathertight installation.

3.6 ROOF INSULATION SUPPORT FOR ROOF DECKS

Provide metal closure strips for support of roof insulation where rib openings in top surface of metal roof decking occur adjacent to edges and openings. Weld metal closure strips in position.

3.7 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

3.8 FIELD QUALITY CONTROL

3.8.1 Deck Weld Inspection

Visual inspect welds in accordance with AWS D1.3/D1.3M.

3.8.2 Decks Not Receiving Concrete

Inspect the decking top surface for distortion after installation. For roof decks not receiving concrete, verify distortion by placing a straight edge across three adjacent top flanges. The maximum allowable gap between the straight edge and the top flanges should not exceed manufacturing and construction tolerances of supporting members. When gap is more than the allowable, provide corrective measures or replacement. Reinspect decking after performing corrective measures or replacement.

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SECTION 05 50 13

MISCELLANEOUS METAL FABRICATIONS
05/17, CHG 1: 08/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 2605	(2020) Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2022) Nuts for General Applications: Machine Screw Nuts, and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.6.2	(2020) Square Head Set Screws and Slotted Headless Set Screws (Inch Series)
ASME B18.6.3	(2013; R 2017) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)
ASME B18.21.1	(2009; R 2016) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.21.2M	(1999; R 2014) Lock Washers (Metric Series)

ASME B18.22M	(1981; R 2017) Metric Plain Washers

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.3	(2020) Safety Requirements for Powder-Actuated Fastening Systems American National Standard for Construction and Demolition Operations

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A29/A29M	(2020) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2022; E 2022) Standard Specification for Ferritic Malleable Iron Castings
ASTM A53/A53M	(2022) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2021a) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip

	Galvanized Coatings
ASTM A924/A924M	(2022) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B26/B26M	(2018; E 2018) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B429/B429M	(2010; E 2012) Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM C1513	(2018) Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM E488/E488M	(2022) Standard Test Methods for Strength of Anchors in Concrete Elements
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

MASTER PAINTERS INSTITUTE (MPI)

MPI 79	(2016) Primer, Alkyd, Anti-Corrosive for Metal

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3	(2018) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health

Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Bollards/Pipe Guards; G

Embedded Angles and Plates, Installation Drawings; G

Roof Hatches, Installation Drawings; G

Exterior Canopy Support Drawings; G

Fabrication Drawings; G

SD-03 Product Data

Corner Guards

Roof Hatches; G

Each Downspout Terminations Type; G

Exterior Canopy; G

Recycled Content; S

SD-05 Design Data

Metal Canopy System; G

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.3.1 Submittals for Metal Canopy System

a. Shop Drawings: Submit complete exterior canopy support drawings including:

(1) Overall canopy layout dimensions

(2) Cut section details including elevation, bent layout dimensions, canopy connection details, and wall connection details

(3) Flashing details pertaining to aluminum canopy

b. Product Data: Submit manufacturer's product information, specification, and installation instructions for aluminum canopy.

c. Samples: Submit color verification samples of actual coated aluminum material.

1.3.2 Quality Assurance for Metal Canopies

a. Manufacturer Qualifications: Minimum five years experience in design, fabrication, and production of aluminum protective covers

b. Components must be assembled in shop to greatest extent possible to minimize field assembly.

c. Aluminum protective cover, including material and workmanship, shall be warranted from defects for a period of one year from date of completion of aluminum protective cover installation.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

1.5 MISCELLANEOUS REQUIREMENTS

1.5.1 Fabrication Drawings

a. Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

b. Canopy must conform to local building codes.

c. PE Stamped calculations are required and must be signed and sealed by an engineer licensed within the state canopy is installed.

1.5.2 Installation Drawings

Submit templates, erection, and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation in relation to the building construction.

PART 2 PRODUCTS

2.1 RECYCLED CONTENT

Provide products with recycled content. Submit data identifying percentage of recycled content for metal.

2.2 MATERIALS

Provide exposed fastenings of compatible materials (avoid contact of dissimilar metals). Coordinate color and finish with the material to which fastenings are applied.

2.2.1 Structural Carbon Steel

Provide in accordance with ASTM A36/A36M.

2.2.2 Structural Tubing

Provide in accordance with ASTM A500/A500M.

2.2.3 Steel Pipe

Provide in accordance with ASTM A53/A53M, Type E or S, Grade B.

2.2.4 Fittings for Steel Pipe

Provide standard malleable iron fittings in accordance with ASTM A47/A47M.

2.2.5 Anchor Bolts

Provide in accordance with ASTM F1554. Where exposed, provide anchor bolts of the same material, color, and finish as the metal to which they are applied.

2.2.5.1 Expansion Anchors and Adhesive Anchors

Provideexpansion anchors and adhesive anchors. Diameters and minimum concrete and masonry embedments indicated on the Drawings. Design values listed on the Drawings are as tested in accordance with ASTM E488/E488M.

a. Calculate pullout and shear capacity according to ACI 318.

2.2.5.2 Lag Screws and Bolts

Provide in accordance with ASME B18.2.1, type and grade best suited for the purpose.

2.2.5.3 Toggle Bolts

Provide in accordance with ASME B18.2.1.

2.2.5.4 Bolts, Nuts, Studs and Rivets

Provide in accordance with ASME B18.2.2 or ASTM A307.

2.2.5.5 Powder Actuated Fasteners

Follow safety provisions in accordance with ASSP A10.3.

2.2.5.6 Screws

Provide in accordance with ASME B18.2.1, ASME B18.6.2, ASME B18.6.3 and ASTM C1513.

2.2.5.7 Washers

Provide plain washers in accordance with ASME B18.22M, ASME B18.21.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers in accordance with ASME B18.21.2M, ASME B18.21.1.

2.2.5.8 Welded Headed Shear Studs

Provide in accordance with ASTM A108 or ASTM A29/A29M-12.

2.2.6 Aluminum Alloy Products

Provide in accordance with ASTM B209M, ASTM B209 for sheet plate, ASTM B221M, ASTM B221M, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.3 FABRICATION FINISHES

2.3.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Provide galvanizing in accordance with ASTM A123/A123M, ASTM A153/A153M, ASTM A653/A653M or ASTM A924/A924M, Z275 G90.

2.3.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.3.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint in accordance with ASTM A780/A780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat, with a torch, surfaces to which stick or paste material will be applied. Heat to a temperature sufficient to melt the metals in the stick or paste. Spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.3.4 Shop Cleaning and Painting

2.3.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete must be free of dirt and grease prior to embed. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints. Shop coat these surfaces with rust prevention.

2.3.4.2 Pretreatment, Priming and Painting

Apply pre-treatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

2.3.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.3.6 Aluminum Surfaces

2.3.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.3.6.2 Aluminum Finishes

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF45. Unless otherwise specified, provide all other aluminum items with a standard mill finish anodized finish. Provide a coating thickness not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations. Provide in accordance with AA DAF45. Provide a polished satin finish on items to be anodized.

2.4 CORNER GUARDS

For jambs and sills of openings and edges of platforms provide steel shapes and plates anchored in masonry or concrete with welded steel straps or end-weld stud anchors. Form corner guards for use with glazed or ceramic tile finish on walls with 0.0625 inch thick corrosion-resisting steel with polished finish, extend 5 feet above the top of cove base or to the top of the wainscot, whichever is less, and securely anchor to the supporting wall. Provide interior corner guards as indicated in Section 10 26 00 WALL AND DOOR PROTECTION.

2.5 BOLLARDS/PIPE GUARDS

Provide 6-inch galvanized standard weight steel pipe in accordance with ASTM A53/A53M. Anchor posts in concrete as indicated and fill solidly with concrete with minimum compressive strength of 2500 psi.

2.6 DOWNSPOUT TERMINATIONS

Provide 4x4 inchaluminum downspout tile adapter with manufacturer's standard powder coated finish. Units shall have all seams welded.

Provide6 inchcast iron downspout boot with cleanout access and manufacturer's standard cast iron strap.

2.7 MISCELLANEOUS PLATES AND SHAPES

Provide items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners or welds. Construct to have at least 8-inch bearing on masonry at each end.

Provide angles and plates in accordance with ASTM A36/A36M, for embedment

as indicated. Galvanize embedded items exposed to the elements in accordance with ASTM A123/A123M.

2.8 ROOF HATCHES (SCUTTLES)

Provide aluminum sheets not less than 14 gauge with 3 inch beaded flange, welded and ground at corners. Provide a minimum clear opening of 30 by 37 inches. Insulate cover and curb with one inch thick rigid fiberboard insulation, covered and protected by aluminum sheet of not less than 26 gage. Provide with 12 inches high curb, formed with 3 inch mounting flanges with holes for securing to the roof deck.

2.8.1 Safety Railings

Safety Railing System: Model SRC Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with OSHA 29 CFR 1910.23 and 29 CFR 1926.502 requirements and authorities having jurisdiction.

a. Height: 42 inches above finished roof deck.

b. Rails:

(1) Aluminum pipe, 1-1/4 inch, 1.66 inch outside diameter, schedule 40 6061 T6 alloy pipe.

(2) Fittings: Cast aluminum 5052-H32 alloy with set screw hold.

(3) Mounting Brackets: 3/16 inch steel, zinc plated with nut backing plate.

(4) Exit: Self-closing gate, 1-1/4 inch aluminum self-closing with coil spring.

(5) Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter

(6) Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.

(7) Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.

(8) Fabricate joints exposed to weather to be watertight.

(9) Fasteners: Manufacturer's standard, finished to match railing system.

(10) Finish: Manufacturer's standard

(11) Color: Safety yellow

(12) Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

(13) Operation: Post locks in place on full extension; release mechanism returns post to closed position.

2.9 WINDOW SUB-SILL

Provide window sub-sill of extruded aluminum alloy, standard mill finish, of size(s) and design(s) indicated. Provide a minimum of two anchors per window section for securing to mortar joints of masonry sill course. Provide sills with protective coating for shipment, of two coats of a clear, colorless, methacrylate lacquer applied to all surfaces of the sills.

2.10 METAL CANOPY SYSTEM

2.10.1 Source Limitations for Metal Canopies

Obtain metal canopies, attachments, drainage devices, and other accessories from single source manufacturer.

2.10.2 Design and Assembly

a. Delegated Design: Engage a professional engineer to design metal canopy to withstand loading criteria as indicated for the project.

   (1) Refer to Drawings for loading criteria.

b. Aluminum protective cover shall be welded together into a frame system consisting of the main support frame and the decking frame. Mechanically fastened connections can be used if shipping does not allow welded system.

c. Canopy shall use perimeter "J" channel as fascia and the decking shall run perpendicular to the plane of the wall. All beams shall have welded caps at the ends to prevent any water leakage.

d. Canopies shall drain from the decking to the drain beam against the wall, down the vertical downspout, and discharge at the bottom of the downspout at grade. Downspout shall be designed to discharge the water away from the entrance.

e. The canopy frame is to be fastened to the wall using required fasteners to withstand loading criteria as indicated.

f. Custom flashing is to be used under the decking frame to prevent water from blowing out between the decking and drain beam.

2.10.3 Materials

a. Aluminum Extrusions:

   (1) ASTM B221 and ASTM B429/B429M 6063-T5 alloy and temper.

b. Hardware:

   (1) All fasteners shall be stainless steel.

2.10.4 Components

a. Canopy Main Frame

   (1) Main frame is to be made using manufacturer's standard extruded aluminum sections and aluminum drain beams (minimum 4 by 8 by

0.125 inches, unless larger are required due to canopy spans). The only drain beam is located at the back of the frame against the wall to receive all draining water from the canopy top.

(a) Provide manufacturer's standard steel hangar tubes welded to steel backing plate and thru bolts for cantilevered canopy application. Separate dissimilar metals to prevent galvanic action. Provide finish to match canopy fascia and decking.

(2) The main frame is to be welded into a solid frame prior to installation. If welding the main frame into one single frame is not possible due to size constraints, the support frame can be made up of multiple smaller frames.

(3) The main frame shall be fabricated and welded to create a minimum 1:12 pitch of the canopy toward the receiving beam against the wall.

b. Decking

(1) Manufacturer's standard interlocking, extruded aluminum flat soffit decking: 3 by 6 by 0.090 inches, unless larger are required due to canopy spans. Interlocking decking shall provide watertight seal.

c. Perimeter Fascia

(1) Perimeter fascia shall be manufacturer's standard "J" channel fascia: 8 by 0.125 inch, unless larger are required due to canopy spans.

d. Flashing

(1) Flashing shall be made of stainless steel sheet painted to match the color of the canopy. Minimum flashing thickness shall be 0.0156 inch thick.

e. Fasteners

(1) All framing fasteners shall be 300 series stainless steel with neoprene washers. All rivets are 3/16 inch aluminum. All decking fasteners shall be long life coated steel with a 300 series stainless steel cap and neoprene washer. Large bell washer shall be used with all decking fasteners.

f. Down Spouts1.

(1) Extruded aluminum downspout: Minimum 2 by 3 by 0.125 inches.

2.10.5 Fabrication

a. Aluminum:

(1) Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

(a) Color: To be selected from manufacturer's standard color chart.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated in accordance with manufacturer's instructions. Verify all field dimensions prior to fabrication. Include materials and parts necessary to complete each assembly, whether indicated or not. Miss-alignment and miss-sizing of holes for fasteners is cause for rejection. Conceal fastenings where practicable. Joints exposed to weather must be watertight.

3.2 WORKMANSHIP

Provide miscellaneous metalwork that is true and accurate in shape, size, and profile. Make angles and lines continuous and straight. Make curves consistent, smooth and unfaceted. Provide continuous welding along the entire area of contact except where tack welding is permitted. Do not tack weld exposed connections. Unless otherwise indicated and approved, provide a smooth finish on exposed surfaces. Provide countersuck rivets where exposed. Provide coped and mitered corner joints aligned flush and without gaps.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage as necessary, whether indicated or not, for fastening miscellaneous metal items securely in place. Include slotted inserts, expansion shields, powder-driven fasteners, toggle bolts (when approved for concrete), through bolts for masonry, headed shear studs, machine and carriage bolts for steel, through bolts, lag bolts, and screws for wood. Do not use wood plugs. Provide non-ferrous attachments for non-ferrous metal. Provide exposed fastenings of compatible materials (avoid contact of dissimilar metals), that generally match in color and finish the surfaces to which they are applied. Conceal fastenings where practicable. Provide all fasteners flush with the surfaces they fasten, unless indicated otherwise. Test a minimum of 2 bolt, nut, and washer assemblies from each certified mill batch in a tension measuring device at the job site prior to the beginning of bolting start-up.

3.4 BUILT-IN WORK

Where necessary and not otherwise indicated, form built-in metal work for anchorage with concrete or masonry. Provide built-in metal work in ample time for securing in place as the work progresses.

3.5 WELDING

Perform welding, welding inspection, and corrective welding in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation. Provide welded headed shear studs in accordance with AWS D1.1/D1.1M, Clause 7, except as otherwise specified. Provide in accordance with the safety requirements of EM 385-1-1.

3.6 DISSIMILAR METALS

Where dissimilar metals are in contact, protect surfaces with a coating in accordance with MPI 79 to prevent galvanic or corrosive action. Where

aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect in accordance with ASTM D1187/D1187M, asphalt-base emulsion. Clean surfaces with metal shavings from installation at the end of each work day.

3.7 PREPARATION

3.7.1 Material Coatings and Surfaces

Remove rust preventive coating just prior to field erection, using a remover approved by the metal manufacturer. Surfaces, when assembled, must be free of rust, grease, dirt and other foreign matter.

3.7.2 Environmental Conditions

Do not clean or paint surfaces when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than minus 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer. Metal surfaces to be painted must be dry for a minimum of 48 hours prior to the application of primer or paint.

3.8 INSTALLATION OF BOLLARDS/PIPE GUARDS

Set bollards/pipe guards vertically in concrete piers. Fill hollow cores with concrete having a compressive strength of 3000 psi.

3.9 INSTALLATION OF DOWNSPOUT TERMINATIONS

Secure downspouts terminations to downspouts and substrate per manufacturer's instructions.

3.10 INSTALLATION MISCELLANEOUS PLATES AND SHAPES

Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners. Construct to have at least 8 inches bearing on masonry at each end.

3.11 INSTALLATION OF METAL CANOPIES

3.11.1 Erection

a. Canopies are to be installed according to approved shop drawings and plans.

b. The entire structure shall be installed straight, true, and plumb according to standard construction procedures.

c . All joints, corners, and connections shall be tight and clean.

d. All exposed fasteners are to be painted to match the canopy color.

e. Decking is to be aligned and secured to aluminum frame structure.

3.11.2 Cleaning

a. All canopy surfaces exposed are to be cleaned after installation is complete.

b. Surplus materials and debris shall be removed from the jobsite after installation is complete.

3.11.3 Protection

a. General Contractor shall ensure protection of installed aluminum canopies from other construction so that canopies are without damage at time of substantial completion of project.

-- End of Section --

SECTION 05 51 33

METAL LADDERS
02/16, CHG 2: 02/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN LADDER INSTITUTE (ALI)

ALI A14.3	(2008; R 2018) Ladders - Fixed - Safety Requirements

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2022; E 2022) Standard Specification for Ferritic Malleable Iron Castings
ASTM A53/A53M	(2022) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A500/A500M	(2021a) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM B26/B26M	(2018; E 2018) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal

MASTER PAINTERS INSTITUTE (MPI)

MPI 79	(2016) Primer, Alkyd, Anti-Corrosive for Metal

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3	(2018) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.23	(Nov 2016) Ladders

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Ladders, Installation Drawings

SD-03 Product Data

Ladders

SD-07 Certificates

Fabricator Certification for Ladder Assembly

1.3 CERTIFICATES

Provide fabricator certification for ladder assembly stating that the ladder and associated components have been fabricated according to the requirements of 29 CFR 1910.23.

1.4 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.5 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A36/A36M.

2.1.2 Structural Tubing

ASTM A500/A500M.

2.1.3 Steel Pipe

ASTM A53/A53M, Type E or S, Grade B.

2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A47/A47M.

2.1.5 Aluminum Alloy Products

Conform to ASTM B209 for sheet plate, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.2 FABRICATION FINISHES

2.2.1 Shop Cleaning and Painting

2.2.1.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean.

2.2.1.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions.

2.2.2 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.3 Aluminum Surfaces

2.2.3.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.2.3.2 Aluminum Finishes

Unexposed plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF45. Unless otherwise specified, provide all other aluminum items with standard mill finish. Provide a coating thickness not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF45.

2.3 LADDERS

Fabricate vertical ladders conforming to 29 CFR 1910.23 and Section 5 of ALI A14.3. Ladders shall be capable of supporting their maximum intended load. Use 2 1/2 by 3/8 inch steel flats for stringers and 3/4 inch diameter steel rods for rungs. Ladder rungs, step and cleats must be spaced not less than 10 inches and not more than 16 inches wide (measured before installation of ladder safety system), spaced no more than 14 inches apart, plug welded or shouldered and headed into stringers. Install ladders so that the maximum perpendicular distance from the centerline of the steps or rungs, or grab bars, or both, to the nearest permanent object in the back of the ladder or to the finished wall surface will not be less than 7 inches, except for the elevator pit ladders, which have a minimum perpendicular distance of 4.5 inches. Provide heavy clip angles riveted or bolted to the stringer and drilled as indicated. Provide intermediate clip angles not over 48 inches on centers. The top rung of the ladder must be level with the top of the access level, parapet or landing served by the ladder except for hatches or wells. Extend the side rails of through or side step ladders 42 inches above the access level. Provide ladder access protective swing gates at the top of access/egress level. The drawings must indicate ladder locations and details of critical dimensions and materials.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Provide Exposed fastenings of compatible materials, generally matching in color and finish, and harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners will be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports must provide strength and stiffness. Formed joints exposed to the weather to exclude water. Items listed below require additional procedures.

3.2 WORKMANSHIP

Metalwork must be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching must produce clean true lines and surfaces. Continuously weld along the entire area of contact. Do not tack weld exposed connections of work in place. Grid smooth exposed welds. Provide smooth finish on exposed surfaces of work in place, unless otherwise approved. Where tight fits are required, mill joints. Cope or miter corner joints, well formed, and in true alignment. Install in accordance with manufacturer's installation instructions and

approved drawings, cuts, and details.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion anchors, and powder-actuated fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine bolts, carriage bolts and powder-actuated threaded studs for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.5 FINISHES

3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D1187/D1187M, asphalt-base emulsion.

3.5.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, must be free of rust, grease, dirt and other foreign matter.

3.5.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

3.6 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. Secure to masonry or concrete with not less than two 1/2 inch diameter expansion bolts. Install intermediate clip angles not over 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete. Ends of ladders must not rest upon finished roof.

-- End of Section --

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SECTION 05 52 00

METAL RAILINGS
02/18, CHG 1: 02/20

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel
AWS D1.2/D1.2M	(2014; Errata 1 2014; Errata 2 2020) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A27/A27M	(2020) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47/A47M	(1999; R 2022; E 2022) Standard Specification for Ferritic Malleable Iron Castings
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM B26/B26M	(2018; E 2018) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Preinstallation Meetings

Within 30 days of contract award, submit fabrication drawings to the Contracting Officer for the following items:

a. Aluminum railings and handrails

b. Anchorage and fastening systems

Submit manufacturer's catalog data, including two copies of manufacturers specifications, load tables, dimension diagrams, and anchor details for the following items:

a. Concrete inserts

b. Aluminum railings and handrails

c. Anchorage and fastening systems

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G

SD-03 Product Data

Aluminum Plates, Shapes, and Bars; G

Concrete Inserts; G

Aluminum Railings and Handrails; G

Anchorage and Fastening Systems; G

Recycled Content for Aluminum; S

SD-07 Certificates

Welding Procedures; G

Welder Qualification; G

SD-08 Manufacturer's Instructions

Installation Instructions

1.4 QUALITY CONTROL

1.4.1 Welding Procedures

Welding requirements: AWS D1.2/D1.2M

Submit results of welding procedures testing in accordance with AWS D1.1/D1.1M made in the presence of the Contracting Officer and by an approved testing laboratory at the Contractor's expense.

1.4.2 Welder Qualification

Submit certified welder qualification by tests in accordance with

AWS D1.1/D1.1M, or under an equivalent approved qualification test. In addition, perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, conduct an immediate retest of two test welds and ensure that each test weld passes. Failure in the immediate retest will require that the welder be retested after further practice or training and make a complete set of test welds.

PART 2 PRODUCTS

2.1 FABRICATION

Preassemble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

For the fabrication of work exposed to view, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by grinding, or by welding and grinding, before cleaning, treating, and applying surface finishes, including zinc coatings.

Provide railing and handrail detail plans and elevations at not less than 1 inch to 1 foot. Provide details of sections and connections at not less than 3 inches to 1 foot. Also detail setting drawings, diagrams, templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchors.

Use materials of size and thicknesses indicated or, if not indicated, of the size and thickness necessary to produce adequate strength and durability in the finished product for its intended use. Work the materials to the dimensions indicated on approved detail drawings, using proven details of fabrication and support. Use the type of materials indicated or specified for the various components of work.

Form exposed work true to line and level, with accurate angles and surfaces and straight sharp edges. Ensure that all exposed edges are eased to a radius of approximately 1/32 inch. Bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

Weld corners and seams continuously and in accordance with the recommendations of AWS D1.1/D1.1M. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Form the exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use countersunk Phillips flathead screws or bolts.

Provide anchorage of the type indicated and coordinated with the supporting structure. Fabricate anchoring devices and space as indicated and as required to provide adequate support for the intended use of the work.

Use hot-rolled steel bars for work fabricated from bar stock unless work is indicated or specified to be fabricated from cold-finished or cold-rolled stock.

2.1.1 Aluminum Railings

Fabrication: Provide fabrication jointing by one of the following methods:

a. Use flush-type rail fittings, welded and ground smooth with splice locks secured with 3/8 inch recessed-head set screws.

b. Ensure that mitered and welded joints made by fitting; post to top rail; intermediate rail to post; and corners, are groove welded and ground smooth. Where allowed by the Contracting Officer, provide butt splices reinforced by a tight-fitting dowel or sleeve not less than 6 inches in length. Tack-weld or epoxy-cement the dowel or sleeve to one side of the splice.

c. Assemble railings using slip-on aluminum-magnesium alloy fittings for joints. Fasten fittings to pipe or tube with 1/4 or 3/8 inch stainless-steel recessed-head setscrews. Provide assembled railings with fittings only at vertical supports or at rail terminations attached to walls. Provide expansion joints at the midpoint of panels. Provide a setscrew in only one side of the slip-on sleeve. Provide alloy fittings to conform to ASTM B26/B26M.

d. Provide aluminum containing a minimum of 25 percent recycled content. Submit data identifying percentage of recycled content for aluminum.

Provide removable railing sections as indicated. Provide toe-boards and brackets where indicated, using flange castings as appropriate.

2.2 COMPONENTS

2.2.1 Concrete Inserts

Provide threaded-type concrete inserts consisting of galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts; either malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M, hot-dip galvanized in accordance with ASTM A153/A153M.

Provide wedge-type concrete inserts consisting of galvanized box-type ferrous castings designed to accept 3/4 inch diameter bolts having special wedge-shaped heads, made of either malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M and hot-dip galvanized in accordance with ASTM A153/A153M.

2.2.2 Fasteners

Provide galvanized zinc-coated fasteners in accordance with ASTM A153/A153M used for exterior applications or where built into exterior walls or floor systems. Select fasteners for the type, grade, and class required for the installation of steel stair items.

Provide standard hexagon-head bolts, conforming to ASTM A307, Grade A.

Provide square-head lag bolts conforming to ASME B18.2.1.

2.2.3 Aluminum Railings And Handrails

Provide railings and handrails consisting of, 1 3/4 inch square aluminum semihollow tube with rounded corners ASTM B221. Provide mill-finish aluminum railings. Ensure that all fasteners are Series 300 stainless

steel.

PART 3 EXECUTION

3.1 PREPARATION

Adjust guardrails before securing in place in order to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than 8 feet on center. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

a. Anchor posts in concrete by means of pipe sleeves set and anchored into concrete. Provide sleeves of galvanized, standard-weight, steel pipe, not less than 6 inches long, and having an inside diameter not less than 1/2 inch greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to the bottom of the sleeve, with closure width and length not less than 1 inch greater than the outside diameter of the sleeve. After posts have been inserted into sleeves, fill the annular space between the post and sleeve with nonshrink grout or a quick-setting hydraulic cement. Cover anchorage joint with a round steel flange welded to the post.

3.2 INSTALLATION

Submit manufacturer's installation instructions for the following products to be used in the fabrication of aluminum guardrail work:

a. Aluminum railings and handrails

b. Anchorage and fastening systems

Provide complete, detailed fabrication and installation drawings for all iron and steel hardware, and for all Aluminum Plates, Shapes, and Bars, and strips used in accordance with the design specifications cited in this section.

3.3 FIELD QUALITY CONTROL

3.3.1 Field Welding

Ensure that procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work comply with AWS D1.1/D1.1M.

-- End of Section --

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SECTION 06 10 00

ROUGH CARPENTRY
08/16, CHG 2: 11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN FOREST FOUNDATION (AFF)

ATFS STANDARDS	(2015) American Tree Farm System Standards of Sustainability 2015-2020

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)

ALSC PS 20	(2015) American Softwood Lumber Standard

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2022) Nuts for General Applications: Machine Screw Nuts, and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.5.2.1M	(2006; R 2011) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2010) Metric Round Head Square Neck Bolts
ASME B18.6.1	(2016) Wood Screws (Inch Series)

AMERICAN WOOD COUNCIL (AWC)

AWC WFCM	(2012) Wood Frame Construction Manual for One- and Two-Family Dwellings

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA BOOK	(2015) AWPA Book of Standards
AWPA M2	(2019) Standard for the Inspection of Preservative Treated Wood Products for Industrial Use
AWPA M6	(2013) Brands Used on Preservative Treated Materials
AWPA P5	(2015) Standard for Waterborne Preservatives

AWPA P18	(2014) Nonpressure Preservatives
AWPA P49	(2015; R 2021) Standard for Fire Retardant FR-1
AWPA T1	(2022) Use Category System: Processing and Treatment Standard
AWPA U1	(2022) Use Category System: User Specification for Treated Wood

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA E445	(2002) Performance Standards and Qualification Policy for Structural-Use Panels (APA PRP-108)
APA F405	(19) Product Guide: Performance Rated Panels
APA L870	(2010) Voluntary Product Standard, PS 1-09, Structural Plywood
APA S350	(2014) PS 2-10, Performance Standard for Wood-Based Structural-Use Panels

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM D2898	(2010; R 2017) Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

CSA GROUP (CSA)

CSA Z809-08	(R2013) Sustainable Forest Management

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(2015) Principles and Criteria for Forest Stewardship

GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2013	(2015) PEFC International Standard Chain of Custody of Forest Based Products Requirements

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019	(2015) Standards, Rules for Label Use, Procedures and Guidance

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC/NIST PS58	(1973) Basic Hardboard (ANSI A135.4)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A; Notice 3) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-1924	(Rev A; Notice 3) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors
CID A-A-1925	(Rev A; Notice 3) Shield Expansion (Nail Anchors)

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Underlayment

Fire-retardant Treatment

Oriented Strand Board

Adhesives

SD-06 Test Reports

Preservative-treated Lumber and Plywood

SD-07 Certificates

Certificates of Grade

Certified Sustainably Harvested Plywood for Other Uses; S

Preservative Treatment

Indoor Air Quality for Non-aerosol Adhesives; S

Indoor Air Quality for Composite Wood; S

1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Store wood I-beams and glue-laminated beams and joists on edge. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements. Do not use materials that have visible moisture or biological growth. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

1.4 GRADING AND MARKING

1.4.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency must be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view must not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

1.4.2 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark must identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA L870. Surfaces that are to be exposed to view must not bear grademarks or other types of identifying marks.

1.4.3 Preservative-Treated Lumber and Plywood

The Contractor is responsible for the quality of treated wood products. Each treated piece must be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor must provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.4.4 Fire-Retardant Treated Lumber

Mark each piece in accordance with AWPA M6, except pieces that are to be natural or transparent finished. In addition, exterior fire-retardant lumber must be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of AWPA M6.

1.4.5 Hardboard, Gypsum Board, and Fiberboard

Mark each sheet or bundle to identify the standard under which the material is produced and the producer.

1.5 SIZES AND SURFACING

ALSC PS 20 for dressed sizes of yard and structural lumber. Lumber must be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes must be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products must be as follows at the time of delivery to the job site:

a. Framing lumber and board, 19 percent maximum

1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to AWPA P5. Pressure treatment of wood products must conform to the requirements of AWPA BOOK Use Category System Standards U1 and T1. Pressure-treated wood products must not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products must not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and must not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards. In accordance with AWPA U1 provide non-copper preservative treatment such as EL2, PTI or SBX,DOT for products in direct contact with sheet metal.

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use. 0.60 pcf intended for Ammoniacal Copper Quaternary Compound (ACQ)-treated foundations. 0.80 to 1.00 pcf intended for ACQ-treated pilings. All wood must be air or kiln dried after treatment. Specific treatments must be verified by the report of an approved independent inspection agency, or the AWPA Quality Mark on each piece. Do not incise surfaces of lumber that will be exposed. Minimize cutting and avoid breathing sawdust. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution. Plastic lumber must not be preservative treated. The following items must be preservative treated:

(1) Wood framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.

(2) Wood members that are in contact with water.

(3) Exterior wood steps, platforms, and railings; and all wood framing of open, roofed structures.

(4) Wood sills, soles, plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.

(5) Nailers, edge strips, crickets, curbs, and cants for roof decks.

1.7.1 Existing Structures

Use borate, permathrin, or a sodium silicate wood mineralization process to treat wood. Use borate for interior applications only.

1.7.2 New Construction

Use a boron-based preservative conforming to AWPA P18, sodium silicate wood mineralization process, or Ammoniacal Copper Quaternary Compound to treat wood. Use boron-based preservatives for above-ground applications only.

1.8 FIRE-RETARDANT TREATMENT

Fire-retardant treated wood must be pressure treated with fire retardants conforming to AWPA P49. Fire retardant treatment of wood products must conform to the requirements of AWPA U1, Commodity Specification H and AWPA T1, Section H. Treatment and performance inspection must be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material must bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting must be subjected to an accelerated weathering technique in accordance with ASTM D2898 prior to being tested. Such items which will not be inside a building, and such items which will be exposed to heat or high humidity, must receive exterior fire-retardant treatment. Fire-retardant-treated wood products must be free of halogens, sulfates, ammonium phosphate, and formaldehyde. Items to be treated include the following:

a. Mechanical/Electrical room panel boards.

1.9 QUALITY ASSURANCE

1.9.1 Humidity Requirements

Sequence work to minimize use of temporary HVAC to dry out building and control humidity.

1.10 ENVIRONMENTAL REQUIREMENTS

During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

1.11 CERTIFICATIONS

1.11.1 Certified Wood Grades

Provide certificates of grade from the grading agency on graded but unmarked lumber or plywood attesting that materials meet the grade requirements specified herein.

1.11.2 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by FSC STD 01 001, ATFS STANDARDS, CSA Z809-08, SFI 2015-2019, or other third party program certified by PEFC ST 2002:2013. Provide a letter of Certification of Sustainably Harvested Wood signed by the wood supplier. Identify certifying organization and their third party program name and indicate compliance with chain-of-custody program requirements. Submit sustainable wood certification data; identify each certified product on a line item basis.

1.11.3 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

1.11.3.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by California Department of Public Health (CDPH) Standard Method, UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.11.3.2 Composite Wood

For purposes of this specification, composite wood products include particleboard, medium density fiberboard (MDF), plywood, biobased and virgin wood panel substrates. Provide products certified to meet California Air Resources Board (CARB) regulation Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products or California Department of Public Health (CDPH) Standard Method. Submit product data for indoor air quality for composite wood.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Virgin Lumber

Lumber fabricated from old growth timber is not permitted. Avoid companies who buy, sell, or use old growth timber in their operations, when possible.

2.1.2 Salvaged Lumber

Provide salvaged lumber where specified. Unless otherwise noted, salvaged lumber must be delivered clean, denailed, and free of paint, finish materials, and other contamination. Lumber must meet the other criteria within this section. Provide documentation certifying products are from salvaged lumber sources.

2.1.3 Recovered Lumber

Use recovered lumber where practical. Unless otherwise noted, recovered lumber must be delivered clean and free of contamination. Provide grading certificates for any recovered wood materials used in structural applications. Lumber must meet the other criteria within this section. Provide documentation certifying products are from recovered lumber sources.

2.2 PLYWOOD, STRUCTURAL-USE, AND ORIENTED STRAND BOARD (OSB) PANELS

APA L870, APA S350, APA E445, and APA F405 respectively.

2.2.1 Other Uses

2.2.1.1 Plywood

Plywood for walls and telecom equipment mounting. C-D Grade, Exposure 1. Provide certified sustainably harvested plywood for other uses.

2.3 OTHER MATERIALS

2.3.1 Hardboard Underlayment

DOC/NIST PS58, service class, sanded on one side, 1/4 inch thick 4 feet wide.

2.3.2 Miscellaneous Wood Members

2.3.2.1 Blocking

Blocking must be standard or number 2 grade.

2.3.3 Adhesives

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space

type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesives used on the interior of the building meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of GS-36. Provide certification or validation of indoor air quality for non-aerosol adhesives applied on the interior of the building (inside of the weatherproofing system). Provide certification or validation of indoor air quality for aerosol adhesives used on the interior of the building (inside of the weatherproofing system).

2.4 ROUGH HARDWARE

Unless otherwise indicated or specified, rough hardware must be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials must be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs must be hot-dip zinc-coated in accordance with ASTM A153/A153M. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather must be copper alloy or hot-dipped galvanized fasteners as recommended by the treated wood manufacturer.

2.4.1 Bolts, Nuts, Studs, and Rivets

ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M and ASME B18.2.2.

2.4.2 Anchor Bolts

ASTM A307, size as indicated, complete with nuts and washers.

2.4.3 Expansion Shields

CID A-A-1923, CID A-A-1924, and CID A-A-1925. Except as shown otherwise, maximum size of devices must be 3/8 inch.

2.4.4 Lag Screws and Lag Bolts

ASME B18.2.1.

2.4.5 Wood Screws

ASME B18.6.1.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Conform to AWC WFCM and install in accordance with the National Association of Home Builders (NAHB) Advanced Framing Techniques: Optimum Value Engineering, unless otherwise indicated or specified. Select lumber sizes to minimize waste. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Space plastic lumber boards as necessary to allow for lengthwise expansion and contraction. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown

edge up. Frame members for the passage of pipes, conduits, and ducts. Provide adequate support as appropriate to the application, climate, and modulus of elasticity of the product. Do not cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spiking and nailing not indicated or specified otherwise must be in accordance with the Nailing Schedule contained in ICC IBC; perform bolting in an approved manner. Spikes, nails, and bolts must be drawn up tight. Install plastic lumber with screws or bolts; if nails are used, use ring shank or spiral shank nails. Use slate or steel shims when leveling joists, beams, and girders on masonry or concrete. Do not use shimming on wood or metal bearings. When joists, beams, and girders are placed on masonry or concrete, a wood base plate must be positioned and leveled with grout. The joist, beam, or girder must then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket must be formed into the wall. The joist, beam, or girder must then be placed into the pocket and leveled with a steel shim.

3.1.1 Sills

3.1.1.1 Anchors in Masonry

Except where indicated otherwise, Embed anchor bolts not less than 15 inches in masonry unit walls and provide each with a nut and a 2 inch diameter washer at bottom end. Fully grout bolts with mortar.

3.1.1.2 Anchors in Concrete

Except where indicated otherwise, Embed anchor bolts not less than 8 inches in poured concrete walls and provide each with a nut and a 2 inch diameter washer at bottom end. A bent end may be substituted for the nut and washer; bend must be not less than 90 degrees. Powder-actuated fasteners spaced 3 feet o.c. may be provided in lieu of bolts for single thickness plates on concrete.

3.1.2 Wall Sheathing

3.1.2.1 Plywood, Structural-Use, and OSB Panel Wall Sheathing

Apply horizontally or vertically. Extend sheathing over and nail to sill and top plate. Abut sheathing edges over centerlines of supports. Allow 1/8 inch spacing between panels and 1/8 inch at windows and doors. If sheathing is applied horizontally, stagger vertical end joints. Nail panels with 6-penny nails spaced 6 inches o.c. along edges of the panel and 12 inches o.c. over intermediate supports. Keep nails 3/8 inches away from panel ledges. Provide 2 by 4 blocking for horizontal edges not otherwise supported.

3.2 MISCELLANEOUS

3.2.1 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

3.3 ERECTION TOLERANCES

a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, must be within the following limits:

   (1) Layout of walls and partitions: 1/4 inch from intended position;

   (2) Plates and runners: 1/4 inch in 8 feet from a straight line;

   (3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

   (4) Face of framing members: 1/4 inch in 8 feet from a true plane.

b. Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive must be within the following limits:

   (1) Layout of walls and partitions: 1/4 inch from intended position;

   (2) Plates and runners: 1/8 inch in 8 feet from a straight line;

   (3) Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

   (4) Face of framing members: 1/8 in 8 feet from a true plane.

3.4 WASTE MANAGEMENT OF WOOD PRODUCTS

In accordance with the Waste Management Plan and as specified. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.

Separate treated, stained, painted, and contaminated wood and place in designated area for hazardous materials. Dispose of according to local regulations. Do not leave any wood, shavings, sawdust, or other wood waste buried in fill or on the ground. Do not burn scrap lumber that has been pressure treated, or lumber that is less than one year old.

-- End of Section --

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SECTION 06 41 16.00 10

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
08/10, CHG 1: 11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A161.2	(1998) Decorative Laminate Countertops, Performance Standards for Fabricated High Pressure

ASTM INTERNATIONAL (ASTM)

ASTM F547	(2017) Standard Terminology of Nails for Use with Wood and Wood-Base Materials

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.9	(2020) Cabinet Hardware

CSA GROUP (CSA)

CSA Z809-08	(R2013) Sustainable Forest Management

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(2015) Principles and Criteria for Forest Stewardship

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates

PEFC INTERNATIONAL STANDARD

PEFC ST 2002:2020	(2020) PEFC International Standard Chain of Custody of Forest Based Products Requirements

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019	(2015) Standards, Rules for Label Use, Procedures and Guidance

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

ANSI/WDMA I.S.1A	(2013) Interior Architectural Wood Flush Doors

WOODWORK INSTITUTE (WI)

NAAWS 3.1	(2017; 2018 Errata Edition) North American Architectural Woodwork Standards

1.2 SYSTEM DESCRIPTION

Work in this section includes laminate clad custom casework cabinets and vanities as shown on the drawings and as described in this specification. This Section includes high-pressure laminate surfacing and cabinet hardware. Comply with EPA requirements in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING. Sand smooth and apply a clear finish of polyurethane to all exposed and semi-exposed surfaces, whose finish is not otherwise noted on the drawings or finish schedule. Wood finish may be shop finished or field applied in accordance with Section 09 90 00 PAINTS AND COATINGS.

1.3 SUSTAINABILITY REPORTING

Materials in this technical specification may contribute towards contract compliance with sustainability requirements. See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for project requirements.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings

Installation

SD-03 Product Data

Wood Materials

Finish Schedule

Certification

Recycled Content for Medium Density Fiberboard; S

Recycled Content for Particleboard; S

Biobased Content for Panel Substrate; S

SD-04 Samples

Plastic Laminates

Cabinet Hardware

SD-07 Certificates

Quality Assurance

Laminate Clad Casework

Certified Sustainably Harvested Wood; S

Indoor Air Quality for Particleboard; S

Indoor Air Quality for Medium Density Fiberboard; S

Indoor Air Quality for Hardwood Plywood; S

Indoor Air Quality for Panel Substrate; S

Indoor Air Quality for Adhesives, Caulks, and Sealants; S

1.5 QUALITY ASSURANCE

1.5.1 General Requirements

Unless otherwise noted on the drawings, furnish all materials, construction methods, and fabrication conforming to and complying with the premium grade quality standards as outlined in NAAWS 3.1, Section for laminate clad cabinets. These standards apply in lieu of omissions or specific requirements in this specification. Contractors and their personnel engaged in the work must be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified. Submit a quality control statement which illustrates compliance with and understanding of NAAWS 3.1 requirements, in general, and the specific NAAWS 3.1 requirements provided in this specification. The quality control statement must also certify a minimum of ten years Contractor's experience in laminate clad casework fabrication and construction. Provide a list of a minimum of five successfully completed projects of a similar scope, size, and complexity in the quality control statement.

1.5.2 Sustainable Design Certification

1.5.2.1 Indoor Air Quality Certification

Submit required indoor air quality certifications in one submittal package.

Provide adhesives, caulks, and sealants certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or VOC content requirements of SCAQMD Rule 1168. Provide current product certification documentation of indoor air quality for adhesives, caulks, and sealants.

Cabinets must not contain added urea formaldehyde resins including

laminating adhesives for composite wood and agrifiber assemblies. For purposes of this specification, composite wood and agrifiber products include particleboard, medium density fiberboard, plywood, biobased and virgin wood panel substrates. Provide products certified to meet California Air Resources Board (CARB) regulation Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products or California Department of Public Health (CDPH) Standard Method. Submit product data for indoor air quality for particleboard, indoor air quality for medium density fiberboard, indoor air quality for hardwood plywood, and indoor air quality for panel substrate.

1.5.2.2 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by FSC STD 01 001, ATFS STANDARDS, CSA Z809-08 (R2013), SFI 2015-2019, or other third-party program certified by PEFC ST 2002:2020. Provide a letter of certification of sustainably harvested wood signed by the wood supplier. Identify certifying organization and their third-party program name and indicate compliance with chain-of-custody program requirements. Submit product data for certified sustainably harvested wood.

1.6 DELIVERY, STORAGE, AND HANDLING

Casework may be delivered knockdown or fully assembled. Deliver all units to the site in undamaged condition, stored off the ground in fully enclosed areas, and protected from damage. Ventilate the storage area and do not subject to extreme changes in temperature or humidity.

1.7 SEQUENCING AND SCHEDULING

Coordinate work with other trades. Do not install units in any room or space until painting, and ceiling installation are complete within the room where the units are located. Install floor cabinets before finished flooring materials are installed.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

2.1.1 Lumber

a. Provide kiln-dried Grade III framing lumber to dimensions as shown on the drawings. Frame front, where indicated on the drawings, must be nominal 3/4 inch hardwood.

b. Standing or running trim casework components, which are specified to receive a transparent finish, must be hardwood species, plain sawn. AWI grade must be premium. Indicate location, shape, and dimensions on the drawings.

2.1.2 Panel Products

2.1.2.1 Plywood

Use veneer core hardwood plywood, NAAWS 3.1 Grade AA panels for framing purposes. Indicate nominal thickness of plywood panels in this specification and on the drawings.

Provide indoor air quality certification for plywood.

2.2 HIGH PRESSURE DECORATIVE LAMINATE (HPDL)

Provide plastic laminates meeting the requirements of ANSI/NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates. Indicate design, colors, surface finish and texture, and locations on the drawings. Submit two samples of each plastic laminate pattern and color. Samples less than 5 by 7 inches in size are not acceptable. Provide plastic laminate types and nominal minimum thicknesses for casework components as indicated in the following paragraphs.

2.2.1 Horizontal General Purpose Standard (HGS) Grade

Provide horizontal general purpose standard grade plastic laminate that is 0.048 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where postforming is not required.

2.2.2 Vertical General Purpose Standard (VGS) Grade

Provide vertical general purpose standard grade plastic laminate that is 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of casework components where postforming is not required.

2.2.3 Cabinet Liner Standard (CLS) Grade

Provide cabinet liner standard grade plastic laminate that is 0.020 inches in thickness. This laminate grade is intended for light duty semi-exposed interior surfaces of casework components.

2.2.4 Backing Sheet (BK) Grade

Undecorated backing sheet grade laminate is formulated specifically to be used on the backside of plastic laminated panel substrates to enhance dimensional stability of the substrate. Backing sheet thickness must be 0.020 inches. Provide backing sheets for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

2.3 THERMOSET DECORATIVE OVERLAYS (MELAMINE)

Use thermoset decorative overlays (melamine panels) for casework cabinet interior and drawer interior surfaces.

2.4 EDGE BANDING

Material width must be 15/16 inches. Color and pattern must match exposed door and drawer front laminate pattern and color.

2.5 CABINET HARDWARE

Submit one sample of each cabinet hardware item specified to include hinges, pulls, and drawer glides. Provide hardware conforming to ANSI/BHMA A156.9, unless otherwise noted, and consisting of the following components:

2.5.1 Door Hinges

Self-closing European type, BHMA No. B01602.

2.5.2 Cabinet Pulls

Brushed stainless steel bar pull type, BHMA No. B02041.

2.5.3 Drawer Slide

Side mounted type, BHMA No. B05091 with full extension and a minimum 100 pound load capacity. Include an integral stop to avoid accidental drawer removal.

2.5.4 Adjustable Shelf Support System

Multiple holes with metal pin supports.

2.6 FASTENERS

Provide nails, screws, and other suitable fasteners that are the size and type best suited for the purpose and conforming to ASTM F547 where applicable.

2.7 ADHESIVES, CAULKS, AND SEALANTS

2.7.1 Adhesives

Use formula and type of adhesives recommended by AWI. Select adhesives for their ability to provide a durable, permanent bond and take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance. Meet local regulations regarding VOC emissions and off-gassing. Comply with indoor air quality requirements.

2.7.1.1 Wood Joinery

Use Type II for interior use polyvinyl acetate resin emulsion adhesives to bond wood members. Adhesives must withstand a bond test as described in ANSI/WDMA I.S.1A.

2.7.1.2 Laminate Adhesive

Adhesive used to join high-pressure decorative laminate to wood must be adhesive consistent with AWI and laminate manufacturer's recommendations containing no added urea formaldehyde. Adhere PVC edgebanding using a polymer-based hot melt glue.

2.7.2 Caulk

Use clear, 100 percent silicone caulk to fill voids and joints between laminated components and between laminated components and adjacent surfaces. Comply with indoor air quality requirements.

2.7.3 Sealant

Use sealant recommended by the substrate manufacturer to provide a moisture barrier at sink cutouts and all other locations where unfinished substrate edges may be subjected to moisture. Comply with indoor air

quality requirements.

2.8 FABRICATION

Verify field measurements as indicated in the shop drawings before fabrication. Accomplish fabrication and assembly of components at the shop site to the maximum extent possible. Meet or exceed the requirements for AWI premium grade unless otherwise indicated in this specification. Make cabinet style, in accordance with NAAWS 3.1, Section 400-G descriptions, flush overlay.

2.8.1 Base and Wall Cabinet Case Body

2.8.1.1 Cabinet Components

Use frame members that are glued-together, kiln-dried hardwood lumber. Brace top corners, bottom corners, and cabinet bottoms with either hardwood blocks or water-resistant glue and nailed in place metal or plastic corner braces. Construct cabinet components from the following materials and thicknesses:

2.8.1.1.1 Body Members (Ends, Divisions, Bottoms, and Tops)

3/4 inch veneer core plywood panel product

2.8.1.1.2 Face Frames and Rails

3/4 inch hardwood lumber

2.8.1.1.3 Shelving

3/4 inch veneer core plywood panel product

2.8.1.1.4 Cabinet Backs

1/4 inch veneer core plywood panel product

2.8.1.1.5 Drawer Sides, Backs, and Subfronts

1/2 inch hardwood lumber

2.8.1.1.6 Drawer Bottoms

1/4 inch veneer core plywood panel product

2.8.1.1.7 Door and Drawer Fronts

3/4-inch particleboard panel product

2.8.1.2 Joinery Method for Case Body Members

2.8.1.2.1 Tops, Exposed Ends, and Bottoms

a. Steel "European" assembly screws (1-1/2 inch from end, 5 inch on center, fasteners will not be visible on exposed parts).

b. Doweled, glued under pressure (approx. 4 dowels per 12 inches of joint).

c. Stop dado, glued under pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts).

d. Spline or biscuit, glued under pressure.

2.8.1.2.2 Exposed End Corner and Face Frame Attachment

2.8.1.2.2.1 Mitered Joint

lock miter or spline or biscuit, glued under pressure (no visible fasteners)

2.8.1.2.2.2 Non-Mitered Joint (90 degree)

butt joint glued under pressure (no visible fasteners)

2.8.1.2.3 Cabinet Backs (Wall Hung Cabinets)

Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery and hanging/mounting mechanisms should transfer the load to case body members. Use the following fabrication method:

2.8.1.2.3.1 Full Overlay

Full overlay, plant-on backs with minimum back thickness of 1/2 inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Do not expose edge of back on finished sides. Anchor strips are not required when so attached.

2.8.1.2.4 Cabinet Backs (Floor Standing Cabinets)

2.8.1.2.4.1 Full Overlay

Full overlay, plant-on backs with minimum back thickness of 1/2 inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Do not expose edge of back on finished sides. Anchor strips are not required when so attached.

2.8.2 Cabinet Floor Base

Mount floor cabinets on a base constructed of 3/4 inch veneer core exterior plywood. Provide base assembly components that are a moisture-resistant panel product. Make finished height for each cabinet base as indicated on the drawings. Make bottom edge of the cabinet door or drawer face flush with top of base.

2.8.3 Cabinet Door and Drawer Fronts

Fabricate door and drawer fronts from 3/4 inch veneer core plywood. Surface all door and drawer front edges with high pressure plastic laminate, color and pattern to match exterior face laminate.

2.8.4 Drawer Assembly

2.8.4.1 Drawer Components

Provide drawer components consisting of a removable drawer front, sides, backs, and bottom. Construct drawer components of the following materials

and thicknesses:

2.8.4.1.1 Drawer Sides and Backs For Laminate Finish

1/2 inch thick 7-ply hardwood veneer core substrate

2.8.4.1.2 Drawer Bottom

1/4 inch thick thermoset decorative overlay melamine panel product

2.8.4.2 Drawer Assembly Joinery Method

a. Set bottoms into sides, front, and back, 1/4 inch deep groove with a minimum 3/8 inch standing shoulder.

2.8.5 Shelving

2.8.5.1 General Requirements

Fabricate shelving from 3/4 inch veneer core plywood. Finish all shelving top and bottom surfaces with thermoset decorative overlay (melamine). Finish shelf edges in a thermoset decorative overlay (melamine).

2.8.5.2 Shelf Support System

The shelf support system is as follows:

2.8.5.2.1 Pin Hole Method

Drill holes on the interior surface of the cabinet side walls. Evenly space holes in two vertical columns Space the holes in each column at 1 inch increments starting 6 inches from the cabinet interior bottom and extending to within 6 inches of the top interior surface of the cabinet. Drill holes to provide a level, stable surface when the shelf is resting on the shelf pins. Coordinate hole diameter with pin insert size to provide a firm, tight fit.

2.8.6 Laminate Application

Apply laminate to substrates following the recommended procedures and instructions of the laminate manufacturer and ANSI/NEMA LD 3, using tools and devices specifically designed for laminate fabrication and application. Provide a balanced backer sheet (Grade BK) wherever only one surface of the component substrate requires a plastic laminate finish. Apply required grade of laminate in full uninterrupted sheets consistent with manufactured sizes using one piece for full length only, using adhesives specified herein or as recommended by the manufacturer. Fit corners and joints hairline. Machined flush, file, sand, or buff all laminate edges to remove machine marks and ease (sharp corners removed). Clean up at easing must be such that no overlap of the member eased is visible. Perform fabrication in conformance to ANSI A161.2. Provide laminate types and grades for component surfaces as follows unless otherwise indicated on the drawings:

2.8.6.1 Base/Wall Cabinet Case Body

a. Exterior (exposed) surfaces to include exposed and semi-exposed face frame surfaces: HPDL Grade VGS.

b. Interior (semi-exposed) surfaces to include interior back wall, bottom, and side walls: Thermoset Decorative Overlay (melamine).

2.8.6.2 Adjustable Shelving

2.8.6.2.1 Top and Bottom Surfaces

Thermoset Decorative Overlay (melamine)

2.8.6.2.2 All Edges

Thermoset Decorative Overlay (melamine)

2.8.6.3 Door, Drawer Fronts, Access Panels

2.8.6.3.1 Exterior (Exposed) and Interior (Semi-Exposed) Faces

HPDL Grade VGS

2.8.6.3.2 Edges

HPDL Grade VGS

2.8.6.4 Drawer Assembly

All interior and exterior surfaces: Thermoset Decorative Overlay (melamine).

2.8.6.5 Countertops and Splashes

All exposed and semi-exposed surfaces: HPDL Grade HGS

2.8.6.6 Tolerances

Meet the NAAWS 3.1 premium grade requirements for flushness, flatness, and joint tolerances of laminated surfaces.

2.8.7 Finishing

2.8.7.1 Filling

Do not expose fasteners on laminated surfaces. Make all nails, screws, and other fasteners in non-laminated cabinet components countersunk and fill the holes with wood filler consistent in color with the wood species.

2.8.7.2 Sanding

Prepare all surfaces requiring coatings by sanding with a grit and in a manner that scratches will not show in the final system.

2.8.7.3 Coatings

Types, method of application and location of casework finishes must be in accordance with the finish schedule, drawings and Section 09 90 00 PAINTS AND COATINGS. Paint all cabinet reveals. Submit descriptive data which provides narrative written verification of all types of construction materials and finishes, methods of construction, etc. not clearly illustrated on the submitted shop drawings. Provide written verification of conformance with NAAWS 3.1 for the quality indicated to include

materials, tolerances, and types of construction. Both the manufacturer of materials and the fabricator must submit available literature which describes re-cycled product content, operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

PART 3 EXECUTION

3.1 INSTALLATION

Installation must comply with applicable requirements for NAAWS 3.1 premium quality standards. Install countertops and fabricated assemblies level, plumb, and true to line, in locations shown on the drawings. Attach and securely anchor cabinets and other laminate clad casework assemblies to the floor and walls with mechanical fasteners that are appropriate for the wall and floor construction.

3.1.1 Anchoring Systems

3.1.1.1 Floor

Utilize a floor anchoring system for base cabinets. Anchoring and mechanical fasteners must not be visible from the finished side of the casework assembly. Attach cabinet assemblies to anchored bases without visible fasteners. Where assembly abuts a wall surface, include a minimum 1/2 inch thick lumber or panel product hanging strip, minimum 2-1/2 inch width; securely attached to the top of the wall side of the cabinet back.

3.1.1.2 Wall

Utilize minimum 1/2 inch thick lumber or panel product hanging strips, minimum 2-1/2 inch width to wall mount cabinet; securely attach to the wall side of the cabinet back, both top and bottom.

3.1.2 Hardware

Install casework hardware in types and locations as indicated on the drawings. Where fully concealed European-style hinges are specified to be used with particleboard or fiberboard doors, use plastic or synthetic insertion dowels to receive 3/16 inch "Euroscrews". The use of wood screws without insertion dowels is prohibited.

3.1.3 Doors, Drawers and Removable Panels

Accomplish the fitting of doors, drawers and removable panels within target fitting tolerances for gaps and flushness in accordance with NAAWS 3.1 premium grade requirements.

3.1.4 Plumbing Fixtures

Install sinks, sink hardware, and other plumbing fixtures in locations as indicated on the drawings and in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

-- End of Section --

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SECTION 06 61 16

SOLID SURFACING FABRICATIONS
08/20

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D696	(2016) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM D790	(2017) Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D2583	(2013a) Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G21	(2015; R 2021; E 2021) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

INTERNATIONAL CAST POLYMER ASSOCIATION (ICPA)

ICPA SS-1	(2001) Performance Standard for Solid Surface Materials

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates

NSF INTERNATIONAL (NSF)

NSF/ANSI 51	(2012) Food Equipment Materials

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SYSTEM DESCRIPTION

a. Work under this section includes countertops and other items utilizing solid surfacing material fabrications as indicated on the drawings and as described in this specification. Do not change source of supply for materials after work has started, if the appearance of finished work would be affected.

b. In most instances, installation of solid surfacing material fabricated components and assemblies requires strong correctly located structural support provided by other trades. To provide a stable, sound, secure installation, close coordination is required between the solid surfacing material fabricator/installer and other trades to ensure that necessary structural wall support, cabinet counter top structural support, proper clearances, and other supporting components are provided for the installation of wall panels, counter tops, shelving, and all other solid surfacing material fabrications to the degree and extent recommended by the solid surfacing material manufacturer.

c. Provide appropriate staging areas for solid surfacing material fabrications. Allow variation in component size and location of openings of plus or minus 1/8 inch.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Fabrication Drawings; G

Installation; G

SD-03 Product Data

Solid Polymer; G

Indoor air quality for solid surface seam and sealant products; S

Quartz Agglomerate Material; G

Recycled Content for Solid Surfacing Materials; S

SD-04 Samples

Material; G

Counter Tops; G

SD-06 Test Reports

Test Report Results

SD-07 Certificates

Qualifications

Indoor Air Quality for solid surface fabrication products; S

SD-10 Operation and Maintenance Data

Solid Polymer, Data Package 1; G

Quartz Agglomerate Material, Data Package 1; G

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

To ensure warranty coverage, provide manufacturer certified solid surfacing fabricators to fabricate the solid surfacing material being utilized. Mark all fabrications with the fabricator's certification label affixed in an inconspicuous location. Minimum of 5 years of experience working with solid surfacing materials is required of fabricators. Submit solid surfacing material manufacturer's certification attesting to fabricator qualification approval.

1.4.2 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

Provide solid surface materials certified to meet California Department of Public Health Standard Method (CDPH SECTION 01350), UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or certification other third-party program. Provide current product certification documentation of indoor air quality for solid surfacing materials.

Provide solid surface seam adhesive and sealants certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or certification by other third-party program or VOC content requirements of SCAQMD Rule 1168. Provide current product certification documentation of indoor air quality for solid surface seam adhesive and sealants.

1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver materials to project site until areas are ready for installation. Deliver components and materials to the site undamaged, in containers clearly marked and labeled with manufacturer's name. Store materials indoors and take adequate precautions to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation, for duration of project.

1.6 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for a period of 10 years from date of final acceptance of the work.

PART 2 PRODUCTS

2.1 MATERIAL

Submit detail fabrication drawings and installation drawings of each solid surfacing fabrication indicated. Include elevations, dimensions, clearances, details of construction and anchorage, and details of joints and connections.

Submit manufacturers' descriptive product data for each type of solid polymer fabrication and quartz agglomerate fabrication indicated. Include manufacturers' literature, finishes, profiles and thicknesses of materials.

Submit manufacturers' operations and maintenance data for each type of solid polymer fabrication and quartz agglomerate material fabrication in accordance with Section 01 78 23 OPERATIONS AND MAINTENANCE DATA.

2.1.1 Solid Surfacing Material

Provide solid polymer that is a homogeneous filled solid polymer; not coated, laminated or of a composite construction, complying with ICPA SS-1. Provide material that meets or exceeds the minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch must be repairable by sanding or polishing. Material thickness is as indicated below; required minimum thickness is 1/4 inch. Submit a minimum 4 inch by 4 inch sample of each color and pattern for approval; include full range of color and pattern variation. Retain approved samples as a standard for this work. Submit test report results from an independent testing laboratory attesting that the submitted solid surfacing materials meet or exceed each of the specified performance requirements.

a. Horizontal Surfaces: 1/2 inch thick material

b. Vertical Surfaces: 1/2 inch thick material

c. Provide materials that meet the emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type). Provide certification or validation of indoor air quality for solid surface fabrication products.

d. Provide solid surfacing materials with highest recycled content feasible. Provide data identifying percentage of recycled content for solid surfacing materials.

2.1.2 Acrylic-modified Polymer Solid Surfacing Material

Cast, solid polymer material composed of a formulation containing acrylic and polyester polymers, mineral fillers, and pigments. Provide acrylic polymer content not less than 5 percent and not more than 10 percent in order to meet the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	4100 psi (max.)	ASTM D638
Hardness	50-Barcol Impressor (min.)	ASTM D2583
Thermal Expansion	.000023 in/in/F (max.)	ASTM D696
Boiling Water Surface Resistance	No Change	ANSI/NEMA LD 3-3.05
High Temperature Resistance	No Change	ANSI/NEMA LD 3-3.06
Impact Resistance (Ball drop)		ANSI/NEMA LD 3-303
1/4 inch sheet	36 inches, 1/2 lb ball, no failure	
1/2 inch sheet	140 inches, 1/2 lb ball, no failure	
3/4 inch sheet	200 inches, 1/2 lb ball, no failure	
Mold & Mildew Growth	No growth	ASTM G21
Bacteria Growth	No growth	ASTM G21
Liquid Absorption (Weight in 24 hrs.)	0.6 percent max.	ASTM D570
Flammability		ASTM E84
Flame Spread	25 max.	
Smoke Developed	100 max.	
Sanitation	"Food Contact" approval	NSF/ANSI 51
Flexural Strength	10,400 psi (min.)	ASTM D790

2.1.3 Material Patterns and Colors

Provide pattern and color for all solid surfacing material components and fabrications as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers. Provide products with consistent patterned color throughout thickness of the product.

2.1.4 Surface Finish

Provide a uniform appearance on exposed finished surfaces and edges. Exposed surface finish is as indicated.

2.2 ACCESSORY PRODUCTS

Provide accessory products, as specified below, as manufactured by the solid surfacing material manufacturer or as approved by the solid surfacing material manufacturer for use with the solid surfacing materials being specified.

2.2.1 Adhesives

Provide a two-part seam adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid surfacing materials and components to create a monolithic appearance of the fabrication. Provide adhesive approved by the solid surfacing material manufacturer. Color-match adhesive to the surfaces being bonded where solid-colored, solid surfacing materials are being bonded together. Provide clear or color matched seam adhesive where particulate patterned, solid surfacing materials are being bonded together.

Provide adhesives that meet the emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content not to exceed 250 g/L. Provide validation of indoor air quality for adhesive.

2.2.2 Seam and Sealant Emissions

Provide seam and other accessory materials that meet the emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content not to exceed 250 g/L. Provide validation of indoor air quality for solid surface seam and sealant products.

2.2.3 Silicone Sealant

Provide silicone sealant, mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, acid-curing; ASTM C920, Type S, Grade NS, Class 25, Use NT; clear formulation; approved for use by the solid surfacing material manufacturer.

2.2.4 Conductive Tape

Provide manufacturer's standard conductive foil tape, 4 mils thick, applied around the edges of cut outs containing hot or cold appliances.

2.2.5 Insulating Tape

Provide manufacturer's standard insulating tape for use with drop-in food wells used in commercial food service applications to insulate solid

surfacing material from hot or cold appliances.

2.2.6 Heat Reflective Tape

Provide heat reflective tape as recommended by the solid surfacing material manufacturer for use with cutouts for heat sources.

2.2.7 Mounting Hardware

Provide mounting hardware, including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

2.3 FABRICATIONS

Provide factory or shop fabricate components to sizes and shapes indicated, to the greatest extent practical, in accordance with approved Shop Drawings and manufacturer's requirements. Provide factory cutouts for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii must be routed to template, with edges smooth. Defective and inaccurate work will be rejected. Submit product data indicating product description, fabrication information, and compliance with specified performance requirements for solid surfacing material, joint adhesive, sealants, and heat reflective tape.

2.3.1 Joints and Seams

Form joints and seams between solid surfacing material components using manufacturer's approved seam adhesive. Provide inconspicuous joints in appearance without voids to create a monolithic appearance.

2.3.2 Edge Finishing

Rout and finish component edges to a smooth, uniform appearance and finish. Provide edge shapes and treatments, including any inserts, as detailed on the drawings. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.3.3 Counter Top Splashes

Fabricate backsplashes and end splashes from 1/2 inch thick solid surfacing material to be in conformance with dimensions and shapes as indicated. Provide backsplashes and end splashes for all counter tops. Shop fabricate backsplashes and provide permanently attached.

2.3.3.1 Permanently Attached Backsplash

Provide permanently attached backsplashes with seam adhesive and to form a radiused coved transition from counter top to backsplash.

2.3.3.2 End Splashes

Provide end splashes loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed.

2.3.4 Window Stools

Fabricate window stools from 1/2 inch thick solid surfacing material; dimensions, edge shape, and other details equal to the width of the window opening by a 1/2 inch overhang of the window sill depth. Provide square

edge profile.

2.3.5 Counter Tops

Fabricate all solid surfacing material, counter top components from 3/4 inch thick material. Indicate details, dimensions, locations, and quantities on the drawings. Provide counter tops with permanently attached with coved transition backsplash and loose endsplashes at all locations and at height as indicated on drawings. Attach 2 inch wide reinforcing strip of solid surfacing material under each horizontal counter top seam. Submit a minimum 1 foot wide by 6 inch deep, full size sample for each type of counter top shown on the project drawings; include the edge profile and backsplash as detailed on the drawings and at least one seam. Retain approved sample as standard for this work. Provide square edge profile.

2.3.5.1 Counter Tops with Sinks

a. Provide stainless steel or vitreous china sink; include cutouts to template for counter tops with sinks as furnished by the sink manufacturer. Provide manufacturer's standard sink mounting hardware for stainless steel and vitreous china rimless installation. Seal between sink and counter top with specified silicone sealant. Provide sink, faucet, and plumbing requirements in accordance with Section 22 00 00 PLUMBING,GENERAL PURPOSE.

2.3.6 Toilet Partition System

Refer to Section 10 21 13 TOILET COMPARTMENTS.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Components

Install all components and fabricated units plumb, level, and rigid. Make field joints between solid surfacing material components using solid surfacing material manufacturer's approved seam adhesives, to provide a monolithic appearance with joints inconspicuous in the finished work. Attach metal or vitreous china sinks and lavatory bowls to counter tops using solid surfacing material manufacturer's recommended clear silicone sealant and mounting hardware. Install solid polymer sinks and bowls using a color-matched seam adhesive.

3.1.2 Silicone Sealant

Use specified silicone sealant to seal all expansion joints between solid surfacing material components and all joints between solid surfacing material components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures. Provide sealant bead smooth and uniform in appearance and minimum size necessary to bridge any gaps between the solid surfacing material and the adjacent surface. Provide continuous bead and run the entire length of the joint being sealed.

3.1.3 Plumbing

Make plumbing connections to sinks and lavatories in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

3.2 CLEAN-UP

Components must be cleaned after installation and covered to protect against damage during completion of the remaining project items. Damaged components must be repaired or replaced at the Contractor's sole expense.

-- End of Section --

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SECTION 07 05 23

PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS
08/19

PART 1 GENERAL

1.1 SUMMARY

Employ an independent agency to conduct the pressure test on the building envelope in accordance with this specification section and ASTM E779.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referenced within the text by the basic designation only.

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ANSI/ASNT CP-105	(2020) ASNT Standard Topical Outlines for Qualification of Nondestructive Testing Personnel
ANSI/ASNT CP-189	(2020) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel
ASNT SNT-TC-1A	(2020) Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing

ASTM INTERNATIONAL (ASTM)

ASTM D3464	(1996; R 2014) Standard Test Method for Average Velocity in a Duct Using a Thermal Anemometer
ASTM E779	(2019) Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1186	(2017) Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
ASTM E1258	(1988; R 2018) Standard Test Method for Airflow Calibration of Fan Pressurization Devices
ASTM E1827	(2011; R 2017) Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
ASTM E2029	(2011) Standard Test Method for Volumetric and Mass Flow Rate Measurement in a Duct Using Tracer Gas Dilution

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 6781	(1983) Thermal Insulation - Qualitative Detection of Thermal Irregularities in Building Envelopes - Infrared Method
ISO 6781-2	(2010) Performance of Buildings - Detection of Heat, Air, and Moisture Irregularities in Buildings by Infrared Methods - Part2: Equipment Requirements
ISO 6781-3	(2015) Performance of Buildings - Detection of Heat, Air, and Moisture Irregularities in Buildings by Infrared Methods - Part 3: Qualifications of Equipment Operators, Data Analysts, and Report Writers

1.3 DEFINITIONS

The following terms as they apply to this section:

1.3.1 Air Barrier Envelope

The surface that separates the inside air from the outside air. The combination of air barrier assemblies and air barrier components, connected by air barrier accessories are designed to provide a continuous barrier to the movement of air through an environmental separator. A single building may have more than one air barrier envelope. The air barrier surface includes the top, bottom, and sides of the envelope. The term "air barrier envelope" is also known as "air barrier system" or simply "air barrier".

1.3.2 Air Leakage Rate

How leaky, or conversely how air tight a building envelope is. The air leakage is normally described in terms of air flow rate for the surface area of the envelope at a defined differential pressure.

1.3.3 Bias Pressure

Also known as zero flow pressure, baseline pressure, offset pressure or background pressure. With the envelope not artificially pressurized, bias is the differential pressure that always exists between the envelope that has been prepared (sealed) for the pressure test and the outdoors. Bias pressure is made up of two components, fixed static offset (usually due to stack effect or the HVAC system) and fluctuating pressure (usually due to wind or a moving elevator). Because of pressure fluctuations many bias pressure readings are recorded and averaged for use in the calculations.

1.3.4 Blower Door

Commonly used term for an apparatus used to pressurize and depressurize the space within the building envelope and quantify air leakage through the envelope. The blower door typically includes a door fan and an air resistant fabric or a series of hard panels that extends to cover and seal the door opening between the fan shroud and door frame. The door fan is a calibrated fan capable of measuring air flow and is usually placed in the opening of an exterior door. With the air barrier otherwise sealed, air

produced by the door fan pressurizes or de-pressurizes the envelope, depending on the fan's orientation.

1.3.5 Environmental Separator

The parts of a building that separate the controlled interior environment from the uncontrolled exterior environment, or that separate spaces within a building that have dissimilar environments. The term "environmental separator" is also known as the "control layer".

1.3.6 Pressure Test

A generic term for a test in which the envelope is either pressurized or de-pressurized with respect to the outdoors.

1.3.6.1 Negative Pressure Test (Depressurization Test)

A test wherein air inside the envelope is drawn to the outdoors. This places the envelope at a lower (negative) pressure with respect to the outdoors.

1.3.6.2 Positive Pressure Test (Pressurization Test)

A test wherein outdoor air is pushed into the envelope. This air movement places the envelope at a higher (positive) pressure with respect to the outdoors.

1.4 WORK PLAN

Submit the following not later than 120 calendar days after contract award, but before start of pressure testing work, steps to be taken by the lead pressure test technician to accomplish the required testing.

a. Memorandum of test procedure.

(1) Proposed dates for conducting the pressure, thermographic and fog tests.

(2) Submit detailed pressure test procedures prior to the test. Provide a plan view showing proposed locations (personnel doors or other similar openings) to install blower doors or flexible ducts (for trailer-mounted fans), if used.

b. Test equipment to be used.

c. Scaffolding, scissor lifts, power, electrical extension cords, duct tape, plastic sheeting and other Contractor's support equipment required to perform all tests.

d. Other Contractor's support personnel who will be on site for testing.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Work Plan; G

SD-03 Product Data

Thermal Imaging Camera; G

SD-05 Design Data

Envelope Surface Area Calculations; G

SD-07 Certificates

Pressure Test Agency

Thermographer Qualifications

Test Instruments

Date Of Last Calibration

SD-06 Test Reports

Pressure Test Procedures; G

Air Leakage Test Report; G

Diagnostic Test Report; G

1.6 QUALITY ASSURANCE

1.6.1 Modification of References

Perform all pressure and diagnostic tests according to the referenced publications listed in paragraph REFERENCES and as modified by this section. Consider the advisory or recommended provisions, of the referred references, as mandatory.

1.6.2 Qualifications

1.6.2.1 Pressure Test Agency

Submit, no later than 15 calendar days after contract award, information certifying that the pressure test agency is not affiliated with any other company participating in work on this contract. The work of the test agency is limited to pressure testing the building envelope, performing a thermography test and fog test, and investigating, through various methods, the location of air leaks through the air barrier. See paragraph PRESSURE TEST AGENCY for additional requirements. For thermographer qualifications, see paragraph THERMOGRAPHER QUALIFICATIONS.

Use the sample TEST AGENCY QUALIFICATIONS SHEET form (Appendix C), to submit the following information.

a. Verification of 2 years of experience as an agency in pressure testing commercial and/or industrial buildings.

b. List of at least ten commercial/industrial facilities with building envelopes that the agency has tested within the past 2 years. Include

building name, address, and name of prime construction contractor and contractor's point-of-contact information.

c. Confirmation of 2 years of commercial and or industrial building pressure test experience for the lead pressure test technician and the thermographer in using the specified ASTM E779 testing standard. References from five Contracting Officers for facilities where the lead test technician has supervised commercial and or industrial building pressure tests in the last 2 years.

d. Verification that the lead pressure test technician has been employed by a building pressure testing agency in the capacity of a lead pressure test technician for not less than 1 year.

1.6.2.2 Thermographer Qualifications

To perform an infrared diagnostic evaluation, use a lead thermographer who has at least an active Level II Certification that is based on the requirements in ANSI/ASNT CP-105 or ANSI/ASNT CP-189 and is in accordance with ASNT SNT-TC-1A. The course of study is to be specifically focused on infrared thermography for building science. The thermographer must have at least two years of building science thermography experience in IR testing commercial or industrial buildings. The thermographer must also have experience in building envelopes and building science in order to make effective recommendations to the contractor should the envelope require additional sealing. Thermographic equipment operators, data analysists and report writers must comply with the requirements of ISO 6781-3. Submit the thermographer's certificate for approval. Submit a list of at least ten commercial/industrial buildings on which the thermographer has performed IR thermography in the past two years. The thermographer is to have a current active certification. Submit certification at least 60 days prior to thermography testing.

1.6.3 Test Instruments and Date of Last Calibration

Submit a signed and dated list of test instruments, their application, manufacturer, model, serial number, range of operation, accuracy and date of most recent calibration. Calibration data applicable to fan systems must be in accordance with ASTM E1258.

1.6.4 Test Reports

No later than 14 days after completion of the pressure test, submit electronic copies of an organized report. The report is to contain a table of contents, an executive summary, an introduction, a results section and a discussion of the results. Submit the air leakage test report as described in paragraph AIR LEAKAGE TEST REPORT. Submit a diagnostic test report as described in paragraph LOCATING LEAKS BY DIAGNOSTIC TESTING. The diagnostic test report is to include the Thermographic Investigation Report and the Fog Test Report (if performed).

Submit field data and completed report forms found in the appendices. Use the sample forms, Test Agency Qualification Sheet, Air Leakage Test Form and Air Leakage Test Results Form to summarize the tests for the appropriate building envelope. Submit both electronically populated and field hand filled-in forms.

Report Data. Include in the report the following information for all tests:

a. Date of issue

b. Project title and number

c. Name, address, and telephone number of testing agency

d. Dates and locations of samples and tests or inspections

e. Names of individuals making the inspection or test

f. Designation of the work and test method

g. Identification of product and specification section

h. Complete inspection or test data

i. Test results and an interpretation of test results

j. Comments or professional opinion on whether inspected or tested work complies with contract document requirements

k. Recommendations on retesting

1.7 CLIMATE CONDITIONS SUITABLE FOR A PRESSURE TEST

As the test date approaches, monitor the weather forecast for the test site. Avoid testing on days forecast to experience high winds, rain, or snow. Monitor weather forecasts prior to shipping pressure test equipment to the site. Based on current and forecast weather conditions, the Contracting Officer's representative is to grant final approval for testing to occur.

1.7.1 Rain

For safety reasons, avoid testing during rain or if rain is anticipated during testing. If pneumatic hoses are installed and exposed to rain inspect the hose to ensure rainwater has not migrated into the hose ends. Orient all exposed hose ends to keep them out of water puddles. Success in temporarily sealing outdoor ventilation components such as louvers and exhaust fans may also be compromised by rain. Don't seal roof-mounted ventilation components during times of potential lightning.

1.7.2 Wind

Because wind can skew pressure test results, test only on days and at times when winds are anticipated to be the calmest. Avoid pressure testing during gusty or high wind conditions. Avoid installing test fans on the windward side of the building if wind gusts during the test are anticipated to be greater than 10 miles per hour.

PART 2 PRODUCTS

2.1 PRESSURE TEST EQUIPMENT

Depending on site conditions and size of the envelope, the test may be conducted using blower door equipment and/or trailer-mounted fans or the building's own supply air system. The testing agency is to supply sufficient quantity of blower equipment that will produce a minimum of 75

Pa differential pressure between the envelope and outdoors using the test methods described herein. Supplying additional blower test equipment to provide additional airflow capacity or to act as a backup is highly recommended.

2.1.1 Blower Door Fans and Trailer Mounted Fans

Each air flow measuring system including blower door fans and trailer mounted fans are to be calibrated within the last 5 years. Calibrated blower door fans and trailer mounted fans must measure accurately to within plus or minus 5 percent of the flow reading. Blower door equipment and trailer mounted fans are to be specifically designed to pressurize building envelopes. Each set of blower door equipment is to include fan(s), digital gage(s), door frame, door fabric or hard panels.

2.1.2 Digital Gages as Test Instruments

Use only digital gages as measuring instruments in the pressure test; analog gages are not acceptable. The gauges must be accurate to within 1.0 percent of the pressure reading or 0.15 Pa, whichever is greater. Each gage is to have been calibrated within two years of the test. The calibration is to be checked against a National Institute of Standards and Technology (NIST, formerly National Bureau of Standards) traceable standard.

2.2 THERMAL IMAGING CAMERA REQUIREMENTS

The thermal imaging camera used in the thermography test must have a thermal sensitivity (Noise Equivalent Temperature Difference.) of +/- 0.18 degrees F at 86 degrees F or less. Ensure the camera's operating spectral range falls between 2 and 15 micrometers. Ensure the camera's IR image viewing screen resolution measures at least 320x240 pixels. Ensure the camera has a means of recording thermal images seen on the camera viewing screen. The camera is to display output as individual still frame images that also can be downloaded and inserted into an electronic Thermographic Investigation Report. All thermographic equipment must comply with the requirements of ISO 6781-2. Submit camera make and model, and catalog information that defines the camera thermal sensitivity for approval.

PART 3 EXECUTION

3.1 PRESSURE TEST AGENCY

The test agency is to be an independent third party subcontractor, not an affiliated or subsidiary of the prime contractor, subcontractors or A/E firm. The agency is to be regularly engaged in pressure testing of commercial/industrial building envelopes. If using blower door or trailer-mounted fans, the lead test technician must have at least two years of experience in using such equipment in building envelope pressurization tests. Formal training using pressure test equipment is highly recommended. Technicians using the building's air handling system for pressure testing are to have tested at least five commercial/industrial buildings within the past two years with each building having over 50,000 square feet of floor area. Submit the name, address and floor areas of each of these five buildings for approval.

3.1.1 Field Work

The lead pressure test technician and thermographer are to be present at

the project site while testing is performed and is to be responsible for conducting, supervising, and managing of their respective test work. Management includes health and safety of test agency employees.

3.1.2 Reporting Work

The lead pressure test technician is to prepare, sign, and date the test agenda, equipment list, and submit a certified Air Leakage Test Report. The thermographer is to prepare, sign, and date the test agenda, equipment list, and submit a certified Thermographic Investigation Report. The contractor is to prepare a final report that identifies improvements that were made to the envelope to reduce air leaks, mitigate thermal bridging, eliminate moisture migration, discovered during diagnostic tests. Jointly submit all reports.

3.2 ENVELOPE SURFACE AREA CALCULATION

The architectural air barrier boundary includes the floor, walls, and ceiling. After construction of the air barrier envelope is complete, field measure the envelope to ensure the physical measurements match the design drawings and the air barrier envelope surface area calculations are generated. If the calculation result is not within 10 percent of the defined air barrier boundary calculation result as indicated, submit the envelope surface area calculation and results for review.

3.3 PREPARING THE BUILDING ENVELOPE FOR THE PRESSURE TEST

3.3.1 Testing During Construction

The pressure test cannot be conducted until all components of the air barrier system have been installed. After all sealing as described herein has been completed, inspect the envelope to ensure it has been adequately prepared. During the pressure test, stop all ongoing construction within and neighboring the envelope which may impact the test or the air barrier integrity. The pressure test may be conducted before finishes that are not part of the air barrier envelope have been installed. For example, if suspended ceiling tile, interior gypsum board or cladding systems are not part of the air barrier the test can be conducted before they are installed. Recommend testing prior to installing the finished ceilings within the envelope and immediately surrounding it. The absence of finished ceilings allows for inspection and diagnostic testing of the roof/wall interface and for implementation of repairs to the air barrier, if necessary to comply with the maximum allowed leakage.

3.3.2 Sealing the Air Barrier Envelope

Seal all penetrations through the air barrier. Unavoidable penetrations due to electrical boxes or conduit, plumbing, and other assemblies that are not air tight are to be made so by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement or damage, and transfer the load to the structure. Durably construct the air barrier to last the anticipated service life of the assembly and to withstand the maximum positive and negative pressures placed on it during pressure testing. Do not install lighting fixtures that are equipped with ventilation holes through the air barrier.

3.3.3 Sealing Plumbing

Prime all plumbing traps located within the envelope full of water.

3.3.4 Close and Lock Doors

Close and lock all doors and windows in the envelope perimeter. For doors not equipped with latching hardware, temporarily secure them in the closed position. Secure the doors in such a way that they remain fully closed even when the maximum anticipated differential air pressure produced during the test acts on them.

3.3.5 Hold Excluded Building Areas at the Outdoor Pressure Level

Keep building areas immediately surrounding but excluded from the test envelope at the outdoor pressure level during the pressure test. Maintain these areas at the outdoor pressure level by propping exterior doors open, opening windows and de-energizing all air moving devices in or serving these areas.

3.3.6 Maintain an Even Pressure within the Envelope

Ensure the pressure differences within the envelope are minimized by opening all internal air pathways including propping open all interior doors. Distribute test fans throughout the envelope as necessary to ensure the internal pressures are uniform (within 10 percent of the average differential pressure). Ideally, do not install suspended ceilings until after all pressure tests have been completed. If, however the envelope includes finished suspended ceiling spaces, temporarily remove approximately 5 percent of all ceiling tiles or a minimum of 1 tile from each isolated suspended ceiling space, whichever comprises the greatest surface area. Temporarily remove additional ceiling tiles during testing to allow for inspection and diagnostic testing of the ceiling/wall interface. An alternative to removing ceiling tiles is to measure the differential pressure between each isolated suspended ceiling space and the outdoors when the area below the suspended ceiling is maintained at a differential pressure of 75 Pa with respect to the outdoors. If the suspended ceiling differential pressure measurement is within ten percent of the 75 Pa pressure below the suspended ceiling no ceiling tiles need to be removed.

3.3.7 Maintain Access to Mechanical and Electrical Rooms

Maintain access to mechanical rooms and electrical rooms associated with the envelope to allow for de-energizing ventilation equipment and resetting circuit breakers tripped by blower door equipment, if used.

3.3.8 Minimize Potential for Blowing Dust and Debris

Because high velocity air will be blown into and out of the envelope during the test, debris, including dust and litter, may become airborne. Airborne debris may become trapped or entangled in test equipment, thereby skewing test results. Ensure areas within and surrounding the envelope are free of dust, litter and construction materials that are easily airborne. If pressurizing existing, occupied areas, provide adequate notice to building occupants of blowing dust and debris, and general disruption of normal activities during the test.

3.3.9 De-energize Air Moving Devices

De-energize all air moving devices serving the envelope to keep air within the envelope as still as reasonably achievable. De-energize all fans that deliver air to, exhaust air from, or recirculate air within the envelope. Also de-energize all fans serving areas adjacent to but excluded from the envelope.

3.3.10 Installing Blower Door Equipment in a Door Opening

Where blower door fans are used, before installing blower door equipment, select a door opening that does not restrict air flow into and out of the envelope and has at least 5 feet clear distance in front of and behind the door opening. Disconnect the door actuator and secure the door open to prevent it from being drawn into the fan by fan pressure. Avoid installing blower door equipment on the windward side of the building.

3.4 BUILDING ENVELOPE AIR TIGHTNESS REQUIREMENT

For each building envelope, perform the Architectural Only test and if noted below, the Architectural Plus HVAC System test. The purpose of the pressure (air leakage) test is to determine final compliance with the airtightness requirement by demonstrating the performance of the continuous air barrier. An effective air barrier envelope minimizes infiltration and exfiltration through unintended air paths (leaks). The tests may be performed in any desired order.

3.4.1 Architectural Only Test

The test envelope is the architectural air barrier boundary as defined on the contract drawings. This boundary includes connecting walls, roof and floor which comprise a complete, whole, and continuous three dimensional envelope. Perform both a positive pressure test and a negative pressure test on this envelope, unless otherwise directed.

3.4.1.1 Test Goal

Input data from the test into the Air Leakage Rate by Fan Pressurization spreadsheet as described in paragraph CALCULATION PROGRAM via the Air Leakage Test Form. Compare output from the spreadsheet against the maximum allowable leakage defined in Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM. The envelope passes the test if the leakage rate, as calculated using the spreadsheet, is equal to or lower than the Architectural Only leakage rate goal.

3.4.1.2 Preparing the Envelope for the Pressure Test - Seal All Openings through the Air Barrier

Temporarily close all perimeter windows, roof hatches and doors in the envelope perimeter except for those doors that are to remain open to accommodate blower door or trailer mounted fan test equipment installation. Seal, or isolate all other intentional openings, pathways and fenestrations through the architectural envelope prior to pressure testing. Follow the Recommended Test Envelope Conditions identified in ASTM E1827, Table 1, for the Closed Envelope condition. These openings may include boiler flues, fuel-burning water heater flues, fuel-burning kitchen equipment, clothes dryer vents, fireplaces, wall or ceiling grilles, diffusers etc. Before sealing flues, close their associated fuel valves and verify the associated pilot lights are extinguished. Prime all

plumbing traps located within the envelope full of water. In lieu of applying tape and/or plastic, typical temporary sealing materials include tape and sheet plastic or a self-adhesive grille wrap. Use and apply tape and plastic in a manner that does not deface or remove paint or mar the finish of permanent surfaces. Be especially aware of residue that remains from tape applied to stainless steel surfaces such as kitchen hoods or rollup doors. For painted surfaces, use tape types that do not remove finish paint when the tape is removed. If paint is removed from the finished surface, repaint to match existing surfaces. Secure dampers closed either manually or by using the building's HVAC system controls. Use the table below for further guidance in building preparation.

Building Component	Envelope Condition
Air handling units, duct fans	As found (open) or temporarily sealed as necessary
Clothes dryer	Off
Clothes dryer vents	Temporarily sealed
Dampers - intake, exhaust	Physically closed or closed using control power or temporarily sealed
Diffusers, registers, grilles within the envelope	Temporarily sealed
Doors, personnel type, at the envelope perimeter	Secured closed
Doors, personnel type, within the envelope	Secured (propped) open
Doors, roll-up type, at the envelope perimeter	Closed (no additional sealing)
Exhaust hoods	Closed* and temporarily sealed
Fireplace hearth	Temporarily sealed *
Kitchen hoods	Temporarily sealed *
Pilot light and associated fuel valve	Extinguished and closed, respectively
Vented combustion appliance	Temporarily sealed *
Vented combustion appliance exhaust flue	Off
Windows	Secured closed
* If the building component has an associated manual or automatic damper, consider securing the damper closed in lieu of temporarily sealing.	

3.5 CONDUCTING THE PRESSURE TEST

Notify the Contracting Officer at least 10 working days before conducting the pressure tests to provide the Government the opportunity to witness the tests and to monitor weather forecasts for conditions favorable for testing. Do not pressure test until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions. During the pressure test periodically inspect

temporarily sealed items to ensure they are still sealed. Seals on temporarily sealed items tend to release more readily at higher pressures. Test data obtained after temporarily sealed items become unsealed cannot be used as input into the calculation program. Follow the Envelope Pressure Test Procedures in the paragraphs below. Submit detailed pressure test procedures indicating the test apparatus, the test methods and procedures, and the analysis methods to be employed for the building envelope pressure (air tightness) test. Submit these procedures not later than 60 days after Notice to Proceed.

3.5.1 Extend Pneumatic Tubes and Establish a Reference Differential Pressure

Confirm the various zones within the envelope have a relatively uniform interior pressure distribution by establishing a representative differential pressure between the envelope and the outdoors with blower door or trailer-mounted fans operating. The number of indoor pressure difference measurements (pneumatic hoses) required depends on the number of interior zones separated by bottle necks that could create significant pressure drops (e.g. doorways and stairwells). Extend at least four pneumatic hoses (differential pressure monitoring ports) to locations within the envelope that are physically opposite of each other. In multiple story buildings, especially those over three stories, extend hoses to multiple floors. Locate the hose ends away from the effects of air discharge from blower test equipment. Select one of the four (or more) interior hoses, one judged by the test agency to be the most unaffected by air velocity produced by blower test equipment, to serve as the interior reference pressure port. Extend at least one additional pneumatic hose to the outdoors (outdoor pressure port). To the end of this hose manifold at least four hoses together and terminate each hose on a different side of the building. With the envelope sealed and the blowers energized, measure the differential pressure using the interior reference pressure port and the four outdoor pressure ports. Then measure and record the differential pressure by individually using each of the remaining three interior hoses. Ensure each reading is within plus or minus 10 percent of the reference reading. Thus at an average 75 Pa maximum pressure difference across the envelope, the difference between the highest and lowest interior pressure difference measurements should be 15 Pa or less. If this condition cannot be met, attempt to create additional air pathways within the envelope to minimize pressure differences within the envelope. If necessary, move the interior hose ends. See step 2.13 of the Air Leakage Test Form in Appendix A.

3.5.2 Bias Pressure Readings

With the fan pressurization equipment de-energized and the envelope sealed, obtain the differential pressure between the outdoors and the envelope. Record 12 bias pressure readings before the pressure test and 12 bias pressure readings after the pressure test. Each reading is the average of ten or more 1-second measurements. Include positive and negative signs for each reading. To help dampen bias pressures that significantly contribute to test pressure, reduce temperature differences between indoor and outdoor air. Temperature differences can be reduced by operating test fan equipment for a few minutes to replace most of the indoor air with outdoor air.

3.5.3 Testing in Both Positive and Negative Directions

The preferred method for testing a building envelope is to test in both

the pressurized and depressurized directions. Testing in one direction is only allowed if opposite direction testing cannot logistically be performed due to test equipment limitations or restrictions. After obtaining the pre-test bias differential pressure readings, conduct the pressure test. Record the envelope pressures (in units of Pascals) from one interior pneumatic hose (monitoring port) and the outdoor pneumatic hose(s), averaged or manifolded, with corresponding flows (in units of cfm) for each fan. Record the flow rates at at least 10 to 12 positive and 10 to 12 negative building pressure readings. If conducting both positive and negative pressure tests the lowest allowable test pressure is 40 Pa and the highest test pressure is 85 Pa. Keep at least 25 Pa difference between the lowest and highest test pressure readings. Include the 75 Pa pressure value between the lowest and highest readings. The 10 to 12 readings in each direction are to be roughly evenly spaced along the range of pressures and flows. After testing is complete de-energize the equipment used to provide pressurization and obtain an additional 10 to 12 post-test bias pressure readings. None of the bias pressure readings are allowed to exceed 30 percent of the minimum test pressure. If these limits are exceeded the test fails and must be repeated.

3.5.4 Using a Building's Own Air Handling System to Pressure Test an Envelope

3.5.4.1 Test Setup

Temporarily seal the envelope in a manner similar to that for testing with blower door or trailer-mounted fans. To positively pressurize the envelope, de-energize all ventilation equipment and close all associated dampers, except those outside air intake dampers associated with supply fans that will be used to pressurize the building envelope. Fully open these dampers. For the negative pressure test, de-energize all ventilation equipment except for those fans that will be used to de-pressurize the envelope. All dampers associated with de-energized fans are to be closed and all exhaust dampers associated with fans used to de-pressurize the envelope will be fully opened.

3.5.4.2 Measuring Airflows

When using the building's own air handling system to pressure test the envelope, air flows can generally be measured using one of the following methods:

a. When testing using the building's own air handling system, ensure flow readings obtained by anemometer comply with ASTM D3464. Pitot tube or hot wire anemometer traverse in accordance with ASTM D3464.

b. Pressure compensated shrouds (especially recommended for rooftop exhaust fans)

c. Tracer gas methods for measuring airflows in ducts in accordance with ASTM E2029. Do not use tracer gas decay, constant injection and constant concentration methods for estimating the total ventilation rate of the envelope.

3.5.4.3 Outdoor Air Flow Measuring Stations

Air flow stations may be used to measure outdoor airflows if one of the above methods is used to check accuracy of at least one air flow reading for each station or if the design of the HVAC system specifically placed

outdoor air flow stations in locations that will yield accurate results. Field verify the accuracy of readings at the air flow measuring stations before obtaining pressure test readings.

3.5.5 Pressure Testing - Special Cases

3.5.5.1 Pressure Testing a Multiple Isolated Zoned Building

Pressure test each exterior corner zone plus at least an additional 20 percent (as measured by floor area) of remaining zones. The Contracting Officer is responsible for selecting which of these additional zones to test. If all zones pass the pressure test it is assumed that all untested zones also pass and no further testing is required. If, however, any zone fails to pass the test's leakage requirements, re-seal and re-test until it passes in accordance with paragraph FAILED PRESSURE TEST. Test an additional 20 percent of previously untested zones. If all tested zones pass, no further testing is needed. If any zone in this group fails the test re-seal and re-test the zone until it passes. Continue this process until all the tested zones pass. When testing a zone, the doors to all adjacent zones that share a common surface with the tested zone are to have their doors opened to the outdoors. The resulting leakage from the test zoned is that through all 6 surfaces (4 walls, roof and floor, for a rectangular shaped zone).

3.5.6 Failed Pressure Test

If the pressure test fails to meet the established criteria, use diagnostic test methods described in paragraph LOCATING LEAKS BY DIAGNOSTIC TESTING to discover the leak locations. Provide additional permanent sealing measures to reduce or eliminate leak sources discovered during diagnostic testing. Retest (perform another pressure test) after sealing has been completed. Repeat this sequence of documenting test results in the test report, performing diagnostic tests, documenting recommendations for additional sealing measures in the test report, sealing leak locations per recommendations, and re-testing as necessary until the building envelope passes the pressure test and is in compliance with the performance requirements.

3.5.7 Air Leakage Test Report

Report volumetric flow rates and corresponding differential pressures in cubic feet per minute (cfm) and Pascals (Pa), respectively, on the Air Leakage Test Form sample form found in Appendix A. Populate the accompanying spreadsheet file entitled Pressure Test Data Analysis with information obtained during the test. The spreadsheet uses equations found in ASTM E779 as a basis for calculating the envelope leakage rate. Other similar leakage rate calculation programs cannot be used or submitted for review. Submit a printout of the data input and output in the report. Should any air tightness (pressure) test fail, the pressure test report is to include data and results from all previous failed tests along with the final successful test data and results. Indicate if the resulting leakage rate did or did not meet the goal leakage requirement. Identify and document deficiencies in the building construction upon failure of a test to meet the specified maximum leakage rate.

Include the Test Agency Qualification Sheet, Air Leakage Test Form and Air Leakage Test Results Form in the written report. Document every test set-up condition with diagrams and photos to ensure the tests can be made repeatable. Document all pneumatic hose termination locations. Record in

detail how the building envelope was prepared for the tests. Also describe in detail which building items were temporarily sealed. Include photos of test equipment and sealing measures in the report. Include an electronic (pdf) version of all test reports on a CD. If the building envelope fails to meet the leakage rate goal, provide recommendations to further seal the envelope and document these recommendations in the test report.

3.6 LOCATING LEAKS BY DIAGNOSTIC TESTING

Use diagnostic test methods described herein to discover obvious leaks through the envelope. Perform diagnostic tests on the building envelope regardless of the envelope meeting or failing to meet the designated leakage rate goal. Use diagnostic test methods in accordance with ASTM E1186 and in conjunction with pressurization equipment as necessary. Use the thermography diagnostic test to establish a baseline for envelope leakage. Apply additional diagnostic tests (find, feel, fog or other tests) as necessary to further define leak locations and pathways discovered using thermography or to find additional leaks not readily detected by thermography. Using a variety of diagnostic tests may help locate leaks that would otherwise go undetected if only a single diagnostic test were used. Pay special attention to locating leaks at interfaces where there is a change in materials or a change in direction of like materials. These interfaces, at a minimum, include roof/wall, wall/wall, floor/wall, wall/window, wall/door, wall/louver, roof mounted equipment/roof curb interfaces and all utility penetrations (ducts, pipes, conduit, etc.) through the envelope's architecture. Also use diagnostic tests to check for leakage between the air duct and duct damper, when the damper, under normal control power, is placed in the closed position. Should leaks be discovered during diagnostic tests, thoroughly document their exact locations on a floor plan so that sealing can be later applied, if required or as directed. If the envelope passes the leakage test, use the diagnostic test procedure described above to identify obvious leakage locations. Seal the leaks at the discretion of the COR based on the magnitude, location, potential for liquid moisture penetration or retention, potential for condensation, presence of daylight through an architectural surface or if the leakage location could potentially cause rapid deterioration or mold growth of, or in the building envelope materials and assemblies. Apply sealing measures after diagnostic testing is complete and all pressurization blowers are off. To verify that the applied sealing measures that are effective, re-test for leaks using the same diagnostic methods that discovered the leak. Reseal and retest until the envelope meets the leakage rate goal and all obvious leaks through the envelope are sealed.

3.6.1 Find Test

Use visual observation to locate daylight and/or artificial light streaming from the opposite side of the envelope. Observe all interfaces identified above.

3.6.2 Feel Test

Use the building's air handling system or blower door equipment to negatively pressurize the building envelope, to at least 25 Pa but no greater than 85 Pa, with respect to the outdoors. The larger the pressure difference, the easier discovering leaks by feeling them becomes. While inside the envelope, hand feel roof/wall, wall/wall, and floor/wall interfaces and utility penetrations (ducts, pipes, conduit, etc) for leaks

and note the leak locations on a floor plan. The "Feel" test may also be used to check for leaks between the ductwork and ductwork damper. To do this, positively pressurize the envelope and check for air movement from the envelope exterior.

3.6.3 Infrared Thermography Test

Avoid performing thermography tests just after pressure testing the building envelope (pressurizing and/or depressurizing the building envelope) as thermography readings may be inaccurate due to excessive air-wash. Perform thermography either before the pressure test or wait an appropriate amount of time after pressure test completion for the temperatures within the building envelope to stabilize before starting the thermography tests. Coordinate thermography examination with the pressure test agency and the test agency's pressurization equipment. The pressure test agency is to allow adequate time for the thermographer to perform a complete thermographic examination, as described hereinafter, of the envelope interior and exterior.

3.6.3.1 Thermography Test Methods

Before thermographic testing, remove furniture, construction equipment, and all other obstructions both inside and outside the building as necessary to gain a clear field of view. In the Thermographic Investigation Report, document all areas where obstructions remain. For exterior thermal examination of the envelope, verify that no direct solar radiation has heated the envelope surfaces to be examined for a period of approximately 3 hours for frame construction and for approximately 8 hours for masonry veneer construction. Conduct exterior investigations after sunset, before sunrise, or on an overcast day when the influence of solar radiation can be determined to be minimal. Limit exterior examinations to times when the influence of solar radiation is minimal, such as after sunset or before sunrise or during an overcast day. Conduct thermal imaging tests only when wind speeds are less than 8 mph at the time of analysis and at the end of analysis. Document any variations in wind during the test. Document all variations of test conditions in the Thermographic Investigation Report. Test only when exterior surfaces are dry. Monitor and document ongoing test parameters, such as the temperatures inside and outside the air barrier envelope, wind speed, and differential pressure.

3.6.3.1.1 Thermography Testing of the Air Barrier

Test the building envelope in accordance with ISO 6781, and ASTM E1186. Perform a complete thermographic inspection consisting of the full inspection of the interior and exterior of the complete air barrier envelope. Document envelope areas that are inaccessible for testing. Use infrared thermography technology in concert with standard pressurization methods (blower doors, trailer mounted fans and/or the building's own air handling systems) to locate leaks through the air barrier. Because thermography works best with at least a 18 degree F temperature difference between the envelope interior and the exterior, adjust the HVAC system, if possible, to create or enhance this temperature difference. The minimum allowable temperature difference is 3 degrees F. Maintain this temperature difference for at least 3 hours prior to the test. Use pressurization methods to establish a minimum of +20 Pa pressure difference with respect to the outdoors while using an infrared camera to view the envelope from outdoors. When viewing with the camera from inside the envelope, keep the envelope at a pressure differential of -20 Pa with

respect to the outdoors using pressure testing equipment or the building's own air handling system.

3.6.3.2 Thermography Test Results

Document the location of all leaks, anomalies, and unusual thermal features on a floor plan and/or elevation view and catalog them with a visible light picture for locating the defect for correction. The thermographer is to recommend corrective actions to eliminate the leaks, anomalies and unusual thermal features. Where leaks are found perform corrective sealing as necessary to achieve the whole envelope air leakage rate specified. After sealing, again use thermography in concert with standard pressurization methods to verify that the air leakage has been reduced. After these leaks have been permanently sealed note all actions taken on the drawings or in the Thermographic Investigation Report. Submit the drawings for approval as part of the Thermographic Investigation Report. Also include thermographic photos that show where leaks were discovered. Include thermograms using an imaging palette that clearly shows the observed thermal patterns indicating air leakage. The Contracting Officer's Representative is to witness all testing.

3.6.4 Fog Test

Before using a theatrical fog generator, disable all building smoke detectors as they may alarm when fog is issued. Coordinate fog tests and the disabling of all smoke detectors with the Contracting Officer's representative and the local fire department as necessary. Use pressure test equipment or the buildings own air handling system to positively pressurize the building envelope to at least 25 Pa but not greater than 85 Pa over the outdoors. Using a theatrical fog generator within the envelope, direct fog at suspected leakage points such as at building interfaces. Test the following interfaces: roof/wall, wall/wall, floor/wall, wall/window, roof/mounted mechanical equipment. From the vantage point immediately outside the envelope and opposite that of the interface being tested, observe the effect as the fog is issued. Detection may also be further enhanced by using a scented fog liquid or a fog liquid that produces a colored fog. Look for fog and smell for associated odor percolating through the interface. Also use smoke puffers and smoke sticks as necessary to locate leaks at these and other interface locations. If the Architectural Plus HVAC System pressure test will be/was performed introduce fog into ductwork to check for leakage between ductwork and associated dampers. After fog testing has ended, reactivate the building smoke detectors and notify the Contracting Officer and local fire department that the test has ended. After sealing has been completed retest these areas using fog. Seal additional leaks that are found.

3.6.5 Diagnostic Test Report

Once the diagnostic tests have been completed and the leakage locations identified and sealed, document these procedures, locations and recommendations in the diagnostic test report. Submit plan and/or profile drawings that thoroughly identify leak locations. Describe in detail all leak locations so that the seal-up crew knows where to apply sealing measures. After sealing measures have been applied, describe the methods used along with applicable photos of the final sealed condition.

3.6.5.1 Thermographic Investigation Report

Submit a report of each thermographic investigation identifying the

thermal discontinuities in the thermal control layer. Indicate in the final report locations to which improvements for both the air control layer and the thermal control layer were made to reduce air leaks and correct discontinuities in the thermal control layer. Include in the report some selected radiometric images of suspected failure points in the air barrier envelope that indicate before and after conditions. Indicate in the final report improvements that were made to the envelope to reduce air leaks. Include the following items in the report:

a. Brief description of the building construction

b. Types of interior and exterior surface materials used in the building.

c. Geographical orientation of the building with a description of the exterior surroundings including other buildings, vegetation, landscaping, and surface water drainage.

d. Camera brand, model and serial number, and date of most recent calibration date; optional lenses with serial numbers (if applicable)

e. Thermographer's and Government Inspector's names

f. Date and time of tests

g. Air temperature and humidity inside the air barrier envelope

h. Outdoor air temperature and humidity

i. General information for the last 12 hours on the solar radiation conditions in the geographic area where the test is being performed.

j. Ambient conditions such as precipitation and wind direction and speed occurring with the last 24 hours, as applicable. Refer to specific requirements in each section of each thermographic inspection type for requirements in each specific area.

k. Documentation of those portions of the building envelop which were not within test conditions when the scan was performed and which portions were obstructed by adjacent structures, interior furnishings, intervening cavities or reflective surfaces.

l. Other relevant information, which may have influenced test results.

m. Drawings, sketches, floor plans and/or photographs detailing the locations in the buildings where thermograms were taken detailing possible irregularities in the components being tested.

n. Thermal images taken during the inspection with their relative locations and written or voiced recorded explanations of the anomaly listed along with visual and reference images.

o. An identification of the aspects or components of the building being examined.

p. Explanations for the type and the extent of each construction defect observed during the inspection.

q. Any results from additional measurements and investigations. Identify additional equipment used and support with type, model number, serial

number and date of most recent calibrated.

3.6.5.2 Fog Test Report

Document all turbulent air flow and dead air spaces within the envelope. Report fog behavior as it exits from and/or is entrained within the building. Include a floor plan in the report that documents the locations where fog passed through the envelope.

3.7 CALCULATION PROGRAM

To calculate the envelope leakage rate and other required outputs, input the data obtained during the pressure tests as documented in the Air Leakage Test Form (Appendix A) into the Air Leakage Rate by Fan Pressurization Excel spreadsheet. This spreadsheet can be found at the following web site:
http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphic

3.8 AFTER COMPLETION OF THE PRESSURE AND/OR DIAGNOSTIC TEST

After all pressure and/or diagnostic testing has been completed unseal all temporarily sealed items. Unless otherwise directed by the Contracting Officer, return all dampers, doors, and windows to their pre-test condition. Remove tape and plastic from all temporarily sealed openings, being careful not to deface painted surfaces. If paint is removed from finished surfaces, repaint to match existing surfaces. Unless otherwise directed by the Contracting Officer's representative, return fuel (gas) valves to their pre-test position and relight pilot lights. Return all fans and air handling units to pre-test conditions.

3.9 REPAIR AND PROTECTION

Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing, inspection, and similar services. Upon completion of inspection, testing, or sample taking and similar services, repair damaged construction and restore substrates and finishes, protect construction exposed by or for quality control service activities, and protect repaired construction.

3.10 APPENDICES

The following forms are available for download as a MS Word file at
http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphic

Appendix A - Air Leakage Test Form
Appendix B - Air Leakage Test Results Form
Appendix C - Test Agency Qualifications Sheet

-- End of Section --

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SECTION 07 11 13

BITUMINOUS DAMPPROOFING
08/11, CHG 1: 05/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4263	(1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Materials

1.3 DELIVERY AND STORAGE

Deliver materials in sealed containers bearing manufacturer's original labels. Labels shall include date of manufacture, contents of each container, performance standards that apply to the contents and recommended shelf life. While in storage, do not allow water based bituminous damproofing to freeze.

PART 2 PRODUCTS

2.1 ASPHALT PRIMER

ASTM D41/D41M.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Remove or cut form ties and repair all surface defects as required in Section 03 30 00 CAST-IN-PLACE CONCRETE. Clean concrete and masonry surfaces to receive dampproofing of foreign matter and loose particles. Apply dampproofing to clean dry surfaces. Moisture test in accordance with ASTM D4263. If test indicates moisture, allow a minimum of 7 additional days after test completion for curing. If moisture still

exists, redo test until substrate is dry.

3.1.1 Metal Surfaces

Metal surfaces shall be dry and be free of rust, scale, loose paint, oil, grease, dirt, frost and debris.

3.2 APPLICATION

Prime surfaces to receive fibrous asphaltic dampproofing unless recommended otherwise by dampproofing materials manufacturer. Apply dampproofing after priming coat is dry, but prior to any deterioration of primed surface, and when ambient temperature is above 40 degrees F.

3.2.1 Surface Priming

Prime surfaces to receive asphalt or fibrous asphalt dampproofing with asphalt primer. Apply primer when ambient temperature is above 40 degrees F and at rate of approximately one gallon per 100 square feet, fully covering entire surface to be dampproofed.

3.2.2 Cold-Application Method

3.2.2.1 Fibrous Asphalt

Apply two coats of fibrous asphalt to surfaces to be dampproofed. Apply each coat uniformly using not less than one gallon fibrous asphalt per 50 square feet. Apply first coat by brush or spray to provide full bond with primed surface. Brush or spray second coat over thoroughly dry first coat unless recommended otherwise by dampproofing materials manufacturer. Provide finished surface that is of uniform thickness and impervious to moisture. Recoat porous areas.

3.2.2.2 Emulsion-Based Asphalt

Emulsion-based asphalt dampproofing work shall not be performed in temperatures below 40 degrees F. Emulsions shall have a smooth and uniform consistency at time of application. Dampproofing materials shall be applied in accordance with manufacturer's published instructions to produce a smooth uniform dry film of not less than 12 mils thick without voids or defects. Dull or porous spots shall be recoated. Dampproofing materials shall seal tightly around pipes and other items projecting through dampproofing. Rates of application shall be as follows:

a. Primer: 1/2 gallon per 100 square feet, cold-applied.

b. Fibrated Dampproofing: 2 gallons per 100 square feet, cold-applied with spray, brush or trowel.

c. Non-fibrated Dampproofing: 2 gallons per 100 square feet, cold-applied with spray, brush or trowel.

-- End of Section --

SECTION 07 13 53

ELASTOMERIC SHEET WATERPROOFING
02/16, CHG 1: 08/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1305	(2008) Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D146/D146M	(2004; E 2012; R 2012) Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D297	(2015; R 2019) Rubber Products - Chemical Analysis
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D429	(2014) Rubber Property-Adhesion to Rigid Substrates
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D573	(2004; R 2019) Standard Test Method for Rubber - Deterioration in an Air Oven
ASTM D624	(2000; R 2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D746	(2014) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D751	(2006; R 2011) Coated Fabrics

ASTM D903	(1998; R 2017) Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
ASTM D1004	(2013) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D1204	(2014; R 2020) Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
ASTM D1876	(2008; R 2015; E 2015) Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
ASTM D2136	(2002; R 2012) Coated Fabrics - Low-Temperature Bend Test
ASTM D2240	(2015; E 2017) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D3045	(1992; R 2010) Practice for Heat Aging of Plastics Without Load
ASTM D5385/D5385M	(1993; R 2014; E 2014) Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
ASTM E96/E96M	(2022) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E154/E154M	(2008a; R 2013; E 2013) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S"

classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Standard Details; G

Elastomeric Waterproofing Sheet Material; G

Protection Board; G

Primers, Adhesives, and Mastics; G

Recycled Content for Waterproofing Sheet Material; S

SD-06 Test Reports

Elastomeric Waterproofing Sheet Material; G

Protective Covering; G

SD-07 Certificates

Elastomeric Waterproofing Sheet Material; G

Primers, Adhesives, and Mastics; G

Protective Coverings; G

Draft Special Warranties; G

Final Special Warranties; G

Certificates Of Compliance; G

Indoor Air Quality for Primer and Mastic; S

Indoor Air Quality for Adhesive and Sealant; S

SD-08 Manufacturer's Instructions

Primers, Adhesives, and Mastics; G

SD-11 Closeout Submittals

Certificates Of Compliance with sustainable requirements for items listed in SD-07; G

1.3 MANUFACTURER'S DETAILS

Submit manufacturer's standard details indicating methods of attachment and spacing, transition and termination details, and installation details. Include verification of existing conditions.

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for protective coverings, and manufacturer's Safety

Data Sheets (SDS) for primers, adhesives, and mastics.

1.5 CODE REQUIREMENTS

Provide membrane waterproofing system in accordance with ICC IBC Section 1805 Dampproofing and Waterproofing.

1.6 DELIVERY, STORAGE, HANDLING, IDENTIFICATION

Deliver and store materials in accordance with manufacturer's printed instructions, out of the weather, in manufacturer's original packaging with brand name and product identification clearly marked. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Do not permit unidentified materials in the work area or in the project.

1.7 ENVIRONMENTAL CONDITIONS

Do not apply waterproofing during inclement weather or when there is ice, frost, surface moisture, or visible dampness on the surface to receive waterproofing for when ambient and surface temperatures are 40 degrees F or below.

1.8 SPECIAL WARRANTIES

1.8.1 Guarantee

Guarantee waterproofing membrane installation against failure due to leaks for a period of two years from the date of Beneficial Occupancy. Submit draft and final guarantees in accordance with Sections 01 78 00 CLOSEOUT SUBMITTALS and 01 78 23 OPERATION AND MAINTENANCE DATA.

1.8.2 Warranty

Provide manufacturer's material warranty for all system components for a period of ten years from the date of Beneficial Occupancy. Submit draft and final warranties in accordance with Sections 01 78 00 CLOSEOUT SUBMITTALS and 01 78 23 OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 SUSTAINABILITY CRITERIA

Where allowed by performance criteria:

2.1.1 Reduced Volatile Organic Compound (VOC) Content

Provide products with reduced VOC content and provide certificates of compliance in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING paragraph REDUCE VOLATILE ORGANIC COMPOUNDS.

Provide primer and mastic certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or VOC content requirements of Green Seal GS-11, California Air Resources Board (CARB) Suggested Control Measure for Architectural Coatings, or SCAQMD Rule 1168. Submit product data for indoor air quality for primer and indoor air quality for mastic.

Provide adhesive and sealant certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold VOC content requirements of SCAQMD Rule 1168. Submit product data for indoor air quality for adhesive and sealant.

2.1.2 Recycled Content

Provide products with recycled content and provide certificates of compliance in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING paragraph RECYCLED CONTENT. Provide waterproofing sheet material with highest recycled content feasible. Submit product data identifying percentage of recycled content for waterproofing sheet material.

2.2 MATERIALS

Provide one of the types of elastomeric waterproofing sheet material and related primers, adhesives, and mastics as specified herein. Ensure compatibility of waterproofing materials with each other, and with materials on which they are applied. Provide materials that comply with applicable requirements cited below when tested in accordance with the referenced ASTM publications.

2.3 BUTYL RUBBER SHEETING

Not less than 60 mils minimum thickness.

2.3.1 Butyl Rubber Sheeting Performance Requirements

a. Thickness Tolerance, ASTM D412: Plus or minus 10 percent.

b. Specific Gravity, ASTM D297: 1.20, plus or minus 0.05.

c. Tensile Strength, ASTM D412: 1200 psi minimum.

d. Tensile Stress at 300 percent elongation, ASTM D412: 600 psi minimum.

e. Elongation, ASTM D412: 300 percent minimum.

f. Tear Resistance, Die C, ASTM D624: 150 pound force per inch (lbf/inch) minimum.

g. Shore A Hardness, ASTM D2240: 5-second interval before reading; 60 plus or minus 10.

h. Ozone Resistance, ASTM D1149: No cracks, 7 days - 50 pphm - 100 degrees F, 20 percent elongation.

i. Heating Aging-Accelerated, ASTM D573: Tensile retention, 60 percent of minimum original elongation retention; 60 percent of minimum original requirement; 7 days, 240 degrees F.

j. Butyl Identification, ASTM D471 REV A, Tricresyl Phosphate Immersion: Maximum volume swell 10 percent, 70 hrs, 212 degrees F.

k. Low Temperature Flexibility, ASTM D746: No failure at minus 40 degrees F.

l. Water Absorption, ASTM D471 REV A: Plus 1 percent maximum. 7 days, 158 degrees F.

m. Exposure to Fungi and Bacteria in Soil, ASTM E154/E154M REV A, Minimum 16 Weeks: Unaffected.

n. Water Vapor Transmission, 80 degrees F Permeance, ASTM E96/E96M, Procedure B or BW: 0.15 perms maximum.

2.3.2 Adhesive, Cement, and Tape for Use with Butyl Rubber

As recommended by the butyl rubber waterproofing membrane manufacturer.

2.4 THERMOPLASTIC MEMBRANE: POLYVINYL CHLORIDE (PVC)

Polyvinyl chloride (PVC) flexible sheets with non-woven fiberglass reinforcing not less than 60 mils minimum thickness.

2.4.1 Thermoplastic Membrane Performance Requirements

a. Overall thickness, ASTM D751: .059 inches minimum

b. Tensile strength, ASTM D638: 1600 psi minimum

c. Elongation at break, ASTM D638: 250 percent minimum

d. Seam strength, ASTM D638: 90 percent minimum of tensile strength

e. Retention of properties after heat aging, ASTM D3045

f. Tensile strength, ASTM D638: 95 percent of original

g. Elongation, ASTM D638: 95 percent of original

h. Tear resistance, ASTM D1004: 17 lbf

i. Low Temperature Bend, ASTM D2136: minus 40 degrees F

j. Liner Dimensional Change, ASTM D1204: 0.002 percent

k. Weight Change After Immersion in Water, ASTM D570: 2.0 percent maximum

2.4.2 Adhesives

a. Adhesive for thermoplastic flashings as recommended by manufacturer.

b. Adhesive for Sub-Membrane Grid: 100 percent solids, two part urethane, with minimum tensile strength of 150 psi, in accordance with ASTM D412 and adhesion to concrete of 12 ply in accordance with ASTM D429 as recommended by manufacturer.

2.4.3 Accessories

Securement Strip: 14 gauge stainless steel metal bar 1 inch wide, pre-punched 1 inch on center for securement.

2.5 COMPOSITE, SELF-ADHERING MEMBRANE SHEETING

Cold applied composite sheet consisting of rubberized asphalt and cross laminated, high density polyethylene film. Not less than 60 mils minimum thickness is required.

2.5.1 Composite, Self-Adhering Sheeting Performance Requirements

a. Tensile Strength ASTM D412, Die C: 250 psi minimum.

b. Ultimate Elongation, ASTM D412, Die C: 200 percent minimum.

c. Water Vapor Transmission, ASTM E96/E96M 80 degrees F Permeance, Procedure B: 0.1 perm maximum.

d. Pliability degrees, ASTM D146/D146M: (180 degrees Bend Over 1 Inch Mandrel): No cracks at minus 25 degrees F.

e. Provide test report data for crack bridging ability: Either in accordance with ASTM C1305 as modified for a dry film thickness specified by the manufacturer and conducted at low temperature; or in accordance with a cycling over crack test also conducted for the specified dry film thickness at low temperature. Using either test, verify crack bridging up to 1/4 inch without damage to the membrane system.

f. Puncture Resistance, ASTM E154/E154M REV A: 40 lb minimum.

g. Lap Adhesion at Minimum Application Temperature, ASTM D1876 Modified, 5 lbs/in.

h. Peel Strength, ASTM D903: Modified 9 lbs/in.

i. Resistance to Hydrostatic Head, ASTM D5385/D5385M: 231 ft of water.

j. Water Absorption, ASTM D570; 0.1 percent maximum.

2.5.2 Primers

Asphalt composition, ASTM D41/D41M, or synthetic polymer in solvent as recommended by the membrane manufacturer.

2.5.3 Mastics

Polymer modified asphalt in suitable solvent of trowel grade consistency and as recommended by the membrane manufacturer.

2.6 Protection Board

Three dimensional, high impact resistant polymeric grid with woven monofilament drainage fabric bonded to the grid.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

Before starting the work, verify surfaces that must be waterproofed are in satisfactory condition. Notify the Contracting Officer of defects or conditions anticipated to prevent a satisfactory application. Do not start application until defects and conditions have been corrected.

3.2 SURFACE PREPARATION

Ensure surfaces to receive treatment are clean, dry, smooth, and free from

deleterious materials and projections. Thoroughly wet holes, joints, cracks, and voids in concrete with water and fill with Portland cement mortar, strike flush, and permit to dry. Cut off high spots or grind smooth. Finish top surfaces of projecting masonry or concrete ledges below grade, except footings, to a steep bevel with Portland cement mortar. Sweep surfaces to receive covering before applying waterproofing to remove dust and foreign matter. Cure concrete by a method compatible with the waterproofing system.

3.3 APPLICATION

3.3.1 Building Envelope Requirements

Provide a continuous waterproofing system at all material and building transitions. Lap, wrap, fasten and seal products in accordance with manufacturer's printed instructions. Envelope assembly variations are not permitted without written approval from the Contracting Officer's Representative.

3.3.2 General Installation Requirements

Provide sheet waterproofing in accordance with manufacturer's printed installation instructions. Ensure the surface to receive membrane is clean, smooth and dry without surface irregularities; correct deficiencies prior to installation. When using solvent welding liquid, avoid prolonged contact with skin and breathing of vapor and provide adequate ventilation. Carry waterproofing of horizontal surfaces up abutting vertical surfaces and adhere solid to the substrate. Avoid wrinkles and buckles in applying membrane and joint reinforcement.

3.3.2.1 Non-Self-Adhering Membrane

Unroll membrane and allow to remain flat for at least one-half hour before application. Apply an asphalt concrete primer prior to application of asphaltic adhesive. Where solvent adhesive is applied, allow major portion of solvent to evaporate so that bonding adhesive does not stick to a dry finger touching it. Apply elastomeric waterproofing membrane in a full bed of adhesive at a uniform coverage rate in accordance with the membrane manufacturer's printed instructions. Pull membrane tight without stretching. As soon as adhesive is fully set and dry, recheck lap splices. Where openings or fishmouths appear, reseal and reroll lap splices.

3.3.2.2 Self-Adhering Membrane

Apply composite, self-adhering membrane on surfaces primed at a uniform coverage rate in accordance with membrane manufacturer's printed instructions. Remove release sheet and apply with tacky surface in contact with dried primer.

3.3.2.3 Protection

Protect membrane over horizontal surfaces from traffic during installation. Use only equipment with rubber tires. Provide walkway protection where heavy traffic from other trades is expected. Do not store material on membrane.

3.3.3 Butyl Rubber

Lap sheets at sides and ends a minimum of 6 inches over the preceding sheet. Apply lap splicing cement over entire 6 inches splice area prior to application of sealant. Make sealant continuous along the entire length of the splice. Maintain a continuous bead of sealant at all membrane splices or as required by the manufacturer. Provide a tongue and groove cemented splice a minimum of 6 inches wide with factory made heat vulcanized seam of not less than 2 inches or as required by the manufacturer, when membrane is below water table.

3.3.4 Thermoplastic Membrane (PVC)

Consult with membrane manufacturer prior to grid application. Install 12 inches wide sub-membrane containment grid as required by manufacturer. Provide the containment grid at intervals across the width and length of the substrate, at the base of all transitions, walls, curbs, penetrations, and at the perimeter of each deck/substrate section. Fully adhere strips to the deck in a full bedding of two-part urethane adhesive. Weld adjacent sheets in accordance with manufacturer's instructions. Hot-air weld all side and end lap joints. Provide lap area a minimum of 3 inch wide when machine welding, and a minimum of 4 inch wide when hand welding but not less than recommended by the manufacturer. Orient overlaps with the direction of flow of water.

3.4 COMPOSITE, SELF-ADHERING MEMBRANE

Lap sheets at edges and ends a minimum of 2-1/2 inches over the preceding sheet. Provide all side laps a minimum 2-1/2 inches and end laps 5 inches. Provide self-adhesive, mastic laps in accordance with manufacturer's recommendation. Roll or firmly press to adhere membrane to substrate. Cover corners and joints with two layers of reinforcement by first applying a 12 inch width of membrane centered along the axis. Flash drains and projections with a second ply of membrane for a distance of 6 inches from the drain or projection. Finish exposed, terminated edges of membrane on horizontal or vertical surfaces with a toweled bead of mastic. Apply mastic around edges of membrane, and drains and projections. Apply mastic at end of each work day.

3.5 FLASHING

Flash penetrations through membrane. Seal all penetrations where reinforcing bars penetrate a waterproofing membrane with the appropriate sealant or mastic flashing component. Embed elastomeric membrane in a heavy coat of adhesive, except for self-adhering membrane. Position continuous metal reglets horizontally on footing and vertically on intersecting and connecting walls, and as specified in Section 07 60 00 FLASHING AND SHEET METAL. Metal reglets are to receive exposed edges of membrane waterproofing. Secure membrane into reglets by lead wedges and fill with cement as recommended in writing by manufacturer of waterproofing materials. Counterflash upper edge of membrane waterproofing and protective covering as specified in Section 07 60 00 FLASHING AND SHEET METAL.

3.6 PROTECTIVE COVERING

After installation has been inspected and approved by the Contracting Officer, apply a protective covering to the membrane waterproofing prior to backfilling. Protect vertical membrane waterproofing with a 1/2 inch

minimum thickness of asphalt plank; 1/2 inch minimum thickness of fiberboard; or 1/8 inch minimum thickness of compatible water resistant bitumen type protection board with edges abutting adjacent edges and exposed surfaces covered by a taping system recommended by manufacturer of protection board. Cover horizontal membrane waterproofing with similar protection board and Portland cement mortar not less than 3/4 inch thick; place uniformly and allow to set before installing subsequent construction.

-- End of Section --

SECTION 07 14 00

FLUID-APPLIED WATERPROOFING
02/12, CHG 2: 02/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C578	(2019) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C836/C836M	(2018; R 2022) Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use With Separate Wearing Course
ASTM D1056	(2020) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fluid-Applied Membrane

Membrane Primer

Elastomeric Sheet

Flexible Foam-Backed Elastomeric Sheet

Solvent

Moisture Meter

Protection Board

Bond Breaker

Submit material description and physical properties, application details, and recommendations regarding shelf life, application procedures, and precautions on flammability and toxicity.

SD-11 Closeout Submittals

Warranty

Information Card

Instructions To Government Personnel

Include copies of Safety Data Sheets for maintenance/repair materials.

1.3 PREWATERPROOFING CONFERENCE

Prior to starting application of waterproofing system, arrange and attend a prewaterproofing conference to ensure a clear understanding of drawings and specifications. Give the Contracting Officer 7 days advance written notice of the time and place of meeting. Ensure that the mechanical and electrical subcontractor, flashing and sheetmetal subcontractor, and other trades that may perform other types of work on or over the membrane after installation, attend this conference.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver waterproofing materials in manufacturer's original, unopened containers, with labels intact and legible. Containers of materials covered by a referenced specification number shall bear the specification number, type, and class of the contents. Deliver materials in sufficient quantity to continue work without interruption. Store and protect materials in accordance with manufacturer's instructions, and use within their indicated shelf life. When hazardous materials are involved, adhere to special precautions of the manufacturer, unless precautions conflict with local, state, and federal regulations. Promptly remove from the site materials or incomplete work adversely affected by exposure to moisture or freezing. Store materials on pallets and cover from top to bottom with canvas tarpaulins.

1.5 ENVIRONMENTAL CONDITIONS

Apply materials when ambient temperature is 40 degrees F or above for a period of 24 hours prior to the application and when there is no ice, frost, surface moisture, or visible dampness on the substrate surface. Apply materials when air temperature is expected to remain above 40 degrees F during the cure period recommended by the manufacturer. Moisture test for substrate is specified under paragraph entitled "Moisture Test." Work may be performed within heated enclosures, provided the surface temperature of the substrate is maintained at a minimum of 40 degrees F for 24 hours prior to the application of the waterproofing, and remains above that temperature during the cure period recommended by the manufacturer.

1.6 WARRANTY

Provide roof system material and workmanship warranties meeting specified requirements. Provide revisions or amendment to standard membrane manufacturer warranty to comply with the specified requirements. Minimum manufacturer warranty shall have no dollar limit, cover full system water-tightness, and shall have a minimum duration of 20 years.

1.6.1 Roof Membrane Manufacturer Warranty

Furnish the roof membrane manufacturer's 20-year no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation, and accessories necessary for a watertight roof system construction. Write the warranty directly to the Government commencing at time of Government's acceptance of the roof work. Provide the the following statements for such warranty:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, blisters, splits, tears, cracks, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the roof membrane manufacturer. All cost associated with the repair or replacement work are the responsibility of the roof membrane manufacturer.

b. The warranty must remain in full force and effect, including emergency temporary repairs performed by others, when the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification.

1.6.2 Roofing System Installer Warranty

The roof system installer must warrant for a minimum period of two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The roof system installer is responsible for correction of defective workmanship and replacement of damaged or affected materials. The roof system installer is responsible for all costs associated with the repair or replacement work.

1.6.3 Continuance of Warranty

Approve repair or replacement work that becomes necessary within the warranty period and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

PART 2 PRODUCTS

2.1 FLUID-APPLIED MEMBRANE

ASTM C836/C836M.

2.2 MEMBRANE PRIMER

As recommended by the fluid-applied membrane manufacturer unless specifically prohibited by the manufacturer of the fluid-applied membrane.

2.3 SEALANT

As specified in Section 07 92 00 JOINT SEALANTS.

2.4 SEALANT PRIMER

As specified in Section 07 92 00 JOINT SEALANTS.

2.5 BACKING MATERIAL

Premolded, closed-cell, polyethylene, or polyurethane foam rod having a diameter 25 percent larger than joint width before being compressed into joint. Provide bond breaker of polyethylene film or other suitable material between backing material and sealant.

2.6 JOINT FILLER

As specified in Section 03 30 00 CAST-IN-PLACE CONCRETE, ASTM D1751.

2.7 BOND BREAKER

As recommended by the fluid-applied membrane manufacturer. Bond breaker shall not interfere with the curing process or other performance properties of the fluid-applied membrane.

2.8 ELASTOMERIC SHEET

Preformed; as recommended by the fluid-applied membrane manufacturer. Bond strength between the fluid-applied membrane and the preformed elastomeric sheet shall be a minimum of one psi when tested in accordance with ASTM C836/C836M.

2.9 ELASTOMERIC SHEET ADHESIVE

As recommended by the elastomeric sheet manufacturer.

2.10 FLEXIBLE FOAM-BACKED ELASTOMERIC SHEET

Flexible foam-backed elastomeric sheet for protection over preformed elastomeric sheet at expansion joints shall be 1/2 inch thick, minimum, closed cell foam conforming to ASTM D1056, Type 2, Class B, Grades 2 or 3, factory-bonded to 1/16 inch thick, minimum, preformed elastomeric sheet.

2.11 PROTECTION BOARD

Premolded bitumen composition board, 1/8 inch minimum thickness or other composition board compatible with the fluid-applied membrane.

2.12 DRAINAGE COURSE AGGREGATE

ASTM C33/C33M, size No. 8.

2.13 INSULATION

Polystyrene foam conforming to ASTM C578, Class IV, thickness as indicated.

PART 3 EXECUTION

3.1 PREPARATION

Coordinate work with that of other trades to ensure that components to be incorporated into the waterproofing system are available when needed. Inspect and approve surfaces immediately before application of waterproofing materials. Remove laitance, loose aggregate, sharp projections, grease, oil, dirt, curing compounds, and other contaminants which could adversely affect the complete bonding of the fluid-applied membrane to the concrete surface.

3.1.1 Flashings

Make penetrations through sleeves in concrete slab watertight before application of waterproofing. After flashing is completed, cover elastomeric sheet with fluid-applied waterproofing during waterproofing application.

3.1.1.1 Drains

Make drain flanges flush with surface of structural slab. Apply a full elastomeric sheet around the drain, with edges fully adhered to drain flange and to structural slab. Do not adhere elastomeric sheet over joint between drain and concrete slab. Do not plug drainage or weep holes. Cover elastomeric sheet with fluid-applied waterproofing during waterproofing application. Lap elastomeric sheet a minimum of 4 inches onto concrete slab.

3.1.1.2 Penetrations and Projections

Flash penetrations and projections through structural slab with an elastomeric sheet adhered to the concrete slab and the penetration. Leave elastomeric sheet unadhered for one inch over joint between penetration and concrete slab. Adhere elastomeric sheet a minimum of 4 inches onto horizontal deck.

3.1.1.3 Walls and Vertical Surfaces

Flash wall intersections which are not of monolithic pour or constructed with reinforced concrete joints with an elastomeric sheet adhered to both vertical wall surfaces and concrete slab. Flash intersections which are monolithically poured or constructed with reinforced concrete joints with either an elastomeric sheet or a vertical grade of fluid-applied waterproofing adhered to vertical wall surfaces and concrete slab. Leave sheet unadhered for a distance of one inch from the corner on both vertical and horizontal surfaces.

3.1.2 Cracks and Joints

Prepare visible cracks and joints in substrate to receive fluid-applied waterproofing membrane by placing a bond breaker and an elastomeric slip sheet between membrane and substrate. Cracks that show movement shall receive a 2 inch bond breaker followed by an elastomeric sheet adhered to the deck. Nonmoving cracks shall be double coated with fluid-applied

waterproofing.

3.1.3 Priming

Prime surfaces to receive fluid-applied waterproofing membrane. Apply primer as required by membrane manufacturer's printed instructions.

3.2 SPECIAL PRECAUTIONS

Protect waterproofing materials during transport and application. Do not dilute primers and other materials, unless specifically recommended by materials manufacturer. Keep containers closed except when removing contents. Do not mix remains of unlike materials. Thoroughly remove residual materials before using application equipment for mixing and transporting materials. Do not permit equipment on the project site that has residue of materials used on previous projects. Use cleaners only for cleaning, not for thinning primers or membrane materials. Ensure that workers and others who walk on cured membrane wear clean, soft-soled shoes to avoid damaging the waterproofing materials.

3.3 APPLICATION

Over primed surfaces, provide a uniform, wet, monolithic coating of fluid-applied membrane, 60 mils thick, plus or minus 5 mils by following manufacturer's printed instructions. Apply material by trowel, squeegee, roller, brush, spray apparatus, or other method recommended by membrane manufacturer. Check wet film thickness as specified in paragraph entitled "Film Thickness" and adjust application rate as necessary to provide a uniform coating of the thickness specified. Where possible, mark off surface to be coated in equal units to facilitate proper coverage. At expansion joints, control joints, prepared cracks, flashing, and terminations, carry membrane over preformed elastomeric sheet in a uniform 60 mil thick, plus or minus 5 mils, wet thickness to provide a monolithic coating. If membrane cures before next application, wipe previously applied membrane with a solvent to remove dirt and dust that could inhibit adhesion of overlapping membrane coat. Use solvent recommended by the membrane manufacturer, as approved.

3.3.1 Work Sequence

Perform work so that protection board is installed prior to using the waterproofed surface. Do not permanently install protection board until the membrane has passed the flood test specified under paragraph entitled "Flood Test." Move material storage areas as work progresses to prevent abuse of membrane and overloading of structural deck.

3.3.2 Protection Board

Protect fluid-applied membrane by placing protection board over membrane at a time recommended by the membrane manufacturer. Protect membrane application when protection board is not placed immediately. Butt protection boards together and do not overlap.

3.3.3 Drainage Course

Place drainage course where shown after flood tests are completed and concrete protection slab or wearing course is ready to be installed.

3.3.4 Insulation

Place insulation of thickness indicated, on top of drainage course just prior to placement of concrete protection slab.

3.4 FIELD QUALITY CONTROL

3.4.1 Moisture Test

Prior to application of fluid-applied waterproofing, measure moisture content of substrate with a moisture meter in the presence of the Contracting Officer. Do not begin application until meter reading indicates "dry" range.

3.4.2 Film Thickness

Measure wet film thickness every 100 square feet during application by placing flat metal plates on the substrate or using a mil-thickness gage especially manufactured for the purpose.

3.4.3 Flood Test

After application and curing is complete, plug drains and fill waterproofed area with water to a depth of 2 inches. A minimum 48 hour cure time, or longer cure time if recommended by the membrane manufacturer, shall be required prior to flood testing. Allow water to stand 24 hours. Test watertightness by measuring water level at beginning and end of the 24 hour period. If water level falls, drain water, allow installation to dry, and inspect. Make repairs or replace as required and repeat the test. Work shall not proceed before approval of repairs or replacement.

3.5 INSTRUCTIONS TO GOVERNMENT PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the roof membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair, and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations.

3.6 INFORMATION CARD

For each roof application, furnish a minimum 8-1/2 inch by 11 inch information card for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 0.032 inch thick aluminum card for exterior display. Identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing contractor identification and contract information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

FORM 1
FLUID-APPLIED WATERPROOFING SYSTEM COMPONENTS
1. Contract Number
2. Date Work Completed
3. Project Specification Designation
4. Substrate Material
5. Slope of Substrate
6. Drains Type/Manufacturer
7. Waterproofing
a. Membrane
b. Sealant
c. Elastomeric Sheet
d. Materials Manufacturer(s)
8. Protection Board
a. Type
b. Thickness
c. Manufacturer's Name
9. Drainage Course Material Graduation
10. Insulation
a. Type
b. Thickness
c. Manufacturer's Name
11. Protection Slab
a. Material
b. Thickness
c. Support

FORM 1	
FLUID-APPLIED WATERPROOFING SYSTEM COMPONENTS	
d. Joint System	
12. Wearing Course	
a. Type	
b. Slope	
c. Joint System	
d. Sealant/Gasket Type	
13. Wearing Surface Type	
Manufacturer's Name	
14. Warranty	
a. Manufacturer warranty expiration	
b. Warranty reference number	
15. Statement of Compliance or Exception	
Contractor's Signature	Date Signed
Inspector's Signature	Date Signed

-- End of Section --

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SECTION 07 21 13

BOARD AND BLOCK INSULATION
02/16, CHG 2: 08/20

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C165	(2007; R 2017) Standard Test Method for Measuring Compressive Properties of Thermal Insulations
ASTM C203	(2005; R 2012) Breaking Load and Flexural Properties of Block-Type Thermal Insulation
ASTM C272/C272M	(2016) Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions
ASTM C578	(2019) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C612	(2014; R 2019) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
ASTM C930	(2019) Standard Classification of Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM C1289	(2022) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D3833/D3833M	(1996; R 2011) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2022) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 31	(2020) Standard for the Installation of Oil-Burning Equipment
NFPA 54	(2021) National Fuel Gas Code
NFPA 70	(2023) National Electrical Code
NFPA 211	(2019) Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Board Insulation; G

Vapor Retarder; G

Pressure Sensitive Tape; G

Protection Board or Coatings; G

Accessories including sealants; G

Recycled Content for Board Insulation; S

SD-07 Certificates

Board Insulation; G

SD-08 Manufacturer's Instructions

Board Insulation

Adhesive

1.3 MANUFACTURER'S DETAILS

Submit manufacturer's standard details indicating methods of attachment and spacing, transition and termination details, and installation details. Include verification of existing conditions.

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for protection board or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to the site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

1.5.2 Storage

Inspect materials delivered to the site for damage and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Comply with manufacturer's recommendations for handling, storage, and protection of materials before and during installation.

1.6 SAFETY PRECAUTIONS

1.6.1 Other Safety Considerations

Comply with the safety requirements of ASTM C930.

PART 2 PRODUCTS

2.1 BOARD INSULATION

Provide thermal insulating materials as recommended by manufacturer for each type of application indicated. Provide insulation with the following physical properties and in accordance with the following standards:

a. Extruded Preformed Cellular Polystyrene: ASTM C578 REV A

b. Mineral Fiber Block and Board: ASTM C612

c. Faced Rigid Cellular Polyisocyanurate and Polyurethane Insulation: ASTM C1289 REV A

   (1) Type I Aluminum Foil on both major surfaces. Class 1 - Non-reinforced core foam.

2.1.1 Thermal Resistance

Unless otherwise indicated, Wall R-13.3.

2.1.2 Fire Protection Requirements

a. Flame spread index of 25 or less when tested in accordance with ASTM E84.

b. Smoke developed index of 150 or less when tested in accordance with ASTM E84.

c. Provide insulated assemblies in accordance ICC IBC Chapter Fire and Smoke Protection Features.

2.1.3 Other Material Properties

Provide thermal insulating materials with the following properties:

a. Mineral fiber board: Compressive strength: Minimum load required to produce a reduction in thickness of 10 percent pounds per square foot (lbf/sf): 25 when tested according to ASTM C165.

b. Block-type insulation: Block-type insulation: Flexural strength: Not less than 25 psi when measured according to ASTM C203 REV A.

c. Water Vapor Permeance: Not more than 1.1 Perms or less when measured according to ASTM E96/E96M, desiccant method, in the thickness required to provide the specified thermal resistance, including facings, if any.

d. Water Absorption: Not more than 2 percent by total immersion, by volume, when measured according to ASTM C272/C272M.

2.1.4 Recycled Materials

Provide thermal insulation containing recycled materials to the extent practicable, provided that the material meets all other requirements of this section. The minimum required recycled material contents (by weight, not volume) are:

Polyisocyanurate/Polyurethane:	9 percent
Phenolic Rigid Foam:	5 percent
Perlite Board:	75 percent post consumer paper

Provide data identifying percentage of recycled content for board insulation.

2.1.5 Indoor Air Quality

Provide certification of indoor air quality for board insulation if installed within the waterproofing envelope.

2.1.6 Prohibited Materials

Do not provide materials containing asbestos.

2.2 PRESSURE SENSITIVE TAPE

As recommended by manufacturer of vapor retarder(s). Match water vapor permeance rating for each vapor retarder specified. Provide tape in accordance with ASTM D3833/D3833M.

2.3 PROTECTION BOARD OR COATING

As recommended by insulation manufacturer.

2.4 ACCESSORIES

2.4.1 Adhesive

As recommended by insulation manufacturer.

2.4.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

Prior to installation, ensure all areas that are in contact with the insulation are dry and free of projections that could cause voids, compressed insulation, or punctured vapor retarders. For foundation perimeter or under slab applications, check that subsurface fill is flat, smooth, dry, and well tamped. Do not proceed with installation if moisture or other conditions are present, and notify the Contracting Officer of such conditions. Do not proceed with the work until conditions have been corrected and verified to be dry.

3.2 PREPARATION

3.2.1 Blocking Around Heat Producing Devices

Provide noncombustible blocking at all spaces between heat producing devices and the floors, ceilings and roofs through which they pass. Provide in accordance with ICC IBC Section 2111.12 Fireplace Blocking and with the following clearances:

a. Recessed lighting fixtures, including wiring compartments, ballasts, and other heat producing devices, unless certified for installation surrounded by insulation: 3 inches from outside face of fixtures and devices or as required by NFPA 70 and, if insulation is placed above fixture or device, 24 inches above fixture.

b. Masonry chimneys or masonry enclosing a flue: 2 inches from outside face of masonry. Masonry chimneys for medium and high heat operating appliances: Minimum clearances required by NFPA 211.

c. Vents and vent connectors used for venting products of combustion, flues, and chimneys other than masonry chimneys: Minimum clearances as required by NFPA 211.

d. Gas Fired Appliances: Clearances as required in NFPA 54.

e. Oil Fired Appliances: Clearances as required in NFPA 31.

Blocking is not required if chimneys or flues are certified in writing by the chimney or flue manufacturer for use in contact with specific insulating materials.

3.3 INSTALLATION

3.3.1 Installation and Handling

Provide insulation in accordance with the manufacturer's printed installation instructions. Keep material dry and free of extraneous materials.

3.3.2 Electrical Wiring

Do not install insulation in a manner that would enclose electrical wiring between two layers of insulation.

3.3.3 Cold Climate Requirement

Place insulation on the outside of pipes.

3.3.4 Continuity of Insulation

Butt tightly against adjoining boards, studs, rafters, joists, sill plates, headers and obstructions. Provide continuity and integrity of insulation at corners, wall to ceiling joint, roof, and floor. Avoid creating thermal bridges and voids. Provide and verify continuity of insulative barrier throughout the building enclosure.

3.3.5 Coordination

Verify final installed insulation thicknesses comply with thicknesses indicated, R-values specified herein, and with the approved insulation submittal(s).

3.4 INSTALLATION ON WALLS

3.4.1 Installation using Furring Strips

Install insulation between members as recommended by insulation manufacturer.

3.4.2 Installation on Masonry Walls

Apply board directly to masonry with adhesive or fasteners as recommended by the insulation manufacturer. Fit between obstructions without impaling board on ties or anchors. Apply in parallel courses with joints breaking midway over course below. Place boards in moderate contact with adjoining insulation without forcing and without gaps. Cut and shape as required to fit around wall penetrations, projections or openings to accommodate conduit or other utilities. Seal around cutouts with sealant. Install insulation in wall cavities so that it leaves at least a nominal 1 inch air space outside of the insulation to allow for cavity drainage.

3.4.3 Adhesive Attachment to Concrete and Masonry Walls

Apply adhesive to wall and completely cover wall with insulation.

a. Full back bed method

b. As recommended by the insulation manufacturer.

c. Use only full back method for pieces of 1 square foot or less.

d. Butt all edges of insulation and seal edges with tape.

3.4.4 Mechanical Attachment on Concrete and Masonry Walls

Cut insulation to cover walls. Apply adhesive to wall and set clip or other mechanical fastener in adhesive as recommended by manufacturer. After curing of adhesive, install insulation over fasteners and bend split prongs to provide a flush condition with the insulation. Butt all edges of insulation and seal with tape.

3.5 PERIMETER AND UNDER SLAB INSULATION

Install perimeter thermal insulation where heated spaces are adjacent to exterior walls, slab edges in slab-on-grade, or floating slab construction.

3.5.1 Manufacturer's Instructions

Layout insulation, tape edges, provide vapor retarder and other required accessories to protection against vermin, insects, and damage in accordance with manufacturer's printed instructions.

3.5.2 Insulation Under Slab

Provide insulation horizontally under slab on grade for a distance of 4 feet from the edge of slab. Install insulation on top of vapor retarder and turn retarder up over the outside edge of insulation to top of slab.

3.5.3 Protection of Insulation

Protect insulation from damage during construction and back filling by application of protection board or a coating. Do not leave installed vertical insulation unprotected overnight. Protect installed insulation from weather, including rain and ultraviolet light, from mechanical abuse, compression, and dislocation.

3.6 VAPOR RETARDER

Apply vapor retarder continuous across all surfaces. Overlap all joints at least 6 inches and seal with pressure sensitive tape. Seal at sills, header, windows, doors and utility penetrations. Repair punctures or tears with pressure sensitive tape.

3.7 ACCESS PANELS AND DOORS

Attach insulation to all access panels greater than 1 square foot and all access doors in insulated floors and ceilings. Use insulation with same R-Value as that for the floor or ceiling in which each panel occurs.

-- End of Section --

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SECTION 07 21 16

MINERAL FIBER BLANKET INSULATION
11/11, CHG 4: 08/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C665	(2017) Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C930	(2019) Standard Classification of Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM D3833/D3833M	(1996; R 2011) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM D5359	(2015) Standard Specification for Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E136	(2019a) Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023) National Electrical Code

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.134 Respiratory Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Blanket Insulation

Recycled Content for Insulation Materials; S

Pressure Sensitive Tape

Accessories

SD-07 Certificates

Indoor Air Quality for Insulation Materials; S

Indoor Air Quality for Adhesives; S

SD-08 Manufacturer's Instructions

Insulation

1.3 CERTIFICATIONS

Submit required indoor air quality certifications and validations in one submittal package.

1.3.1 Insulation Products

Provide insulation installed within the interior of the building (inside of the weatherproofing system) certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, or SCS Global Services Indoor Advantage Gold. Submit product data for indoor air quality for insulation materials.

1.3.2 Adhesives and Sealants

Provide adhesives and sealants applied within the interior of the building (inside of the weatherproofing system) certified to meet California Department of Public Health (CDPH) Standard Method, UL 2818 GREENGUARD Gold, SCS Global Services Indoor Advantage Gold or VOC content requirements of SCAQMD Rule 1168. Submit product data for indoor air quality for adhesives and sealants.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials to site in original sealed wrapping bearing

manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

1.4.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.

1.5 SAFETY PRECAUTIONS

1.5.1 Respirators

Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.

1.5.2 Other Safety Concerns

Consider other safety concerns and measures as outlined in ASTM C930.

PART 2 PRODUCTS

2.1 BLANKET INSULATION

ASTM C665, Type I, blankets without membrane coverings and II, blankets with non-reflecting coverings; Class A, membrane-faced surface with a flame spread of 25 or less and a smoke developed rating of 150 or less when tested in accordance with ASTM E84.

2.1.1 Thermal Resistance Value (R-VALUE)

The R-Value must be as indicated on drawings.

2.1.2 Recycled Materials

Provide insulation materials containing the following minimum percentage of recycled material content by weight:

Fiberglass: 20 percent glass cullet complying with ASTM D5359

Provide data identifying percentage of recycled content for insulation materials.

2.1.3 Prohibited Materials

Do not provide asbestos-containing materials.

2.1.4 Reduced Volatile Organic Compounds (VOC) for Insulation Materials

Provide certification of indoor air quality for insulation materials.

2.2 BLOCKING

Wood, metal, unfaced mineral fiber blankets in accordance with ASTM C665, Type I, or other approved materials. Use only non-combustible materials meeting the requirements of ASTM E136 for blocking around chimneys and heat producing devices.

2.3 PRESSURE SENSITIVE TAPE

As recommended by the vapor retarder manufacturer and having a water vapor permeance rating of one perm or less when tested in accordance with ASTM D3833/D3833M.

2.4 ACCESSORIES

2.4.1 Adhesive

As recommended by the insulation manufacturer. Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesives used on the interior of the building that meet either emissions requirements of CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type) or VOC content requirements of GS-36. Provide certification or validation of indoor air quality for adhesives.

2.4.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

2.4.3 Wire Mesh

Corrosion resistant and as recommended by the insulation manufacturer.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

Before installing insulation, ensure that areas that will be in contact with the insulation are dry and free of projections which could cause voids, compressed insulation, or punctured vapor retarders. If moisture or other conditions are found that do not allow the workmanlike installation of the insulation, do not proceed but notify Contracting Officer of such conditions.

3.2 PREPARATION

3.2.1 Blocking Around Heat Producing Devices

Install non-combustible blocking around heat producing devices to provide the following clearances:

a. Recessed lighting fixtures, including wiring compartments, ballasts, and other heat producing devices, unless these are certified by the manufacturer for installation surrounded by insulation: 3 inches from outside face of fixtures and devices or as required by NFPA 70 and, if

insulation is to be placed above fixture or device, 24 inches above fixture.

3.3 INSTALLATION

3.3.1 Insulation

Install and handle insulation in accordance with manufacturer's instructions. Keep material dry and free of extraneous materials. Any materials that show visual evidence of biological growth due to presence of moisture must not be installed on the building project. Ensure personal protective clothing and respiratory equipment is used as required. Observe safe work practices.

3.3.1.1 Electrical wiring

Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.

3.3.1.2 Continuity of Insulation

Install blanket insulation to butt tightly against adjoining blankets and to studs, rafters, joists, sill plates, headers and any obstructions. Where insulation required is thicker than depth of joist, provide full width blankets to cover across top of joists. Provide continuity and integrity of insulation at corners, wall to ceiling joints, roof, and floor. Avoid creating thermal bridges.

3.3.1.3 Installation at Bridging and Cross Bracing

Insulate at bridging and cross bracing by splitting blanket vertically at center and packing one half into each opening. Butt insulation at bridging and cross bracing; fill in bridged area with loose or scrap insulation.

3.3.1.4 Cold Climate Requirement

Place insulation to the outside of pipes.

3.3.1.5 Insulation without Affixed Vapor Retarder

Provide snug friction fit to hold insulation in place. Stuff pieces of insulation into cracks between trusses, joists, studs and other framing, such as at attic access doors, door and window heads, jambs, and sills, band joists, and headers.

3.3.1.6 Sizing of Blankets

Provide only full width blankets when insulating between trusses, joists, or studs. Size width of blankets for a snug fit where trusses, joists or studs are irregularly spaced.

3.3.1.7 Special Requirements for Ceilings

Place insulation under electrical wiring occurring across joists. Pack insulation into narrowly spaced framing. Do not block flow of air through soffit vents.

-- End of Section --

SECTION 07 22 00

ROOF AND DECK INSULATION
02/16, CHG 3: 11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1177/C1177M	(2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1289	(2022) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM 4450	(1989) Approval Standard for Class 1 Insulated Steel Deck Roofs
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Insulation Board Layout and Attachment; G

Verification of Existing Conditions; G

SD-03 Product Data

Insulation; G

Cover Board; G

Fasteners; G

Moisture Control; G

Recycled Content For Insulation; S

SD-06 Test Reports

Flame Spread Rating; G

SD-07 Certificates

Installer Qualifications; G

Certificates Of Compliance For Felt Materials; G

Indoor Air Quality For Insulation; S

SD-08 Manufacturer's Instructions

Nails and Fasteners; G

Roof Insulation; G

1.3 SHOP DRAWINGS

Submit insulation board layout and attachment indicating methods of attachment and spacing, transitions, tapered components, thicknesses of materials, and closure and termination conditions. Show locations of ridges, valleys, crickets, interface with, and slope to, roof drains. Base shop drawings on verified field measurements and include verification of existing conditions.

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for cover board or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

1.5 MANUFACTURER'S INSTRUCTIONS

Include field of roof and perimeter attachment requirements.

Provide a complete description of installation sequencing for each phase of the roofing system. Include weatherproofing procedures.

1.6 QUALITY CONTROL

Provide certification of installer qualifications from the insulation manufacturer confirming the specific installer has the required qualifications for installing the specific roof insulation system(s) indicated.

Provide certificates of compliance for felt materials.

1.7 FM APPROVAL REQUIREMENTS

Provide fastening patterns in accordance with FM 1-120 for insulation on steel decks.

1.8 FIRE PERFORMANCE REQUIREMENTS

1.8.1 Insulation in Roof Systems

Comply with the requirements of ICC IBC or FM 4450. Roof insulation to have a flame spread rating of 75 or less when tested in accordance with ASTM E84. Additional documentation of compliance with flame spread rating is not required when insulation of the type used for this project as part of the specific roof assembly is listed and labeled as FM Class 1 approved. Only roof assemblies that pass FM 4450 may be used.

1.8.2 Thermal Barrier Requirements

Separate polyurethane or polystyrene insulation from a steel deck with a thermal barrier of glass mat gypsum roof board or other approved barrier material in accordance with the requirements of the ICC IBC or FM 4450. Only roof assemblies that pass FM 4450 may be used.

1.8.3 Fire Resistance Ratings for Roofs

Provide in accordance with ICC IBC Chapter 7 and Table 721.1(3) Min Fire and Smoke Protection For Floor and Roof Systems.

1.9 CERTIFICATIONS

Provide products certified to meet indoor air quality requirements by UL 2818(Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

1.10 DELIVERY, STORAGE, AND HANDLING

1.10.1 Delivery

Deliver materials to the project site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

a. Name of manufacturer

b. Brand designation

c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification

Deliver materials in sufficient quantity to allow continuity of the work.

1.10.2 Storage and Handling

Store and handle materials in accordance with manufacturer's printed instructions. Protect from damage, exposure to open flame or other ignition sources, wetting, condensation, and moisture absorption. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Replace damaged material with new material.

1.11 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

1.12 PROTECTION

1.12.1 Special Protection

Provide special protection as approved by the insulation manufacturer.

1.12.2 Completed Work

Cover completed work with cover board for the duration of construction. Avoid traffic on completed work particularly when ambient temperature is above 80 degrees F. Replace crushed or damaged insulation prior to roof surface installation.

PART 2 PRODUCTS

2.1 INSULATION

2.1.1 Insulation Types

Provide one, or an assembly of a maximum of three, of the following roof insulation materials. Provide roof insulation that is compatible with attachment methods for the specified insulation and roof membrane.

a. Polyisocyanurate Board: Provide in accordance with ASTM C1289 REV A Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength of 20 pounds per square inch (psi).

2.1.2 Recycled Materials

Provide thermal insulation materials containing recycled content. Unless specified otherwise, the minimum required recycled content for listed materials are:

Polyisocyanurate/polyurethane:	9 percent recovered material

Provide data identifying percentage of recycled content for insulation.

2.1.3 Indoor Air Quality

Provide certification of indoor air quality for insulation, if installed within the building waterproofing envelope.

2.1.4 Insulation Thickness

As necessary to provide the thermal resistance (R-value) indicated. Base calculation on the R-value for aged insulation. For insulation over steel decks, satisfy both specified R-value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature.

2.1.5 Cants and Tapered Edge Strips

Provide preformed cants and tapered edge strips of the same material as the roof insulation. When unavailable, provide pressure-preservative treated wood, wood fiberboard, or rigid perlite board cants and edge strips as recommended by the roofing manufacturer for the specific application, unless otherwise indicated. Face of cant strips to incline at 45 degrees with a minimum vertical height of 4 inches. Taper edge strips at a rate of one to 1 1/2 inch per foot down to approximately 1/8 inch thick.

2.2 COVER BOARD

For use as a thermal barrier (underlayment), fire barrier (overlayment), or cover board for hot-mopped, torched-down, or adhesive-applied roofing membrane over roof insulation.

2.2.1 Glass Mat Gypsum Roof Board

ASTM C1177/C1177M, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E84, 500 psi, Class A, non-combustible, 5/8 inch thick, 4 by 8 feet board size.

2.3 MOISTURE CONTROL

2.3.1 Vapor Retarder

At metal deck roofs without concrete fill provide a combined air barrier and vapor retarder Class III on glass mat Gypsum roof board with a moisture vapor permeability of 5 perms or greater, refer to Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM

2.3.2 Organic Roofing

Provide in accordance with ASTM D226/D226M, Type I.

2.4 FASTENERS

Provide flush-driven fasteners through flat round or hexagonal steel or plastic plates. Provide zinc-coated steel plates, flat round not less than 1 3/8 inch diameter, hexagonal not less than 28 gage. Provide high-density plastic plates, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fully recess fastener head into plastic plate after it is driven. Form plates to prevent dishing. Do not use bell or cup shaped plates. Provide fasteners in accordance with insulation manufacturer's recommendations for holding power when driven, or a minimum of 120 pounds each in steel deck,

whichever is the higher minimum. Provide fasteners for steel or concrete decks in accordance with FM APP GUIDE (http://www.approvalguide.com/) for Class I roof deck construction, and spaced to withstand uplift pressure of 90 pounds per square foot.

2.4.1 Fasteners for Steel Decks

Approved hardened penetrating fasteners or screws in accordance with FM 4450 and listed in FM APP GUIDE for Class I roof deck construction. Quantity and placement to withstand a minimum uplift pressure of 90 psf in accordance with FM APP GUIDE.

2.5 WOOD NAILERS

Pressure-preservative treated as specified in Section 06 10 00 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Ensure surfaces are clean, smooth, and dry prior to application. Ensure surfaces receiving vapor retarder are free of projections that might puncture the vapor retarder. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work.

The Contractor must inspect and approve the surfaces immediately before starting installation. Prior to installing vapor retarder, perform the following:

a. Examine steel decks to ensure that panels are properly secured to structural members and to each other and that surfaces of top flanges are flat or slightly convex.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage from hollow or low spots, perform the following:

a. Provide wood nailers of the same thickness as the insulation at eaves, edges, curbs, walls, and roof openings for securing of cant strips, gravel stops, and flashing flanges.

b. Fill or cover cracks or knot holes larger than 1/2 inch in diameter in wood decks as necessary to form an unyielding surface.

c. Cover steel decks with a layer of insulation board of sufficient width to span the width of a deck rib opening, and in accordance with fire safety requirements. Secure with piercing or self-drilling, self-tapping fasteners of quantity and placement in accordance with FM APP GUIDE. Locate insulation joints parallel to ribs of deck on solid bearing surfaces only, not over open ribs.

3.2 INSTALLATION OF VAPOR RETARDER

Install vapor retarder in direct contact with roof deck surface. Air barrier / vapor retarder to consist of the following: At metal deck roofs

without concrete fill provide a combined air barrier and vapor retarder Class III on glass mat Gypsum roof board with a moisture vapor permeability of 5 perms or greater, refer to Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM.

3.2.1 Vapor Retarder on Steel Decks

Mechanically secure protection board to metal decking and install air barrier/vapor retarder Class III per manufacturer's instructions and requirements.

3.3 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of roofing, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, provide joints of each succeeding layer that are parallel and offset in both directions with respect to the layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface. Verify required slopes to each roof drain.

3.3.1 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.

3.3.2 Special Precautions for Installation of Foam Insulation

3.3.2.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, install 1/2 inch thick wood fiberboard, glass mat gypsum roof board, or 3/4 inch thick expanded perlite board insulation over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

3.3.3 Cant Strips

Where indicated, provide cant strips at intersections of roof with walls, parapets, and curbs extending above roof. Wood cant strips must bear on and be anchored to wood blocking. Fit cant strips flush to vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install in an approved adhesive.

3.3.4 Tapered Edge Strips

Where indicated, provide edge strips in the right angle formed by the juncture of roof and wood nailing strips that extend above the level of the roof. Install edge strips flush to vertical surfaces of wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, install in an approved adhesive.

3.4 PROTECTION

3.4.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with finished

roofing specified in by manufacturer on same day. Phased construction is not permitted. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces is not permitted. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight in accordance with indicated live load limits of roof construction. Protect exposed edges of insulation with cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs must be two layers of bituminous-saturated felt set in plastic bituminous cement or single ply set in roof cement. Fill all profile voids in cutoffs to prevent trapping moisture below the membrane. Remove cutoffs when work resumes.

3.4.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

3.5 INSPECTION

Establish and maintain inspection procedures to assure compliance of the installed roof insulation with contract requirements. Remove, replace, correct in an approved manner, any work found not in compliance. Quality control must include, but is not limited to, the following:

a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

b. Verification of certification, listing or label compliance with FM Data Sheets. (https://www.fmglobal.com/fmglobalregistration/Downloads.aspx)

c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.

d. Inspection of vapor retarder application, including edge envelopes and mechanical fastening.

e. Inspection of mechanical fasteners; type, number, length, and spacing.

f. Coordination with other materials, cants, sleepers, and nailing strips.

g. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

h. Installation of cutoffs and proper joining of work on subsequent days.

i. Continuation of complete roofing system installation to cover insulation installed same day.

j. Verification of required slope to each roof drain.

-- End of Section --

SECTION 07 27 10.00 10

BUILDING AIR BARRIER SYSTEM
08/19, CHG 1: 02/20

PART 1 GENERAL

1.1 SUMMARY

This Section specifies the construction and quality control of the installation of an air barrier system. Construct the air barrier system indicated, taking responsibity for the means, methods, and workmanship of the installation of the air barrier system. The air barrier must be contiguous and connected across all surfaces of the enclosed air barrier envelope indicated. The maximum leakage requirements of individual air barrier components and materials are specified in the other specification sections covering these items.

This section also defines the maximum allowable leakage of the final air barrier system. The workmanship must be adequate to meet the maximum allowable leakage requirements of this specification. Test the assembled air barrier system to demonstrate that the building envelope is properly sealed and insulated. Passing the air barrier system leakage test and thermography test will result in system acceptance. Conform air barrier system leakage and thermography testing and reporting to the requirements of Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referenced within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4541	(2017) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM E96/E96M	(2022) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E2178	(2021a) Standard Test Method for Air Permeance of Building Materials
ASTM E2357	(2017) Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 285	(2012) Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.3 DEFINITIONS

The following terms as they apply to this section:

1.3.1 Air Barrier Accessory

Products designated to maintain air tightness between air barrier materials, air barrier assemblies and air barrier components, to fasten them to the structure of the building, or both (e.g., sealants, tapes, backer rods, transition membranes, fasteners, strapping, primers).

1.3.2 Air Barrier Assembly

The combination of air barrier materials and air barrier accessories that are designated and designed within the environmental separator to act as a continuous barrier to the movement of air through the environmental separator.

1.3.3 Air Barrier Component

Pre-manufactured elements such as windows, doors, dampers and service elements that are installed in the environmental separator.

1.3.4 Air Barrier Envelope

The combination of air barrier assemblies and air barrier components, connected by air barrier accessories that are designed to provide a continuous barrier to the movement of air through an environmental separator. There may be more than one air barrier envelope in a single building. Also known as Air Barrier System.

1.3.5 Air Barrier Material

A building material that is designed, tested and/or produced to provide the primary resistance to airflow through an air barrier assembly of a wall system.

1.3.6 Air Barrier System

Same as AIR BARRIER ENVELOPE.

1.3.7 Air Leakage Rate

The rate of airflow (CFM) driven through a unit surface area (sq.ft.) of an assembly or system by a unit static pressure difference (Pa) across the assembly. (example: 0.25 CFM/sq.ft. @ 75 Pa)

1.3.8 Air Leakage

The total airflow (CFM) driven through the air barrier system by a unit static pressure difference (Pa) across the air barrier envelope. (example: 6500 CFM @ 75 Pa)

1.3.9 Air Permeance

The tested rate of airflow (CFM) through a unit area (sq.ft.) of a material driven by unit static pressure difference (Pa) across the material (example: 0.004 CFM/sq.ft. @ 75 Pa) as established by ASTM E2178.

1.3.10 Environmental Separator

The parts of a building that separate the controlled interior environment from the uncontrolled exterior environment, or that separate spaces within a building that have dissimilar environments. Also known as the Control Layer.

1.3.11 Vapor Permeance

Vapor permeance is separated into three classes based on the water vapor permeance of a material as tested via ASTM E96/E96M

Class I Vapor Barrier/Retarder	0.1 perm or less
Class II Vapor Barrier/Retarder	0.1 perm to 1.0 perm
Class III Vapor Barrier/Retarder	1.0 perm to 10 perm

1.4 PREPARATORY PHASE OR PRECONSTRUCTION CONFERENCE

Organize pre-construction conferences between the air barrier inspector and the sub-contractors involved in the construction of or penetration of the air barrier system to discuss where the work of each sub-contractor begins and ends, the sequence of installation, and each sub-contractor's responsibility to ensure airtight joints, junctures, penetrations and transitions between materials. Discuss the products, and assemblies of products specified in the different sections to be installed by the different sub-contractors.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Air Barrier System Shop Drawings; G, Manufacturer produced warranted air barrier system

SD-03 Product Data

Air Barrier System Product Data; G

SD-04 Samples

Material Samples For Air Barrier System; G

SD-05 Design Data

Design Data And Calculations For The Air Barrier System; G, Manufacturer produced warranted air barrier system

SD-06 Test Reports

Design Review Report; G

Testing and Inspection; G

SD-07 Certificates

Air Barrier Inspector; G

1.6 AIR BARRIER ENVELOPE SURFACE AREA AND LEAKAGE REQUIREMENTS

The building air barrier systems must meet the following leakage requirements. The allowable leakage rate and the maximum leakage are at a differential test pressure of 75 Pa.

Air Barrier Envelope 1	
Surface Area	8740 square feet
Architectural Only Test:	
Allowable leakage rate	0.25 CFM/sq.ft
Maximum leakage	2185 CFM

Air Barrier Envelope 2	
Surface Area	10,580 square feet
Architectural Only Test:	
Allowable leakage rate	0.25 CFM/sq.ft
Maximum leakage	2645 CFM

1.7 AIR BARRIER INSPECTOR

Employ a designated Air Barrier Inspector on this project. The Air Barrier Inspector performs a Design Review, oversees quality control testing specified in these specifications, performs quality control air barrier inspection as specified, interfaces with the designer and product manufacturer's representatives to assure all installation requirements are met, and verifies that the constructed work is in accordance with both the manufacturer's recommendations for products used, the content of this specification and other contract drawings or docouments. Qualification for the Air Barrier Inspector are as follows:

a. Training and certification as an Air Barrier Auditor from the Air Barrier Association of America (ABAA) or other third party air barrier association.

b. Or, provide documentation in resume format that demonstrates that the individual proposed has the experience, knowledge, skills and abilities to fulfill the above stated duties as the air barrier inspector.

c. It is acceptable that this individual be employed by the firm who will

be performing the building pressurization test or another independent third party entity, provided they meet the above requirements but is not a member of the installing contractor or firm.

Provide copies of Air Barrier Inspector qualifications 30 days after Notice to Proceed.

1.8 DESIGN REVIEW

Review the Contract Plans and Specifications and advise the Contracting Officer of any deficiencies that would prevent the construction of an effective air barrier system. Provide a Design Review Report individually listing each deficiency and the corresponding proposed corrective action necessary for proper air barrier system. Provide copies of the Design Review Report not later than 14 days after approval of the Air Barrier Inspector Qualifications. Submit design data and calculations for the Air Barrier System for a manufacturer produced warranted air barrier system.

PART 2 PRODUCTS

2.1 AIR BARRIER

Provide air barrier system of compatible parts from one or several manufacturers coordinated by the contractor or provide a single warranted system provided by a primary manufacturer. The air barrier system as part of a tested exterior wall assembly must meet the conditions of acceptance as tested in accordance with NFPA 285. Materials used for roof assembly air barrier must conform to the appropriate UL and FM wind and fire requirements for the specified roof assemblies.

If a complete air barrier system from a single manufacturer is utilized, whether warranted on not warranted, the air barrier system must conform to ASTM E2357.

Materials in the following categories as used in the air barrier system or assembly of the exterior wall system are tested and are required to conform to ASTM E2178: Self-adhered sheet membranes, fluid applied membranes, spray polyurethane foam, mechanically fastened commercial building wrap, factory bonded membranes to sheathing, and adhesive backed commercial building wrap and accessory products.

Other materials used as an air barrier such as concrete, glass, wood, metal or gypsum board may or may not conform to ASTM E2178 but are acceptable provided that when integrated into the air barrier system or assemblies that they are not subject to material or environmental induced degradation in their final produced state and once incorporated in the permanent construction.

All materials used must be identifiable through manufacturer testing data and/or literature to be compatible with all the attached or adjoining materials or substrates used in the system.

Provide Air Barrier System Shop Drawings, Material Samples for Air Barrier System and Air Barrier System Product Data.

PART 3 EXECUTION

3.1 QUALITY CONTROL

3.1.1 Documentation and Reporting

Document the entire installation process on daily job site reports. These reports include information on the Installer, substrates, substrate preparation, products used, ambient and substrate temperature, the location of the air barrier installation, the results of the quality control procedures, and testing results.

3.1.2 Quality Control Testing And Inspection

Conduct the following tests and inspections as applicable in the presence of the Contracting Officer during installation of the air barrier system, and submit quality control reports as indicated below.

a. Provide a Daily Report of Observations with a copy to the Contracting Officer.

b. Inspect to assure continuity of the air barrier system throughout the building enclosure and that all gaps are covered, the covering is structurally sound, and all penetrations are sealed allowing for no infiltration or exfiltration through the air barrier system.

c. Inspect to assure structural support of the air barrier system to withstand design air pressures.

d. Inspect to assure masonry surfaces receiving air barrier materials are smooth, clean, and free of cavities, protrusions and mortar droppings, with mortar joints struck flush or as required by the manufacturer of the air barrier material.

e. Inspect and test to assure site conditions for application temperature, and dryness of substrates are within guidelines.

f. Inspect to assure substrate surfaces are properly primed if applicable and in accordance with manufacturer's instructions. Priming must extend at least 2 inches beyond the air barrier material to make it obvious that the primer was applied to the substrate before the air barrier material.

g. Inspect to assure laps in materials are at least a 2-inch minimum, shingled in the correct direction or mastic applied in accordance with manufacturer's recommendations, and with no fishmouths.

h. Inspect to assure that a roller has been used to enhance adhesion. Identify any defects such as fishmouths, wrinkles, areas of lost adhesion, and improper curing. Note the intended remedy for the deficiencies.

i. Measure application thickness of liquid applied materials to assure that manufacturer's specifications for the specific substrate are met.

j. Inspect to assure that the correct materials are installed for compatibility.

k. Inspect to assure proper transitions for change in direction and

structural support at gaps.

l. Inspect to assure proper connection between assemblies (membrane and sealants) for cleaning, preparation and priming of surfaces, structural support, integrity and continuity of seal.

m. Perform adhesion tests for fluid-applied and self-adhered air barrier membranes to assure that the manufacturer's specified adhesion strength properties are met. Determine the bond strength of coatings to substrate in accordance with ASTM D4541.

n. Provide cohesion tests for spray polyurethane foam (SPF). Perform the tests in accordance with the specification sections which specify these materials. Perform adhesion tests as follows: Using a coring tool remove a sample and determine the relative adhesion quality of the foam. If the foam is hard to remove and leaves small bits of foam on the substrate it is called cohesive foam failure and is considered the best adhesion. If the foam comes away from the substrate with some force but is clean, it is called a mechanical bond. If it comes away easily from the substrate, the adhesion is poor. Cohesive foam failure and a good mechanical bond are acceptable.

o. Provide written test reports of all tests performed.

3.2 REPAIR AND PROTECTION

Upon completion of inspection, testing, sample removal and similar services, repair damaged construction and restore substrates, coatings and finishes. Protect construction exposed by or for quality control service activities, and protect repaired construction.

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SECTION 07 27 19.01

SELF-ADHERING AIR BARRIERS
05/17, CHG 2: 08/20

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR BARRIER ASSOCIATION OF AMERICA (ABAA)

ABAA Accreditation	Accreditation
ABAA QAP	Quality Assurance Program

ASTM INTERNATIONAL (ASTM)

ASTM D146/D146M	(2004; E 2012; R 2012) Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D903	(1998; R 2017) Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
ASTM D1876	(2008; R 2015; E 2015) Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
ASTM D4263	(1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4541	(2017) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2022) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E154/E154M	(2008a; R 2013; E 2013) Water Vapor Retarders Used in Contact with Earth Under

	Concrete Slabs, on Walls, or as Ground Cover
ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E2178	(2021a) Standard Test Method for Air Permeance of Building Materials
ASTM E2357	(2017) Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 285	(2012) Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.2 RELATED REQUIREMENTS

Coordinate the requirements of Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM and other building enclosure sections to provide a complete building air barrier system. Submit all materials, components, and assemblies of the air barrier system together as one complete submittal package.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualifications of Manufacturer; G

Qualifications of Installer; G

SD-02 Shop Drawings

Self-adhering Air Barrier; G

SD-03 Product Data

Self-adhering Air Barrier; G

Primers, Adhesives, and Mastics; G

Safety Data Sheets; G

SD-06 Test Reports

Field Peel Adhesion Test; G

Flame Propagation of Wall Assemblies; G

Flame Spread and Smoke Developed Index Ratings; G

Site Inspections and Testing; G

SD-07 Certificates

Self-adhering Air Barrier; G

SD-08 Manufacturer's Instructions

Self-adhering Air Barrier; G

Primers, Adhesives, and Mastics; G

1.4 MISCELLANEOUS REQUIREMENTS

For self-adhering air barrier provide the following:

1.4.1 Shop Drawings

Submit self-adhering air barrier shop drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other building enclosure assemblies and materials, and membrane counterflashings. Show details for bridging of gaps in construction, treatment of inside and outside corners, expansion joints, methods of attachment of materials covering the self-adhered barrier without compromising the barrier. Indicate how miscellaneous penetrations such as conduit, pipes, electric boxes, brick ties, and similar items will be sealed.

1.4.2 Product Data

Submit manufacturer's technical data indicating compliance with performance and environmental requirements, manufacturer's printed instructions for evaluating, preparing, and treating substrates, temperature and other limitations of installation conditions, safety requirements for installation, and Safety Data Sheets. Indicate flame and smoke spread ratings for all products.

1.4.3 Test Reports

Submit test reports indicating that field peel-adhesion tests on all materials have been performed and the changes made, if required, in order to achieve successful and lasting adhesion. Submit test reports for flame propagation of wall assemblies tested in accordance with NFPA 285. Submit test reports for flame spread and smoke developed index ratings of barrier system materials tested in accordance with ASTM E84.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver and store materials in sufficient quantity to allow for uninterrupted flow of work. Inspect materials delivered to the site for damage and store out of weather. Deliver materials to the jobsite in their original unopened packages, clearly marked with the manufacturer's name, brand designation, description of contents, and shelf life of containerized materials. Store and handle to protect from damage.

1.5.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Protect stored materials from direct sunlight. Keep materials sealed and separated from absorptive materials, such as wood and insulation.

1.6 FIELD PEEL ADHESION TEST

Perform a field peel-adhesion test on the construction mockup. Test the self-adhering air barrier for adhesion in accordance with ASTM D4541 using a Type II pull tester except use a disk that is 4 inches in diameter and cut through the membrane to separate the material attached to the dish from the surrounding material. Perform test after curing period in accordance with manufacturer's written recommendations. Record mode of failure and area which failed in accordance with ASTM D4541. Compare adhesion values with the manufacturer's established minimum values for the particular combination of material and substrate. Indicate on the inspection report whether the manufacturer's requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product and substrate combination, the inspector must record actual values.

1.7 AIR BARRIER TESTING

Perform air barrier testing in accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM.

1.8 QUALITY ASSURANCE

1.8.1 Qualifications of Manufacturer

Submit documentation verifying that the manufacturer of the self-adhering air barrier is currently accredited by Air Barrier Association of America (ABAA Accreditation https://www.airbarrier.org/).

1.8.2 Qualifications of Installer

Submit documentation verifying that installers of the self-adhering air barrier are currently certified in accordance with the ABAA QAP Quality Assurance Program (https://www.airbarrier.org/qap/).

1.9 PRECONSTRUCTION MEETING

Conduct a preconstruction meeting a minimum of two weeks prior to commencing work specified in this Section. Agenda must include, at a minimum, construction and testing of mockup, sequence of construction,

coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. Attendance is required by representatives of related trades including covering materials, substrate materials, adjacent materials, and materials and components of the air barrier system.

1.10 ENVIRONMENTAL CONDITIONS

1.10.1 Temperature

Install air barrier within the range of ambient and substrate temperatures as recommended in writing by the air barrier manufacturer. Verify that the surface to receive self-adhering air barrier is dry for a minimum of 48 hours prior to the installation of the barrier. Do not apply air barrier to damp or wet substrates. Do not apply during inclement weather or when ice, frost, surface moisture, or visible dampness is present on surfaces to be covered, or when precipitation is imminent.

1.10.2 Exposure to Weather and Ultraviolet Light

Protect air barrier products from direct exposure to rain, snow, sunlight, mist, and other extreme weather conditions. Replace, at no additional cost to the government, barrier products that have been exposed to ultraviolet (sun)light longer than allowed by manufacturer's written requirements.

PART 2 PRODUCTS

2.1 SELF ADHERING AIR BARRIER

Provide minimum 0.040 inch thick self-adhering, vapor permeable, air barrier membrane consisting of a cross-laminated high density polyethylene (HDPE) film, fully coated with rubberized asphalt adhesive. Provide membrane in rolls of various widths interleaved with disposable silicone release paper. Self-adhering air barrier must exhibit no visible water leakage when tested in accordance with ASTM E331 and must perform as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration. Use regular or low temperature formulation depending on site conditions, within temperature ranges specified by manufacturer.

2.1.1 Physical Properties

a. Air Permeance (ASTM E2178): Less than 0.004 CFM per sf at 1.57 psf.

b. Air Leakage (ASTM E2357, ASTM E283): Less than 0.004 CFM per sf at 1.57 psf at one inch.

c. Tensile Strength (ASTM D412 die C modified): Not less than 400 psi.

d. Tensile Elongation (ASTM D412 die C modified): Not less than 200 percent.

e. Puncture Resistance (ASTM E154/E154M): Not less than 40 lbs.

f. Pliability (ASTM D146/D146M): Unaffected at minus 25 degrees F, 0.063 inch mandrel.

g. Lap Adhesion (ASTM D1876 modified): Not less than 4.0 lbs per inch.

h. Peel Adhesion (ASTM D903): Not less than 5.0 lbs per inch.

i. Water Vapor Permeance (Vapor Impermeable Air Barrier) (ASTM E96/E96M, desiccant method A): 0.1 perms or less.

j. Water Absorption (ASTM D570): Not to exceed 0.12 percent by weight.

k. Flame propagation of wall assemblies (NFPA 285): Pass

l. Surface Burning Characteristics (ASTM E84):

(1) Flame Spread Index Rating not higher than 25.

(2) Smoke Developed Index Rating not higher than 200.

2.2 PRIMERS, ADHESIVES, AND MASTICS

Provide primers, adhesives, mastics and other accessory materials as recommended in writing by the manufacturer of the self-adhering air barrier for adequate bonding to each type of substrate.

2.3 SHEET METAL FLASHING

Provide as specified in Section 07 60 00 FLASHING AND SHEET METAL.

2.4 JOINT SEALANTS

Provide as specified in Section 07 92 00 JOINT SEALANTS. Verify compatibility with adjacent products that are or will be in contact with one another.

PART 3 EXECUTION

3.1 EXAMINATION

Before installing air barrier, examine substrates, areas, and conditions under which air barrier assemblies will be applied, with Installer present, for compliance with requirements. Ensure the following conditions are met:

a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.

b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.

c. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263 and take suitable measures until substrate passes moisture test.

d. Verify sealants used in sheathing are compatible with membrane proposed for use. Perform field peel adhesion test on materials to which sealants are adhered.

3.2 PREPARATION

Clean, prepare, and treat substrate in accordance with manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for air barrier application.

a. Prime masonry and concrete substrates with conditioning primer.

b. Prime gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.

c. Prime wood, metal, and painted substrates with primer.

d. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and at protrusions.

3.3 INSTALLATION

3.3.1 Installation of Self-adhering Air Barrier

Install materials in accordance with manufacturer's recommendations and the following:

a. Apply primer at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application. Apply as many coats as necessary for proper adhesion.

b. When membrane is properly positioned, press into place and roll membrane with roller immediately after placement.

c. Apply membrane sheets to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.

d. Position subsequent sheets of membrane applied above so that membrane overlaps the membrane sheet below by a minimum of 2-1/2 inches, unless greater overlap is recommended by manufacturer. Roll into place with roller.

e. Make all side laps a minimum of 2-1/2 inches and all end laps a minimum of 5 inches, unless greater overlap is recommended by manufacturer. Roll seams with roller.

f. Roll membrane to adhere to substrate. Cover corners and joints with two layers of reinforcement by first applying a 12 inch width of membrane centered along the axis. Flash drains and projections with a second ply of membrane for a distance of 6 inches from the drain or projection.

g. Seal around all penetrations through the air barrier resulting from pipes, vents, conduit, electrical fixtures, structural members, or other construction passing through it. Seal with termination mastic, extruded silicone sealant, membrane counterflashing or other sealing methods in accordance with manufacturer's written recommendations.

h. Continuously connect the air barrier between walls, roof, floor and below grade assemblies to form a continuous integrated air barrier system around the entire building enclosure. Extend the air barrier membrane into rough openings such as doors, windows, louvers, and

other exterior penetrations. Seal edges of barrier at junctures with rough openings.

i. At changes in substrate plane, provide transition material (e.g. bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.

j. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Continuously support membrane with substrate.

k. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.

l. At expansion and seismic joints provide transition to the joint assemblies.

m. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.

n. At end of each working day, seal top edge of membrane to substrate with termination mastic.

o. Do not allow materials to come in contact with chemically incompatible materials.

p. Counterflash upper edge of thru-wall flashing and air barrier. Counter flashing and thru-wall flashing are specified in Section 07 60 00 FLASHING AND SHEET METAL.

3.4 FIELD QUALITY CONTROL

3.4.1 Site Inspections and Testing

Provide site inspections and testing in accordance with ABAA protocol to verify conformance with the manufacturer's instructions, the ABAA QAP Quality Assurance Program (https://www.airbarrier.org/qap/), Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM and this section.

a. Conduct inspections and testing at 5, 50, and 95 percent completion of this scope of work. Forward written site inspections and testing reports to the Contracting Officer within five working days of the inspection and test being performed.

b. If inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Government.

3.5 FIELD PEEL ADHESION TEST

Conduct in accordance with test protocol indicated in Part 1, paragraph FIELD PEEL ADHESION TEST.

3.6 PROTECTION AND CLEANING

3.6.1 Protection

3.6.1.1 Adjacent Surfaces

Protect exposed adjacent surfaces that could be damaged by primers and adhesives associated with air barrier membrane. Provide protection during application and the remainder of construction in accordance with manufacturer's written instructions.

3.6.1.2 The Air Barrier Assembly

Protect finished portions of the air barrier assembly from damage during ongoing application and throughout the remainder of the construction period in accordance with manufacturer's written instructions. Coordinate timing of installation of materials that will cover the air barrier membrane to ensure the exposure period does not exceed that recommended by the air barrier manufacturer's written installation instructions. Remove and replace, at no additional cost to the government, membrane products that exceed the manufacturer's allowed exposure limits.

3.6.2 Cleaning

Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and as acceptable to the primary material manufacturer.

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