PROJECT DESIGN

QUUG 19-1000, ADD NON-POTABLE WATER DIST LINES TO IRRIGATION AREAS, MULTI AT MORÓN AIR BASE, SPAIN

SPECIFICATIONS

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EstudioGH Arquitectura e Ingeniería

February 2026

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SECTION 01 11 00

SCOPE OF WORK AND DRAWINGS

SCOPE OF WORK: This project provides for work to complete a design for the expansion of the non-potable water distribution system to cover irrigation areas and provisions for the future connection of buildings to the non-potable water distribution system at Morón Air Base.

The construction works consist of, but are not limited to, the items indicated below, including the testing to be performed by independent laboratories for quality control:

1. Site investigation

   The Contractor shall be verifying existing utility locations, within the area of work. 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 located. Verify the elevations of existing piping, utilities, and any type of underground obstruction discovered during scanning, in locations to be traversed by piping and other work to be conducted or installed. Verify elevations before installing new utilities close to manholes or other adjacent structures.

2. CLIN´S

CLIN #1: BASE BID: AREA #1 (BRANCH LINE Nº18) + INSTALLATIONS OF PROGRAMMERS IN EXISTING SPRINKLER IRRIGATION SYSTEM + MODIFICATION OF NON-POTABLE WATER SYSTEM AT POTABLE WATER TREATMENT FACILITY

1.1 Civil works:

1. Excavations and fill for trenches utilities routing.
2. Fill vegetation area

1.2 Mechanical Works

1.2.1 Modification of non-potable water system at potable water treatment facility

1. Provide all piping and valves as indicated in the drawings for non potable water system.

1.2.2 Installations of programmers in existing sprinkler irrigation system

1. Provide all piping and valves as indicated in the drawings for non potable water system.

2.Provide hose bibb, hose connection vacuum breaker 3/4", water meter, pressure gauge, solenoid valve, programmer with solar panel as indicated in the drawings including cabinet.

1.2.3 Irrigation System area #1 branch line nº18

1. Provide hose bibbs with water meter, pressure gauge as indicated in the drawings including cabinet.
2. Provide all piping and valves as indicated in the drawings for non potable water system.

CLIN #2: OPTION #1: AREA #2 (BRANCH LINES 08, 09, 11, 12 (building #302) and Running Track

1.1 Civil works:

1.Excavations and fill for trenches utilities routing.
2. Fill vegetation area

1.2 Mechanical Works

1.2.1 Irrigation System area #2 branch line nº 08, 09, 11, 12 (building #302) and running track

1. Provide all piping and valves as indicated in the drawings for non potable water system.
2. Provide hose bibbs with water meter, pressure gauge as indicated in the drawings including cabinet.
3. Provide handhole connections for buildings.

CLIN #3: OPTION#2: AREA #3 (BRANCH LINES 06 AND 07)

1.1 Civil works:

1.Excavations and fill for trenches utilities routing.
2. Fill vegetation area

1.2 Mechanical Works

1.2.1 Irrigation System area #3 branch line nº 06 and 07

1. Provide all piping and valves as indicated in the drawings for non potable water system.
2. Provide hose bibbs with water meter, pressure gauge as indicated in the drawings including cabinet.

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CLIN #4: OPTION #3: AREA #4 (BRANCH LINES 05, 15, 15.1 AND 17. Building #208 and #202)

1.1 Civil works:

1.Excavations and fill for trenches utilities routing.
2. Fill vegetation area

1.2 Mechanical Works

1.2.1 Irrigation System area #4 branch line nº 05, 15, 15.1 and 17. Building #208 and #202

1. Provide all piping and valves as indicated in the drawings for non potable water system.
2. Provide hose bibbs with water meter, pressure gauge as indicated in the drawings including cabinet.
3. Provide handholes connections for buildings.

CLIN #5: OPTION #4: AREA #5 (BRANCH LINES 01, 02, 03, 04, 16 and 19)

1.1 Civil works:

1.Excavations and fill for trenches utilities routing.
2. Fill vegetation area

1.2 Mechanical Works

1.2.1 Irrigation System area #5 branch line nº 01, 02, 03, 04, 16 and 19

1. Provide all piping and valves as indicated in the drawings for non potable water system.
2. Provide hose bibbs with water meter, pressure gauge as indicated in the drawings including cabinet.

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CLIN #6: OPTION #5: UPGRADES

1. Polyethylene pipe HDPE PN10 DN200, connection fittings and excavation and filling of trench 30m
2. Polyethylene pipe HDPE PN10 DN160, connection fittings, excavation and filling of trench 40m
3. Polyethylene pipe HDPE PN10 DN63, connection fittings and excavation and filling of trench 40m
4. Polyethylene pipe HDPE PN10 DN110, connection fittings and excavation and filling of trench 40m
5. Gate Valve Ø160mm and accessories (valve box) 2ud.
6. Gate Valve Ø110mm and accessories (valve box) 2ud
7. Road crossing (drilled) RC-01 for pipe Ø160mm 10m
8. Road crossing (drilled) RC-02 for pipe Ø110mm 11m
9. Cabinet including hose bibb, hose connection vacuum breaker 3/4" water meter, pressure gauge solenoid valve, programmer with solar panel and accessories 4ud

CLIN #7: OPTION #6: EXPANSION NPW – DISTRIBUTION OF NON-POTABLE WATER FOR BUILDINGS #106, #110, #119, #192 AND #203

1.1 Civil works:

1.Excavations and fill for trenches utilities routing.
2. Fill vegetation area

1.2 Mechanical Works
1. Provide all piping and valves as indicated in the drawings for non potable water system.
2. Provide handholes connections for buildings.

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DRAWINGS:

RELACIÓN DE PLANOS / DRAWING SCHEDULE			
PLANOS **DRAWING**	***PLANO No.*** **DWG. No**	***HOJA No.*** **SHEET No.**	***TÍTULO DE HOJA*** **/ TITLE SHEET**
GENERAL / GENERAL			
GI001	R-869-01	1 OF 77	*HOJA TÍTULO* TITLE SHEET
GI002	R-869-02	2 OF 77	*RELACIÓN DE PLANOS. 1 DE 2* DRAWINGS SCHEDULE. 1 OF 2
GI003	R-869-03	3 OF 77	*RELACIÓN DE PLANOS. 2 DE 2* DRAWINGS SCHEDULE. 2 OF 2
GC101	R-869-04	4 OF 77	*PLANTA GENERAL, ZONAS Y OPCIONES* GENERAL SITE PLAN, AREAS AND OPTIONS
GC102	R-869-05	5 OF 77	*PLANTA GENERAL, OFERTA BASE* GENERAL SITE PLAN, BASE BID
GC103	R-869-06	6 OF 77	*PLANTA GENERAL, OPCIÓN 1* GENERAL SITE PLAN, OPTION 1
GC104	R-869-07	7 OF 77	*PLANTA GENERAL, OPCIÓN 2* GENERAL SITE PLAN, OPTION 2
GC105	R-869-08	8 OF 77	*PLANTA GENERAL, OPCIÓN 3* GENERAL SITE PLAN, OPTION 3
GC106	R-869-09	9 OF 77	*PLANTA GENERAL, OPCIÓN 4* GENERAL SITE PLAN, OPTION 4
GC107	R-869-10	10 OF 77	*PLANTA GENERAL, OPCIÓN 6* GENERAL SITE PLAN, OPTION 6
GC108	R-869-11	11 OF 77	*RUTAS DE ACCESO Y ZONAS DE ACOPIO* ACCESS ROUTES AND STOCKPILING AREAS

RELACIÓN DE PLANOS / DRAWING SCHEDULE			
PLANOS DRAWING	*PLANO No.* DWG. No	*HOJA No.* SHEET No.	*TÍTULO DE HOJA* / TITLE SHEET
CIVIL / CIVIL			
C- 001	R- 869- 12	12 OF 77	*NOTAS GENERALES, LEYENDA Y ABREVIATURAS* GENERAL NOTES, LEGEND AND ABBREVIATIONS
C- 101	R- 869- 13	13 OF 77	*PLANTA GENERAL DE DISTRIBUCIÓN DE AGUA NO POTABLE* GENERAL NON- POTABLE WATER DISTRIBUTION PLANT
CD401	R- 869- 14	14 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 1, RAMAL 18* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 1, BRANCH LINE 18
CD402	R- 869- 15	15 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONAS 2 Y 4, INSTALACIÓN DE PROGRAMADORES* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREAS 2 AND 4, IRRIGATION PROGRAMMERS INSTALLATION
CD403	R- 869- 16	16 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 2, INSTALACIÓN DE PROGRAMADORES* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 2, IRRIGATION PROGRAMMERS INSTALLATION
CD404	R- 869- 17	17 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, INSTALACIÓN DE PROGRAMADORES. 1 DE 2* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 3, IRRIGATION PROGRAMMERS INSTALLATION. 1 OF 2
CD405	R- 869- 18	18 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, INSTALACIÓN DE PROGRAMADORES. 2 DE 2* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 3, IRRIGATION PROGRAMMERS INSTALLATION. 2 OF 2
CD406	R- 869- 19	19 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 2, RAMALES 08, 09, 11 Y PISTA DE ATLETISMO* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 2, BRANCH LINES 08, 09, 11 AND RUNNING TRACK
CD407	R- 869- 20	20 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 2, RAMAL 12* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 2, BRANCH LINE 12
CD408	R- 869- 21	21 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, RAMALES 06 Y 07* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONSAND DEMOLITION SITE PLAN. AREA 3, BRANCH LINES 06 AND 07
CD409	R- 869- 22	22 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMAL 05* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS ANDDEMOLITION SITE PLAN. AREA 4, BRANCH LINE 05
CD410	R- 869- 23	23 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMAL 16* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 4, BRANCH LINE 16
CD411	R- 869- 24	24 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMAL 15.1* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 4, BRANCH LINE 15.1

CD412	R- 869- 25	25 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 5, RAMALES 01, 16 Y 19* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 5, BRANCH LINES 01, 16 AND 19
CD413	R- 869- 26	26 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 5, RAMALES 02, 03 Y 04* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 5, BRANCH LINES 02, 03 AND 04
CD414	R- 869- 27	27 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, RAMALES 13 Y 14* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 3, BRANCH LINES 13 AND 14
CD415	R- 869- 28	28 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, RAMAL 10* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 3, BRANCH LINE 10
CD416	R- 869- 29	29 OF 77	*PLANTA AMPLIADA DE ESTADO ACTUAL Y DEMOLICIÓN DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMALES 05.1 Y 15.2* ENLARGED EXISTING NON- POTABLE WATER DIST LINES CONDITIONS AND DEMOLITION SITE PLAN. AREA 4, BRANCH LINES 05.1 AND 15.2
CP401	R- 869- 30	30 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 1, RAMAL 18* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 1, BRACH LINE 18
CP402	R- 869- 31	31 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONAS 2 Y 4, INSTALACIÓN DE PROGRAMADORES* ENLARGED EXTERIOR FINISHES SITE PLAN. AREAS 2 AND 4, IRRIGATION PROGRAMMERS INSTALLATION
CP403	R- 869- 32	32 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 2, INSTALACIÓN DE PROGRAMADORES* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 2, IRRIGATION PROGRAMMERS INSTALLATION
CP404	R- 869- 33	33 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 3, INSTALACIÓN DE PROGRAMADORES. 1 DE 2* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 3. IRRIGATION PROGRAMMERS INSTALLATION, 1 OF 2
CP405	R- 869- 34	34 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 3, INSTALACIÓN DE PROGRAMADORES. 2 DE 2* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 3. IRRIGATION PROGRAMMERS INSTALLATION, 2 OF 2
CP406	R- 869- 35	35 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 2, RAMALES 08, 09, 11 Y PISTA DE ATLETISMO* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 2, BRANCH LINES 08, 09, 11 AND RUNNING TRACK
CP407	R- 869- 36	36 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 2, RAMAL 12* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 2, BRANCH LINE 12
CP408	R- 869- 37	37 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 3, RAMALES 06 Y 07* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 3, BRANCH LINES 06 AND 07
CP409	R- 869- 38	38 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 4, RAMAL 05* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 4, BRANCH LINE 05
CP410	R- 869- 39	39 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 4, RAMAL 16* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 4, BRANCH LINE 16
CP411	R- 869- 40	40 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 4. RAMAL 15.1* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 4, BRANCH LINE 15.1
CP412	R- 869- 41	41 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 5, RAMALES 01, 16 Y 19* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 5, BRANCH LINES 01, 16 AND 19
CP413	R- 869- 42	42 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 5, RAMALES 02, 03 Y 04* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 5, BRANCH LINES 02, 03 AND 04

CP414	R- 869- 43	43 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 3, RAMALES 13 Y 14* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 3, BRANCH LINES 13 AND 14
CP415	R- 869- 44	44 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 3, RAMAL 10* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 3, BRANCH LINE 10
CP416	R- 869- 45	45 OF 77	*PLANTA AMPLIADA DE ACABADOS EXTERIORES. ZONA 4, RAMALES 05.1 Y 15.2* ENLARGED EXTERIOR FINISHES SITE PLAN. AREA 4, BRANCH LINES 05.1 AND 15.2
C- 501	R- 869- 46	46 OF 77	*DETALLES. 1 DE 7* DETAILS. 1 OF 7
C- 502	R- 869- 47	47 OF 77	*DETALLES. 2 DE 7* DETAILS. 2 OF 7
C- 503	R- 869- 48	48 OF 77	*DETALLES. 3 DE 7* DETAILS. 3 OF 7
C- 504	R- 869- 49	49 OF 77	*DETALLES. 4 DE 7* DETAILS. 4 OF 7
C- 505	R- 869- 50	50 OF 77	*DETALLES. 5 DE 7* DETAILS. 5 OF 7
C- 506	R- 869- 51	51 OF 77	*DETALLES. 6 DE 7* DETAILS. 6 OF 7
C- 507	R- 869- 52	52 OF 77	*DETALLES. 7 DE 7* DETAILS. 7 OF 7
C- 601	R- 869- 53	53 OF 77	*CUADRO DE ARMARIOS* CABINET SCHEDULE

RELACIÓN DE PLANOS / DRAWING SCHEDULE			
PLANOS DRAWING	*PLANO No.* DWG. No	*HOJA No.* SHEET No.	*TÍTULO DE HOJA* / TITLE SHEET
MECÁNICA / MECHANICAL			
M- 0 0 1	R- 869- 54	54 OF 77	*NOTAS GENERALES, LEYENDA Y ABREVIATURAS* GENERAL NOTES, LEGEND AND ABBREVIATIONS
M- 10 1	R- 869- 55	55 OF 77	*PLANTA GENERAL DE DISTRIBUCIÓN DE AGUA NO POTABLE* EXISTING GENERAL NON- POTABLE WATER DIST LINES SITE PLAN
M- 10 2	R- 869- 56	56 OF 77	*PLANTA GENERAL DE ZONAS DE RIEGO CON PROGRAMADORES* GENERAL PLAN OF IRRIGATION AREAS WITH PROGRAMMERS
MS4 0 0	R- 869- 57	57 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 5, INSTALACIÓN DE TRATAMIENTO DE AGUA POTABLE.* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 5, POTABLE WATER TREATMENT FACILITY.
MS4 0 1	R- 869- 58	58 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 1, RAMAL 18* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 1, BRANCH LINE 18
MS4 0 2	R- 869- 59	59 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONAS 2 Y 4, INSTALACIÓN DE PROGRAMADORES* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREAS 2 AND 4, IRRIGATION PROGRAMMERS INSTALLATION
MS4 0 3	R- 869- 60	60 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 2, INSTALACIÓN DE PROGRAMADORES* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 2, IRRIGATION PROGRAMMERS INSTALLATION
MS4 0 4	R- 869- 61	61 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, INSTALACIÓN DE PROGRAMADORES. 1 DE 2* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 3, IRRIGATION PROGRAMMERS INSTALLATION. 1 OF 2
MS4 0 5	R- 869- 62	62 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, INSTALACIÓN DE PROGRAMADORES. 2 DE 2* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 3, IRRIGATION PROGRAMMERS INSTALLATION. 2 OF 2
MS4 0 6	R- 869- 63	63 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 2, RAMALES 08, 09, 11 Y PISTA DE ATLETISMO* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 2, BRANCH LINES 08, 09, 11 AND RUNNING TRACK
MS4 0 7	R- 869- 64	64 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 2, RAMAL 12* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 2, BRANCH LINE 12
MS4 0 8	R- 869- 65	65 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, RAMALES 06 Y 07* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 3, BRANCH LINES 06 AND 07
MS4 0 9	R- 869- 66	66 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMAL 05* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 4, BRANCH LINE 05
MS4 10	R- 869- 67	67 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMAL 16* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 4, BRANCH LINE 16
MS4 11	R- 869- 68	68 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMAL 15.1* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 4, BRANCH LINE 15.1
MS4 12	R- 869- 69	69 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 5, RAMALES 01, 16 Y 19* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 5, BRANCH LINES 01, 16 AND 19
MS4 13	R- 869- 70	70 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 5, RAMALES 02, 03 Y 04* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 5, BRANCH LINE 02, 03 AND 04

MS414	R- 869- 71	71 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, RAMALES 13 Y 14* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 3, BRANCH LINES 13 AND 14
MS415	R- 869- 72	72 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 3, RAMAL 10* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 3, BRANCH LINE 10
MS416	R- 869- 73	73 OF 77	*PLANTA AMPLIADA DE DISTRIBUCIÓN DE AGUA NO POTABLE. ZONA 4, RAMALES 05.1 Y 15.2* ENLARGED NON- POTABLE WATER DIST LINES SITE PLAN. AREA 4. BRANCH LINES 05.1 AND 15.2
M- 501	R- 869- 74	74 OF 77	*DETALLES* DETAILS
M- 601	R- 869- 75	75 OF 77	*DIAGRAMA GENERAL DE TUBERÍAS E INSTRUMENTACIÓN* GENERAL PIPING AND INSTRUMENTATION DIAGRAM
M- 602	R- 869- 76	76 OF 77	*CUADROS. 1 DE 2* SCHEDULES. 1 OF 2
M- 603	R- 869- 77	77 OF 77	*CUADROS. 2 DE 2* SCHEDULES. 2 DE 2

*** END OF SECTION ***

SECTION 01 11 01

GENERAL CONDITIONS

1. GENERAL: The work consists of furnishing all labor, materials, utilities, transportation, equipment, and services to execute the project. In accordance with the drawings and specifications, complete and ready for use. Measurements shown on the drawings and specifications are given for reference use only. They are not conclusive and may be erroneous. It is the Contractor's responsibility to verify any and all of measurements. The Government will not be held responsible for measurements shown or measurements and estimations made by the Contractor.

2. GENERAL DESCRIPTION: The work consists in, but is not limited to, executing the line items indicated in the scope of work. All line items indicated in the scope of work do not limit nor reduce the Contractor's responsibility to perform all work as required by the project in order to provide a complete and usable facility.

3. LOCATION: The work is located in Morón Air Base, Spain, as shown on the contract drawings.

4. DRAWINGS ACCOMPANYING SPECIFICATIONS: Drawings are the property of the Government and shall not be used for any purpose other than that contemplated by the specifications. The drawings indicated in the specifications are in A1 size.

5. WARRANTY: For this contract the Contractor shall provide a two-year standard commercial warranty for with all line items of the scope of work, including materials and workmanship. The warranty shall cover all defects noticed and reported to the Contractor within two years after acceptance of the work. The Contractor shall repair or replace defective materials at their expense within a reasonable time and as approved by the Contracting Officer. The Contractor must comply with any additional warranty periods established by Spanish codes and regulations. The Contractor shall submit the warranty letter within 15 calendar days after to the acceptance of the work by the Contracting Officer.

6. BASE ACCESS:

6.1. Permits or Authorizations: The Contractor shall obtain all permits or authorizations required to access Morón Air Base. All the communications in relation to the Base Access request must be directed to Construction Management Section for PASS&ID Office processing. Once the works have finalized, the Contractor will return the permits or authorizations. Contractor is responsible to provide the required escorts as required to execute the works.

6.2. Delays and Interruptions: The Contractor is advised that delays are liable to occur, due to security reasons, during the access/egress process of personnel and materials from Morón Air

Base. Additionally, the Contractor shall immediately interrupt the work when it is required if security warning/risk situations occur. The contractor shall submit in writing, excess delays (90 minutes or more) experienced due to base access.

7. WORK CLEARANCE REQUEST:

7.1. 15 calendar days in advance, as minimum, before the commencement of the works, the Contractor shall request AF Form 103 "BCE Work Clearance Request" to Construction Management in order to obtain all the information pertaining to the current status of Base utilities. Additional requests shall be submitted to Construction Management 15 calendar days in advance, at minimum. The Contractor shall not perform any work under any circumstances without having the approved Work Clearance at the construction site (hard copy) and not before having marked at the site with stakes and/or pins the location of the utilities. Work Clearance Request shall only be processed once all materials and documentation necessary to commence work have been submitted and approved. The Contractor shall be responsible for any damage caused to Base utilities shown on the AF Form 103 and project drawings and shall be responsible for the repairs without additional cost to the Government.

7.2. Return entire permit to Geobase Office after completion of digging excavating activities. If additional utilities are located or encounters (or marked utilities are not found in their expected locations) then the requester shall provide a sketch to Geobase office precisely detailing the location(s) of all utilities that were found to not be in the location expected within the 10 workdays after the discovery of the discrepancy.

8. BASE UTILITIES:

8.1. The Contractor, at its expense and in coordination with the Contracting Officer or CE personnel, shall install and maintain all necessary temporary connections and distribution lines. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, and associated accessories.

8.2. Use of Base Utilities: Water, sewage and electrical utilities may be available to the Contractor for supply to the following buildings: Offices, latrines, break rooms and laboratories. If the contractor wants any of these available utilities, the contractor must provide the material for the temporary utility connection and he must perform the work for the temporary utility installation. If the contractor does not want any of these available utilities, the contractor is responsible for providing their own utilities at no additional cost to the government. Contractor must request officially the connection points needed in the Mobility Plan for CE review/approval.

Other utilities, apart from the listed below, shall be supplied by the Contractor at no cost to the Government.

The following utilities are available from the existing Base utilities:

1. Electricity: 120/208 volts, 60 Hz.

2. Non-potable water.

8.3. Base utility connection and/or disconnection: 15 calendar days before the connection/disconnection date, the Contractor shall request the connection and/or disconnection and shall indicate:

1. Type of utility required

2. Type of connection and/or disconnection to be performed

3. Utility use

4. Required consumption

5. Maximum duration

All connection and/or disconnection works of Base utilities shall be programmed between 08:30 and 16:00 hours (between 08:30 to 15:00 during the period from 15 June to 15 September) from Monday to Friday, except holidays. The utility connections and/or disconnections can be considered critical by the Government, in which case they shall be performed on the date and time most convenient to the Government, i.e. weekends and/or during nighttime hours, without additional cost to the Government. The Contractor shall be responsible for making connections and/or disconnections, conversion, transportation of Base utility to the work site, including the furnishing and installation of the mechanisms that prevent the backflow of water to the Base service (backflow preventers) and the furnishing and installation of the transformers, if required. The Contractor shall not activate or alter any control device of the Base utilities including water, sewage and electricity. The Government shall operate said control devices. The Contractor shall submit additional requests to Construction Management with a minimum of 15 calendar days in advance of the estimated date for the required connection, disconnection or control maneuver of the corresponding utility. The temporary overhead connections to utility are prohibited. All utilities shall be restored to their original condition prior to satisfying final contractual payments.

8.4. Base Utility Outages: When a utility outage is necessary, the Contractor shall request the utility outage, at least 15 calendar days in advance of the work, and shall indicate:

1. Type of affected utility

2. Type of cut to be performed

3. Maximum duration

All utility outages shall be scheduled from 08:30 and 16:00 hours (from 08:30 to 15:00 during the

period from 15 June to 15 September) from Monday to Friday, except holidays. The utility outages can be considered critical by the Government, in which case they shall be performed on the date and time most convenient to the Government, i.e. weekends and/or during nighttime hours, without Government cost. The Contractor shall be responsible for making the outage, including the provision and installation of devices and materials. The Contractor shall not activate or alter any control device of the Base utilities, including water, sewage and electricity. The Government shall operate said control devices. Temporary overhead connections to utility are prohibited. All systems shall be restored to their original condition prior to satisfying final contractual payments.

9. HOT WORK: The Contractor shall submit for approval a written request to Construction Management 15 calendar days prior to any welding, as oxyacetylene or plasma cutting work. Said request shall indicate welding procedures and fire prevention measures. All welding work performed during the project execution shall be carried out by qualified welders only. The copies of the welder certificates, issued by an approved agency, shall be kept in the construction inspector's files. Contractor will be responsible to keeping in effect the Hot Work Permit along the project execution period with the frequency established by the Fire Prevention Department.

10. VEHICULAR, MACHINERY AND EQUIPMENT TRAFFIC:

10.1. Transit Control Plan: All works requiring vehicular or pedestrian traffic disruptions on the Base shall require an approved transit control plan. Said plan shall be approved at least 15 calendar days prior to carrying out said disruption. Said plan shall include:

1. Start date of the traffic disruption
2. Duration of the traffic disruption
3. Proposed alternative routes
4. Signs, barriers, cones, flags and/or flagmen to be implemented

The Contractor shall establish alternate procedures if unforeseen circumstances take place. The responsibility of the provision, erecting, keeping and removing all signs, barriers, cones and flags shall be solely the Contractor. Once the work is completed, the Contractor shall remove the signaling elements such as signs, barriers, cones and/or flags.

10.2. Access Route Plan: 10 calendar days after the contract commencement date, the Contractor shall submit an access route plan to Construction Management for its approval by Contracting Officer or authorized representative.

10.3. Trucks: Trucks loaded with loose material (volatile dust, construction debris or other objects that could fall from them) shall be duly covered. Said covers (tarpaulins, etc.) shall be securely secured and placed on the load before accessing the Base roads.

11. STOCKPILING:

11.1. Stockpiling area of demolished/removed material: The Contractor shall transport the demolished or excavated materials to an authorized dump. Should any of the Morón Air Base shops need all or part of any of the materials from the demolition operations (concrete, aggregate and natural ground), the Contracting Office representative shall coordinate with the base Construction Management office on the exact location to stockpile said material.

11.2. Stockpiling area for Contractor material and Contractor offices: The C.O. representative shall coordinate with the base Construction Management office the exact location for Contractor offices and stockpiling.

12. CONSTRUCTION SCHEDULE:

12.1. It shall be the sole responsibility of the Contractor to ensure all required submittals are submitted for approval in a timely manner, which shall not incur any delay in completion of the project. For materials or equipment requiring a long term of procurement and delivery, said term shall be included in the period of performance. Delay in delivery/procurement will not justify an extension of the period of performance.

12.2. The Contractor shall submit an updated Construction Schedule within 7 calendar days after the Construction Phase starting date and when requested by the Contracting Officer or his authorized representative. In no case is the Contractor required to submit an updated more frequently than 20 working days. For Design-Build contracts, the updated Construction Schedule shall be submitted prior the actual construction starts.

12.3. The Construction Schedule shall include a Gantt chart showing each task, including task description, identification number, duration in calendar days, earliest start and finish dates, predecessor and successor task identification numbers, critical path and float that a task in the project network can be delayed without causing a delay to the subsequent task/s (free float) and to the project completion date (total float). The critical path shall be shown by means of a red color line and the float by means of black line after the predecessor task bar.

12.4. The Construction Schedule shall show the whole week, from Monday through Sunday. The labor days shall be from Monday through Friday. Saturday and Sunday shall be non-labor days. The holidays shall not be considered on the Construction Schedule and, therefore, they shall be considered labor days for Construction Schedule development purpose only.

12.5. The Construction Schedule shall be developed assuming 8-working hours for each labor days.

12.6. The Construction Schedule must include the following tasks if required:

12.6.1. Preconstruction tasks:

1. Preparation and transmittal of the bond and insurance submittals.

2. Preparation, transmittal, and approval of the submittals shown on document Schedule of Material Submittals (progress schedule, mobility plan, project sign, quality control plan, key staff, health and safety plan, environmental protection plan, AF Form 103 BCE Work Clearance Request, utility connection request, utility outage requests, welding work request, transit control plan, access routes, materials and equipment).

3. Procurement, fabrication and delivery on construction site of long lead time materials, equipment and fabricated assemblies.

4. The installation of the portable/modular buildings (rest room, dressing room, dining room, first aid, office, if required).

5. The installation of temporary connections from the portable/modular buildings to the utilities of the base.

6. The installation of the temporary fence and fabric plastic mesh along the perimeter of the area assigned for the Contractor (equipment and material storage, personnel vehicle parking area, portable/modular buildings, off-construction site disposal and waste area, if required).

7. The installation of the project sign.

8. The installation of the temporary plastic Jersey barriers filled with water, fence, fabric plastic mesh, cones and lights along the perimeter of the construction site.

9. The installation of the temporary signs, barriers, cones and flags along the transit routes.

10. The installation of the temporary occupational safety and health signs (prohibition, mandatory, warning, help, fire prevention, danger, directional board) at the area assigned for the Contractor.

11. The installation of the temporary occupational safety and health signs at the construction site.

12.6.2. Construction tasks:

1. The construction tasks shown on the AF Form 3052, Construction Cost Estimate Breakdown, including testing, curing time and the submission of the

delivery tickets of the waste and construction debris and the approval of the field test result data.

12.6.3. Finish tasks:

1. Required testing.

2. Commissioning.

3. Pre-final inspection, including the request.

4. Correction of deficiencies.

5. Final inspection, including the request.

6. The removal of the temporary occupational safety and health signs at the construction site.

7. The removal of the temporary plastic Jersey barriers filled with water, fence, fabric plastic mesh, cones and lights along the perimeter of the construction site.

8. Final cleaning.

9. The removal of the temporary signs, barriers, cones and flags along the transit routes.

10. The removal of the project sign.

11. The removal of the temporary occupational safety and health signs at the area assigned for the Contractor.

12. The removal of temporary connections to the utilities of the base, including the preparation and transmittal of the utility disconnection request, the utility outage request and the approval of the Government.

13. The removal of the portable/modular buildings.

14. The removal of the temporary fence and fabric plastic mesh along the perimeter of the area assigned for the Contractor.

15. Restoration of the area assigned for the Contractor. To include restoration of all grass by means of hydro seeding. Final project acceptance and progress report will not be approved until grass is established and accepted by Contracting Officer.

16. Preparation and transmittal of the letter submittal about the inventory of all excess supplies, materials and equipment imported duty free for use under this contract.

17. Preparation and transmittal of the As-Built drawing submittal.

18. Preparation and transmittal of the spatial data submittal.

19. Preparation and transmittal of the warranty letter submittal.

20. Preparation and transmittal of the submittal of a certificate from the authorized dump about the estimated amounts or waste and construction debris managed during the execution of the project.

21. Approval of the submittals.

22. Project closeout.

13. PROGRESS SCHEDULE (AF Form 3064): Within the 10 calendar days after the contract commencement date or another period determined by the Contracting Officer, the Contractor shall develop and submit a practicable schedule to Construction Management for its approval by Contracting Officer or authorized representative. The plan shall show:

1. Activity sequence that the Contractor proposes to perform the work.

2. Dates proposed by the Contractor for the start and completion of the salient features of the work (including the acquiring of materials, plant and equipment).

The progress schedule of the work shall be delivered in the line graphic format at an adequate scale indicating the percentage of work scheduled every 30 calendar days for its execution during the performance period. The programmed works shall correspond to the line items of the cost estimate of the contract. If the Contractor fails to submit a progress schedule of the works within the established period, the Contracting Officer may withhold the approval of the progress payments until the Contractor submits the required progress schedule.

14. PROGRESS REPORT (AF Form 3065): Every 30 calendar days progress report to be submitted to Construction Management Office in accordance with previously submitted Progress Schedule AF Form 3064. If the Contractor fails to submit a progress report of the works within the established period, the Contracting Officer may withhold the approval of the progress payments until the Contractor submits the required progress schedule. No work items will be considered 100% complete until approval of preconstruction and final submittals required. For each individual project Contracting Officer will determine the maximum percentage of work complete without preconstruction and final submittals required.

15. WORK PLAN

15.1 The Contractor shall submit a Work Plan within 7 calendar days after the Construction Phase starting date. The Work Plan shall present the construction activities planned to take place. The Work Plan shall be prepared in coordination with the Health and Safety Plan and the Quality Control Plan and shall contain the following:

1. The summary of the proposed methodology for the execution of each task required for the project completion.

2. The resources to be used for the execution of each task required for the project completion describing the equipment and personnel to be used.

3. Daily production for each task required for the project completion.

16. MOBILITY PLAN: The Contractor shall submit a mobility plan to Construction Management for its approval by Contracting Officer or authorized representative. Said plan shall show:

1. Location and area of the work site.

2. Location and area of the offices.

3. Location and area of the parking area.

4. Location and area of the material storage areas.

The Contractor shall include in the mobility plan the proposed system to supply the utilities required at each site.

16.1. Construction Site Fencing: The construction site, offices, parking area, latrines, and material storage areas shall be fenced in by means of a two-meter high fence with gates and locks, unless otherwise approved the Government. The Contracting Officer or authorized representative shall specify the type of fencing, height and color. Fences shall be screened with a green opaque mesh to prevent the view of the inside of the fenced area from the outside. Fencing shall be completely secured at top and bottom to prevent the access to the fenced area. The fence and mesh shall be adequately anchored to prevent their failing during high wind gusts. The Contractor shall include in the Mobilization Plan:

1. Photos, catalogs or samples of the fence to be used

2. Photos, catalog or samples of the mesh to be used

The Contractor shall not start the installation of the fencing and mesh until the plan is approved in writing by the Contracting Officer or authorized representative. The responsibility of providing,

erecting, keeping and removing all the fences and meshes shall be solely the Contractor. The Contractor shall replace or repair, within the following 24 hours or as determined by the Contracting Officer or authorized representative, all fence or mesh sections that have been damaged or deteriorated. Once the works have been finalized, the Contractor shall remove the fences and meshes.

16.2. Offices: Temporary prefabricated buildings required for administrative reasons (office space, conference room and break room) shall be in good conditions. Temporary prefabricated buildings requiring paint, repairs or are in bad conditions shall not be allowed at the site. Said temporary prefabricated buildings shall show on the outside a plaque of 0.5 x 0.5 meters maximum dimensions, indicating the name of the company and telephone number (s) of the person (s) designated as POC for the Contractor. Once the works are finalized, the Contractor shall remove the temporary prefabricated buildings.

16.3. Latrines: Prefabricated temporary buildings required for personnel latrines shall be in good conditions. The prefabricated temporary buildings requiring paint, repairs or are in bad conditions shall not be allowed on the work site. These buildings shall be kept in perfect use conditions and sanitized, shall be treated for insects and shall be emptied and cleaned with a detergent for sanitary use once a week. The frequency of emptying and cleaning shall be adjusted according to needs. The prefabricated temporary buildings shall be located at no less than 50 meters from the existing buildings of Base if they cannot be located near a sewage manhole. Once the works have been completed, the Contractor shall remove the temporary facilities and shall leave the area clean and sanitized.

16.4. Parking: The Contractor, their employees and subcontractors shall park all vehicles, including heavy machinery, equipment and vehicles, in areas where they do not pose an obstruction in the corresponding work site.

16.5. Material Storage: Material storage containers shall be in good conditions. The storage of materials, in containers or not, at the work site shall be at the Contractor's risk. The use of private security guards at the work site shall require the previous Spanish Air Force Security Forces approval. The Contractor shall not use the work site to store material. Once the works have finished, the Contractor shall remove the excess stored material.

17. PROJECT SIGN: Within 15 calendar days after the Construction Phase starting date, the Contractor shall install an identifying work/project sign in accordance with Figure 1 or Figure 2 no later than one day after the work site fencing is completed. The sign shall be mounted on two wooden posts of 10 cm x 10 cm, as minimum, fastened to the ground and adequately anchored. The location of said sign shall be determined by the Contracting Officer or his representative. During final cleanup of the work site, the sign, posts, fasteners and anchoring elements shall be removed. Unless otherwise specified, the sign shall have white background and the lettering shall be dark blue. When the performance period and completion date are contractually modified, the contractor shall replace the project sign within 15 calendar days after the contract modification at no cost to the Government.

18. QUALITY CONTROL PLAN: Within 15 calendar days after the Construction Phase starting date and after the approval of the Work Plan, the Contractor shall submit for its approval a complete Quality Control Plan in English and Spanish which may be consulted by the workers at the Contractor's offices at the site.

18.1. Content: The plan shall contain at minimum the following:

1. Names and qualifications of the proposed quality control chief and inspectors.

2. Organization Chart: Include the teaming partners/key subcontractors, and the works required for the project. The team partners/key subcontractors indicated shall be those that participate in the project and the same as those submitted in the contract bid. The lack of this information or variation with previously submitted teaming partners/key subcontractors is cause for the disapproval of the QC Plan.

3. Responsibility of the Quality Control Inspectors, Quality Control Manager and the Project Manager.

4. Inspection types to be performed. The Contractor shall fully develop a Program of Points Inspection (PPI) covering all types of works involved in the project. Development of the PPI shall be based in any and all of the following documents:

a. Project drawings and specifications.

b. Applicable regulations, standards and industry codes.

c. Specific regulations for certain products, installations or facilities.

d. Manufacturer's recommendations.

The type and number of Inspection Points (IP) shall be the required to obtain an acceptable level of inspection for achieving the best quality results. The Contracting Officer or authorized representative shall evaluate if the type and number of Inspection Points are sufficient to obtain the acceptable quality level.

5. Inspection procedures and actions to be taken for failed or unsatisfactory inspections.

6. Inspection Reporting Forms. Submit all reporting forms for any type of inspection to be performed under this project. As a minimum, a specific form shall be developed for each section of the specifications, covering all necessary inspection points for such work. Minimum information required for each IP shall be:

a. Description of the IP

b. Applicable documents

c. Type and frequency of inspection

d. Lot applied for the inspection

e. Responsible of the performed inspection

f. Inspection result

g. Date of inspection

h. Reference to non-compliance document/register, if not in compliance

i. Information about pass/rejection criteria for the IP

j. Other.

7. List of planned "Hold Inspection Points" with the estimated dates from the construction schedule.

8. "Schedule of Material Submittals" form of the project with column titled "Required Submission Date" filled in by the Contractor with the dates estimated by the Contractor for the submission of the corresponding item. Said estimated dates shall be based on the period for the delivery and review of the submissions and re-submissions, the period for the purchase orders, acquisitions and receptions at the work site of the items, the approved Work Plan of the Contractor and the completion date of the contract. If the Work Plan is modified, the Contractor shall update the "Schedule of Material Submittals" form.

9. Material Testing: Submit the name and qualifications of the testing agency or laboratory planned for testing. All test reports shall be submitted in time for review and approval. The work activity related to these tests can only be continued when the test report has been approved. If any test report fails, the following work activities shall not be executed until after the fault has been corrected. The Contractor shall be responsible for checking that all reports are reviewed by him and taking the necessary actions to resolve any failed test.

10. Perform daily reports of all activities carried out during the contract term. These daily reports shall be kept at the work site and shall be available for review at all times. A copy of the daily reports performed from Monday to Friday (or Sunday if the Contractor works during the weekend) shall be submitted weekly to Construction Management. The daily report shall include, at least, the following:

a. Inspection date

b. Weather conditions

c. Inspection of the equipment and materials delivered at the work site and their delivery date

d. Names of people who have visited the work site during the day and visit date

e. Inspection of the deficiencies found during the day and the taken corrective actions

f. Inspection and acceptance of the materials and workmanship.

g. Work performed during the day, including the used personnel and equipment

h. Any field change or modification approved by the Contracting Officer.

18.2. Daily Report electronic file naming. Each Daily Report shall be named as indicated on this paragraph, failure in doing so will result in rejection of the daily report and the Contractor has to resubmit it. Daily Report file names shall have the following format: XXXXXXX, YYYYYY, Daily Report, from ZZZZ WW VV to SSSS UU TT, where:

1. XXXXXXX stands for the contract number last seven digits, after removing the first “FA5575“digits.

2. YYYYYY stands for the project number

3. ZZZZ stands for the year in which the inspection is made on Monday

4. WW stands for the month in which the inspection is made on Monday

5. VV stands for the month in which the inspection is made on Monday

6. SSSS stands for the year in which the inspection is made on the last day of the weekly period (Friday or Sunday)

7. UU stands for the month in which the inspection is made on the last day of the weekly period (Friday or Sunday)

8. TT stands for the month in which the inspection is made on the last day of the weekly period (Friday or Sunday)

18.3. Acceptance of the Construction Quality Control (QC) Plan: Acceptance of the QC Plan is required before the start of the work. The Contracting Officer reserves the right to require changes in the QC Plan, operations and key personnel, including the dismissal of personnel, to ensure the specified work quality.

18.4. The Contractor shall be responsible for keeping the records.

19. LABORATORY TESTING:

19.1. Laboratory: All sampling and testing shall be performed by an approved laboratory, independent from the Contractor, that is accredited in accordance with a current UNE-EN 9001:2000 and registered by Junta de Andalucía for the following tests. The laboratory shall be the responsible to perform the entire quality control of the project, shall be as a consultant and shall provide the technical assistance that can be required.

19.2. Laboratory Tests: Laboratory tests performed more than 6 months before the submission date shall not be accepted.

20. PRE-FINAL AND FINAL INSPECTIONS: The pre-final and final inspections shall be conducted jointly with the Contractor, the Government inspector and a representative of the Contracting Office. The Contractor shall request a pre-final inspection once the works are completed in accordance with the inspector's judgement. After the solving of all the discrepancies found during the pre-final inspection, if any, the Contractor shall request a final inspection. All punch list items must have been completely fixed before final acceptance of the project works. The Contractor shall request to Construction Management the pre-final or final inspection at least 15 calendar days in advance of the desired date.

21. WORKDAY:

21.1. Normal Workday: Normal workday shall be from 08:00 to 17:00, from Monday to Friday, except holidays. The Contractor shall perform all work during normal workday unless the Contracting Officer or authorized representative issues a special authorization to deviate from said work schedule.

21.2. Special Working Hours: If the Contractor wishes to work outside the normal working hours, on Saturdays, Sundays or holidays, he shall submit a request to the Contracting Officer with at least 10 calendar days in advanced for evaluation (approval/disapproval).

22. CONSERVATION AND MAINTENANCE OF THE EXISTING FACILITIES:

Before the start of any work activity, the Contractor will carry out an inspection of the existing facilities at the work site (or adjacent to it), as well as the pavements proposed by the Contractor on the Transit Control Plan and on the Access Route Plan. The Contractor shall submit a report in writing, attaching photographs, to Construction Management of all the defects found during said inspection. The Contractor shall conserve and protect all existing facilities at the work site and adjacent to the work site. The Contractor shall repair all the defects that were not documented in the original report or have been further damaged by the Contractor's construction activities or negligence. These repairs will be completed without additional cost to the Government and before the final acceptance of the project.

23. ENVIRONMENTAL PROTECTION PLAN: Within 15 calendar days after the Construction Phase starting date, the Contractor shall submit to Construction Management for its approval by Contracting Officer or authorized representative an Environmental Protection Plan, in English and Spanish versions, which may be consulted by the workers at the Contractor's offices at the site. The contractors are responsible for the entire process of requesting environmental permits (where necessary) to conduct work after the approval from Spanish Air Force (SpAF) Base Commander. The contractor must submit the request for the SpAF Base Commander's approval to Civil Engineering. The program shall comply with applicable Spanish regulations and the below standards.

23.1. Integrated Natural Resources Management Plan for Morón Air Base (2015 - 2020)

23.2. Final Environmental Governing Standards for Spain, May 2014

23.3. Conservation and Maintenance of the Existing Vegetation: The Contractor shall conserve and protect the existing vegetation (trees, shrubs, grass) on the work site or adjacent to it that has not to be removed or has not to be affected by the works required by this contract. The Contractor shall only remove the trees and/or shrubs when specifically indicated on the specifications and drawings and shall avoid damaging the remaining vegetation. If any tree branch is split during the execution of the works due to the handling of the equipment or due to some carelessness of the workers, the Contractor shall prune those affected branches with a clean cut and apply a pruning paste to said cut. The Contractor shall cut the vegetal cover and/or turf at the work site to include a minimum of 1 meter outside of fencing so that it does not exceed 10 cm in height. The Contractor shall restore, at no additional cost to the Government, to its original condition the area affected during the execution of the project works before the final acceptance of project works.

23.4. Site Cleaning: The Contractor shall remove debris, waste materials and garbage and shall keep the site always tidy. All waste materials and garbage shall be placed in containers provided by the Contractor, which shall be removed daily outside of the Base to an authorized dump during the progress of the work. The Contractor shall ensure that all volatile wastes are placed in suitable containers to prevent that the wind blows them to adjacent areas and/or the aerodrome. Once the works are completed, the Contractor shall remove the containers.

23.5. Access Route Cleaning: The Contractor shall be solely responsible for any material dumped/spilled by trucks, vehicles, machinery or equipment on the access routes. Said material deposited on the access routes shall be removed by the Contractor immediately. The Contractor shall be responsible for ensuring that all access routes are kept clean at all times. No amount of material deposited on the access routes shall be tolerated.

23.6. Waste and Debris: The Contractor, 15 calendar days prior to the final inspection date, shall submit a certificate from the authorized dump or waste management plant to the Construction Management for its approval by Contracting Officer or authorized representative with the quantities of waste and debris managed during the period of the execution of the works. The delivery tickets shall be previously delivered to Construction Management for their review during

the work execution. A report detailing the types and quantities of construction debris removed will be provided to the environmental section upon completion of the works.

23.7. Hazardous Material: The contractor shall provide SDSs to the environmental section for review for each chemical they will be using to execute the project. Estimated quantities of each chemical to be used will also be provided. Before transporting any hazardous material, the Contractor shall contact the Chief of Construction Management to coordinate its handling, transportation and storage. The Contractor shall be responsible for complying with all applicable environmental regulations related to handling, transportation and storage of hazardous materials and/or waste.

23.8. Noise Control and Prevention: The Contractor shall comply with all applicable state, autonomous community, municipality and Base regulations related to the control and prevention of the noise. The Contractor shall take the measures required to prevent and control the noise in the vicinity of the construction area.

23.9. Dust Control and Prevention: The Contractor shall comply with all applicable state, autonomous community, municipality and Base regulations related to the control and prevention of the dust. The Contractor shall take the measures required to prevent and control the dust in the vicinity of the construction area.

23.10. Storm Water Pollution Control and Prevention: The Contractor shall comply with all applicable state, autonomous community, municipality and Base regulations related to the control and prevention of the pollution of the storm water. The Contractor shall take the measures required to prevent and control the pollution of the surface and ground storm waters.

24. SPECIFICATIONS AND DRAWINGS FOR THE CONSTRUCTION: (See Solicitation/Contract FAR clause 52.236-21, Specifications and Drawings for Construction, Feb 1997).

24.1. Maintenance and Updating of Specifications and As-Built Drawings: During the work execution, the Contractor shall keep 2 sets of specifications and drawings at A1 size. All the variations between the work as it has been built and the one indicated or specified on the original documents of the contract shall be shown in red. The As-Built drawings shall be kept updated at the work site at all times during the contract. All the revisions of the drawings shall be shown as follows:

1. The revisions shall be numbered

2. The revisions shall be marked in red accompanied with the revision number

3. The revision number shall be indicated on the "Mark" column of the title block

4. The revision description shall be indicated on the "Description" column of the title block

5. The approval date of the revision shall be indicated on the "Date" column of the title block

6. The Government Construction Management inspector has to sign on "Appr" column on the title block.

24.2. Availability and Review of As-Built Drawings: The As-Built drawings shall be available for inspection by the Contracting Officer or his authorized representative during the execution of the works.

24.3. Submittal of As-Built drawings: 15 calendar days prior to the final inspection date, the Contractor shall submit to Construction Management for its approval by Contracting Officer or authorized representative:

1. One complete set of the As-Built drawings in paper and A1 size showing:

a. "As-Built" stamp near the title box

b. Revisions numbered, marked in red, described, dated and signed by project inspector

2. One CD with the As-Built drawings in AutoCAD format. The AutoCAD version shall be the same version used by the Base Design Section. The name of the drawing files on the CD shall correspond to the drawing number. The CD, as well as the drawing title block, shall include the following information:

a. Project Name and Number.

b. Date.

c. Contract Number.

d. Contractor Name.

25. DD FORM 1354: Applicable to design-build projects. Contractor's Designer of Record (DOR) will submit a Transfer and Acceptance of DoD Real Property Form with the completion of as-built and spatial data. This form must be completed in accordance with UFC 1-300-08 Criteria for Transfer and Acceptance of DoD Real Property.

26. GUIDELINES FOR AS-BUILT SPATIAL DATA COLLECTION AND SUBMITTAL: The Contractor shall submit the spatial data within 10 calendar days after the approval of the As-Built drawings.

26.1. The Contractor shall be responsible for accurately collecting all the spatial data of the features as they have been constructed and installed. The required positional accuracy is +/- 2 cm.

26.2. The Contractor shall be responsible for delivering and submitting the spatial data in ESRI shapefile or ESRI Geodatabase format.

26.3. The Contractor shall identify the classification, type, size, location, identification number and other necessary attributes, as specified by the Government, for all features.

26.4. The Contractor shall be responsible for delivering and submitting the spatial data in a logical layering system according to the current version of Spatial Data Standard for Facilities Infrastructure and Environment (SDSFIE).

26.5. The Contractor shall be responsible for delivering and submitting the spatial data in the Universal Transverse Mercator (UTM) coordinate system, World Geodetic System 1984 (WGS84) datum. Morón Air Base is situated within UTM Zone 30 North.

26.6. The Contractor shall coordinate with the GeoBase Office of the Base to determine the current version being used for all software, data and standards. The Government will provide the Contractor with the data and information concerning all necessary and pertinent functions and principal features of the project including the last update of the digital planimetric data of the Base.

26.7. A copy of the approved As-Built set of drawings shall be attached to the Spatial Data submittal.

26.8. All data to be delivered shall be in a digital (electronic information) format and shall be delivered on CD-ROM or DVD-ROM. The media used for the delivery must have an external label listing:

1. Contractor's contact information.

2. Short description of the content.

3. Sequence number if there are multiple volumes.

26.8.1. A transmittal sheet in both hardcopy and digital format (*.dbf, *.xls, or ASCII comma-delimited format) must accompany the media used for the delivery and it shall contain

1. Contractor's contact information

2. Short description of the content

3. Sequence number if there are multiple volumes

4. Total number of volumes being delivered

5. List of file names

6. File descriptions on each volume

7. Instructions for reading, restoring or transferring the files from the media used for the delivery

8. Certification that all delivery media are free of known computer viruses, including the name(s) of the software used to scan the potential viruses and the date on which they were scanned

26.8.2. The following procedures must be performed before GIS data are saved on the delivery media:

1. Shapefile data shall include, as a minimum, the following files: the *.shp, *.shx, *.dbf, *.prj and *.xml or other metadata file.

2. Geodatabase data shall be returned in a Personal Geodatabase format compatible with the version of ArcGIS currently used by the GeoBase Office. All concomitant tables, domains, metadata, etc. shall be included in the Geodatabase.

3. Any ArcGIS Map Documents (i.e. *.mxd files) delivered shall be accompanied by all referenced data files, both spatial and tabular; and any associated images or other objects in the layout.

26.8.3. These deliverables include, but are not limited to:

- Site plans
- As-built drawings
- Engineering designs, plans or surveys
- Topographic surveys or studies
- Boundary or Cadastral surveys
- Master Plan drawings
- Utility (water, sewer, power, storm, etc.) designs, plans, surveys and studies
- Pavement, Grading, or Excavation plans
- Soil/Geology studies or surveys
- Environmental assessments, surveys, studies, or plans
- Historical or Archaeological surveys, studies, or plans

All data deliverables shall be in a digital (electronic information) format and shall be delivered in a format that conforms to the CADD/GIS Technology Center's Spatial Data and A/E/C CAD Standards (latest version available) as applicable. ALL digital files shall be delivered in a format that is directly readable and compatible with the installation's software and hardware platforms without conversion.

The following procedures must be performed before a file is placed on the delivery media:

1. Include all files, both graphic and non-graphic, required for the project. Make sure all files are in the same directory, and that references to those files do not include device or directory specifications.

2. Ensure all reference (external reference) files are attached and without device or directory specifications.

3. Remove all extraneous graphics/text outside the project border area, and set the active parameters to a standard setting (or the setting contained in the seed or prototype file).

4. Include any standards sheets (abbreviations, symbols libraries, font libraries, color tables, pen tables, plot configuration files, user command files, etc.) necessary for a complete project.

5. Compress and/or reduce all files using the appropriate utilities. A digital media copy of the decompression utility should be provided with the delivered data.

27. SITE INVESTIGATION AND CONDITIONS AFFECTING WORK: (See Solicitation/Contract FAR clause 52.236-3, Site Investigation and Conditions Affecting the Work, Apr 1984). The Contractor will take steps reasonably to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to:

1. Conditions bearing upon transportation, disposal, handling, and storage of materials.

2. The availability of labor, water, electric power, and roads.

3. Uncertainties of weather, river stages or similar physical conditions at the site.

4. The conformation and conditions of the ground.

5. The character of equipment and facilities needed preliminary to and during work performance.

The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government. The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government.

28. PERMITS AND RESPONSIBILITIES: The Contractor, without additional expense to the Government, shall be responsible for obtaining any necessary licenses and permits, and for complying with any USAF or Spanish national, autonomous community and municipality laws, codes, and regulations applicable to the performance of the work. The Contractor shall be responsible for all damages to persons or properties that may occur due to the Contractor's operations. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work that may have been accepted under the contract. (See Solicitation/Contract FAR clause 52.236-7, Permits and responsibilities, Nov 1991)

29. CONTRACTOR AND SUBCONTRACTOR PERSONNEL: The key staff organizational chart identifying roles and responsibilities shall be posted in the Contractor's office at all times. Any proposed key staff proposed change during the execution of the project shall be submitted to Construction Management for its approval by Contracting Officer or authorized representative.

29.1. Key Staff: The Contractor shall submit the organizational chart of proposed key staff (Project Manager, Designer of Record (DOR), Superintendent, Quality Control Manager, Surveyor, and Safety Chief) for Contracting Officer approval. The required key staff positions are mandatory and shall not be interchangeable. The Contractor shall identify Teaming Partners/Key Subcontractors and describe the extent of their involvement in the project and applicable qualifications, certifications, and specialized experience. The Contracting Officer or authorized representative shall have the right to determine, without appeal of such decision, whether the proposed or previously approved key personnel has the competence and technical capability or not, in which case, said key personnel shall be replaced immediately by another subject to approval by the Contracting Officer or his authorized representative.

29.2. Project Manager: The Contractor shall be responsible for the overall work management and shall assign a competent Project Manager from his own organization. The Project Manager must have the authority to act for the Contractor and the qualifications and experience necessary to perform adequately the work in accordance with the characteristics and complexity of the project. The Project Manager must be able to effectively answer technical questions related to the

project and effectively manage the works. The Project Manager must have, as a minimum, a university degree in Technical Architecture or Technical Engineering and at least 5-year experience managing similar projects.

29.3. Designer of Record (DOR): Applicable to Design Build Contracts. The Contractor shall be responsible for the design of each discipline and for the design management and shall assign a competent DOR. The DOR must have the authority to act for the Contractor and the qualifications and experience necessary to perform adequately the design in accordance with the characteristics and complexity of the project. The DOR shall stamp, sign, and approve each final drawing. The DOR shall be the design certifying authority and will be professional licensed through respective design authorities (i.e. U.S. Professional Engineer (P.E.) o Architect or through Colegio de Ingenieros o Arquitectos)

29.4. Superintendent: The Contractor shall be responsible for work management and shall assign and have on the worksite a competent Superintendent from its own organization. The Superintendent must be present at the work site at all times during the project execution and must have the authority to act for the Contractor and the qualifications and experience necessary to perform adequately the work in accordance with the characteristics and complexity of the project. The Superintendent must be able to effectively answer technical questions related to the project and effectively manage the work. The Superintendent must have, as a minimum, a university degree in Technical or Architectural Engineering and at least 5-year experience managing similar projects or 10 years' experience managing similar projects without a Technical or Architectural Engineering degree.

29.5. Quality Control Manager: The Quality Control Manager shall be responsible for all activities related to the Quality Control/Assurance related to the assigned project/s. The Quality Control Manager shall be only dedicated to quality control activities, such as development and compliance of the Quality Control plan, inspection program, testing program, submittal preparation and certification (signature in the AF Form 3000), etc, and shall not perform any other duties related to project execution or cost control. The Quality Control Manager shall only be present at the work site during the project execution to perform duties stated in the Quality Control Plan and must have as a minimum a university degree in Technical Engineering or Technical Architecture and at least 5 years experience as Quality Control Manager on similar projects. The Quality Control Manager shall be able to manage to a maximum of five concurrent projects.

29.5.1. Other Quality Control Personnel / Quality Control Specialist: The project might require a quality control specialist for specific works or equipment with knowledge on the required matters.

29.6. Surveyor: The surveyor shall be present at the work site as required during the project execution to perform duties stated in the Quality Control Plan and the required topographical survey of the construction and work site and must have, as a minimum, a university degree in Technical Architecture or Technical Engineering and at least 5-year experience as Surveyor on similar projects.

29.7. Safety Officer: A designated safety officer will be assigned to each project to perform the duties stated in the Safety Plan and must have a 60 hours minimum of Basic Level official training on Occupational Safety and Health and at least 5 year experience as Safety Chief on similar projects.

30. ENGLISH SPEAKING REQUIREMENT:

30.1. All formal and informal meetings shall be conducted in English. Additionally, the contractor will have the ability to communicate in English at the construction site and through writing correspondence.

30.2. The Contracting Officer or authorized representative shall have the right to terminate any meetings, without cause for claim, if in their opinion, the Contractor's English does not have the linguistic capability described above.

31. INFORMATION DISCLOSURE: The disclosure of information or photographs concerning any aspect of the materials or services related to this bid request, purchase order or other documents related to this project without the prior written approval of the Contracting Officer is banned.

32. HEALTH AND SAFETY PROGRAM:

32.1. Health and Safety Plan: Within 15 calendar days after the Construction Phase starting date, the Contractor shall submit Health and Safety Plan in English and Spanish to Construction Management for his approval by Contracting Officer or authorized representative, which may be consulted by the workers at the Contractor's offices at the site. The Health and Safety Plan shall be written by a Superior Technician in Occupational Risk Prevention, specialty in Work Safety (Técnico Superior en Prevención de Riesgos Laborales, especialidad en Seguridad en el Trabajo) or by a competent and qualified technician in accordance with current regulations. The Health and Safety Plan shall identify the risks for the safety and health of the workers and shall propose, for each risk, the necessary preventive measures to protect the physical integrity of the workers and to minimize the material damages to the facilities. Fire prevention measures shall be indicated for the works that involve fire risk. The Contractor shall provide fire extinguishers for hazardous works due to the fire or fire risk. All avoidable risks shall be eliminated. Preventive measures shall preferably be collective. When the application of collective measures is not technically feasible, the use of Personal Protection Equipment shall be allowed. The Contractor shall indicate the content of the First Aid Kit in the Health and Safety Plan.

32.2. General Regulations: The Contractor shall implement the Health and Safety Plan in accordance with the corresponding current legislation of the state, autonomous community and municipality. The program shall include, but not be limited to, the following:

32.2.1. Standard of Occupational Safety and Health Administration of United States Department of Labor

1. Public Law 91-596, 84 STAT. 1590, 91st Congress, S.2193, 29 December 1970

2. Public Law 91-596, Amendments through 1 January 2004.

32.2.2. Standard of American National Standards Institute (ANSI) and American Society of Safety Engineers (ASSE)

1. ANSI/ASSE A10.8: Safety Requirements for Scaffolding

2. ANSI/ASSE A10.12: Safety Requirements for Excavation

3. ANSI/ASSE A10.13 (Comparison package): Safety Requirements for Steel Erection
s
4. ANSI/ASSE A10.18: Safety Requirements for Temporary Roof and Floor Holes, Wall Openings, Stairways and Other Unprotected Edges in Construction and Demolition Operations

5. ANSI/ASSE A10.32: Fall Protection Systems

32.2.3. Standard of American National Standards Institute (ANSI) and American Society of Safety Professionals (ASSP)

1. ANSI/ASSE Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

32.2.4. Standards of American Society of Mechanical Engineers (ASME)

1. Guide to Mobile Crane Standards (STP-SA-055)

2. Safety Standard for Portable Automotive Service Equipment (PASE)

3. Tower Cranes (B30.3)

4. Mobile and Locomotive Cranes (B30.5)

5. Winches (B30.7)

6. Articulating Boom Cranes (B30.22)

7. Personnel Lifting Systems (B30.23)

8. Self-Erecting Tower Cranes (B30.29)

32.2.5. Code of Federal Regulations (CFR)

1. CFR, Title 29, Part 1910 (29 CFR), Occupational Safety and Health Standards (Continued).

2. 29 CFR 1910.94 Ventilation

3. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response

4. 29 CFR 1926 Safety and Health Regulations for Construction.

5. 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response

6. 29 CFR 1926.502 Fall protection systems criteria and practices.

7. 40 CFR 763 Asbestos.

32.2.6. Standards of National Fire Protection Association (NFPA)

1. NFPA 10 Standard for Portable Fire Extinguishers

2. NFPA 70 National Electrical Code

3. NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations

32.2.7. Standards of the United States Air Force (USAF)

1. AFI 91-203, Air Force Consolidated Occupational Safety Instruction

32.2.8. Standards of the United States Army Corps of Engineers (USACE)

1. Engineer Manual (EM) 385-1-1, Safety and Health Requirements

32.2.9. Spanish Health, Life, & Safety Standards and Laws.

32.3. Base Regulations: The Contractor, his employees and subcontractors shall know and comply with all Base rules and regulations, including the regulations about fire, traffic and security.

32.4. Excavations and Hazardous Areas: The Contractor shall install the devices of signaling and protection (barriers, warning lights with portable lamp with minimum IP-44, self-powered light,

beacons, flags, cones, signs and / or markers) along the excavations and other areas considered dangerous by the Government. The Contractor shall be responsible for supplying, erecting, keeping and removing all signaling and protection devices. The Contractor shall pay for the damages caused due to his negligence. Once the works are completed, the Contractor shall remove the signaling and protection devices.

32.5. Burning and Explosives: Burning practices and use of explosives without prior written authorization from the Government are forbidden.

33. ASBESTOS: The use of asbestos containing materials is forbidden.

34. LEAD PAINT: The use of lead paint is forbidden.

35. RADIO TRANSMITTER RESTRICTIONS: Radio transmitters shall not be used without prior approval from the Government.

36. WEATHER PROTECTION: The Contractor shall take the necessary precautions to protect the work, facilities, equipment and materials, including materials furnished by the Government or property of the Government, from the weather. The Contractor shall be responsible for knowing the weather forecast for each day and for taking the necessary protection measures. Before starting any work, the Contractor shall have the material (tarpaulins, etc…) or necessary equipment on the work site to protect the work, facilities, equipment and materials exposed to weather conditions that could affect them. The tarpaulins shall be waterproof and strong enough to withstand the weight of rainwater that may accumulate on the tarpaulins. The Contractor shall be responsible for the damage caused due to the lack of protection against the weather conditions.

37. MATERIAL, EQUIPMENT AND/OR PLAN SUBMISSIONS

37.1. Required Submissions: The contractor shall submit the documentation or samples indicated on the "Schedule of Material Submittals" form for each item described on that form.

If the submission of a material or equipment has not been approved by the Contracting Officer or his authorized representative, the Contractor shall not perform any purchase order of said material or equipment, nor shall receive and store it at the construction site nor shall use it for the construction.

If all the submissions corresponding to a work unit have not been approved by the Contracting Officer or his authorized representative, the Contractor shall not perform any work activity corresponding to the following work unit.

37.2. Procedure for the Submissions: The Contractor shall send an email to 496ABS.CE.CENM@us.af.mil attaching the files corresponding to AF Form 3000 and the documentation of the material, equipment, plan, etc. to be submitted. If the email size exceeds 10 Mbytes, the Contractor shall send the files using the DoD SAFE platform of the Internet page

https://safe.apps.mil/. Due to DoD SAFE platform requirements, the Contractor shall request Construction Management office to have a drop-off request sent for each submission they need to do. The Contractor shall receive an automatically generated email with instructions to upload the documents that will be only valid for 14 calendar days. Failure to upload documents in such period, or incomplete/erroneous uploads will require a new drop-off request and shall be the only responsibility of the Contractor, and those delays shall not be accounted for extensions of period of performance. The files sent by email shall not be compressed.

37.2.1. Submittal Electronic File Naming: Each submittal file shall be named as indicated on this paragraph. If a file is not named so, the submittal shall be rejected. The contractor shall submit two files. The names of the files of the submittals shall have the following format: XXXXXXX, YYYYYY, Item WW, Sub WWRV, Sec ZZZ, AF3000/AAAAAAAAAA, where:

1. XXXXXXX represents the last seven digit of the contract number, after removing the first "FA5575" digits.

2. YYYYYY represents the project number

3. WW represents the item number of the "Schedule of Material Submittals" form corresponding to submitted material, equipment, plan, etc.. It shall be added a 0 to the first nine items

4. RV correspond to the re-submission number of a submittal previously submitted. RV digits shall not be included on the file name of the first submittal of each item. It shall be added a 0 to the first nine re-submissions of the same item

5. ZZZ represents the section number of the specifications corresponding to the submitted material, equipment, plan, etc.. Add the additional digits required to indicate the full number of the corresponding section

6. The "AF3000" digits shall ONLY be included on the file name corresponding to AF 3000 form for digital signature

7. AAAAAAAAAA represents up to the 10 first digits of the description of the item of the AF form 3000. The "AAAAAAAAAA" digits shall NOT be included on the file name corresponding to AF 3000 form

37.2.2. Example number 1 "19C0015, 151011, Item 08, Sub 08, Sec 011101, As-Built D" means that the file corresponds to the contract number FA5575-19-C-0015, project number QUUG 15-1011, item number 08 of the "Schedule of Material Submittals" form, submission number 08, corresponding to section 01 11 01 of the specifications, the As-Built Drawings submission. This file includes the information submitted for review.

37.2.3. Example number 2: "19C0015, 151011, Item 03, Sub 03R1, Sec 011100, AF3000" means that the file corresponds to the contract number FA5575-19-C-0015, project number QUUG 15-1011, item number 03 of the "Schedule of Material Submittals" form, re-submission number 1 of submission number 03, corresponding to section 01 11 00 of the specifications. This file includes the AF Form 3000 form only.

37.2.4. AF 3000 Form: The Contractor shall download the Material Approval Submittal form (AF 3000) from the web site http://www.e-publishing.af.mil/?txtSearchWord=af3000&client=AFPW_EPubs&proxystylesheet=AFPW_EPubs&ie=UTF-8&oe=UTF-8&output=xml_no_dtd&site=AFPW_EPubs&btnG.x=0&btnG.y=0. The AF Form 3000 shall be signed by the Quality Control Chief.

37.2.5. Submissions: Submissions of incomplete items shall not be accepted. In the file corresponding to the PDF documentation of the material, equipment, plan, etc., the Contractor shall include a PDF copy of the corresponding AF form 3000 as the first page of said documentation. The contractor shall ensure that all the necessary fields of the AF form 3000 are filled in, that ALL the submitted information corresponding to the material, equipment, plan, etc. is complete and accurate and that said information is highlighted on said documentation to prove that it meets the project requirements.

37.3. Submission Review: After the review period of each submission, the Contracting Officer or authorized representative shall return the AF form 3000 to the Contractor indicating if the submission has or not approved and the cause of such disapproval:

1. Request of minor clarifications, changes and/or additional information

2. The submitted information is incomplete or imprecise

3. The submitted information does not meet the project requirements

37.4. Performance Period Extension due to the Re-submissions: The performance period of the contract shall not be extended if the Contractor has to submit any re-submission for any reason or cause.

37.4.1. Disapproved Submissions: If a submission is disapproved by the Contracting Officer, the Contractor shall submit again the files corresponding to the AF form 3000 and the documentation of the material, equipment, plan, etc. If minor clarifications, changes and/or additional information were required or the submitted information was incomplete or inaccurate as justification for the disapproval of the submission, the Contractor shall include said required information in the documentation of the material, equipment, plan, etc.

37.4.2. Submittals Already Approved: When a submission has been approved by the Contracting Officer, the Contractor shall not submit a re-submission for the material, equipment, plan, etc. already approved unless said re-submission is accompanied by a justification for the

requested substitution and the necessary complementary documentation (manufacturer's statement, original purchase order, etc.). The re-submission shall not be approved if it does not include the justification and the necessary complementary documentation. A simple statement from the Contractor, instead of from the manufacturer, shall not be accepted. In this case, the Contractor shall submit again the files corresponding to the AF form 3000 and the documentation of the material, equipment, plan, etc. with the justification and the necessary complementary documentation.

37.5. Delivery Date of the Submissions: The Contractor shall submit the files corresponding to AF form 3000 and the documentation of each item of the "Schedule of Material Submittals" form to the Construction Management no later than the date indicated by the Contractor on said "Schedule of Material Submittals" form included in the approved Quality Control Plan.

37.6. Review Period

37.6.1. Review Period for the Submissions: The review period of each submission may be up to 10 working days from the date of the receipt of the submission by Construction Management. In some cases, due to complexity, the review period may be up to 15 working days. These review periods are for planning purposes only, submittals requiring further coordination with respective Air Force Agencies may require additional government review periods.

38. REQUEST FOR INFORMATION (RFI)

38.1. RFI: The contractor shall submit the RFIs to request clarifications or additional information about specific aspects of the project or to propose reasoned and justified technical solutions and shall with sufficient time in advance so that the RFI can be reviewed and the contract completion date is not delayed.

38.2. Procedure for the RFIs: The Contractor shall send an email to the Contracting Officer attaching the files corresponding to "496 ABS Construction Request for Information Checklist (Post-Award)" form and the corresponding documentation of the material, equipment, plan, etc., if any. If the email size exceeds 10 Mbytes, the Contractor shall send the files using the DoD SAFE platform of the Internet page https://safe.apps.mil/. The files sent by email shall not be compressed.

38.2.1. RFI File Naming: Each RFI file shall be named as indicated on this paragraph. If a file is not named so, the RFI shall be rejected. The names of the files of the RFI shall have the following format: XXXXXXX, YYYYYY, RFI ZZ, AAAA, Attachment, where:

1. XXXXXXX represents the last seven digit of the contract number, after removing the first "FA5575" digits

2. YYYYYY represents the project number

3. ZZ represents the RFI number. It shall be added a 0 to the first nine RFIs

4. AAAAAA represents the description of the RFI

5. Attachment indicates that said file, if any, includes the documentation of the material, equipment, plan, etc. for which is requested information. The "Attachment" digits shall NOT be included on the file name corresponding to "496 ABS Construction Request for Information Checklist (Post-Award)" form

Example number 1: "19C0015, 151011, RFI 02, Sign Location, Attachment" means that the file corresponds to the contract number FA5575-19-C-0015, project number QUUG 15-1011, RFI number 02 and related to the sign location. This file includes information of the material, equipment, plan, etc. for which is requested information only.

Example number 2: "19C0015, 151011, RFI 02, Sign Location" means that the file corresponds to the contract number FA5575-19-C-0015, project number QUUG 15-1011, RFI number 02 and related to the sign location. This file includes the "496 ABS Construction Request for Information Checklist (Post-Award)" form only.

38.2.2. "496 ABS Construction Request for Information Checklist (Post-Award)" Form: The Contractor shall obtain the "496 ABS Construction Request for Information Checklist (Post-Award)" form from Construction Management.

38.2.3. RFIs: In the file corresponding to the PDF documentation of the material, equipment, plan, etc., for which is requested information, the Contractor shall include a PDF copy of the corresponding "496 ABS Construction Request for Information Checklist (Post-Award)" form as the first page of said documentation. The Quality Control Chief shall ensure that all the necessary fields of the "496 ABS Construction Request for Information Checklist (Post-Award)" are filled in, that ALL the submitted information corresponding to the material, equipment, plan, etc. is complete and accurate.

38.3. RFI Review: After the review period of each RFI, the Contracting Officer or authorized representative shall return the "496 ABS Construction Request for Information Checklist (Post-Award)" to the Contractor indicating:

1. If the RFI has or not approved, if the Contractor has made a proposal, and the cause of such disapproval

2. The requested clarifications or additional information

38.4. Performance Period Extension due to the RFIs: The performance period of the contract shall not be extended if the Contractor has to submit any RFI for any reason or cause, except if the Contracting Officer or his authorized representative approves it.

38.5. Review Period of the RFIs: The review period of each RFI may be up to 10 working days from the date of the receipt of the RFI by Construction Management. Depending on the complexity, the review period may be longer, in which case the Contractor shall be notified by Construction Management.

39. MATERIAL AND/OR EQUIPMENT PURCHASE ORDER AND DELIVERY

39.1. Material and/or Equipment Purchase Order: Once the Contractor has received the approval from the Contracting Officer for the submission, the Contractor shall make the purchase order of the approved equipment or material. The Contractor shall keep a copy of all delivery tickets of each material or equipment at the construction site for their inspection by the authorized representative of the Government.

39.2. Delay of the Delivery of Materials and/or Equipment: The delay of the delivery of materials and/or equipment shall not justify an extension of the performance period of the contract, unless justified by Federal Acquisition Regulation (FAR) clause "52.249-10 – Default" and the Contracting Officer is notified in writing within 10 days of the beginning of any delay.

40. COMMENCEMENT OF THE WORKS: The Contractor shall not start any work activity until the following submissions are approved by the Contracting Officer or his authorized representative:

1. Construction schedule
2. Work plan
3. Classification certificate
4. Quality certificate
5. Environment certificate
6. Laboratory certificate, if required
7. Work clearance request
8. Base utility connection/disconnection request, if required
9. Base utility outage request, if required
10. Welding work request, if required
11. Transit control plan, if required

12. Access haul routes
13. Progress schedule
14. Mobility plan
15. Project sign
16. Quality control plan
17. Environmental protection plan
18. Key Staff
19. Personnel listing
20. Health and safety plan

Once all the materials and/or equipment necessary for a specific work activity are at the construction site for their use, the Contractor may begin the works related to such work activity. The Contractor shall request an authorization from the Contracting Officer if he wishes to start the works without all the materials and/or equipment at the construction site.

41. DESIGN CONFERENCES: Applicable to design-build projects. Design review meetings are required after each design submittal is received. As required, additional meetings during design periods may be requested by the government Project Manager to include the DOR and respective stakeholders.

42. PRE-CONSTRUCTION CONFERENCE: The Contracting Officer may conduct a preconstruction conference before commencement of work. The Contracting Officer may request the attendance of the Contractor's key staff, representatives of the subcontractors and Government departments involved on the project. Additional meetings related to the project status may be requested by any interested party through the execution of the project. The DOR and site superintendent will be required to be at the pre-construction conference. The contractor will lead a presentation on how the work will be completed and a detailed view of the construction schedule.

43. CONSTRUCTION CONFERENCES: As required, construction conferences will be held at the request of the Government. All key staff and subcontractors may be requested to attend as required, including the DOR.

44. GENERAL CONDITIONS UPDATE: It is expected that this document may suffer changes/additions/modifications throughout the life of this contract. Whenever a change to these General Conditions is made, Contracting Officer shall deliver the updated general conditions to all

contractors for acceptance in the way that is considered more convenient to the Government. These modifications shall either be unilateral or bi-lateral, as determined by the Government.

*** END OF SECTION ***

SECTION 01 11 02

SPECIAL CONDITIONS

1. PERFORMANCE PERIOD: The performance period estimated by the Government for the completion of the entire work ready for use, including from the preconstruction activities through the finish works, is 570 calendar days, including an average inclement weather days.

CLIN#1: BASE BID: 110 calendar days
CLIN#2: OPTION 1: 90 calendar days
CLIN#3: OPTION 2: 60 calendar days
CLIN#4: OPTION 3: 110 calendar days
CLIN#5: OPTION 4: 110 calendar days
CLIN#6: OPTION 5: 90 calendar days

1.1. It shall be the sole responsibility of the Contractor to ensure all required submittals are submitted to Construction Management for approval in a timely manner, which shall not incur any delay in completion of the project. For materials or equipment requiring a long term of procurement and delivery, said term shall be included in the period of performance. Delay in delivery/procurement will not justify an extension of the period of performance.

2. CONSTRUCTION SCHEDULE:

2.1. The Contractor shall submit an updated Construction Schedule within 7 calendar days after the Construction Work Commencement (CWC) date and when requested by the Contracting Officer or his authorized representative. In no case is the Contractor required to submit an updated more frequently than 20 working days.

2.2. The Construction Schedule shall include a Gantt chart showing each task, including task description, identification number, duration in calendar days, earliest start and finish dates, predecessor and successor task identification numbers, critical path and float that a task in the project network can be delayed without causing a delay to the subsequent task/s (free float) and to the project completion date (total float). The critical path shall be shown by means of a red color line and the float by means of black line after the predecessor task bar.

2.3. The Construction Schedule shall show the whole week, from Monday through Sunday. The labor days shall be from Monday through Friday. Saturday and Sunday shall be non-labor days. The holidays shall not be considered on the Construction Schedule and, therefore, they shall be considered labor days for Construction Schedule development purpose only.

2.4. The Construction Schedule shall be developed assuming 8-working hours for each labor days.

3. WORK PLAN

3.1. The Contractor shall submit a Work Plan within 7 calendar days after the Construction Work Commencement (CWC) date. The Work Plan shall present the construction activities planned to take place. The Work Plan shall be prepared in coordination with the Health and Safety Plan and the Quality Control Plan and shall contain the following:

1. The summary of the proposed methodology for the execution of each task required for the project completion.

2. The resources to be used for the execution of each task required for the project completion describing the equipment and personnel to be used.

3. Daily production for each task required for the project completion.

4. GOVERNMENT-FURNISHED MATERIAL (GFM): Not used

5. EQUIPMENT, CONTROLS, AND MATERIAL OF THE UNITED STATES OF AMERICA:

5.1. Equipment List: The following listed equipment, controls, and materials shall be manufactured in the United States of America or in another country where the supplier is under license of the United States of America manufacturer and the product meets the same applicable specifications and/or standards. No substitutions will be allowed.

a. Hose bibbs and hose connection vacuum

6. CERTIFICATES: The submitted certificates shall be original or a notarized copy. The Contractor shall submit the certificates within 30 calendar days after the Construction Work Commencement (CWC) date.

6.1. Classification Certificate of the Contractor: Contractor must hold an updated Certificate of Classification issued by the Spanish “Registro Oficial de Licitadores y Empresas Clasificadas del Estado” of the "Ministerio de Hacienda y Administraciones Públicas" covering the following groups, subgroups, and categories. The certificate holder must execute the activities related to the certificate.

Group	Subgroup	Category
C	1	2
E	1	3

Certificate of Classification C12 corresponds to work activities related to demolitions which annual average cost is less than 150.000 euros and no greater than 360.000 euros.

Certificate of Classification E13 corresponds to work activities related to water supply and sewage system which annual average cost is greater than 360,000 euros and less than or equal to 840,000 euros.

7. SPECIAL GENERAL REQUIREMENTS: The following special conditions apply:

7.1 Work Phasing Plan: The Contractor shall submit a detailed Work Phasing Plan. Said schedule shall be submitted for approval 15 calendar days prior to the commencement of work in affected area. Schedule shall take into account that the sewer system shall be operative at all times.

7.1.1 Temporary bypass: If required, provide for continuous bypass flow around the section or sections of pipe designated to be replaced. Provide pump and bypass lines of adequate size and capacity to handle the necessary flow.

7.2 Stockpiling Area of Demolished/Removed Material: The Contractor shall transport the material to an authorized dump. Should any of the Morón Air Base shops need all or part of any of the materials from the demolition operations, Construction Management shall notify the Contracting Office, and shall coordinate with the Base Chief of Operations and Maintenance the exact location to stockpile said material.

7.3 Stockpiling Area for Contractor Material and Contractor Offices: construction Management shall coordinate with the base Chief of Operations and Maintenance the exact location for Contractor offices and stockpiling.

7.4 Trenches, Excavations and Related Equipment: The Contractor shall protect and adequately signal the excavations and trenches. In the case that there are open excavations during the night, these shall be adequately illuminated or be completely covered prior to the end of the work day. No equipment shall remain at the work site after working hours. Watering of the piles of excavated material or fill shall be accomplished in order to preclude wind dispersing said material.

7.5 Ground Penetrating Radar (GPR) Report: submit GPR report, the location of underground existing utilities shall be verified as required in section 01 11 00. The GPR results shall be analyzed by the contractor and coordinated with Base Operations personnel, so that the report can be tailored before submission in order to be a comprehensive and useful document where all the utilities are perfectly identified.

The Contractor shall conduct a GPS (Global Positioning System) and GPR (Ground Penetration Radar) of all the installed or reinstalled components of the new water lines such as: pipes, elbows, boxes, bends, valves, backflow preventers, hose bibbs, water dispensers, hydrants, etc. This GPS and GPR survey shall also be extended to all other installations different than

mechanical and should cover electrical, lightning, including ground rods, and any other new equipment or installation outside the building.

7.5.1 GPS and GPR Equipment

The GPS equipment shall be able to measure data with a precision error of less than 1 meter.

7.5.2 Excel

The Contractor shall provide a table in Excel format listing each one of the above-mentioned elements including the building or area being supplied, the pipe/valve/backflow preventer diameter, and the UTM zone 30 projection coordinates referencing the WGS84 Geodetic System.

7.5.3 GeoBase

Government personnel responsible for GeoBase will provide UTM coordinates from one of the Morón Base stations in order to calibrate or tune up the Contractor's GPS equipment.

7.6 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 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.

*** END OF SECTION ***

SECTION 02 41 00

DEMOLITION

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.

Real Decreto 105/2008 Production and Management of Construction and Demolition Residues

Ley 22/2011 Residuos y Suelos Contaminados, 28 de Julio

Ley 31/95 for Risk Prevention in the Workplace

Orden MAM/304/2002 Operaciones de Valorización y Eliminación de Residuos

Real Decreto 396/2006 Minimum health and safety requirements for the protection of workers from risk of exposure to asbestos

1.2 GENERAL REQUIREMENTS

Demolition shall not be started until authorization is received from the Contracting Officer or his/her authorized representative. Remove rubbish and debris from the job site daily; do not allow accumulations inside or outside the building. Store materials that cannot be removed daily in areas specified by the Contracting Officer or authorized representative. The demolition work shall be accomplished item by item, beginning from the roof down to the foundation and in such a manner that overloading of the intermediate items be avoided. Prior to the removal of the structural elements, drop ceilings, partitions, nonload-bearing walls and plumbing fixtures shall be removed. In case any structural element has settled, partitions shall not be removed before shoring. Whenever the work is interrupted, blind walls of a height greater than five times its thickness shall not be left without bracing. A machine to carry out the demolition work may be used to demolish walls of a height lower than 2/3 of the height the machine can reach and all the applicable safety measures shall be taken to avoid damages to objects and injuries to workers. The machine shall be used in those areas previously prepared for the machine use. The machine shall be operated on secure and solid floors only. When the machine is used for the removal of debris, no pressure will be exerted over the adjacent buildings or over the fence around the work site. A water supply connection will be left ready to water the job site when needed in order to avoid generating dust. The removal of an item which cannot be handled by only one person will be accomplished by hanging or shoring the item, avoiding its dropping down and the vibrations it may transmit to the rest of the building. The turning over of an item shall only be performed if the item is subject to be divided into its constituent parts. It shall be previously shored or braced and cut at the base; set off the force over its center of gravity and consider the area it will fall on. Nails shall be bent or removed from the wooden items. The following safety rules shall apply: The demolition work shall always be accomplished from the top

downwards in such a way that the workers stay at the same level of the demolition work, without any person staying neither underneath nor next to the area where the demolition is being accomplished. Furthermore, the workers shall use a safety belt properly fastened to a fixed point to prevent a mishap.

Officer or his authorized representative shall be able to reserve for reutilization any material originating from demolition if he so deems it convenient, in which case it shall be removed carefully and delivery to the Government in the same functioning conditions.

The same applies to materials supplied under this contract that for any cause were not installed.

1.3 SUBMITTALS

Submit the following:

1.3.1 Statements:

a. Demolition plan:

Demolition plan shall include 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. Information shall therein be contained on the authorized disposal area or recycling plant where the resultant materials from the demolition operations are to be sent and the authorization of use or certificate of the disposal facility to receive the material.

1.3.2 Certificates of compliance:

-Authorized dump or treatment and recovery plant.

-Delivery and disposal certificate of waste from construction and demolition.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with the state and local hauling and disposal regulations. RD 105/2008 shall be particularly followed. In addition, safety requirements shall conform with "Ley de Prevención de Riesgos Laborales". Also, comply with Law 10/1998.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance in the surrounding area. Vacuum and dust the work area daily. The elimination of the elements from the demolition operations shall be accomplished in an independent manner in accordance with the type of material and its components and characteristics particularly as established in the norms regulating said elimination. These operations are affected by the transportation of said waste material from the demolition point to the authorized disposal facility or recycling plant. The Contractor shall be responsible for misuse or disposition of materials to be eliminated as well as the transportation and disposal of same in unauthorized areas.

1.6 PROTECTION

1.6.1 Existing Work

Protect existing work which is to remain in place, be reused, or remain the property of the Government. Repair items which are to remain and which are damaged during performance of the work to their original condition, or replace with new. Repairs must have Contracting Officer or authorized representative approval.

1.7 BURNING

Burning of materials will not be permitted. In those building with a wooden structure or where flammable materials can be found, provide a manual fire extinguisher.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.1 EXISTING CONSTRUCTION TO BE REMOVED:

3.1.1 Previous Considerations

The facility shall be visually examined before proceeding to fumigate its interior so as to completely eliminate the risk of bites and associated mishaps. The demolition work shall be accomplished from top to bottom in such a way that the workers stay at the same level of the demolition work, without any person staying underneath or near the items to be demolished. Workers shall use safety belts fastened to a fixed point when working at a height of 3 m or higher. Provide footbridges to allow traffic between the beams or joists when the beam filling has been removed. The bracing devices will not be removed before the removal of the stress exerted over them. The oscillation effect shall be considered when cutting the metal items or when removing the stress from them. Overhanging items shall be shored before easing the counterweight. In general, items such as glass, plumbing fixtures, etc shall be removed without being divided into pieces to avoid cuts and injures. If an item is subject to be divided into parts, the resulting pieces shall be of a size that can be easily handled by only one person. The cut or demolition of an item by only one person shall be accomplished if the item is kept hung, and violent drops and the vibrations subject to be transmitted to the rest of the building or to the hanging devices are avoided. The demolition of an item will be accomplished without moving its point of support and in a slow descent. The overturning method shall only be used when dealing with items divided into pieces that are placed in the ground floor and without any contact with the adjacent building. Shoring and/or bracing shall be accomplished before overturning as well as cutting the base 1/3 of its thickness. Prior to demolishing the load-bearing walls, the building structure shall be braced at all the portal frames in direct contact with the walls. Bracing shall be accomplished by means of steel braided cables in diagonal struts and threaded tighteners. Bracing shall remain fixed/tense but untight and when the demolition work is complete it shall be removed gradually at all portal frames at the same time, and detecting a possible deformation or movement of the metal structure if any.

3.1.2 Procedures and Sequence

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 Disconnection Existing Utilities

Remove existing utilities, as indicated 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.

3.2 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.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except where specified in specifications or indicated in drawings, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.4 CLEANUP

Remove and transport debris and rubbish in a manner that will prevent spillage on pavements, streets or adjacent areas. Clean up spillage from pavements, streets and adjacent areas.

*** END OF SECTION ***

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

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.

UNA NORMA ESPAÑOLA (UNE)

UNE 104281-4-2	Materiales bituminosos y bituminosos modificados. Materiales para sellado de juntas en elementos de hormigón. Métodos de ensayo. Penetración.

MINISTERIO DE FOMENTO

CE-2021	Código Estructural 2021

MINISTERIO DE LA VIVIENDA
CODIGO TECNICO DE LA EDIFICACION (CTE)
SEGURIDAD ESTRUCTURAL (SE)

DB-SE	Structural Safety
DB-SE-AE	Exterior Actions against Construction
DB-SE-C	Foundations
DB-SE-A	Steel
DB-SE-F	Mansonry Walls

1.2 SUBMITTALS

1.2.1 Catalog Data:

- Polyethylene sheet catalog data.
- Precast concrete cabinet

1.2.2 Schedules, listing, report, plans:

- Quality Control Program.

1.2.3 Test:

- Concrete Mix design
- Slump Tests
- Compressive Strength Tests

1.2.4 Certificate

- Inspection certificate of the concrete batch plant.
- Reinforcing Bars

1.3 DELIVERY, STORAGE, AND HANDLING

Do not deliver concrete until vapor barrier, forms, reinforcement and embedded items are in place and ready for concrete placement. 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. Provide for accurate identification after bundles are broken and tags removed.

1.4 QUALITY ASSURANCE

1.4.1 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, 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. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted within the last six months. Obtain mix design approval from the contracting officer prior to concrete placement.

1.5 QUALITY CONTROL PLAN

Develop and submit for approval a concrete quality control program in accordance with the guidelines of CÓDIGO ESTRUCTURAL 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.

PART 2 - PRODUCTS

2.1 CONCRETE

2.1.1 Mix Design

Use in-situ-made concrete only when approved by Contracting Officer. Design mix in accordance with CE-2021.

Reinforced concrete shall be HA-30 / B/22 / XA2. Slump with Abrams Cone test shall be between 5 and 9 cm. Water-cement ratio shall not exceed 0,55. Minimum 300 kg cement/m3 concrete.

Mass concrete shall be HM-30 / B/22 / XA2. Slump with Abrams Cone test shall be between 5 and 9 cm. Water-cement ratio shall not exceed 0,65. Minimum 200 kg cement/m3 concrete.

Lean concrete shall be HM-15 / B/22. Slump with Abrams Cone test shall be between 5 and 9 cm. Water-cement ratio shall not exceed 0,65. Minimum 200 kg cement/m3 concrete.

2.1.2 Ready-Mixed Concrete

CE-2021, except as modified herein.

2.2 MATERIALS

2.2.1 Cement

CE-2021. Cement type CEM II A-V 42.5N, as required to achieve compressive strength, without additives for all concrete work.

2.2.2 Water

Water used for mixing and curing the concrete on site shall not contain any deleterious ingredient in such a quantity as to affect the properties of the concrete or the reinforcement protections against corrosion.

2.2.3 Aggregates

CE-2021. Obtain all aggregates for exposed concrete from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalis in the cement. In reinforced or prestressed concrete, calcium chloride may not be used as additive, nor, in general, products whose composition contains chlorides, sulphides, sulphites or other chemical components that may cause or promote corrosion of reinforcements.

2.2.4 Materials for Curing Concrete

Curing by adding moisture may be replaced by the protection of the surfaces by means

of plastic coatings, film-forming agents or other suitable treatments, provided that such methods, especially in the case of dry masses, offer the guarantees deemed necessary to achieve, during the first period of hardening, the retention of the initial moisture of the mass, and do not contain substances that are harmful to concrete. Fabric cloth made from jute or organic emulsion compound of a well-known manufacturer which has been in the market for at least five years to prevent premature evaporation of mixing water in the concrete. The compound will be transparent.

2.2.5 Reinforcing Bars

CE-2021. All bars shall be corrugated bars. Welded wire fabric shall be as per CE-2021. All bars shall be type B 500 SD or B 500 S. Reinforcing bars to be AENOR certified. Alternatively wire mesh 6 mm diameter can be B 500 T. Other bars with diameters different than 6mm are not permited to be B 500 T.

Submit mill certificates for reinforcing bars.

2.2.5.1 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 UNE-EN 10080
and UNE-EN ISO 15630, with welded intersections spaced no greater than 300 mm apart in direction of principal reinforcement.

2.2.5.2 Reinforcing Bar Supports

a. Provide reinforcement support types within structure as required by Contract Documents. Reinforcement supports must conform CE-2021.

b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar support.

c. Legs of supports in contact with formwork must be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

2.2.6 Forms

UNE 180201 standard. Provide wood, plywood, or steel. Hardwood shall have a phenolic faced for forms used in exposed concrete surfaces. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Form surfaces shall not contain irregularities.

2.2.7 Form Ties and Accessories

The use of wire alone is prohibited. Form ties and accessories shall not reduce the

effective cover of the reinforcement.

2.2.8 Expansion/Contraction Joint Filler

UNE 104281-4-2, 2.5 cm thick, unless otherwise indicated.

2.2.9 Joint Sealants

As per UNE 104281-4-2.

2.2.10 Concrete Joints

Water based acrylic resin. As reference: SIKATop-30

2.3 PRECAST CONCRETE CABINET

The cabinet will be constructed of precast concrete with high-strength CEM I 52.5N SR5 cement, with protection against sulfates and seawater, reinforced with polyethylene fibers, and including hardener, superplasticizer, and resin. Door manufactured from 1.5 mm thick galvanized steel sheet, without welding, with folds around the entire perimeter. Dimension shall be according to the drawings.

For reference: Cabinet model 615C or similar. Munasa.

PART 3 - EXECUTION

3.1 FORMS

Set forms true to line and grade and make mortar-tight. Before concrete placement, coat the contact surfaces of forms with a coating compound. Do not use mineral oil on formed surfaces to be painted. Prevent concrete damage during form removal. Provide wire ties, supports, and other devices necessary to install and secure the reinforcement. Mass concrete for footings, if applicable, may be placed in excavations shallower than 600 mm without forms, upon inspection and approval of the Contracting Officer. In those cases, excavation width shall be a minimum of 100 mm greater than indicated. After placing concrete, forms shall remain in place until the minimum concrete strength is reached according to CE-2021. Prevent concrete damage during form removal.

3.1.1 Sidewalks form setting

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 3 mm in any 3 m long section. After forms are set, grade and alignment shall be checked with a 3 m straightedge. Forms shall have a transverse slope 2% or as indicated with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

CE-2021. Provide bars, wire fabrics, wire ties, supports, and other devices necessary to install and secure the reinforcement properly. Reinforcement shall not contain rust, scale, oil, grease, clay, and foreign substances that would reduce the bond. Excessive rusting of reinforcement is a basis of rejection. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.2.1 Vapor Barrier

Provide, where indicated in drawings, around foundations. Use the greatest widths and lengths practicable so as to eliminate joints wherever possible. Lap joint minimum of 12 inches. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier.

3.2.2 Spacers

Place reinforcement and secure with galvanized or concrete or rigid plastic, spacers, or metal hangers.

3.2.3 Splicing

CE-2021. Do not make splices at points of maximum stress. Overlap bars 40 diameters minimum. Overlap welded wire fabric the spacing of the cross wires, plus 5cm.

3.2.4 Cover

CE-2021, for minimum coverage, unless otherwise indicated.

3.2.5 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:

3.2.5.1 Maximum Allowable Construction Joint Spacing

a. In walls at not more than 18.3 meter in any horizontal direction.

b. In slabs on ground, so as to divide slab into areas not in excess of 111.5 square meter.

3.2.5.2 Construction Joints for Constructability Purposes

Construction joints will be avoided as much as possible. In case the foundation needs to be executed in several phases, construction joints should be prepared with formwork perpendicular to the ground and longitudinal reinforcement where the joint is made. Construction joints may only be made between footings and foundation beams, and in piers, at top of footing .

3.2.6 Expansion Joints and Contraction Joints

Provide expansion joints at edges of floor slabs on grade abutting vertical surfaces, and additionally as indicated. Make expansion joints 20 mm wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.2.7 Placing

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop according to article 71.7.3.3 CE-2021. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 3 meters center maximum in each direction when pouring interior slabs and on 6 meters center maximum for exterior slabs.

3.2.8 Vibration

Furnish a spare vibrator on the job site whenever concrete is placed. Consolidate

concrete slabs greater than 10 cm in depth with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 10 cm or less in depth by wood straight edge. Operate vibrators with vibratory element submerged in the concrete with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18-inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.2.9 Setting Miscellaneous Material

Place and secure pipe sleeves, drains and other such items in position before concrete placement. Temporarily fill voids in sleeves and drains with readily removable material to prevent the entry of concrete. For vertical surfaces, apply adhesive between concrete following adhesive manufacturer instructions and recommendations.

3.3 MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE

CE-2021. Provide mandatory batch ticket information for each load of ready mix concrete. For "in situ" mixed 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 air temperature is less than 30 degrees C. Prior to placing concrete, remove dirt, construction debris and water from within the forms. Consolidate concrete slabs greater than 10 cm depth with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 10 cm or less in depth by tamping, spading, and settling with a heavy levelling straight edge. Except in the case that the elaborated reinforcements are in possession of an officially recognized quality mark and that the execution control is intense, it will not be possible to proceed to the concrete placement until the results of the corresponding tests are available to verify its accordance.

3.3.1 Cold Weather

Provide the temperature of the mass concrete or the formwork of no less than 5ºC. Do not place concrete when the ambient temperature is below 0ºC in the next 48 hours. According to CE-2021.

3.3.2 Hot Weather

When the concreting is carried out in hot weather, appropriate measures will be taken to prevent the evaporation of the mixing water, particularly during the transport of the concrete and to reduce the temperature of the mass. These measures should be accentuated for high resistance concrete. For this, the constituent materials of the concrete and the formwork or molds intended to receive it must be protected from sunlight. Once the concrete is placed, it will be protected from the sun and especially from the wind, to prevent it from drying out. If the ambient temperature is higher than 40ºC or there is excessive wind, the concreting will be suspended, unless, with the prior express authorization of the facultative direction, specials measures are adopted. According to CE-2021.

3.4 SURFACE FINISHES

Slope floors uniformly. After trowelling is completed protect surface for curing.

3.4.1 Defects

Repair formed surfaces by removing minor honeycombs, pits greater than 10 mm2 surface area or 3 mm maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with non-shrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb will be rejected, unless correction of defects is approved. Obtain Contracting Officer approval of corrective action prior to repair. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish, unless otherwise specified.

3.4.2 Flat Exposed Surfaces

Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

3.4.3 Formed Surfaces

3.4.3.1 As-Cast Rough Form

Provide as-cast rough form for surfaces not exposed to public view. Remove fins and other projections exceeding 6 mm in height; level abrupt irregularities

3.4.3.2 As-Cast Smooth Form

Provide as-cast smooth form for surfaces exposed to public view. Form facing material shall produce a smooth, uniform texture on the concrete. Remove fins and other projections.

3.5 FLOOR, SLAB AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

Slope floors uniformly. Provide floor slabs with a steel trowelled finish. After trowelling and moist curing are completed, apply a liquid chemical sealer-hardener compound on interior floor slabs that do not receive floor covering.

3.5.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete 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.

3.5.1.1 Steel Trowelled

First, provide a floated finish. When slab attains a proper set, trowel to a smooth, hard, dense finish. Finished surfaces shall be free of trowelled marks, uniform in texture, and a true plane, flat within 3 mm in 3 meters. Hand finish portions of the slab not accessible to power finishing equipment (e.g., edges, corners) to match the remainder of the slab. Power trowel once and finally hand trowel where a finished floor covering (e.g., tile, carpet) is specified. Power trowel twice and finally hand trowel for exposed concrete floors, Apply quartz or corundum powder as required for the float finish. The color shall be determined by the Contracting Officer or his/her authorized representative. In places where a paint finish or other continuous material finish is required, follow the previous treatment for this effect as recommended by the manufacturer.

3.5.1.2 Broomed

Provide for exterior walks unless otherwise indicated. Provide a floated finish, then finish with a flexible bristle broom. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.5.2 Pavement

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straight edge to check slope and flatness; correct and refloat as necessary. Obtain final finish by belting. Lay belt flat on the concrete surface and advance with a sawing motion; continue until a uniform but gritty nonslipped surface is obtained. Round edges and joints with an edge having a radius of 3 mm.

3.5.3 Concrete Walks

Provide 4 inches thick minimum or as shown in drawings. Provide joints thickness and spacing as indicated. Cut contraction joints with a jointing tool after the surface has been finished. Provide transverse expansion joints where indicated and at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures. Provide walks with a broomed finish unless otherwise indicated in drawings. Provide a transverse slope of 2% or as indicated in drawings.

3.5.4 Curbs

Provide same joints thickness and spacing as for concrete walks.

3.6 CURING AND PROTECTION

During the setting and first period of hardening of the concrete, the maintenance of its humidity must be ensured through adequate curing. This will be extended for the necessary period depending on the type and class of cement, the temperature and degree of humidity of the environment, etc. Curing can be done by keeping the surfaces of the concrete elements

moist, through direct irrigation that does not cause washout. The water used in these operations must have the qualities required by the CE. Curing by added moisture may replaced by the protection of the surfaces by means of plastic coatings, film-forming agents or other suitable treatments, provided that such methods, especially in the case of dry masses, offer the guarantees deemed necessary to achieve, during the first hardening period, the retention of the initial humidity of the mass, and do not contain harmful substances for the concrete. If the curing is carried out using special techniques (steam curing, for example) it will proceed in accordance with the good practice standards specific to said techniques, with prior authorization from the facultative direction.

3.6.1 Moist Curing

Provide for the removal of water without erosion or damage to the structure. Use one or several of the hereafter explained methods as per the Contracting Officer's instructions.

3.6.1.1 Fog Spraying or Sprinkling

Provide uniform and continuous application of water throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.6.1.2 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 15 cm over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

3.6.1.3 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 45 cm minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting, overlap and continuously tape sheeting joints, and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.6.2 Liquid Membrane-Forming Compound Curing

Seal or cover joint openings prior to application of the curing compound. Prevent curing compound from entering the joint. Provide and maintain compound on the concrete surface throughout the curing period.

3.6.2.1 Application

Unless the manufacturer recommends otherwise, apply compound immediately

after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 20 m2maximum per 3.78 liters of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check crack, or peel.

3.6.2.2 Protection of Treated Surfaces

Prohibit foot and vehicular traffic and other sources of abrasion for not less than 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.6.3 Curing Period

No less than 7 days for all concrete.

3.6.3.1 Additional Curing

Double the required curing period if either one or the average of both test cylinders indicate less than 90 percent of the strength specified.

3.7 CONCRETE QUALITY CONTROL

The Contractor shall submit a Quality Control Program for approval, where the Quality Control Plan shall be developed, according to the CE-2021.

3.7.1 Aggregate Testing

3.7.1.1 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 CE-2021 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.

3.7.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with CE-2021 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.

3.7.2 Concrete Testing

3.7.2.1 Slump Tests

According to CÓDIGO ESTRUCTURAL. 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 16 cubic meters (maximum) of concrete.

3.7.2.2 Compressive Strength Tests

CÓDIGO ESTRUCTURAL. Make five test cylinders for each set of tests. Samples to be taken as per CE-2021. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

*** END OF SECTION ***

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SECTION 07 92 00

JOINT SEALANTS

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.

UNA NORMA ESPAÑOLA (UNE)

UNE 104281-4-2	Materiales bituminosos y bituminosos modificados. Materiales para sellado de juntas en elementos de hormigón. Métodos de ensayo. Penetración
UNE 104281-4-4	Materiales bituminosos y bituminosos modificados. Materiales para sellado de juntas en elementos de hormigón. Métodos de ensayo. Adherencia a bloques de mortero

1.2 SUBMITTALS

Submit the following:

1.2.1 Manufacturer's Catalog Data:

a. Sealants, Primers and Bond Breakers
Data for the sealants shall include shelf life, recommended cleaning solvents, application instructions, and color chart.

1.3 ENVIRONMENTAL CONDITIONS

The ambient temperature shall be within the limits of 5 and 38 degrees C when sealant is applied.

1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon.

PART 2 - PRODUCTS

2.1 MATERIALS

Sealant materials shall in all cases be those recommended by the manufacturer's for the specific application. Contractor will provide product technical sheets stating so.

a. SIKA, S.A.
Ayala, 3-3
28001 Madrid, Spain
Tel: 276-4300

f. Approved equal.

2.2 EXTERIOR SEALANT

Shall be of the following types:

2.2.1 Single component urethane base sealing compound.

2.2.2 Multicomponent polyurethane sealing compound.

2.2.3 Single component polyurethane sealing compound.

2.2.4 Single component clear silicone sealant

Single component clear silicone sealant shall be used for all prefinished surfaces and for aluminum windows.

2.2.5 Color of sealant shall be as selected by the Contractor Offiicer.

2.3 PRIMER FOR SEALANTS

Use a non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.3.1 Bond Breakers

Use the type and consistency recommended by the sealant manufacturer for the particular application.

2.3.2 Backstops

Use backstops in all joints even if they are not shown in drawings. Use fiberglass roping, or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements, as recommended by the sealant manufacturer. Backstop material shall be compatible with the sealant. Do not use oakum and other types of absorptive materials as backstops.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

Surfaces shall be clean, dry to the touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Where grooves have not been provided, suitable grooves shall be cleaned out to the depth of 13 millimeters and ground to a minimum width of 6 millimeters without damage to the adjoining work.

3.1.1 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. Use non-staining solvents recommended by the item manufacturer.

3.1.2 Concrete Surfaces for micro-concrete application

Chip contact surface of the support for better adhesion. Once contact surface is clean, saturate with water, without puddles.

3.2 SEALANT PREPARATION

Do not modify the sealant by addition of liquids, solvents, or powders. Mix multicomponent elastomeric sealants in accordance with manufacturer's printed instructions.

3.3 APPLICATION

3.3.1 Backstops

Provide a suitable backstop where necessary. In all joints the back of joints shall be filled tightly with a backstop material.

3.3.2 Primer

Just prior to application of the sealant or calking compound, clean out all loose particles from joints. Apply primer in accordance with compound manufacturer's directions.

3.3.3 Bond Breaker

Bond breakers shall be provided as recommended by the sealant manufacturer for each type of joint and type of sealant used.

3.3.4 Sealant Compounds

Use a compound that is compatible with the material to and against which it is applied. Do not use a compound that has exceeded its shelf life or has become too jelled to be discharged in a continuous flow from the gun. Apply the compound in accordance with the manufacturer's printed instructions. Force the compound into joints with sufficient pressure to fill the joints solidly. Compound shall be uniformly smooth and free of

wrinkles.

3.3.4.1 Exterior Sealant

Provide sealant at all joints around the perimeter of openings and at all exposed joints on the building and at all joints indicated to receive sealant or where required for first class workmanship. Provide also at the following locations:

a. Joints and recesses formed where frames and subsills of windows, doors, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.
b. Metal-to-metal joints where sealant or caulking is shown or specified.
c. Bottoms of exterior door frames and thresholds.
d. Decks and walkways at construction joints.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

Protect areas adjacent to joints from compound smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

3.4.2 Cleaning

Immediately scrape off fresh compound that has been smeared on adjacent surfaces and rub clean with a solvent as recommended by the compound manufacturer for cleaning these surfaces. Upon completion of compound application, remove all remaining smears and stains resulting therefrom and leave the work in a clean and neat condition.

*** END OF SECTION ***

SECTION 09 90 00

PAINTS AND COATINGS

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.

NORMAS TECNOLOGICAS DE LA EDIFICACION (NTE)

NTE RPP-1976	"Revestimientos, pinturas".

UNA NORMA ESPAÑOLA (UNE)

UNE EN ISO 11890-1 2007	"Pinturas y barnices. Determinación del contenido en compuestos orgánicos volátiles (COV). Parte 1: Método por diferencia."
UNE-EN ISO 12944	(2018) Pinturas y Barnices. Protección de estructuras de acero frente a la corrosión mediante sistemas de pintura protectores.
UNE-EN ISO 8501	(2008) Preparación de sustratos de acero previa a la aplicación de pinturas y productos relacionados. Evaluación visual de la limpieza de las superficies.
UNE-EN ISO 8503-1	(2012) Preparación de sustratos de acero previa a la aplicación de pinturas y productos relacionados. Características de rugosidad de los sustratos de acero chorreados.
UNE-EN ISO 8504-2	(2020) Preparación de sustratos de acero previa a la aplicación de pinturas y productos relacionados. Método de preparación de la superficie

CE MARKING

Directive 2004/42/CE	2004 "on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC"

1.2 SUBMITTALS

Submit the following:

1.2.1 Certificates

-Coating: For each type of coating, or other product furnished, submit a certificate from the manufacturer stating that the product conforms to requirements referenced.

- Delivery tickets: The delivery tickets of all the paintings and coatings, from the manufacturer or painting store, indicating the delivery date, the product and quantities and reference of the project/contract by which the product is delivered to, shall be submitted.

1.2.2 Catalog Data

For each type of coating, or other product furnished. Submit technical data with the catalogue date also, which shall refers to the physical characteristic and chemical component as well as the manufacturer's Safety Data Sheets (MSDS).

1.2.3 Operation and Maintenance Data

Coating

1.3 REGULATORY REQUIREMENTS

1.3.1 Lead Content

Do not use coatings having a lead content.

1.3.2 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.3.3 Asbestos Content

Do not use coating containing asbestos.

1.4 DELIVERY AND STORAGE

Deliver materials in sealed, labeled containers bearing the manufacturer's name, brand designation, specification number, batch number and color. Restrict storage and mixing of materials to locations designated by the Contracting Officer.

1.5 SAFETY METHODS

Apply coating materials using safety methods and equipment in accordance with the manufacturer's recommendations.

1.5.1 Toxic Materials

To protect personnel from overexposure to toxic materials, the most stringent guidelines shall be adhered to:

a. The manufacturer's when using mineral spirits, or other chemicals. Use impermeable gloves, chemical goggles or face shields, and other recommended protective clothing and equipment to avoid exposure of skin, eyes, and respiratory system. Conduct work in a manner to minimize exposure of building occupants and the general public.

b. Manufacturer's Material Safety Data Sheets.

1.6 ENVIRONMENTAL CONDITIONS

1.6.1 Interior Coatings

Unless otherwise specified by the manufacturer, apply coatings when surfaces to be painted are dry and the surface temperatures in a range of 6º – 28ºC before application and during the drying period. Sun exposure will not directly affect the application plane. In rainy weather, if the surface is not protected the application will be postponed.

1.7 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements

1.8 LOCATION AND SURFACE TYPE TO BE PAINTED

All plaster, masonry and others, carpentry (except aluminum) and metal structures shall be painted.

1.8.1 Paint Included

Where a space or surface must be painted as indicated, the following areas will be included unless otherwise specified:

a. Surfaces behind dismountable objects and surface mounted elements which can be easily removed by unfastening elements such as screws and bolts.
b. Existing coated surfaces that are damaged during performance of the work.

1.8.2 Paint Excluded

Do not paint the following unless otherwise indicated.

a. Concealed surfaces which are inaccessible by panel boards, fixed ductwork, machinery, and equipment fixed in place.
b. Surfaces in concealed spaces. Concealed spaces are defined as spaces above suspended ceilings, attic spaces, crawl spaces and chases.
c. Copper, stainless steel, aluminum, brass, and lead, and varnish, lacquer and cork finished surfaces, chalkboards and factory finished items.
d. Precast concrete surface to be exposed.

PART 2 - PRODUCTS

2.1 MATERIALS

Paint product shall be furnished by re-known manufacturers. Colors of Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Submit Product Data Sheets for specified coatings and solvents. Provide preprinted cleaning and maintenance instructions for all coating systems.

2.2 COLORS

2.2.1 Exterior plaster, cement, masonry and other surfaces

a. Background RAL 1014

2.3 PRODUCT REQUIREMENTS

The products shall comply with the following requirements:

2.3.1 Unpainted exterior plaster, cement, masonry and other surfaces or with paint in poor conditions:

a. Prime: Universal Fixing-primer for porous surfaces

Color	Transparent, colorless
Specific Weight	1,02±0,05 kg/l
Viscosity	4 +/- 3 PO
Solids Contend (Vol)	46±1
Solids Contend (Weight)	47±1
Drying to touch	(20ºC. y 60% H.R) 10 -30 min.
Recoat (20ºC. y 60% H.R):	4 hours
Classification	AFNOR NFT 36005 Group I class 7b2.

b. Intermediate Coat: Water based smooth covering carbonation resistant and water vapor permeable.

Finishes	Mate
Specific Weight:	1,51±0,05 kg/l
Viscosity	95+/- 15 PO
Solid Conted (Vol)	47±1
Solid Contend (Weight)	66±1
VOC Cat.a/BA 75/40:	0,48 g/l

Drying to touch:	(20ºC. y 60% H.R) 1 h. Washable: 25 – 30 days.
Recoat: (20ºC. y 60% H.R):	4- 6 hours
Classification	AFNOR NFT 36005 Group I class 7b2

c.Final Coat: Acrylic Copolymers Based Textured coat (2 coats)

Finishes	Rough Matt
Specific Weighto:	1,67±0,05 kg/l
Solid Contend (Vol)	43±1
Solid Contend (Weight)	80±1
VOC Cat.a/BA 75/40:	1 g/l
Drying to touch:	(20ºC. y 60% H.R) 1-3 h. washable: 25–30 days.
Recoat: (20ºC. y 60% H.R):	24 hours
Classification	AFNOR NFT 36005 Group I class 7b2

2.3.2 Unpainted Galvanized Steel Surfaces

Phosphate and passivator primer of two components with corrosion inhibitors and chromate-free:

Gloss:	Semi-matte
Color:	Greenish-yellow
Solids:	20% volume
Density:	0.95 kg/l of the product mixed
Efficiency for 10 microns	20 – 25 m²/l
Film thickness	8 – 10 microns dry or 50 microns wet

b. Intermediate and final coating: Two component polyurethane acrylic enamel.

Color:	Green
Volume solids:	50,0 %
Density:	1,2 kg/l
Film thickness:	40 microns

2.3.3 Unpainted Cooper or Brass surface (hose bibbs)

Two-component epoxy primer suitable for non-ferrous metals:

Gloss: Semi-matte
Color: Greenish-yellow
Volume solids: 20%
Density: 0.95 kg/l (mixed product)
Theoretical coverage at 10 microns DFT: 20–25 m²/l
Recommended dry film thickness: 50–75 microns

Surface must be clean, dry, degreased, and lightly abraded prior to application.

b. Intermediate and final coating: Two component polyurethane acrylic enamel.

Color: Green
Volume solids: 50.0%
Density: 1.2 kg/l
Recommended dry film thickness: 40 microns

This coating may be applied directly over the cured epoxy primer and can function as both intermediate and final coat depending on the required protection level.

2.3.4 Unpainted exterior and interior PVC

a. Primer (Epoxy Primer for PVC)

Type: Two-component epoxy–polyamide primer with zinc phosphate (formulated for PVC after light sanding or adhesion promoter application).
Color: Red
Volume solids: 50.0 %
Density: 1.40 kg/L
Recommended dry film thickness (DFT): 45 microns
Technical notes for PVC:
Requires an adhesion promoter for plastics or light sanding (P240–P320).
Excellent chemical resistance and very good adhesion on rigid PVC.

b. Intermediate and Final Coatings (Polyurethane Topcoat for PVC)

Type: Two-component polyurethane acrylic enamel (compatible with epoxy systems on PVC).
Color: Green
Volume solids: 50.0 %
Density: 1.20 kg/L
Recommended dry film thickness (DFT): 40 microns
Technical notes for PVC:

High flexibility and UV resistance, necessary to prevent cracking on PVC.

Can be applied in one or two coats depending on the required finish.

2.3.5 Unpainted exterior and interior HDPE

a. Primer (Adhesion Promoter for HDPE)

Type: Polyolefin adhesion promoter (suitable for HDPE, LDPE, PP, TPO, PE-based plastics)
Color: clear
Volume solids: 10–15 %
Density: 0.85–0.90 kg/L
Recommended dry film thickness (DFT): 10–15 microns
Recommended wet film thickness (WFT): 60–120 microns (due to low solids)

Mixing: Single-component
Method of application: Spray (preferred), brush or wipe-on depending on manufacturer
Recoat window: 5–30 minutes
Purpose: Ensures chemical surface activation of HDPE, enabling correct adhesion of subsequent coatings. Without this layer, no epoxy or PU will adhere reliably to HDPE.

b. Intermediate and Final Coating

Type: Two-component polyurethane acrylic enamel (high-flexibility, plastic-grade)
Color: Green
Volume solids: 50.0 %
Density: 1.20 kg/L
Recommended dry film thickness (DFT): 40 microns
Recommended wet film thickness (WFT): 80 microns
Mixing ratio: Typically 4:1 or 2:1 depending on manufacturer
Application: Spray gun, airless, or HVLP
Curing:
- Touch dry: 30–60 min
- Hard dry: 12–24 h
- Full cure: 5–7 days

PART 3 - EXECUTION

3.1 PROTECTION OF AREAS AND SPACES

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated or could be affected by paint during the works. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Unless the paint or primer manufacturer recommends a different surface preparation, proceed to cleaning the general support, removing dust, dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other substances deleterious to the coating All elements, such as door and window frames, conduits, installations and down spouts shall be mounted and installed on the wall surface. Interior areas shall be brushed and dust-free before and during the application of the coating material. Surfaces shall not be painted until all the works which produce dust or suspended particles are finalized. Artificial procedures for drying the primer or surface before applying the primer shall not be used. Surfaces shall be level and smooth unless a textured finish, as on the exterior walls, is desired.

3.2.1 Preparation of Plaster, Cement, Masonry and Other Surfaces

Unless the paint or primer manufacturer recommends a different type of surface preparation, proceed to patch all joints, cracks, holes, and other surface defects with patching plaster or spackling compound and sand out smooth. Putty defects, seal with a coat applied by brush, roller or paint gun. Small fins and imperfections on the surface shall be sanded. Surface moisture shall not exceed 6% before painting, having dried naturally. In addition to moisture content requirements, plaster shall be allowed to age a minimum of 10 days before application of coatings. Plaster, cement, masonry and other surfaces shall be inspected between coat applications to eliminate imperfections. All salt efflorescence, such as alkalinity, shall be removed by means of a chemical treatment of zinc sulphate or fluosilicate crystals dissolved in hot water in a concentration of 5 – 10%, prior to painting. Surface stains produced by mildew, besides being scraped or removed by means of a scouring pad, shall be disinfected by washing fungicides and applying the established paint treatment. The established paint treatment for areas stained by interior humidity shall be applied.

3.3 APPLICATION

3.3.1 Coating Application

Unless the paint or primer manufacturer recommends a different type of application for the pain or primer, the following process shall be implemented. Paint the different items in the workshop when possible. Paint and finish doors and other prefabricated elements before delivering them to the work site. Apply coating at the work site only for repair of minor defects or damaged surfaces. Thoroughly work coating materials into joints,

crevices, and open spaces. Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material. Surfaces shall not be painted until all dust or suspended particle producing works have finished. Artificial procedures for drying the paint or surface before applying the paint shall not be used. For epoxy paints, follow manufacturer recommendations and instructions with special precautions.

3.3.1.1 Drying Time

Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying. Provide each coat in specified condition to receive the next coat.

3.3.1.2 Primers and Intermediate Coats

Unless the paint or primer manufacturer recommends a different type of paint or primer application, do not allow primers or intermediate coats to dry more than 5 days before applying subsequent coats. Each coat shall cover the surface of the preceding coat or surface completely and there shall be a visually perceptible difference in shades of successive coats. Mixing of the primer or paint components shall be performed at the moment of application and in the quantities specified by the manufacturer. Wood surfaces shall be sanded down smooth between the different coats of paint to be applied.

3.3.1.3 Finished Surfaces

Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

3.3.2 Thinning of Paints or Primer

Unless the paint or primer manufacturer recommends a different type of thinning process for the paint or primer, reduce paints or primers to proper consistency by adding fresh paint or primer, except when thinning is mandatory for the type of paint or primer being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to be used.

3.3.3 Coating Systems

Minimum: Apply paints, primers, enamels, undercoats, and other coatings to a minimum dry film thickness of 40 micras each coat unless specified otherwise. Coating thickness, where specified, refers to the minimum dry film thickness in micras.

3.3.4 Number and Trim

Contractor shall paint the building trims with the size, shades and colors indicated in drawings. For identification numbering and lettering, see section 1.8.3 of this specification.

3.4 COATING SYSTEMS

Unless the paint or primer manufacturer recommends a different type of coating:

3.4.1 Exterior plaster, cement, masonry and other surfaces

One coat of primer and two coats of paint.

3.5 INSPECTION AND ACCEPTANCE

In addition to meeting the previously specified requirements, prove the mobility of moving components, including but not limited to swinging and sliding doors, cabinets and hardware for inspection by the Government. Perform this demonstration after appropriate curing and drying times of the coatings have elapsed and prior to invoicing for final payment.

3.6 TABLE OF PAINTING

Exterior cement, concrete, brickwork and similar surface

Coat	Material	Efficiency
Primer	15% water + 85% Vynil plastic paint	4,25 m²/litre
Intermediate	Vynil plastic paint	5 m²/litre
Top coat	Vynil plastic paint	5 m²/litre

Galvanized steel surface

Coat	Material	Film thickness dry
Primer	Phosphate and pasivator primer of two components with corrosión inhibitors and chromate-free	8-10 micras
Intermediate	Modified alkyd resin base enamel	30 micras
Top coat	Modified alkyd resin base enamel	30 micras

Cooper or Brass surface (hose bibbs)

Coat	Material	Film thickness dry
Primer	Two-component epoxy primer for non-ferrous metals	50-75 micras
Intermediate	Two-component polyurethane acrylic enamel	40 micras
Top coat	Two-component polyurethane acrylic enamel	40 micras

Exterior and interior PVC

Coat	Material	Film thickness dry
Primer	Two-component epoxy–polyamide primer with zinc phosphate	45 micras 40 micras
Intermediate	Two-component polyurethane acrylic enamel	

Exterior and interior HDPE

Coat	Material	Film thickness dry
Primer	Polyolefin adhesion promoter (suitable for HDPE, LDPE, PP, TPO, PE-based plastics)	10–15 microns 60-120 microns
Intermediate	Two-component polyurethane acrylic enamel (high-flexibility, plastic-grade)	40 microns 80 microns

*** END OF SECTION ***

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SECTION 31 00 00

EARTHWORK

PART I - 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.

MINISTERIO DE TRANSPORTES Y MOVILIDAD SOSTENIBLE

PG-3	Pliego de Prescripciones Técnicas Generales para Obras de Carreteras y Puentes.

ASOCIACIÓN ESPAÑOLA DE NORMALIZACIÓN Y CERTIFICACION
UNA NORMA ESPAÑOLA (UNE)

UNE-EN ISO 17892-1	Geotechnical investigation and testing – Laboratory testing of soil – Part 1: Determination of water content.
UNE-EN ISO 17892-4	Geotechnical investigation and testing – Laboratory testing of soil – Part 4: Determination of particle size distribution.
UNE-EN ISO 3310-1	Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth.
UNE-EN 933-1	Tests for geometrical properties of aggregates – Part 1: Determination of particle size distribution – Sieving method.
UNE-EN 933-2	Tests for geometrical properties of aggregates – Part 2: Determination of particle size distribution – Test sieves, nominal size of apertures.
UNE-EN 933-8	Tests for geometrical properties of aggregates – Part 8: Assessment of fines – Sand equivalent test.
UNE-EN 1097-2	Tests for mechanical and physical properties of aggregates – Part 2: Methods for the determination of resistance to fragmentation (Los Angeles test).
UNE-EN 13242	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction.
UNE 103100	Preparation of soil samples for testing.

UNE 103103	Determination of the liquid limit of a soil (Casagrande method).
UNE 103104	Determination of the plastic limit of a soil.
UNE 103201	Determination of soluble sulfate content of a soil.
UNE 103204	Determination of organic matter content of a soil.
UNE 103205	Determination of soluble salts content of a soil.
UNE 103206	Determination of soluble gypsum content of a soil.
UNE 103302	Determination of particle density of a soil.
UNE 103406	Collapse test on soils.
UNE 103500	Normal Proctor compaction test.
UNE 103501	Modified Proctor compaction test.
UNE 103502	Laboratory determination of California Bearing Ratio (CBR).
UNE 103503	In situ density of a soil by the sand cone method.
UNE 103601	Free swelling test in oedometer.
UNE 103900	In situ density and moisture content by nuclear methods.

SAFETY AND HEALTH (SPAIN)

Royal Decree 1627/1997	Disposiciones mínimas de seguridad y salud en las obras de construcción.
NTP 278	Zanjas: prevención de desprendimientos y derrumbes.

1.2 DESCRIPTION: The work includes performing site preparation, excavation, filling, backfilling, compacting, and finished grading necessary to construct the finished grades indicated.

The Contractor shall carry out a geotechnical investigation and testing program sufficient to characterize the ground conditions along the water lines alignment and at utility crossings prior to the start of excavation and shoring works. The investigation shall provide information on soil stratigraphy, groundwater conditions and relevant geotechnical parameters required for excavation, shoring design and backfilling works.

1.3 DEFINITIONS:

1.3.1 Backfill: Material used in refilling a cut or other excavation.

1.3.2 Compaction: The process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Compaction Rate" is expressed as a percentage of

the maximum density obtained by the applicable Proctor test (Proctor-UNE 103500 or Modified Proctor-UNE 103501, as specified) for general soil types abbreviated in this specification as X% (Proctor or Modified Proctor) maximum density".

1.3.3 Excavation: The removal of soil or hard material to obtain a specified depth of elevation.

1.3.4 Fill: Specified material placed at a specified compaction rate to obtain an indicated grade or elevation.

1.3.5 Lift: A layer or course of soil placed on top of a previously prepared or placed soil in a fill.

1.3.6 Soil: The loose surface material of the earth resulting from the chemical and mechanical weathering of rock and organic material.

1.3.7 Subgrade: The bottom layer of material graded or otherwise prepared for supporting the addition of fill material, pavement courses, or a building slab.

1.3.8 Topsoil: In natural soil formations, the fine-grained, weathered material on the surface or directly below any loose or partially decomposed organic matter. Topsoil may be a dark-colored, fine, silty, or sandy material with a high content of well decomposed organic matter.

1.3.9 Unsatisfactory Material: Existing, in-situ soil or other material which can be identified as having insufficient strength characteristics or stability to carry intended loads in fill without excessive consolidation or loss of stability.

1.3.10 Support: Set of items intended to contain the ground pressure in excavations and trenches and pits to prevent landslides, to protect the operators working inside and to limit the landslides in the adjacent soil.

1.3.11 Shoring: Protective system composed of panels of different materials; three different types: light (less than 50% of the trench wall shored), semi-full trench and full trench shoring, depending on the depth of excavation and the loads affecting it. It serves for the containment of the lands in trenches and wells in order to avoid landslides.

1.3.12 Sheet piling: Protective system made with panels of different materials and piles, capable of withstanding the thrust of the earth, in order to avoid failures of slope breakage, undermining and filling.

1.3.13 Soil characterization: Soil characterization is defined as the classification of soils through geotechnical tests that define their physical, chemical, rheological and edaphological characteristics. The following soils are studied and evaluated for their possible reuse:

1.3.13.1 Collapsible soils: Collapsible soils will be considered those in which a remolded and compacted sample, with the remolded density and humidity of the normal

Proctor test according to UNE 103500, suffers a settlement greater than one percent (1%) of the initial height of the sample when be tested in UNE 103406 and a test pressure of 0.2 MPa.

1.3.13.2 Expansive soils: Expansive soils are considered to be those in which a remolded and compacted sample, with the optimum density and humidity of the normal Proctor test according to UNE 103500, exceeds a free swelling of three percent (3%) when it's tested according to UNE 103601.

1.3.14 Contracting Officer Representative: The technical representative of the Contracting Officer responsible for the project, who may be the Civil Engineering Department responsible for the Works. The Contracting Officer Representative has authority to review and approve submittals, construction methods and technical deviations in accordance with the Contract Documents.

1.3.15 Construction Inspector: The person designated by the Owner to perform field inspections, witness tests and verify compliance of the Works with the Contract Documents.

1.4 DELIVERY AND STORAGE: Deliver and store materials in a manner to prevent contamination or segregation.

1.5 SITE CONDITIONS:

1.5.1 The Contractor shall be responsible for performing and interpreting the geotechnical investigation required to define excavation methods, shoring systems and backfilling procedures. The results of the geotechnical investigation shall be submitted to the Contracting Officer Representative for review prior to commencing earthworks.

1.5.2 Utilities: Contact the Contracting Officer Representative 72 hours prior to construction for the location of all existing underground utilities. Excavation made with power-driven equipment is not permitted within 60 cm of any known utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction use hand excavation. Temporary support and protection shall be provided. Support uncovered lines or other existing work as affected by the contract excavation until approval for backfill is granted by the Contracting Officer Representative. Report damage to utility lines or subsurface construction immediately to the Contracting Officer Representative. As-built records of all encountered utilities shall be provided.

1.5.3 Staking of existing facilities: The contractor must mark the existing facilities that affect the excavations by means of signaling stakes. These stakeouts must be carried out as indicated in the AF Form 103 building permit. In the case of crossing facilities, the contractor must submit a plan, which details each crossing as well as a detailed report of each situation before starting the excavations.

1.6 SUBMITTALS:

1.6.1 Technical data
- Geotechnical investigation report
- Shoring design report
- Topographical study of the trenches
- Utility Crossings Plan and Report
- Compaction Plan
- Dewatering Method Statement and Drawings
- As-built Records of Encountered Utilities
- Nuclear gauge calibration report

1.6.2 Test Report:
- Proposed materials test reports for Backfill
- Proposed materials test reports for reused topsoil and soil
- Field Density and Moisture Test Reports.
- Plate Load Test and Footprint Test Reports
- Saturation Lines / Isosaturation Curves Laboratory Report

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PART 2 - PRODUCTS

2.1 BACKFILL MATERIAL: Free of debris, roots, scrap material, vegetation, refuse, soft unsound particles, and deleterious or objectionable materials. The material shall be of granular nature, generally non-cohesive, either wet or dry, and may include well-graded or poorly graded sands with small percentages of fines. Such material shall be equivalent to natural sands or crushed aggregate materials (zahorras) in accordance with the Spanish General Technical Specifications for Road and Bridge Works (PG-3, Articles 330 and 332) and UNE-EN 13242.

2.1.1 Base and subbase backfill:

2.1.1.1-Select Granular Backfill ZA-20: crushed aggregate (zahorra artificial) ZA-20. To be used as base below concrete slabs and pavements, and where indicated in drawings. It shall comply with the grading limits established in PG-3 and UNE-EN 13242. Particle size distribution shall be determined in accordance with UNE-EN 933-1 (sieving method) using test sieves conforming to UNE-EN ISO 3310-1. Particle sizes as follows:

Sieve size (mm)	Percent (%) passing by weight
32	100
20	75 – 100
12.5	60 - 86
8	45 - 73
4	31 - 54
2	20 - 40
0.50	9 - 24
0.250	5 - 18
0.063	0 - 9

- Gradation:

  -Maximum nominal size: 20 mm

  -In all cases, the sieving through the 0.063 mm sieve (UNE-EN 933-2 standard) will be less than two-thirds (< 2/3) of the sieving through the 0.250 mm sieve (UNE-EN 933-2 standard)

- Chemical composition:

  - Total Sulfur S< 0.5% (UNE-EN 1744-1) where materials in contact with stabilized with cement layers and 1% in other cases.

- Course aggregates :

  - Angularity (% broken faces) according to table 510.1.a (PG3) UNE-EN 933-5.
  - Proportion of totally rounded particles according to table 510.1.b (PG3) UNE-EN 933-5.

- Flag index (FI) < 35 (UNE-EN 933-3).
- Los Angeles abrasion value (LA): According table 510.2 (PG3) UNE-EN 1097-2
- Fines content (< 0.063 mm): ≤ 1% (UNE-EN 933-1)

- Fine aggregates:
  - Sand Equivalent (SE) according to table 510.3 (PG3) UNE-EN 933-8.

- California Bearing Ratio (CBR): > 80 (UNE 103502 — CBR test)

- Moisture–density relationship (Proctor): (UNE 103500 Standard Proctor or UNE 103501 Modified Proctor as specified). If not indicated in the drawings, UNE 103501 (Modified Proctor) shall apply by default. Compaction rate as indicated in drawings, with a minimum 98% PM if not indicated or unless otherwise approved by Contracting Officer Representative.

2.1.1.2-Subbase material backfill: Selected soil according to article 330 PG3. To be used as subbase below concrete slabs and pavements, and where indicated in drawings.

Gradation:

Maximum size:	10 cm
Organic Materia	<0.2%
Soluble salts (gypsum included) SS	<0.2%
Amount of material passing no. 0.40 sieve:	< 15%
Liquid limits:	< 30
Plasticity index:	< 10
California bearing ratio:	>20

The selected soil should not produce collapse settlement or free swelling.

2.1.2 Soil Materials: Maximum particle size permitted is 7,5 cm. Use excavated materials from the site for the work indicated when material falls within requirements specified herein.

2.1.2.1 General Backfill Beside Structures: No soft, spongy, highly plastic or otherwise unstable material is permitted. The method of compaction next to the structures must be such that ensuring the required level of compaction does not affect the adjacent structural stability, using the necessary equipment for this purpose.

2.1.2.2 Topsoil: Provide salvaged topsoil. Provide additional topsoil from approved sources off the Base if salvaged topsoil is not sufficient to complete all indicated topsoil work. The recovered topsoil must meet the requirements and scales as topsoil as established by the Ministry of Agriculture.

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2.1.3 Common Fill: To be used in trenches with no paving or slabs above, as indicated in drawings. Approved and classified soil material with the following characteristics:

Maximum size:	5 cm
Organic Materia	<2%
Gypsum content	<5%
Soluble salts (different gypsum) SS	<1%
Amount of material passing no. 0.063 sieve:	less than 25%
Liquid limits:	< 50
Plasticity index:	< 21
California bearing ratio:	
Top	> 5
Core	>3
Foundation	>3
Settlement in collapse test	<1%
Free swelling	<3%

Test the filling material in accordance with UNE-EN ISO 17892-4 to verify compliance with the granulometric limits, with UNE 103104 for plastic limit, UNE 103103 for liquid limit, and UNE 103500 or UNE 103501 for the moisture–density relationship. CBR shall be determined according to UNE 103502.

2.1.4 Other materials indicated on the Drawings, such as sands with particle size less than 4 mm, selected fill materials with minimum CBR of 12, or similar, shall be supplied in accordance with the requirements of the Spanish General Technical Specifications for Road and Bridge Works (PG-3). These materials shall comply with the applicable grading, plasticity, and bearing capacity criteria, and shall be tested for acceptance in accordance with the relevant UNE and UNE-EN standards specified herein, including those for particle size distribution, Atterberg limits, moisture–density relationship (Proctor), and California Bearing Ratio (CBR).

2.1.5 The use of excavating products: All materials obtained by the excavation may be used for backfilling and other purposes upon approval by the Contracting Officer Representative and if the conditions or technical requirements established by the engineer and Construction Inspector is met. Stone or rocks appearing on a flat area where the cut zone shall be removed.

2.2 BURIED WARNING AND IDENTIFICATION TAPE: Warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 7.5 cm minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Green	Non-Potable Water
Blue	Water
Green	Sewer

2.2.1 Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.07 millimeters. Tape shall have a minimum strength of 1500 psi (105 Kg/cm²) lengthwise and 1250 psi (87 Kg/cm²) crosswise, with a maximum 350% elongation or equivalent values expressed in metric units (SI system).

2.2.2 Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.10 millimeters. Tape shall have a minimum strength of 1500 psi (105 Kg/cm²) lengthwise and 1250 psi (87 Kg/cm²) crosswise or equivalent values expressed in metric units (SI system). Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 90 centimeters deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

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PART 3 - EXECUTION

3.1 PROTECTION:

3.1.1 Shoring and Sheeting: All trenches deeper than 1.30 m shall be provided with shoring systems in accordance with Royal Decree 1627/1997 and NTP 278. The contractor will deliver a Shoring project prepared by a Technical Engineer before starting the works. The shoring project will contain at least:

- Description of soil conditions based on the relevant parameters from the Contractor´s geotechnical investigation.
- Design criteria and calculation assumptions (soil parameters, groundwater level, surcharge loads). Calculations of ground stability.
- Drawings and technical specifications of the shoring system.
- Installation and removal procedure.
- Inspection and maintenance procedures during excavation.
- Safety measures and emergency actions in case of instability or excessive deformation.
- Shoring system catalog.

Excavation without shoring shall only be permitted if expressly approved by the Contracting Officer Representative and justified by a specific geotechnical and safety analysis prepared by a competent Technical Engineer.

In no case shall excavation works start without prior approval of the shoring project or the alternative safety solution.

Upon commencing the execution of the trenches, the contractor will perform a topographical study of the trenches and it shall be presented to the Contracting Officer Representative. The aforesaid topographical study must be verified and approved by the Construction Inspector. Provide shoring and sheeting as required and as indicated in RD 1627/1997 and NTP 278 to accomplish the following:

a. Prevent undermining of pavements, foundations and slabs
b. Trench side protection according to depth:

– Trenches deeper than 1.30 m: shoring systems shall be mandatory.

– Trenches with a depth between 1.00 m and 1.30 m: trench walls may be protected either by shoring systems or by sloping, with a maximum slope of 2H:1V, with berms of 0.65 mts as approved by the Contracting Officer Representative.

– Trenches with a depth less than or equal to 1.00 m: trench walls may be sloped with a maximum slope of 1H:1V with berms of 0.65 mts.

3.1.2 Dewatering: Dispose of surface water which may accumulate in open excavations, unfinished fills, or other low areas. Remove water by trenching where approved, pumping, or other methods to prevent softening of exposed surfaces. Collect and dispose of surface water. All the dewatering will be at the contractor's expenses despite the volume of water to be removed from the bottom of the trench. The dewatering will be executed in a fashion to avoid making currents at the bottom of the trench. The Contractor shall submit for approval to the

Contracting Officer Representative or his representative the detailed drawings and other documents explaining and justifying the proposed construction methods.

3.1.3 Protection and Restoration of Surfaces: Protect newly graded areas from traffic, erosion, and settlements. Repair and reestablish damaged or eroded slopes, elevations or grades prior to acceptance. Protect existing streams, ditches and storm drain inlets from water-borne soil. The Contractor shall provide all appropriate means of signaling for the protection of the trenches and affected surfaces.

3.1.3.1 Disposal of Excavated Materials: Dispose of excavated material in such a manner that it will not obstruct the flow of streams, endanger a partly finished structure, impair the efficiency or appearance of facilities, or be detrimental to the completed work.

3.2 SURFACE PREPARATION:

3.2.1 Clearing and Grubbing: Unless indicated otherwise, remove trees, logs, stumps, shrubs, and brush within the limits of construction. Protect from damage trees and shrubs which are indicated to be saved or which are outside the limits of construction. Brush, refuse, stumps, roots, and timber shall become the property of the Contractor and removed from the Base.

3.2.2 Stockpiling Topsoil: Strip approved topsoil to a depth of 15 cm from the site where excavation or grading is indicated and stockpile separately from other excavated material. Locate topsoil so that the material can be used again for the finished grading. Protect and store in segregated piles until needed. For the reuse of this topsoil material, the contractor must submit at least the following soil tests:

-Content in organic material.
-Content of soluble salts.
-Gypsum content.
-Content in nitrogen, potassium and phosphorus.

3.2.3 Unsatisfactory Material: Remove organic matter, sod, muck, and rubbish under embankments which are less than 0.90 m in thickness and under pavements or slabs on grade.

3.3 EXCAVATION:

Excavate to the contours, elevations, and dimensions indicated. Keep excavations free from water while construction is in progress. Refill overexcavated areas below the indicated depth with the material and compaction level required for the corresponding zone (foundation, trench or embankment), as approved by the Contracting Officer Representative, or as specified herein. Refill excavations cut below the depths indicated with granular subbase and compact as specified herein. Excavate soil disturbed or weakened by the Contractor's operations and soils permitted to soften from exposure to weather.

If ground or groundwater conditions encountered differ significantly from those identified in the Contractor’s geotechnical investigation, the Contractor shall immediately notify the

Contracting Officer Representative and shall not proceed with excavation in the affected area until instructions are issued.

3.3.1 Excavations for Structures and Foundations: Excavate to depths indicated. If excavation is deeper than indicated then fill with lean concrete when the foundations are placed.

3.3.2 Shoring and Sheeting: Shore and sheet excavations with members sized and arranged to prevent injury to persons and damage to structures. Also arrange shoring and sheeting to preclude injurious caving during removal.

3.3.3 Pipe Trenches: Excavate to the dimensions indicated. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. The bottom of the trenches shall be clean from loose material and cracks and crevices shall be backfilled with the same material as the base or Support of the pipe or conduit. In cases in which the sinkholes depth is greater than the thickness of the base or support, the type and quality of the backfill shall be as indicated by the project engineer or construction inspector in order to prevent the formation of adverse beddings for the pipes or conduits.

3.4 BORROW MATERIALS:

Select borrow materials to meet requirements and conditions of the fill or backfill materials to be used. Obtain borrow materials from sources off the Base.

3.5 FILLING AND BACKFILLING:

Fill and backfill to contours, elevations, and dimensions indicated. Compact each layer before placing next one. The Contractor may not continue with the filling of the following filling layer without the approval of the density tests of the previous filling layer by the Contracting Officer Representative or his representative. These tests must be delivered in a timely manner, or the construction inspector must validate their acceptance on site by means of a copy of the on-site tests.

3.5.1 Subgrade Preparation: Scarify the subgrade surface to a depth of 20 cm before the fill is started. Step, bench, or break up sloped surfaces steeper than one vertical to 4 horizontal so that the fill material will bond with or be securely keyed to the existing material. Scarify existing surface, where filling and backfilling are not necessary, to a minimum depth of 20 cm if subgrade density is less than the compaction rate specified and recompact. When the subgrade is part fill and part excavation or ground, scarify the excavated ground portion to a depth of 20 cm and recompact as specified for the fill. Compact with equipment well suited to the soil being compacted. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

3.5.2 Fill and Backfill Beside Structures: Place required backfill adjacent to structures and compact in a manner that prevents wedging action or eccentric loading upon or against the structures. Step or serrate slopes bounding or within areas to be backfilled to prevent sliding of the fill. Do not use equipment for backfilling operations or for the formation of embankments against structures that will overload the structure.

3.5.3 General Fill and Backfill: Construct fill and backfill at the locations and to lines and grades indicated. Use only approved materials in constructing fill on the prepared subgrade. Place satisfactory material in horizontal lifts not exceeding 15 cm in loose depth. Do not place material on surfaces that are muddy, frozen, or contain frost. Compact with equipment well suited to the soil being compacted. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Compact each lift as specified before placing the overlaying lift. Backfill as rapidly as construction, testing, and acceptance of work permits. Backfilling against concrete will be done only after approval has been obtained from the Contracting Officer Representative. In trenches close (< 1 m) to electrical power poles, suitable sheet piling must be used. The sheet piling must be approved by the Contracting Officer Representative or his representative.

3.5.4 Bedding Requirements: Except as specified otherwise in the individual piping section, provide bedding for buried piping as specified herein. Backfill to bottom of pipe shall be compacted to 95% UNE 103501 maximum density. Piping shall have bedding to top line of pipe. Bedding will be applied in two phases: first phase up to centerline of the pipe; second phase, up to top line of pipe after piping installation. Bedding materials shall consist of coarse sands and sands with a maximum particle size of 4 mm, including well-graded or poorly graded granular materials with small percentages of fines, generally non-cohesive, either wet or dry. These materials shall be equivalent to granular soils suitable for bedding and backfill in accordance with PG-3, such as natural sands, complying with the requirements for grading and plasticity established in PG-3 (Articles 330 and 332) and UNE-EN 13242.

3.5.5 Weather Limitations: Fill and backfill shall not be constructed when weather conditions detrimentally affect the quality of the finished course. Place fill and backfill only if the atmospheric temperature is above freezing in the shade and is rising. Do not construct fill and backfill in the rain or on saturated subgrades. If weather conditions are windy or hot with a high rate of evaporation, schedule the placement in cooler portions of the day and furnish equipment to add moisture to the fill or backfill during and after placement.

3.6 BURIED WARNING AND IDENTIFICATION TAPE:

Provide buried utility lines with utility identification tape. Bury tape 25 centimeters below finished grade; under pavements and slabs, bury tape 15 centimeters below top of subgrade.

3.7 USE OF SOILS:

The soils used both for the trench bed and for the common backfill must be approved prior to their use. The soils for the trench bed will be as indicated in section 3.5.4. The soils for common filling will be as indicated in section 2.1.3.

In the event that there are different types of soil along the trench, they will be considered as another type of filling and comply with the following conditions:

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The materials to be used will be classified into groups whose characteristics are similar. For these purposes, those materials are considered similar, if the following is fulfilled, in a minimum of three (3) tested samples:

- Belonging to the same type of classification defined according to PG3 or Casagrande Abacus.

-Range of variation of the maximum dry density in the reference Proctor test not greater than three percent (3%).

-Optimum moisture variation ranges in the reference Proctor test not exceeding two percent (2%).

-Variation greater than 30 kg/m3 of the maximum density with optimum humidity.

-Granulometric curves with variation in a total average percentage greater than 5%.

-Within each group, the corresponding mean values of the maximum dry density and of the optimum humidity will be established, which will serve as a reference to carry out the analysis of the control results. The validity zone indicated in the isosaturation curves will also be determined.

-In the event that the materials from the same excavation area cannot be grouped in the manner described above, nor is it possible to separate them for their use, the method of controlling the finished product by the Proctor tests will not be applicable, and intensive use of the plate load test will have to be used according to PG-3 / NLT-357, with some complementary test such as the footprint test correlated with the plate load test according to PG-3 / NLT-357, or the procedural control method, as determined by the Inspector of the Works.

For each type of soil, the contractor must submit the documentation referred to in this section.

In the case of soil reuse, the following exceptions are stipulated:

The expansive soils will not be used in crowning or in the shoulders, as in these areas the seasonal variations in humidity are particularly pronounced. If the use in the core cannot be avoided, a special study will be carried out, which shall consider the functionality of the embankment-type fill, the permeability characteristics of the crown and shoulders, free swelling and climatic conditions, and will define the provisions and care to be adopted during construction. However, soils whose free swelling, according to UNE 103601, is greater than five percent (5%) may not be used in any case. These soils must be slightly compacted on the wet side, in relation to the optimum humidity of the reference Proctor test.

Collapsible soils will not be used for common fill, unless approved by the Contracting Officer Representative, verifying their viability in the core of the trench and always compacted on the wet side of the reference Proctor test.

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For the reuse of soils from trench excavations for both common fill and topsoil, the contractor must carry out the following tests if they do not comply with the provisions of section 2.1.3, and must meet the following characteristics:

-Organic material content less than two percent (MO<2%),according to UNE 103204.

-Gypsum content less than five percent (gypsum < 5%), according to UNE 103206.

-Content of other soluble salts other than gypsum less than one percent (SS < 1%), according to UNE 103205.

-Liquid limit less than sixty-five (LL < 65), according to UNE 103103.

-If the liquid limit is greater than forty (LL > 40) the plasticity index will be greater than seventy-three percent of the value resulting from subtracting twenty from the liquid limit (IP > 0.73 (LL-20)).

-Settlement in the collapse test of less than one percent (1%), according to UNE 103406, for a remolded sample according to the normal Proctor test UNE 103500, and test pressure of two tenths of a megapascal (0.2 MPa).

-Free swelling according to UNE 103601 of less than three percent (3%), for reshaped sample according to the normal Proctor test UNE 103500.

-CBR> 3 according to UNE 103502

Once the characteristics of the soil to be reused have been approved, the contractor must submit a compaction plan. The compaction plan must include at least:

- Estimation of the maximum thickness of the layer to be compacted.

-Type of machinery to be used for compaction.

-Number of passes of compaction machinery.

-Number of compaction test points.

The “caballeros”, or soils deposits, which are formed for the reuse of soil from excavations, must have a regular shape, smooth surfaces that favor water runoff and a stability level that prevents any collapse. They must be located in places that, for this purpose, the Construction Inspector indicates, but not less than 2 meters from the trench cut. Care will be taken to avoid their dragging towards the road or the drainage works, and that they are not hindering the circulation along the paths that have been established, nor the course of the drains or ditches that are in the vicinity.

The material poured into the “caballeros” may not be placed in such a way that it represents a danger to existing constructions, by direct pressure or by overloading the adjoining land.

Unusable excavated materials will be transported to an authorized landfill, with no right to ask for independent payments.

3.8 COMPACTION:

Compact each layer or lift of material specified so that in-place density tested is not less than the percentage of maximum density specified in Table I.

TABLE I

Fill and Backfill	Percent of maximum dry density according to the applicable Proctor test (UNE 103501 or UNE 103500)
Under sidewalks	98
Adjacent to structures	95
Bottom of excavated trenches	98
Common trench filling	(95-98)
Topsoil	95

3.8.1 On-site Moisture Control: Before beginning the compaction of the bottom of the excavation or any backfill layer, the contractor must verify the on-site moisture. If said humidity referred to the reference Proctor is not within the values of +2% or -2%, the contractor must carry out irrigation operations until reaching the reference humidity (-2%) or aerate the soil using scarifying techniques to reduce excess moisture. Once the most convenient humidification has been achieved, the mechanical compaction of the layer will proceed. The setting humidity will be established taking into account: the humidity, immediately after compaction, will be such that the saturation level at that moment is between the values of the corresponding saturation level, in the reference Proctor test, at humidities of less than two percent (-2%) and more than one percent (+1%) of the optimum of said reference Proctor test. In the case of expansive or collapsible soils, the indicated saturation limits will be those corresponding to humidity of less than one percent (-1%) and more than three percent (+3%) of the optimum for the reference Proctor test.

3.8.2 Filling Layer placement: Once the excavation bottom has been compacted, the filling process will be started, using the materials previously defined, which will be extended in approved layers of uniform thickness. The thickness of these layers will be adequate so that, with the available means, the required compaction rate is obtained throughout its thickness. Said thickness, in general and unless otherwise specified according to the approved Compaction Plan or by the Construction Inspector, will be fifteen centimeters (15 cm). In any case, the layer thickness must be greater than three-halves (3/2) of the maximum size of the material to be used. No layer shall be extended until it has been verified that the underlying surface meets the required conditions and the extension is authorized by the Contracting Officer Representative or his authorized representative.

3.8.3 Compaction control: The purpose of the compaction control will be to verify, on the one hand, that each layer comply with the required conditions of dry density and humidity,

and, on the other hand, that the deformability characteristics are adequate to ensure acceptable behavior of the filling. To this end, the control will be carried out by the "Finished Product Control" method, through "in situ" determinations in the compacted fill, comparing the results obtained with the corresponding reference values. In special circumstances, the Contracting Officer Representative or the Construction Inspector may also prescribe additional tests to characterize the geotechnical properties of the fill (shear strength, expansiveness, collapse, etc.). With this "Finished Product Control" method, it will be considered that the compaction of a layer is acceptable, when the following two conditions are fullfilled: the "in situ" dry density is higher than the maximum minimum value established and the saturation level is within the limits established in this section. In the event that the density in situ does not reach the minimum established values, the Contracting Officer Representative or the Construction Inspector may request the performance of the following tests:

The vertical deformation modulus in the second load cycle (Ev2) obtained from the plate load test according to PG-3 / NLT 357 shall be not less than 30 MPa, with Ev2/Ev1 ≤ 2.2.

Cross-hole tests, surface waves, penetrometric tests, stentometers, total or interstitial pressure cells, etc.

3.8.4 Reference tests:

3.8.4.1 Proctor compaction test: The reference compaction test will be the modified Proctor (UNE 103501), being the normal Proctor (UNE 103500) for soils with a swelling index greater than 3% or expansive soils.

3.8.4.2 Plate load test: To determine the modulus of deformation of the filling, the plate load test will be used. The dimensions of said plate will be such that its diameter or side is at least five (5) times greater than the maximum size of the material used. In no case will the surface of the plate be less than seven hundred square centimeters (700 cm2). The test will be carried out according to PG-3 / NLT 357 methodology, applying the pressure in two consecutive load cycles.

3.8.4.3 Footprint test: In the case of carrying out the footprint test, the footprint test correlated with the plate load test according to PG-3 / NLT 357 will be used, in which the control of settlements is indicated, on ten (10) points separated by one meter (1 m), before and after the passage of the standard truck. The indentation test will be carried out in correlation with the plate load test according to PG-3 / NLT-357 and therefore the admissible indentation values will be those that guarantee the result of the load plate. They will be established by the Director of Works at the Contractor's proposal supported by the corresponding contrast tests. In any case, the admissible footprint values will not be higher than the following: Common filling: five millimeters (5 mm).

3.9 FINISH OPERATIONS:

3.9.1 Site Grading: Grade to grades indicated within 3 cm. Grade areas to drain water away from structures and to provide suitable surfaces for moving machines. Existing grades which are to remain but are disturbed by construction operations shall be restored.

3.9.2 Finishing Subgrades Under Structures and Pavements: Finish the surface of the fill or of the subgrade to the elevation and cross section indicated. The finished surface shall be smooth and of uniform texture. Eliminate imprints made by compaction and shaping equipment. The surface shall show no deviations in excess of 9 mm when tested with a 3 m straightedge.

3.9.3 Spreading Topsoil: Clear areas indicated to receive topsoil for the finished surface of materials interfering with seeding, planting and maintenance operations. Do not place topsoil when the subgrade is frozen, extremely wet or dry, or in other conditions detrimental to seeding, planting, or grading. Spread topsoil to a uniform depth of 10 cm over the designated area.

3.9.4 Disposition of Surplus Material: Surplus or other soil material not required or suitable for filling and backfilling shall be wasted by disposition off the Base.

3.9.5 Protection of Surfaces: Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes prior to acceptance of work.

3.10 FIELD QUALITY CONTROL:

3.10.1 Density control determination “in situ”:

3.10.1.1 Batch definition: Within the control execution to be controlled, it is defined as "batch", which will be accepted or rejected as a whole, to the lowest that results from applying the following criteria to a single layer of embankment:

A trench length of 150 m in length.
The fraction built daily.
The fraction built with the same material, from the same loan and with the same equipment and compaction procedure.

A batch composed of fractions corresponding to different days or filling layers will never be chosen, therefore the number of batches chosen for each day and filling layer will be an integer number.

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3.10.1.2 Samples and tests to be carried out in each batch: Within the area defined by the batch, the following independent samples are chosen:

-Densities: Each excavation bottom will be tested for 5 points per lot.
-Densities: Each filling layer will be tested for 5 points per batch.

To measure the dry density "in situ", test the density according to UNE 103503 (sand cone method) or UNE 103900 (nuclear methods). Likewise, high performance methods such as nuclear methods with radioactive isotopes will preferably be used. In any case, before using the latter, their results will be calibrated with the determinations given by the substitution procedures. This calibration must be performed for each of the defined groups of materials and will be checked at least once for every ten (10) batches tested. In a similar way, Contractor will proceed with the humidity tests, by oven-drying according to UNE-EN ISO 17892-1.

Determination of deformations: In the event that the deformation test is required, the batch will be defined according to the indications of the Contracting Officer Representative or Construction Inspector.

The determination of deformations must always be carried out using material with the required conditions of density and saturation level; in case of doubt, or in any case that the Construction Inspector so indicates, these facts must be verified. It may even force to remove the upper crust of desiccated material before performing the test.

Thickness: Methods of estimating the thickness of the layer in the trench will be used by means of external reference stakes every 20 meters of trench length or interior signaling of the trench.

3.10.2 Analysis of the results: Acceptance criteria: The moisture and density determinations "in situ" will be compared with the reference values defined in section 3.8. Table I. For the acceptance of the compaction of a sample, the average value of the density of the sample must meet the minimum conditions established in section 3.8. Table I. In addition, at least sixty percent (60%) of the representative points of each of the individual tests in a moisture-dry density diagram must be within the validity zone defined below, and the rest of the points may not have a density lower than thirty kilograms per cubic meter (30 kg/m3) than the admissible ones as indicated. The validity zone is the one located above the reference Proctor curve, normal or modified depending on the case, and between the isosaturation lines corresponding to the limits imposed on the level of saturation in the project or in this specification.
These limit lines will be those that pass through the points of the reference Proctor curve corresponding to humidity of less than two percent (-2%) and more than 1 percent (+1%) of the optimum. In the case of expansive or collapsible soils, the points of the reference Proctor curve will be those corresponding to humidity of less than one percent (-1%) and more than 3 percent (+3%) of the optimal reference.

The saturation rate is given by:

$$Sr = w \cdot (Ps / Pw) \cdot [Pd / (Ps-Pd)]$$

and that the lines of equal saturation are defined by the expression:

$$Pd = Ps \cdot \{ Sr/ [w \cdot (Ps/Pw)+Sr] \}$$

where:

Sr = Saturation Rate (%).

w = Soil Moisture (%).

Pd = Dry Density (kg/m3).

Pw = Density of water (can be taken equal to one thousand kilograms per cubic meter 1.000 kg/m3).

Ps = Density of soil particles according to UNE 103302 (kg/m3).

The contractor shall submit a laboratory report of the saturation lines for the evaluation of the density batches that do not meet the minimum requirements and are verified by means of this analysis of results.

Failure to comply with the foregoing will result in the recompaction of the tested area or batch. In doubtful cases, it may be advisable to increase the intensity of control to reduce the frequency and incidence of unacceptable situations or batch sections to be rejected. In the event of carrying out plate-bearing tests and not complying with the indicated values or the acceptable values indicated by the Construction Inspector for the alternative test of correlation with the plate-bearing test, the batch will also be recompacted.

*** END OF SECTION ***

SECTION 31 05 19

GEOTEXTILES

PART 1 - GENERAL

1.1 OBJECT: The works covered by this section of the specifications consist in performing all operations, furnishing all labor, shop work, materials, facilities, transportation, equipment, supplies, services and execution of the placement of geotextile in accordance with the drawings and specifications, all of which are bound to the terms and conditions of the contract.

1.2 APPLICABLE PUBLICATIONS: The following publications are part of these specifications in all their extent unless otherwise indicated.

PLIEGO DE PRESCRIPCIONES TÉCNICAS GENERALES PARA OBRAS DE CARRETERAS Y PUENTES (PG-3)

Artículo 290	Geotextiles y Productos Relacionados (Orden FOM/2523/2014)
Artículo 422	Geotextiles como Elementos de Separación y Filtro (Orden FOM/1382/2002)

1.3 SUBMITTALS

1. Product data

   - Geotextile

PART 2 - MATERIALS AND EQUIPMENT

The materials and equipment shall comply with Article 290 and 422 of PG-3 with the following exceptions:

The deformation energy of the geotextile until its rupture shall be >6.4 KN/m.

The tensile strength in the main direction shall be >20 KN/m (nominal value less tolerance). The tensile strength in one direction shall not be 1.5 times greater than the tensile strength in the perpendicular direction.

The strength that causes a deformation of 20% of the elongation at the break point shall be <80% of the tensile strength. This aspect has to be fulfilled both in the direction of maximum tensile strength and in the direction perpendicular thereto.

The elongation at maximum load or deformation at break shall be> 54% (nominal value less tolerance).

The resistance to dynamic perforation (cone drop) shall be <13 mm (nominal value plus tolerance).

Static puncture resistance (CBR drilling test) shall be> 3.60 KN (nominal value less tolerance)

The durability shall be ≥ 100 years on natural soils with 4 <pH <9 and a temperature <25 ° C.

The geotextile shall not be stored out in the open for more than 15 days.

Geotextiles shall not be used if the date of manufacture is 12 months or longer.

Geotesan NT35 for reference.

PART 3 - EXECUTION

The geotextile shall be executed in compliance with Article 290 and 422 of PG-3 with the following exceptions:

The overlap shall be ≥50 cm.

The placement of the upper layer shall be made in such a way that the placement and compaction equipment do not drive at any time on the surface of the geotextile.

The direction of advance of the placement equipment of the upper layer shall be made in such a way that it does not affect the overlap of the geotextile layers.

The placement of the geotextile or top layer shall not be allowed when rainfall occurs or when the ambient temperature is <2 ° C.

The surface on which the geotextile is placed shall be clean and free of cutting or sharp objects.

The geotextile must be covered within 24 hours of placement.

The control of the geotextile to be performed by the contractor shall consist on:

- Visual inspection of the truckload before it is unloaded at the work site:

➢ Delivery note
➢ Labeling and CE marking
➢ Name and type of geotextile stamped clearly and indelibly on the geotextile itself at maximum intervals of 5 m
➢ Verification of document data

For the control of execution a minimum of 2 samples shall be taken for each lot or fraction. The level of security will be high and, therefore, the lot shall be 6,000 m^2 or the fraction built daily.

The contractor shall submit daily reports with the following information:

➢ Work area location
➢ Placement day
➢ Quantity of placed rolls, by type
➢ Manufacture date
➢ Delivery note reference
➢ Location of each roll

Paragraph 290.7 of Article 290 and 422.6 of Article 422 of PG-3: Not applicable.

*** END OF THE SECTION ***

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SECTION 32 92 19

SEEDING

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.

AENOR – UNA NORMA ESPAÑOLA (UNE)

UNE 142404-1	(2012) Fertilizantes. Requisitos para el etiquetado. Parte 1: Etiquetado de abonos sólidos inorgánicos o minerales simples con elementos nutrientes primarios

1.2 DEFINITIONS

1.2.1 Stand of Turf: 95 percent ground cover of the established species.

1.3 SUBMITTALS

Submit:

a. Seed: Submit technical data and a turf establishment schedule.
b. Fertilizer: Submit technical data.
c. Topsoil: Submit technical data.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1 Delivery

1.4.1.1 Seed Protection

Protect the seed from drying out and from contamination during delivery, on-site storage and handling.

1.4.1.2 Fertilizer Delivery

Fertilizer shall be delivered to the work site, in its original intact containers bearing labels with the chemical analysis, trade name, brand name, manufacturer's trademark and indication of compliance with the specified requirements.

1.4.2 Storage

1.4.2.1 Seed and Fertilizer Storage

Store in cool and dry locations, away from contaminants.

1.4.3 Handling

Do not throw or dump materials from vehicles.

1.5 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.5.1 Planting Dates

1.5.1.1 Seed

Seed sowing will take place from March 1 to May 15 for spring sowing and from September 1 to October 30 for fall sowing. Construction scheduling may require different timing. The seed manufacturer must provide a memorandum allowing for deviation from the above periods..

1.6.1 Restrictions

The weather restrictions have be provided by the manufacturer.

1.6 SCOPE OF WORK

Site preparation, topsoil, fertilization, and seeding of soil surfaces in areas within or outside the construction limits that have been disturbed by Contractor's operations shall be provided.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Classification

Certified seed from the last harvest, delivered in original sealed packages, with guaranteed analysis of the product for percentages of mixtures, purity, germination, weed content, and inert material. Damp, moldy, or damaged seed will be rejected. The type of grass has to be changed if recommended by the seed manufacturer depending on the type of soil (clay, siliceous, ph) in which the seed is to be sown and the season in which it is to be sown..

2.1.2 Composition of Grass

Name of Seed (Botanical)	
	40 g/m^2
Festuca arundinacea varieded 1 30%	
Festuca arundinacea varieded 2 30%	
Lolium perenne 15%	
Lolium perenne 4turf 15%	
Poa pratense 10%	
Penicetium Clandestinum (Whittet variety)	10g/m^2

2.2 TOPSOIL

2.2.1 On-Site Topsoil

Reusable topsoil shall be removed and stored in the work area if the requirements specified for topsoil as set forth in the paragraph entitled “Composition” are met.

2.2.2 Off-Site Topsoil

It shall meet the requirements specified in the paragraph entitled “Composition”. Additional topsoil shall be provided by the Contractor.

2.2.3 Composition

Topsoil shall contain between 5 to 20 percent organic matter. The maximum particle size shall be 19 mm, with a maximum of 3 percent retained on a 6 mm mesh sieve.

pH	between 7 and 7.5
Phosphor	16 ppm minimum
Total carbonates	15% minimum
Potassium	0.5 MEQ/100 g

2.3 FERTILIZER

The analysis statement shall be guaranteed by the manufacturer. The granular fertilizer shall contain a minimum percentage by weight of 15 percent available nitrogen, 15 percent available phosphorus and 15 percent available potassium. The fertilizer shall be a registered product and shall comply with UNE 142404-1. The type of fertilizer will be changed if the seed manufacturer recommends the change based on the type of soil, the seed to be sown and the sowing period.

2.4 WATER

Suitable quality for irrigation. Source of water to be approved by Contracting Officer.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Subgrade

After the areas to be seeded have been leveled to the required grade, plow to a depth of 15 cm by scarifying, discing, harrowing, or other approved methods. Remove debris and stones larger than 2.5 cm. that may remain on the surface after plowing.

3.1.2 Topsoil placement

Immediately prior to topsoil placement, scarify the subsoil to a depth of 5 cm to mix the topsoil with the subsoil. Spread topsoil uniformly to a minimum depth of 15 cm or as indicated on drawings. Do not spread topsoil while it is freezing or the weather is excessively wet or dry. Correct irregularities in finished surfaces to remedy irregularities. Protect finished topsoil areas from road and foot traffic.

3.1.3 Fertilizing

Apply fertilizer at a rate of 4 grams per square meter. Incorporate the fertilizer into the soil to a depth of at least 15 cm. This work can be done as part of the plowing operation specified above.

3.2 SEEDING

3.2.1 Seeding Conditions and Method

Immediately prior to seeding, restore the soil to the proper level. Do not plant when the soil is muddy or in unsatisfactory conditions for planting.

3.2.2 Broadcast Seeding

Sow seed at the rate of 40 g/m2 de (Festuca arundinacea varieded 1 30% + Festuca arundinacea varieded 2 30% + Lolium perenne 15%+Lolium perenne 4turf 15%+ Poa pratense 10%) + Penicetium Clandestinum (Whittet variety) 10 g/m2 by hand or using approved sowing equipment. Sow half of seed in one direction and remainder at right angles to the first sowing. Cover seed to an average depth of 2,5 cm using spike-tooth harrow, cultipacker or other approved device. The height of the grass shall be kept between 26 and 35 cm. The landscaping shall be maintained during three months.

3.2.3 Rolling

Immediately after sowing the seeds, firm the area with a roller not exceeding 120 kilograms per meter of roller width.

3.3 PROTECTION OF SEEDED AREAS

Immediately after seed sowing, protect the area from traffic or other use.

3.4 RESTORATION

Restore the existing turf areas that have been damaged during the project execution to their original condition.

3.5 WATERING

3.5.1 General

The Contractor shall be responsible for the maintenance and watering of the turf for a period of three months. Watering shall commence immediately after seeding. Adequate precautions shall be taken to avoid soil or seed movement. The frequency of watering shall be as required to keep the soil sufficiently moist. Irrigation shall be done in the early morning or late afternoon to avoid evaporation of water. The Contractor shall be responsible for performing the necessary irrigation to allow for healthy turf growth.

3.5.2 Watering

Irrigation will be carried out in such a way as to provide a daily rainfall of 7-8 mm in two periods of 3-4 mm each.

3.5.3 Watering Period

The watering season will depend on weather conditions. The soil surface shall always remain moist. The Contractor shall be responsible for the execution of irrigation necessary to allow for proper turf growth.

3.6 TURF ESTABLISHMENT PERIOD

3.6.1 Duration

The rooting period shall be until the lawn is mowed ten times or three months, whichever is longer.

3.6.2 Maintenance During Turf Establishment Period

Mow the lawn area to a maximum allowable height for the area. Remove excess clippings, weeds, water, fertilizer and perform other operations as necessary to encourage lawn growth..

3.7 FIELD QUALITY CONTROL

3.7.1 Final Inspection and Acceptance

At the end of the rooting period of the turf, a final inspection shall be made by the Contracting Officer at the written request of the Contractor. Such request shall be made at least 10 days prior to the last day of the established rooting period for such turf. Final acceptance shall be based on satisfactory rooting of the turf defined as a 95 percent ground cover of the species planted.

3.7.2 Replanting

Re-seed those areas that do not show satisfactory grass rooting within the specified planting dates and properly maintain the newly seeded areas until they take root, at no additional cost to the Government.

*** END OF SECTION ***

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SECTION 33 11 00

WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification and are referenced in the text by the basic designation only.

REAL DECRETO

Real Decreto 140/2003	Real Decreto 140/2003, de 7 de febrero, por el que se establecen los criterios sanitarios de la calidad del agua de consumo humano.
Real Decreto 3/2023	Real Decreto 3/2023, de 10 de enero, por el que se establecen los criterios técnico-sanitarios de la calidad del agua de consumo, su control y suministro.
Reglamento UE 10/2011	Reglamento (UE) no 10/2011 de la comisión de 14 de enero de 2011sobre materiales y objetos plásticos destinados a entrar en contacto con alimentos

UNA NORMA ESPAÑOLA (UNE)

UNE-EN ISO 15874	"Sistemas de canalización en materiales plásticos para instalaciones de agua caliente y fría."
UNE 53331	(1997) IN, "Tuberías de PVC y PE de alta y media densidad."
UNE 53332	(1990) "Tubos y accesorios de PVC-U para canalizaciones subterráneas, enterradas o no y empleadas para la evacuación y desagües."
UNE-EN 1092-1	(2019) Bridas y sus uniones. Bridas circulares para tuberías, grifería, accesorios y piezas especiales, designación PN. Parte 1: Bridas de acero.
UNE-EN 1074-1	(2001) Válvulas para el suministro de agua. Requisitos de aptitud al uso y ensayos de verificación apropiados. Parte 1: Requisitos generales.

UNE-EN 1074-2
Válvulas para el suministro de agua. Parte 2: Válvulas de compuerta.

UNE-EN 16767 (2017)Válvulas industriales. Válvulas antirretorno de acero y de fundición.

UNE-EN 805
Abastecimiento de agua. Requisitos para los sistemas y sus componentes fuera de los edificios.

CTC PLÁSTICOS

RP01.01 "Tubos de polietileno (PE) para aplicaciones de suministro de agua para consumo humano (UNE EN 12201-1 y 2) rev. 16 (2004.07.20)".

CÓDIGO TÉCNICO DE LA EDIFICACIÓN (CTE)

DB-HS 4 "Suministro de agua".

1.2 GENERAL

The project drawings show the general requirements as to sizes, arrangement, extent of piping and location of equipment.

1.3 CROSS CONNECTION AND INTERCONNECTIONS

Contractor shall not install any plumbing fixture, device or piping in such a manner that will make a cross connection or interconnection between the water distribution system and a polluted system which in turn may permit the backflow of sewage, gas, polluted water or mechanically treated water into a water supply system.

1.4 PROTECTION TO FIXTURES, MATERIALS AND EQUIPMENT

Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be covered tightly to protect against dirt, water and chemical or mechanical injury.

1.5 SUBMITTALS REQUIRED

The submittal requirements of the following list:

1.5.1 Manufacturer's Data:

- Pipe, Fittings, Joints, Couplings and electrowelded joining for HDPE
- Valves and valve box
- Hose bibb and Hose connection vacuum breaker
- Water meter
- Irrigation Timer (Programer)
- Handhole and covers

1.5.2 Test Reports

- Combined Hydrostatic Pressure and Leakage Test

1.5.3 Shop drawings

- SCADA system

1.5.4 Schedules, listings, reports, plans

- SCADA system

1.6 QUALITY CONTROL

1.6.1 Regulatory requirements

Use Real Decreto 3/2023, UNE-EN ISO 9001, UNE-EN ISO 14001 and UNE-EN 12873-2 for potable water materials for potable water systems.

PART 2 - PRODUCTS

2.1 MATERIALS

All materials are intended for potable water use unless otherwise indicated, comply with Real Decreto 3/2023, UNE-EN ISO 9001, UNE-EN ISO 14001 and Reglamento UE 10/2011.

2.1.1 PIPE, FITTINGS, JOINTS AND COUPLINGS

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on joints. Include information concerning gaskets with submittal for joints and couplings.

2.1.1.1 PLASTIC PIPING

2.1.1.1.1 High Density polyethylene (HDPE) Pipe PN10

Non-potable water shall be high density polyethylene σ80, (PE100), density 0.955kg/m³. PN10, AENOR certified. Black color. Unions between HDPE pipes shall be made exclusively using electrofusion couplers (electrowelded sleeves); butt fusion between HDPE pipes is not permitted. Polyethylene pipe shall be of the following thickness:

Nominal Diameter Inches	Outside Diameter (UNE) mm	Thickness mm
1 1/4	40	2.4
1 ½	50	3.0
2	63	3.8
2 ½	75	4.5
3	90	5.4
4	110	6.6
6	160	9.5
8	200	11.9
10	250	14.8
12	315	18.7

2.1.1.1.2 High Density polyethylene (HDPE) Pipe PN16

Use PN16 PE pipes for pipes in Potable Water Treatment Facility connections from the main water line and for exposed aboveground water piping. Shall be high density polyethylene σ80, (PE100), density 0.955kg/m³. PN16, AENOR certified. Apt for human consumption. Black color. Unions between HDPE pipes shall be made exclusively using electrofusion couplers (electrowelded sleeves); butt fusion between HDPE pipes is not permitted. Polyethylene pipe shall be of the following thickness:

Nominal Diameter Inches	Outside Diameter (UNE) mm	Thickness mm
1	32	2.9
1 ½	50	4.6
2	63	5.8
2 ½	75	6.8
3	90	8.2
4	110	10.0
6	160	14.6
8	200	18.2

2.1.1.2 FITTINGS FOR HDPE PIPE

Ductile iron fittings, UNE-EN 545 and UNE-EN 598 , with cement-mortar lining for ductile iron fittings. Fittings with push-on joint ends are to conform to the same requirements as fittings with mechanical-joint ends.

2.1.1.2.1 Electrofusion fittings

Use UNE-EN 12201 electrofusion couplers, reducers, couplings, elbows, and tees for HDPE-to-HDPE joints; socket fusion for HDPE-to-HDPE joints is not permitted.

2.1.1.3 JOINT AND JOINT MATERIALS

Mechanical Joint: UNE-EN 1295-2 Mechanical joint adapter and gaskets for mechanical joints for joint connections between pipe and valves, and other accessories which require them.

2.1.1.4 STAINLESS STEEL PIPING

Exterior piping shall be Stainless Steel SS304

2.1.1.5 TRENCHLESS PIPING (ROAD CROSSINGS)

2.1.1.5.1 HDPE Jacket

Provide HDPE jacket in accordance with paragraphs HIGH DENSITY POLYETHYLENE (HDPE) PIPE PN10 piping in this specification. Submit electrofusion joining information for HDPE-to-HDPE joints, including

recommended electrofusion parameters, recommended product and environmental conditions for joining, and documentation that these parameters and conditions have been validated by appropriate testing.

2.1.2 VALVES

2.1.2.1 GATE VALVE (UNDERGROUND)

GGG50 ductile cast iron. PN10. EPDM elastic closure. Stainless steel axis. Epoxy-resin paint on the interior and exterior (minimum 250 microns).

2.1.2.3 VALVE BOX (UNDERGROUND)

All underground shut-off water valves will be installed with a thrust block, valve box and cover, as indicated on the drawings. Concrete shall be HM-20-P-15-XC2. Underground metallic components shall be coated with epoxy paint. The cover will be painted in green.

Cast Protection for Valve Box with Support and Cover (BBR 2145 C-250): Hydraulic closure device for valve box made of spherical graphite cast according to EN1563, class 250, equipped to insert in PVC DN 250 pipes including watertight gaskets. Coated with epoxy-polyester paint, 100 microns thick minimum. The words “Agua” & “Water” (both) shall be cast into covers so that it is plainly visible. The piece of PVC pipe to fix to the support will be PN 10 (for 10 kg/cm2 pressure).

2.1.2.4 BALL VALVES

Body: brass Cu Zn40 Pb2. Sphere: micropolished brass and chrome plated. Duraluminum handle.

2.1.2.5 SOLENOID CONTROL VALVE (Potable Water Treatment Facility)

Valve shall be either fully open or fully closed in response to an electrical signal to the solenoid pilot assembly. Valve shall be equipped with a 3-way electrical solenoid-operated pilot that can be piped for either normally closed (energize to open) or normally open (energize to close) operation, providing reliable main valve on/off control. Main valve body shall be, constructed of ductile iron per ASTM A536 with FDA-approved fusion epoxy coating for enhanced corrosion resistance. Valve shall be suitable for potable water service. Pilot system shall include replaceable flow control and stainless steel trim for long service life. Rated for operation on 120V-60Hz AC. Maximum operating differential pressure: 200 psi (13.8 bar).

Reference model: Zurn Model ZW206

2.1.2.5.1 SCADA System Modifications and Integration

The Contractor shall modify, reprogram, and fully integrate the existing SCADA system to incorporate all equipment, instrumentation, control logic, alarms, interlocks, and monitoring functions associated with the non-potable water distribution modifications described in the contract drawings.

SCADA modifications shall include, but not be limited to:

- Programming of control logic for automatic operation and interlocking of the two new motorized control valves installed on the non-contaminated raw water manifold branches.

- Implementation of interlocks between control valve position/status and operation of well pumps serving the manifold contaminated source.

- Integration of well pump status, valve position feedback, tank level instrumentation, and all associated permissives.

- Development of alarms, trending, and operator interface updates as required.

- Updates to human-machine interface (hmi) graphics to reflect the modified system configuration.

- Modification of control narratives and system documentation.

All SCADA reprogramming and integration work shall be performed in strict coordination with the Activity User and the Civil Engineering (CE) Department. The Contractor shall obtain review and concurrence from CE prior to implementation of any software or control logic modifications.

The Contractor shall prepare and submit a detailed control sequence narrative describing the proposed control philosophy, interlocks, permissives, fail-safe conditions, transition logic, and alarm strategy associated with the modifications. The control sequence narrative shall be submitted for Government review and written approval prior to implementation, programming, or installation of any related control components. No SCADA programming, valve installation, or control system modification shall proceed until written approval of the control sequence is obtained.

The Contractor shall ensure that any subcontractor performing SCADA programming or integration services is fully qualified and demonstrably experienced with the existing SCADA platform installed at the facility. The subcontractor shall be familiar with the existing hardware, communication protocols, PLC architecture, control philosophy, and HMI configuration.

The Contractor shall be fully responsible for system functionality, operational reliability, and compatibility with the existing SCADA infrastructure. All modifications shall be tested, commissioned, and validated in the presence of the Government prior to final acceptance. Any deficiencies identified during testing shall be corrected at no additional cost to the Government.

Provide updated as-built documentation, control narratives, I/O lists, network diagrams, and revised HMI screenshots reflecting the final configuration.

2.1.2.6 SOLENOID CONTROL VALVE (Irrigation system)

Valve shall be either fully open or fully closed in response to an electrical signal to the solenoid pilot assembly. The electrical signal shall be by solar panel. . Valve shall equipped with a 3-way electrical solenoid-operated pilot that can be plumbed to be normally closed (energize to open) or normally open (energize to close) providing main valve on/off capabilities. Strong cast iron body GG25 with polyurethane paint coating in furnace. Voltage 24V in DC. The valve shall be compatible with the irrigation programmer.
For reference: Genebre 4720-4721

2.1.3 HOSE BIBB

Copper or brass, hex shoulder sillcock with Tee handle. ¾" hose thread (American), male IPS connection. Maximum pressure 8.61 bar (125 psi). It shall include hose connection vacuum breaker.

2.1.4 HOSE CONNECTION VACUUM BREAKER (HCVB) (8B)

Provided with spring loaded check valve. ¾" hose thread female inlet & ¾" male outlet connection. Maximum pressure 125 psi. Maximum temperature 180 ºF. Brass body, with breakway set screw to prevent removal, drainable. Shall be furnished and installed by the Contractor in strict accordance with manufacturer instructions. Tests shall be accomplished by the Government.

2.1.5 ACCESSORIES

2.1.5.1 Thrust Blocking

All underground piping elbows and new-existing piping connections shall include concrete thrust blocking. Concrete shall be HM-20-P-15-XC2. Thrust blocking dimensions shall be in accordance with the table shown on the drawings.

2.1.5.2 Insulating Joints

Provide a rubber-gasketed insulating joint or dielectric coupling between pipe of dissimilar metals which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.1.5.3 Dielectric Fittings

Install dielectric fittings between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains to prevent metal-to-metal contact of dissimilar metallic piping elements and compatible with the indicated working pressure.

2.1.6 WATER METER

2.1.6.1 Irrigation Water meter (irrigations cabinets)

2.1.6.1.1 Irrigation water meter DN15 to DN50

-Type: multi-jet cold water meter

-Register: dry dial register (the rollers are isolated from the water)

-Transmission: protected magnetic transmission

-Application: measurement of consumption of cold, clean potable water

-Maximum temperature: up to 50 °C

-Nominal pressure: MAP 16

-Certification: approved in accordance with MID (legal metrology)

-Installation: horizontal or vertical

-Register orientation: rotatable up to 355°

For reference model Zenner MTKDI-N

2.1.6.1.2 Irrigation water meter DN65 to DN150

The water meter consists of Woltmann meter according to MID 2014/32/UE. The water meter shall be equipped with a 6-roller dry dial clock and a disc modulator.

.For reference model Zenner WPD / WPHD

2.1.6.2 Water meter (BMETERS) (Potable Water Treatment Facility)

2.1.6.2.1 General features:

The water meter consists of Woltmann meter according to MID 2014/32/UE with installation of data communication modules M-BUS. Magnetic transmission. Dry dial. The water meter shall be compatible with existing SCADA system.

For reference model BMETERS. WDE-K50

2.1.7. IRRIGATION TIMER (PROGRAMMER)

2.1.7.1 Programmer

The programmer shall be operated with battery-powered and solar panel. The programmer shall be the following characteristics:

- Number of stations: 6 or 12
- Battery-operated controller for automatic irrigation without AC power
- Battery-life indicator for battery replacement
- 3 flexible programs with 4 start times each and up to 4-hour run times
- Delay Between Stations for slow-closing valves or
- pump recharge
- Seasonal adjustment for quicker schedule
- adjustments without changing run times
- Solar Panel provides maintenance-free operation
- Mounts to flat surfaces or steel postsSolar panel shall be maintenance-free operation

2.1.7.1.1 Operating Specifications

- Plastic model operates six 1.5V AA alkaline batteries
- Stainless steel model operated by six 1.5V C alkaline batteries
- Stainless steel solar model operates 800 mAh solar panel with charging cell
- All models operate optional 24 VAC plug-in wall adapter (P/N 526500)
- Operates DC-latching solenoids (P/N 458200)
- Station output: 9-11 VDC
- P/MV output: 9-11 VDC
- Sensor inputs: 1
- Approvals: Plastic IP24, Stainless Steel IP44, UL, cUL, FCC, CE, RCM
- Warranty period: 2 years

For reference model Hunter XC Hybrid

2.1.7.2 Solar Panel Kit

The Solar Panel shall provides maintenance-free operation by harnessing the sun's energy to power the controller 24 hours a day, 7 days a week, for years on end.

- Charging Cell: 800mAh 9.0V
- Wire: 40 feet/12m, 18 AWG/1mm UL rated for outdoor sunlight exposure
- Maximum wire distance from charging cell to solar panel: 200 feet/61m, 18AWG/1mm

For reference model Hunter SPNODE.

2.1.8 HANDHOLE

2.1.8.1 Handhole

Pre-manufactured concrete for underground, with dimensions shown in project drawings.

2.1.8.2 Handhole Covers

Cast-iron with epoxy-polyester coating, dimensions as shown in drawing, with weatherproof gasket. Nominal strength 400 kN. No logo engraved in the cover, instead of the logo, proper text as shown in project drawings shall be factory engraved. The covers shall be painted in green color.

2.1.9 ASPHALT SURFACE REPAIR

The aggregate and hot-mix bituminous features will meet the requirements established for the T00 heavy traffic category in article 542, Bituminous Concrete Type Hot-Mix Bituminous, approved by Circular Order 24/02 PG-3.

2.1.9.1 Surface Course:

AC16 SURF 35/50 . Thickness equal to existing one.

2.1.9.2 Tack Coat:

C60B3 ADH

2.1.9.3 Intermediate Course

AC22 INT 35/50. Thickness equal to existing one.

2.1.9.4 Primer coat:

C60BF4IMP.

2.1.10 BURIED WARNING AND IDENTIFICATION TAPE

Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for piping warning. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 50 mm minimum width, green coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be “CAUTION BURIED PIPING BELOW” or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Connections to Existing System

Perform all connections to the existing water system in the presence of the Contracting Officer.

3.1.2 Operation of Existing Valves

Do not operate valves within or directly connected to the existing water system unless expressly directed to do so by the Contracting Officer.

3.1.3 Earthwork

Perform earthwork operations in accordance with Section 31 00 00 EARTHWORK.

3.1.4 GPS SURVEY AND GPR (GROUND PENETRATION RADAR) SURVEY

According to section 01 11 02 SPECIAL CONDITIONS paragraph 7.5

3.2 INSTALLATIONS

Install all materials in accordance with the applicable reference standard, manufacturers instructions and as indicated herein.

3.2.1 Piping

3.2.1.1 General Requirements

Install pipe, fittings, joints and couplings in accordance with the applicable referenced standard, the manufacturer's instructions and as specified herein.

3.2.1.1.1 Termination of Water Lines

Terminate the work covered by this section at a point approximately 1.5 m from the building, unless otherwise indicated.

Do not lay water lines in the same trench with gas lines, fuel lines, electric wiring, or any other utility. Where nonferrous metallic pipe (i.e., copper tubing) crosses any ferrous piping, provide a minimum vertical separation of 300 mm between pipes.

3.2.1.1.2 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Under no circumstances is it permissible to drop or dump pipe, fittings, valves, or other water line material into trenches. Cut pipe cleanly, squarely, and accurately to the length established at the site

and work into place without springing or forcing. Replace a pipe or fitting that does not allow sufficient space for installation of jointing material. Blocking or wedging between bells and spigots is not permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at the design elevation and grade. Secure firm, uniform support. Wood support blocking is not permitted. Lay pipe so that the full length of each section of pipe and each fitting rests solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports for fastening work into place. Make provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been assembled. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Provide a minimum of 760 mm depth of cover over top of pipe.

3.2.1.1.3 Connections to Existing Non Potable Water Lines

Make connections to existing water lines after coordination with the facility and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped and as indicated.

3.2.1.1.4 Non Potable Water Piping Crossing Sewer Piping

Lay water lines which cross sewer force mains and inverted siphons at least 600 mm above these sewer lines; when joints in the sewer line are closer than 900 mm horizontally from the water line relay the sewer line to ensure no joint closer than 900 mm.

a. Normal Conditions: Provide a separation of at least 600 mm between the bottom of the water piping and the top of the sewer piping in cases where water piping crosses above sewer piping.

3.2.1.1.5 Penetrations

Provide HDPE PN10 sleeves for pipe passing through walls of valve pits and structures. Fill annular space between walls and sleeves with rich cement mortar. Fill annular space between pipe and sleeves with mastic.

3.2.1.1.6 Flanged Pipe

Only install flanged pipe aboveground or with the flanges in valve pits.

3.2.1.2 Polyethylene (PE) Piping

Install PE pipes in accordance with UNE-EN 12201, UNE-EN 805 and the manufacturer's installation instructions. All HDPE-to-HDPE joints in PE piping systems shall be made exclusively with electrofusion couplers (electrowelded sleeves); butt fusion between HDPE pipes is not permitted.

3.2.1.3 Pipe Restraint

3.2.1.3.1 Concrete Thrust Blocks

Install concrete thrust blocks where indicated.

3.2.1.4 Valves

3.2.1.4.1 Gate Valves

Install gate valves in accordance with UNE-EN 1074-1 (General requirements for water supply valves) and UNE-EN 1074-2 (Gate valves).
Installation, testing, and commissioning of valves shall comply with UNE-EN 805.

Gate valves shall be CE-marked and suitable for potable water supply systems. Materials, coatings and pressure ratings shall comply with the manufacturer's technical documentation and applicable European legislation.

3.2.1.5 HANDHOLE INSTALLATIONS

3.2.1.5.1 Site Preparation and Installation

Precast structures shall be installed on a properly prepared and compacted granular bedding layer (sand or crushed stone).

The bedding material shall be compacted to not less than 90% of maximum density and extend at least 150 mm (6 inches) beyond the perimeter of the structure.

When multiple precast sections are assembled, they shall be properly aligned, leveled, and sealed to ensure structural continuity and watertightness.

3.2.1.5.2. Embedded Items and Accessories

Precast units shall be supplied with factory-installed lifting anchors, handling devices, and embedded hardware suitable for safe installation.

Frames, covers, and metallic accessories shall be free from defects and properly seated, ensuring correct fit and long-term performance.

3.2.1.5.3. Coordination with Other Utilities

The location and elevation of the manhole shall be coordinated with adjacent utilities, piping, and finished grade levels.

Installation shall strictly follow approved construction drawings and project specifications, avoiding conflicts with other underground services.

3.2.1.5.4 Backfilling and Final Works

After placement and connection of utilities, the space around the structure shall be backfilled with suitable material, placed in layers and compacted to prevent settlement.

Final inspection shall verify structural alignment, accessibility, and compliance with design elevations.

3.3 FIELD QUALITY CONTROL

3.3.1 Tests

Notify the Contracting Officer a minimum of five days in advance of hydrostatic testing. Coordinate the proposed method for disposal of waste water from pressure testing. Perform field tests, and provide labor, equipment, and incidentals required for testing. Provide documentation that all items of work have been constructed in accordance with the Contract Documents.

3.3.1.1 Combined Hydrostatic Pressure and Leakage Test

The Contractor shall perform a single combined hydrostatic pressure and leakage test for all HDPE piping in accordance with UNE-EN 12201, UNE-EN 805, and UNE-EN 1074.

3.3.1.1.1 Test Pressure

The test pressure shall be equal to 1.5 × the system working pressure, and in no case less than7,5 bar.

3.3.1.1.2 Stabilization Period

After reaching the test pressure, allow the piping to stabilize for the period required by UNE-EN 805 before recording measurements. Pressure shall be maintained without additional pumping except as required to compensate for temperature changes.

3.3.1.1.3 Strength Test (Hydrostatic Phase)

The piping shall maintain the specified test pressure for the required duration without any pressure drop indicative of structural failure, joint separation, or material defect.

3.3.1.1.4 Tightness Test (Leakage Phase)

After completing the strength test, verify system tightness.
No visible leakage shall be allowed at any HDPE electrofusion joint, fitting, valve, or appurtenance.
Allowable pressure variation and leakage criteria shall comply with UNE-EN 805.

3.3.1.1.5 Restrictions

No testing shall begin until concrete thrust blocks have cured for a minimum of 7 days.
Testing shall be performed prior to backfilling unless otherwise approved by the Contracting Officer.
All testing equipment shall be calibrated within the required certification period.

3.3.1.3 Buried Warning and Identification Tape Continuity Test

Test Buried Warning and Identification Tape for continuity after service connections have been completed and prior to final pavement or restoration. Verify that Buried Warning and Identification Tape is locatable with electronic utility locating equipment. Repair breaks or separations and re-test for continuity.

3.4 SYSTEM STARTUP

Water mains and appurtenances must be completely installed, disinfected, flushed, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Obtain approval by the Contracting Officer prior to the new water piping being placed into service.

3.5 CLEANUP

Upon completion of the installation of water lines and appurtenances, remove all debris and surplus materials resulting from the work.

3.6 ROAD CROSSINGS

3.6.1 Trenchless piping

For those areas (indicated in drawings) such as roads, parking lots, etc under which the new pipe installation runs, a drilling machine shall be used under the asphalt or concrete. The drill opening will be protected with a high density PN10 polyethylene casing. The casing diameter shall be as required in order to place in its interior the new pipe including the electro-welded connection fittings, at least 1,5 times larger than the outer diameter of the NPW pipe that will be housed. Boring depth shall be more than 1.5 m from the top of the casing to the asphalt/concrete Surface.

3.6.2 Non trenchless piping

In case the drilling job is not indicated on the drawings, the surface where the trench is being provided shall be repaired using cast in place concrete (according to drawings details and section 03 30 00 Cast in place concrete) or a hot-mix asphalt as indicated under item “Asphalt Surface Repair” in this specifications.

*** END OF SECTION ***