WEST TEXAS VA HEALTHCARE SYSTEM

A/E REPLACE BOILERS: 519-20-200

BIG SPRING, TEXAS

U.S. Department of Veterans Affairs

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MP101	MECH PIPING PLAN - BOILER PLANT FLOOR
MP101A	PARTIAL MECH PIPING PLAN - BOILER PLANT FLOOR
MP101B	PARTIAL MECH PIPING PLAN - BUILDING 2 EAST
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SHEET NUMBER	SHEET NAME
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Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: COVER SHEET / SHEET INDEX	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: GI001
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	

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Autodesk Docs://0489001/0131-VABS Boiler Replacement/0489001.013_ARCH R25.rvt

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ABBREVIATIONS

ACT.	ACTUAL
ADJ.	ADJUSTABLE
A.F.F.	ABOVE FINISH FLOOR
A.F.S.	ABOVE FINISH SLAB
AGG.	AGGREGATE
AHJ	AUTHORITY HAVING JURISDICTION
ALUM.	ALUMINUM
BLDG.	BUILDING
BK.	BRICK
BM.	BEAM
CAB.	CABINET
CPT.	CARPET
C.J.	CONTROL JOINT
℄	CENTERLINE
C.G.	CORNER GUARD
CLR.	CLEAR
CLG.	CEILING
COL.	COLUMN
CONC.	CONCRETE
COND.	CONDITION
CONT.	CONTINUOUS
C.T.	COUNTERTOP
DBL.	DOUBLE
DEMO.	DEMOLITION
DIA.	DIAMETER
DIM.	DIMENSION
DISP.	DISPENSER
DN.	DOWN
DWG.	DRAWING
E.W.C.	ELECTRIC WATER COOLER
EA.	EACH
E.J.	EXPANSION JOINT
EXP.	EXPANSION
E.W.	EACH WAY
EXT.	EXTERIOR
EXIST.	EXISTING
F.E.C.	FIRE EXTINGUISHER CABINET
F.D.	FINISH DIMENSION
F.D.V.B.	FIRE DEPARTMENT VALVE BOX
F.F.	FINISH FLOOR
FIN.	FINISH(ED)
FRT.	FIRE RETARDANT TREATED
G.I.	GALVANIZED IRON
G.B.(GYP.BD.)	GYPSUM BOARD
GA.	GAUGE
GALV.	GALVANIZED
GL.	GLASS
H.M.	HOLLOW METAL
H.S.	HORIZONTAL IN SPLASH
I.C.U.	INTENSIVE CARE UNIT
INT.	INTERIOR
INSUL.	INSULATION
I.T.C.	INSTALLED THIS CONTRACT
K.S.	KNEE SPACE
LAM.	LAMINATED
LAV.	LAVATORY
L.L.V.	LONG LEG VERTICAL
L.L.H.	LONG LEG HORIZONTAL
MANUF.	MANUFACTURER
MAX.	MAXIMUM
MECH.	MECHANICAL
MIN.	MINIMUM
M.O.	MASONRY OPENING
MTL.MET.	METAL
MNT.	MOUNTED
N/A	NOT APPLICABLE
NOM.	NOMINAL
N.T.S.	NOT TO SCALE
N.I.C.	NOT IN CONTRACT
O.C.	ON CENTER
O.D.	OVERFLOW DRAIN
O.H/OPP.H.	OPPOSITE HAND
P.D.	PLAN DIMENSION
PLAS. LAM.	PLASTIC LAMINATE
P.T.	PORCELAIN TILE
P.T.D.	PAPER TOWEL DISPENSER
RB	RUBBER BASE
R.REV.	REVISED/REVERSE
R.(RAD.	RADIUS
REINF.	REINFORCE
REF.	REFERENCE/REFER TO
REQ'D	REQUIRED
R.D.	ROOF DRAIN
RM.	ROOM
R.O.	ROUGH OPENING
SCHED.	SCHEDULED
SAB.	SOUND ATTENUATION BATTS
SHT.	SHEET
SIM.	SIMILAR
SL.	SLOPE
STL.	STEEL
S.S.	STAINLESS STEEL
S.S.V.	SOLID SURFACE VENEER
SUSP.	SUSPENDED
S.V.	SHEET VINYL
T.A.S.	TEXAS ACCESSIBILITY STANDARDS
T.B.	TACK BOARD
T.D.H.	TEXAS DEPARTMENT OF HEALTH
TEMP. GR (T.)	TEMPERED GLASS
THK.	THICK
TOIL.	TOILET
TYP.	TYPICAL
U.C.	UNDER COUNTER
UCR	UNDER COUNTER REFRIGERATOR
U.L.	UNDERWRITERS LABORATORIES
U.N.O.	UNLESS NOTED OTHERWISE
UR.	NEW URINAL
VCT	VINYL COMPOSITION TILE
V.T.	VINYL TILE
VERT.	VERTICAL
W.C.	NEW WATER CLOSET
WDW.	WINDOW
WD.	WOOD
WH	WATER HEATER
W/	WITH
W/O	WITHOUT

BATT. INSULATION
CAST IN PLACE CONCRETE
CAST STONE
CONCRETE MASONRY/CMU
EARTH IN SECTION
FACE BRICK
GYP./GYPSUM BOARD
MARBLE
PARTICLE BOARD/PLYWOOD
ROOF INSULATION
STUCCO
CONTINUOUS WOOD BLOCKING
DISCONTINUOUS WOOD BLOCKING
FINISHED WOOD

COLUMN GRID LINE
CENTERLINE
6'-11 125/128" — DIMENSION TO FACE OF FINISH, FACE OF CONCRETE, COLUMN CENTERLINE, OR AS NOTED.
100"
ROOM NAME 101 — ROOM TAG (FOR STANDARD PLANS): ROOM NAME, ROOM NUMBER, ROOM AREA
ROOM NAME XXXX XX'-XX" XXXX XXXX XXX — ROOM TAG (FOR SPECIALTY PLANS): ROOM NAME, ROOM NUMBER, FLOOR FINISH, BASE TYPE, WALL FINISH, CEILING TYPE
101 — DOOR NUMBER SYMBOL
AC1 — EXTERIOR WALL TYPE TAG
A3 — INTERIOR PARTITION TYPE TAG
X9 — EXTERIOR WINDOW
X9 — INTERIOR WINDOW
A — SIGN TYPE, SEE SIGNAGE SCHEDULE
1 — DRAWING REVISION
A1 — NOTES BY NUMBER
N — NORTH ARROW
Name Elevation — LEVEL DATUM: LEVEL NAME, LEVEL ELEVATION
1 A101 SIM — DETAIL - SECTION: POSITION ON SHEET, SHEET NUMBER
1 A101 SIM — DETAIL - PLAN RCP: POSITION ON SHEET, SHEET NUMBER
1 A101 SIM — WALL SECTION: POSITION ON SHEET, SHEET NUMBER
1 A101 SIM — BUILDING SECTION: POSITION ON SHEET, SHEET NUMBER
2 X.XXX SIM — EXTERIOR ELEVATION: POSITION ON SHEET, SHEET NUMBER
X 2 X.XXX X — INTERIOR ELEVATION: POSITION ON SHEET, SHEET NUMBER
1 1/8" = 1'-0" — VIEW TITLE: DRAWING NUMBER, DRAWING SCALE
0 4'-0" 8'-0" 16'-0" — GRAPHIC SCALE

GENERAL NOTES

1. ALL WORK RELATING TO THIS CONSTRUCTION SHALL COMPLY WITH U.S. DEPARTMENT OF LABOR, THE OCCUPATIONAL SAFETY AND HEALTH STANDARDS AND ALL RELATED LOCAL AND FEDERAL BUILDING CODES AND ORDINANCES.
2. DO NOT SCALE THE DOCUMENTS.
3. ALL DIMENSIONS ARE TO BE FIELD VERIFIED AND BACK CHECKED FOR CORRECTNESS. IF ANY DEVIATIONS OR DISCREPANCIES OCCUR, CONTACT COR FOR VERIFICATION PRIOR TO PROCEEDING WITH THE WORK.
4. THE GENERAL CONTRACTOR IS TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS ON THE SITE PRIOR TO THE BEGINNING OF THE WORK AND ADVISE THE COR OF ANY AND ALL DISCREPANCIES.
5. THE GENERAL CONTRACTOR AND ALL SUBCONTRACTORS SHALL CAREFULLY REVIEW THE DRAWINGS, SPECIFICATIONS DETAILS AND NOTES FOR INFORMATION REGARDING THE SCOPE OF WORK INTENDED PRIOR TO PROCEEDING WITH THE WORK.
6. THE GENERAL CONTRACTOR SHALL COORDINATE ALL BUILDING MANAGEMENT SYSTEMS, AND LOCKING HARDWARE WITH THE OWNER PRIOR TO INSTALLATION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL MECHANICAL, ELECTRICAL, AND PLUMBING PENETRATIONS REQUIRED BY THE WORK WHETHER EXPRESSLY NOTED IN THE DOCUMENTS OR NOT.
8. ALL WOOD INDICATED IN THESE DOCUMENTS IS TO BE TREATED FOR FIRE RETARDANCY UNLESS NOTED OTHERWISE.
9. FIRE SPRINKLER HEAD LOCATIONS ARE TO BE COORDINATED WITH LIGHTING, HVAC, AND CENTERED BOTH WAYS IN CEILING TILES, GYP. BD. REVEALS & CEILINGS, ETC.
10. THE COMPLETE SPRINKLER SYSTEMS IS NOT SHOWN ON THESE DRAWINGS. THE CONTRACTOR IS ADVISED THAT SPECIAL CARE MUST BE TAKEN IN LAYING OUT THE SPRINKLER SYSTEM FOR A NEAT, ORDERLY AND AESTHETICALLY APPROPRIATE LAYOUT. COR'S DECISIONS SHALL BE FINAL IN AESTHETIC JUDGEMENT WITH RESPECT TO LOCATION OF HEADS. ADDITIONAL HEADS SHALL BE ADDED BY CONTRACTOR AS MAY BE REQUIRED TO SATISFY COR'S AESTHETIC JUDGEMENT. COR'S REVIEW OF HEAD LOCATIONS WILL OCCUR DURING SHOP DRAWING STAGE.
11. THE CONTRACTOR SHALL REVIEW THE CIVIL DOCUMENTS, THE SOILS REPORT, AND THESE DOCUMENTS (ALL IN THEIR ENTIRETY) TO INSURE THAT ALL REQUIRED EARTHWORK, PAVING, CURB, AND STRUCTURAL SLAB WORK IS FULLY COVERED IN THE SCOPE OF THE CONTRACTOR'S BID. THE CONTRACTOR SHALL FULLY COORDINATE ALL OF THE ABOVE REFERENCED WORK WITH THE OWNER'S REPRESENTATIVE, THE ARCHITECT, AND THE CIVIL ENGINEER TO INSURE THAT ALL WORK IS FULLY COORDINATED AND COMPLETED.
12. ALL MATERIALS SHALL BE INSTALLED ACCORDING TO INDUSTRY STANDARDS. ALL AGENCIES OR "STANDARD" RECOMMENDATIONS REFERENCED IN THE SPECIFICATIONS, OR MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES, WHICHEVER IS THE MOST STRINGENT, IN ORDER TO PROVIDE A COMPLETE AND HIGH QUALITY PROJECT.
13. THE CONTRACTOR REPRESENTS AND WARRANTS THAT IF HAS EXAMINED THE PLANS, DRAWINGS, SPECIFICATIONS AND ALL CONSTRUCTION CRITERIA OF THE OWNER AND HAS SATISFIED ITSELF THAT THE INFORMATION CONTAINED THEREIN IS SUFFICIENT TO FULLY AND COMPLETELY CONSTRUCT THE PROJECT.
14. IN THE EVENT OF A CONFLICT WITH THE CONSTRUCTION DOCUMENTS, THE MORE EXPENSIVE, GREATER QUALITY, AND LARGER SCOPE SHALL GOVERN.
15. ALL ELECTRICAL, TELEPHONE AND OTHER OUTLET LOCATIONS ARE TO BE COORDINATED WITH THE OWNER AND THE INTERIOR ELEVATIONS PRIOR TO INSTALLATION OF THE OUTLETS OR THE MILLWORK / CASEWORK.
16. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY WOOD AND METAL BLOCKING IN WALLS / PARTITIONS FOR THE MOUNTING OF EQUIPMENT, ACCESSORIES, CASEWORK, RAILS, ETC. THAT ARE PROVIDED BY THE CONTRACTOR AND ITEMS THAT ARE PROVIDED BY THE OWNER OR ONE OF THE OWNER'S VENDORS.

GENERAL PROJECT DESCRIPTION

THIS PROJECT SHALL CONSIST OF INTERIOR RENOVATIONS TO AN EXISTING BUILDING AS DEFINED ON THE CHART BELOW.

PROJECT TYPE	YES	NO
NEW CONSTRUCTION: (COMPLETELY NEW BUILDING AND SITE WORK)		●
ADDITION: (NEW CONSTRUCTION TO INCREASE SIZE OF EXISTING BUILDING)		●
RENOVATION: (REPLACEMENT OF EXISTING BUILDING COMPONENTS)	●	
SYSTEM UPGRADES	●	

ITEM	YES	NO
NEW STRUCTURAL SYSTEM		●
EXISTING STRUCTURAL SYSTEM AFFECTED		●
EXISTING EXTERIOR WALLS AFFECTED	●	
EXTERIOR WALLS		●
EXISTING INTERIOR WALLS AFFECTED		●
EXISTING INTERIOR FINISHES AFFECTED	●	
EXISTING ROOFING AFFECTED	●	
EXISTING HVAC SYSTEMS AFFECTED	●	
EXISTING ELECTRICAL SYSTEMS AFFECTED	●	

CODE INFORMATION

BUILDING:	2021 INTERNATIONAL BUILDING CODE
LIFE SAFETY:	NFPA 101 LIFE SAFETY CODE 2021
ACCESSIBILITY:	ARCHITECTURAL BARRIERS ACT ACCESSIBILITY STANDARDS (ABASS) VA SUPPLEMENT, BARRIER FREE DESIGN GUIDE (PG-16-13)
FIRE:	2021 INTERNATIONAL FIRE CODE 2021 NFPA 101
PLUMBING:	2021 INTERNATIONAL PLUMBING CODE
MECHANICAL:	2021 INTERNATIONAL MECHANICAL CODE
ELECTRICAL:	2020 NATIONAL ELECTRICAL CODE
ENERGY:	2021 INTERNATIONAL ENERGY CODE 2022 ASHRAE 90.1

OCCUPANCY CLASSIFICATIONS

GROUP F-1 - MODERATE-HAZARD FACTORY INDUSTRIAL - ELECTRIC GENERATION PLANTS (IBC)
GENERAL INDUSTRIAL OCCUPANCY (OHM) NFPA 101)

WORK CATEGORY

MODIFICATION (NFPA 101 - 43.2.2.1.3.2021 EDITION)

PROJECT AREA

3,703 SF

OWNER

WEST TEXAS VA HEALTHCARE SYSTEM

CONTRACT OFFICER REPRESENTATIVE

Mr. JOSHUA JUNKIN

ARCHITECT

O'BRIEN ENGINEERING INC.

MECHANICAL, PLUMBING, AND ELECTRICAL ENGINEER

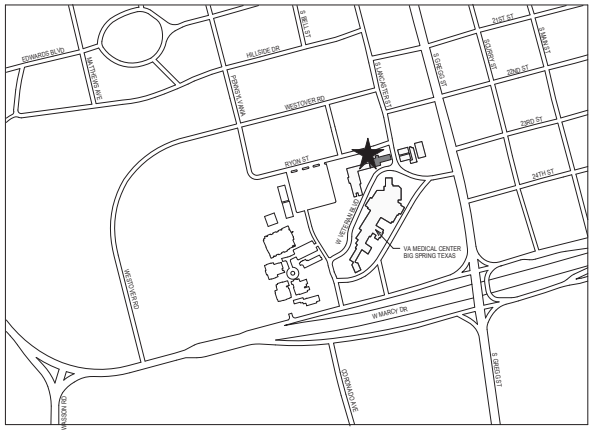
O'BRIEN ENGINEERING INC.

CIVIL ENGINEER

O'BRIEN ENGINEERING INC.

STRUCTURAL ENGINEER

R. L. WOODS & ASSOCIATES, LLC



VICINITY MAP

NOT TO SCALE

N

Revisions:	Date:

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REGISTERED ARCHITECT KIMBERLY JOW 22637 STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
VICINITY MAP, SYMBOLS AND NOTES	100% CONSTRUCTION DOCUMENTS	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: GI002
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	

VA FORM 08 - 6231

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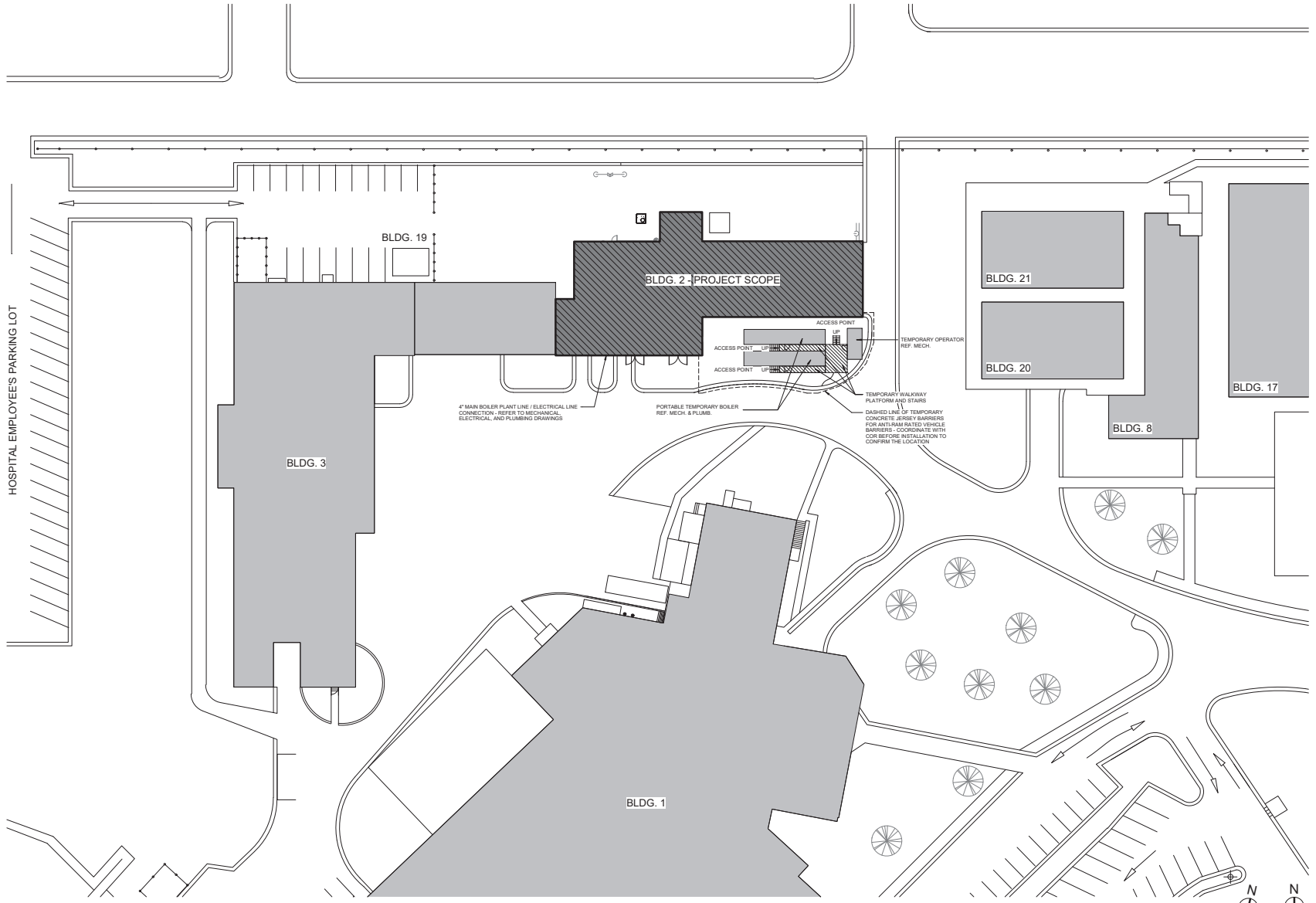
Autodesk Docs://0489001.0131 VABS Boiler Replacement/0489001.0131_ARCHR25.rvt

SITE PREPARATION PHASING NOTES:

CONTRACTOR TO VERIFY LOCATION WITH COR

1. CONTRACTOR TO PROVIDE AREA FOR TRUCK AND CRANE ACCESS TO FACILITATE STAGING DEMO AND NEW DELIVERIES.
2. CONTRACTOR TO PREPARE SITE TO ACCOMMODATE DELIVERY TRUCKS
3. CONTRACTOR TO PREPARE SITE TO ACCOMMODATE CRANE AND 5,000 LBS FORKLIFTS FOR MOBILIZING EQUIPMENT IN THE PLANT AND ON THE ROOF.
4. OPENINGS IN THE BUILDING TO FACILITATE BOILER REMOVAL AND REPLACE
5. CONTRACTOR TO VERIFY STAGING AREA LOCATION WITH COR
6. REFER MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR ALL REQUIRED SERVICE CONNECTIONS.



1 SITE PLAN
3/64" = 1'-0"

Revisions:	Date:

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STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA | U.S. Department of Veterans Affairs

Drawing Title	SITE PLAN
Phase	100% CONSTRUCTION DOCUMENTS
Project Title	A/E REPLACE BOILERS
Project Number	519-20-200
Building Number	2
APPROVED:	COR, Mr. JOSHUA JUNKIN
	FULLY SPRINKLERED
Location	BIG SPRING, TEXAS
Issue Date	10/07/2025
Checked	JOW
Drawn	KL
Drawing Number	GI101

VA FORM 08 - 6231

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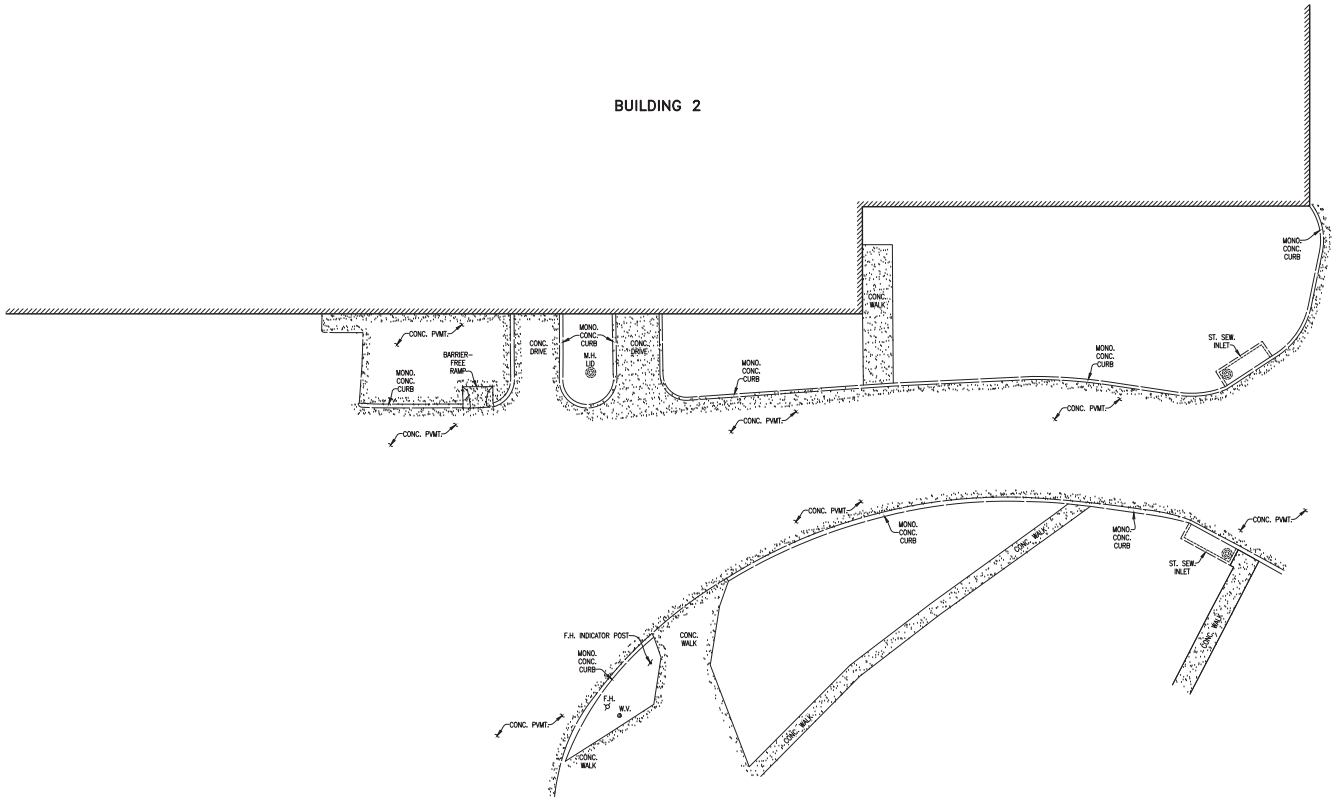
LEGEND

- EDGE OF EXISTING STRUCTURE
- EXISTING CONCRETE PVMT./WALK
- EXISTING SIGN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

NOTES

1. SHOULD ANY EXISTING UNDERGROUND UTILITY BE LOCATED OR DISCOVERED THAT IMPACTS THE CONTRACTOR'S ABILITY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR PRIOR TO BEGINNING ANY WORK IN THE CONFLICT AREA.



0 10 20 30
HORIZONTAL SCALE IN FEET

Revisions:	Date:

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07-02-2025

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VA U.S. Department of Veterans Affairs

Drawing Title: EXISTING SITE PLAN	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	Drawing Number: CS101

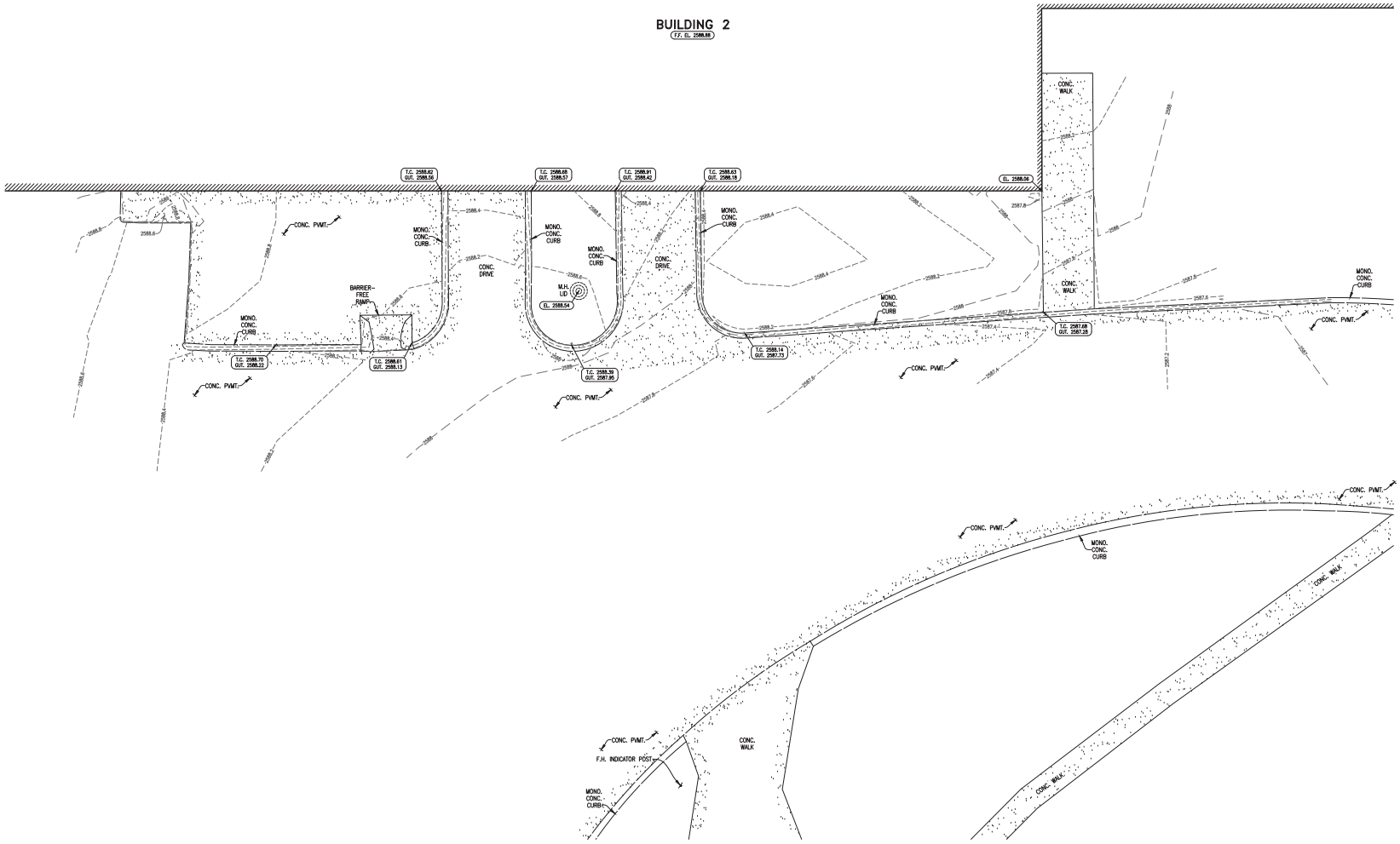
VA FORM 08-6231

LEGEND

	EDGE OF EXISTING STRUCTURE
	EXISTING CONCRETE PVMT./WALK
	EXISTING SIGN
	EXISTING FIRE HYDRANT
	EXISTING WATER VALVE
2589	EXISTING 1.0' CONTOUR LINE
2588.8	EXISTING 0.2' CONTOUR LINE
EL. 2588.34	EXISTING SPOT ELEVATION

NOTES

1. SHOULD ANY EXISTING UNDERGROUND UTILITY BE LOCATED OR DISCOVERED THAT IMPACTS THE CONTRACTOR'S ABILITY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR PRIOR TO BEGINNING ANY WORK IN THE CONFLICT AREA.



0 5 10 15
HORIZONTAL SCALE IN FEET

Revisions:	Date:

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Drawing Title: EXISTING GRADING PLAN	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG101
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

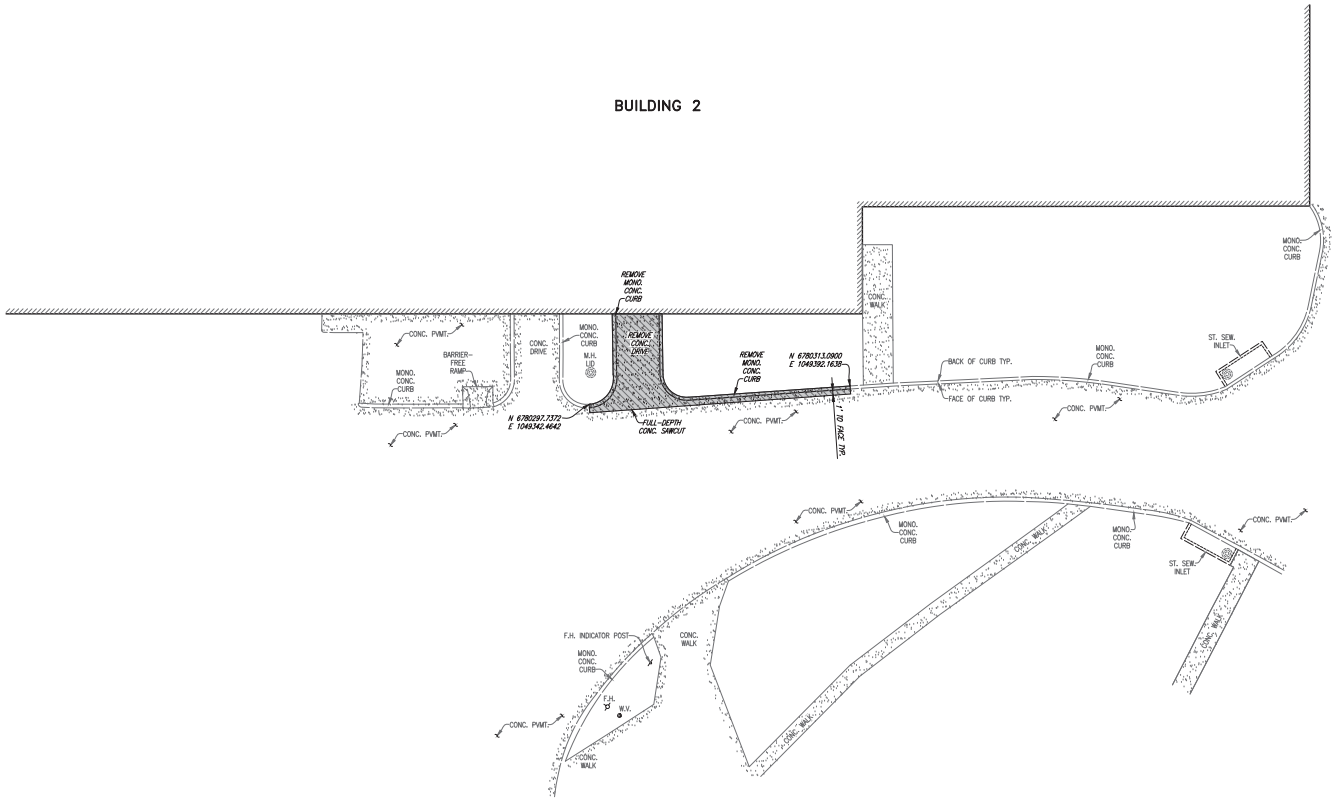
VA FORM 08-6231

LEGEND

- EDGE OF EXISTING STRUCTURE
- EXISTING CONCRETE PVMT./WALK
- EXISTING SIGN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- *REMOVE EXISTING CONCRETE PAVEMENT*

NOTES

1. *SHOULD ANY EXISTING UNDERGROUND UTILITY BE LOCATED OR DISCOVERED THAT IMPACTS THE CONTRACTOR'S ABILITY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR PRIOR TO BEGINNING ANY WORK IN THE CONFLICT AREA.*



0 10 20 30

HORIZONTAL SCALE IN FEET

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Drawing Title: DEMOLITION PLAN	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CD101
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

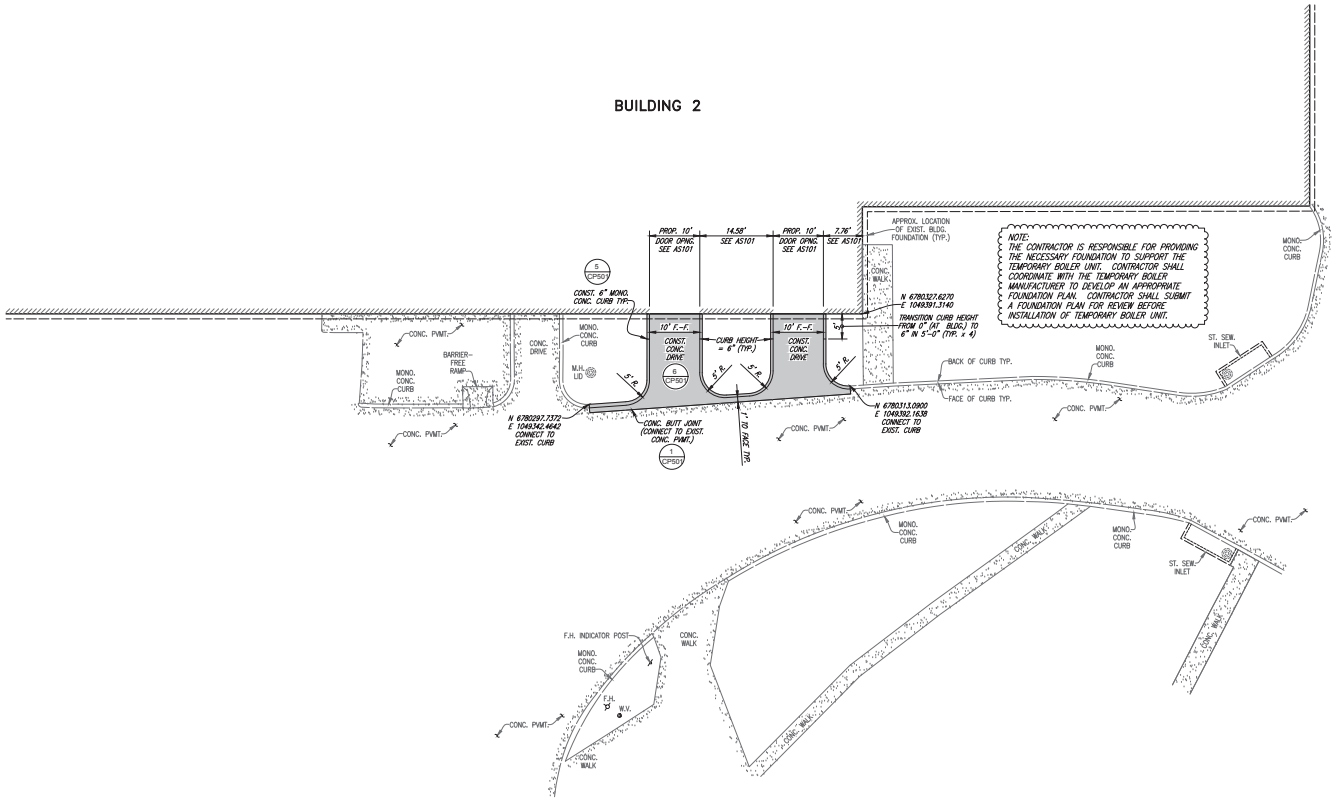
VA FORM 08-6231

LEGEND

- EDGE OF EXISTING STRUCTURE
- EXISTING CONCRETE PVMT./WALK
- EXISTING SIGN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- *PROPOSED CONCRETE PAVEMENT*

NOTES

1. *SHOULD ANY EXISTING UNDERGROUND UTILITY BE LOCATED OR DISCOVERED THAT IMPACTS THE CONTRACTOR'S ABILITY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR PRIOR TO BEGINNING ANY WORK IN THE CONFLICT AREA.*



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HORIZONTAL SCALE IN FEET

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Drawing Title: PROPOSED PAVING PLAN	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CS102
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

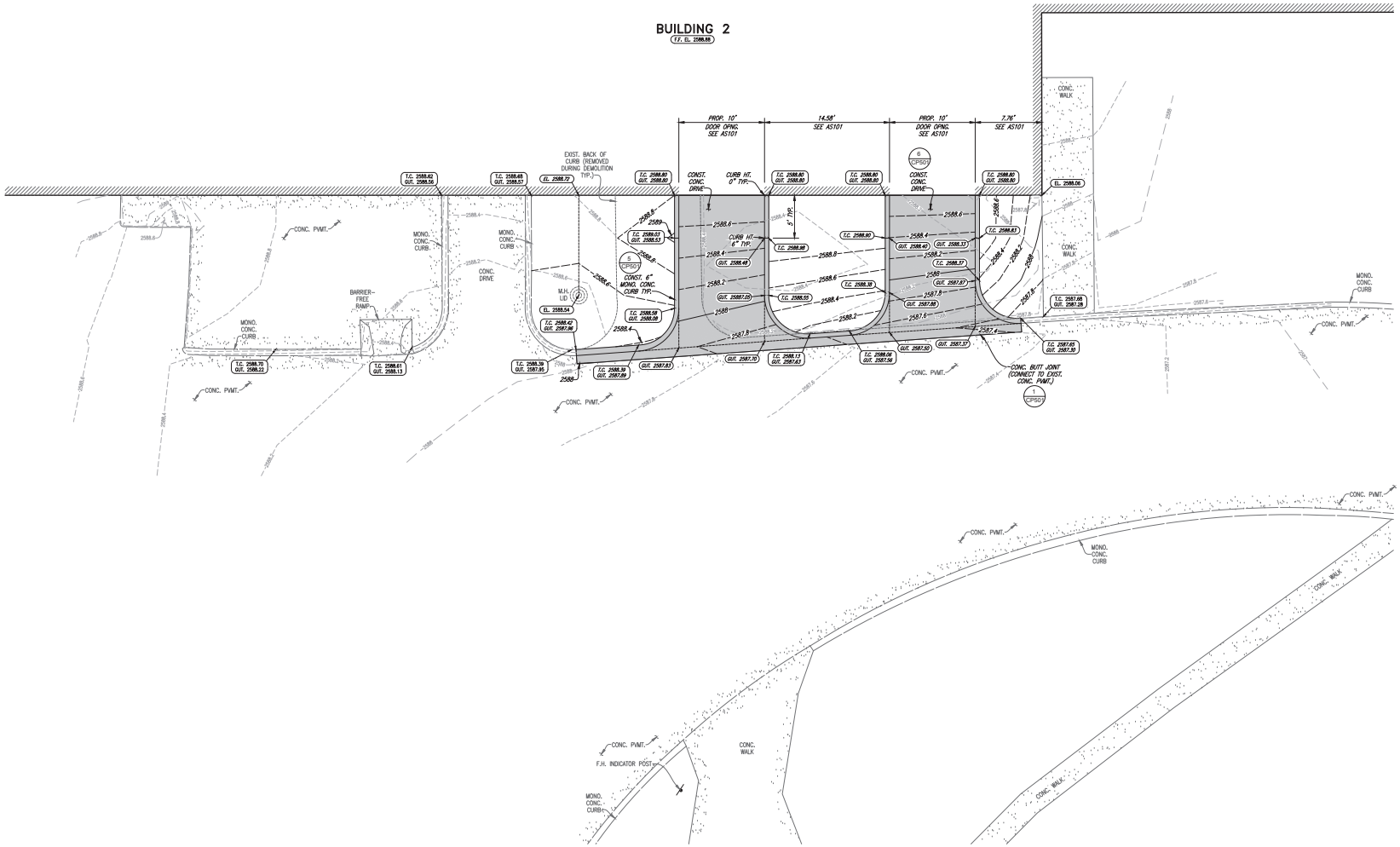
VA FORM 08-6231

LEGEND

	EDGE OF EXISTING STRUCTURE
	EXISTING CONCRETE PVMT./WALK
	EXISTING REMOVED BACK OF CURB
	EXISTING SIGN
	EXISTING FIRE HYDRANT
	EXISTING WATER VALVE
2589	EXISTING 1.0' CONTOUR LINE
2588.8	EXISTING 0.2' CONTOUR LINE
EL. 2586.34	EXISTING SPOT ELEVATION
2589	*PROPOSED 1.0' CONTOUR LINE*
2588.8	*PROPOSED 0.2' CONTOUR LINE*
EL. 2586.34	*PROPOSED SPOT ELEVATION*
	FOR ALIGNMENT PURPOSES ONLY

NOTES

1. *SHOULD ANY EXISTING UNDERGROUND UTILITY BE LOCATED OR DISCOVERED THAT IMPACTS THE CONTRACTOR'S ABILITY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR PRIOR TO BEGINNING ANY WORK IN THE CONFLICT AREA.*



0 5 10 15
HORIZONTAL SCALE IN FEET

Revisions:	Date:

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VA U.S. Department of Veterans Affairs

Drawing Title: PROPOSED GRADING PLAN	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG102
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

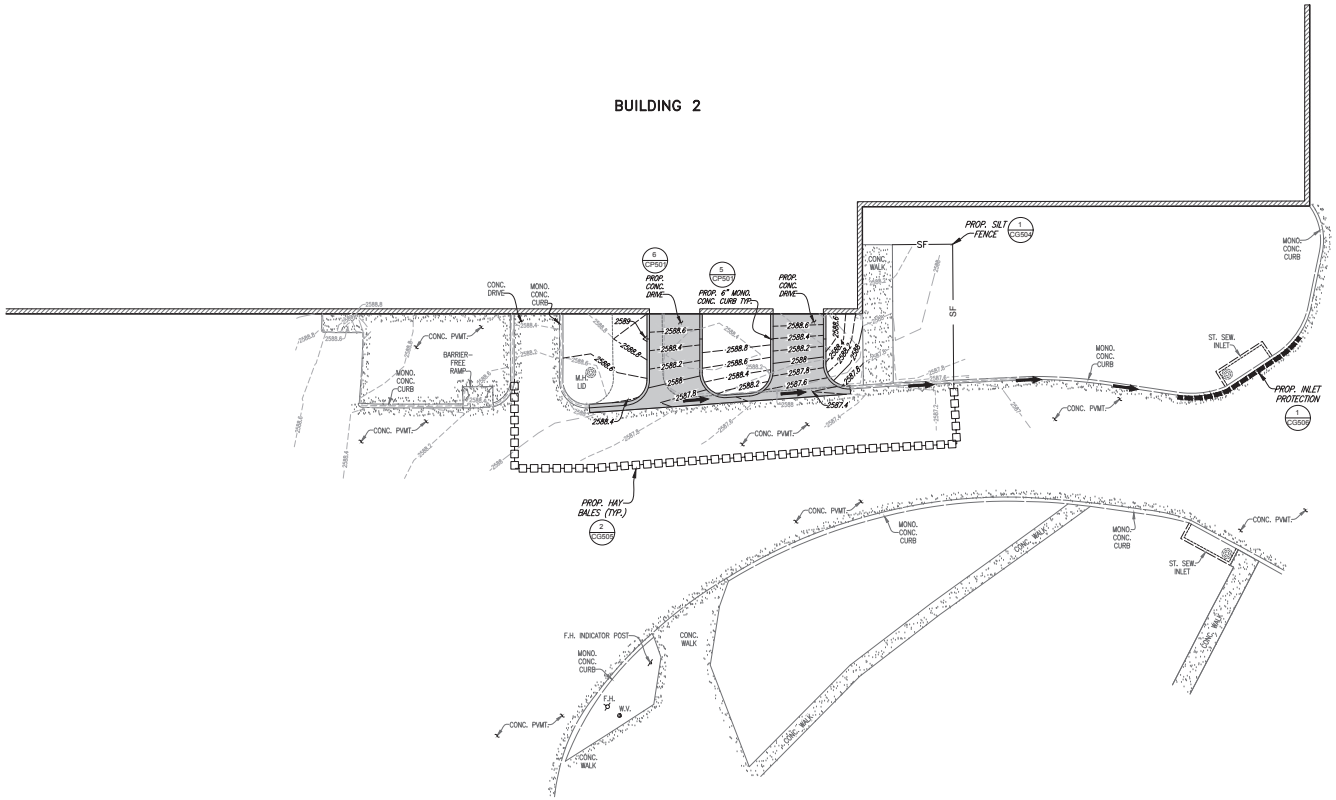
VA FORM 08-6231

LEGEND

- EDGE OF EXISTING STRUCTURE
- EXISTING CONCRETE PVMT./WALK
- EXISTING REMOVED BACK OF CURB
- EXISTING SIGN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- 2589 — EXISTING 1.0' CONTOUR LINE
- 2588.8 — EXISTING 0.2' CONTOUR LINE
- DRAINAGE FLOW DIRECTION
- 2589 — *PROPOSED 1.0' CONTOUR LINE*
- 2588.8 — *PROPOSED 0.2' CONTOUR LINE*
- SF — *PROPOSED SILT FENCE*
- *PROPOSED INLET PROTECTION*
- *PROPOSED HAY BALES*

NOTES

1. *SHOULD ANY EXISTING UNDERGROUND UTILITY BE LOCATED OR DISCOVERED THAT IMPACTS THE CONTRACTOR'S ABILITY TO CONSTRUCT THE PROJECT IN ACCORDANCE WITH THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR PRIOR TO BEGINNING ANY WORK IN THE CONFLICT AREA.*



0 10 20 30
HORIZONTAL SCALE IN FEET

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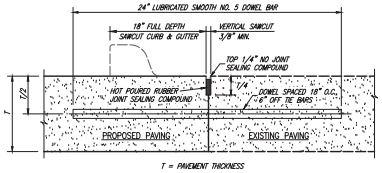
Drawing Title	Phase	Project Title	Project Number
EROSION CONTROL PLAN	ISSUE FOR BID	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
Approved: COR: JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG103
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

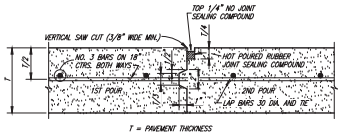
VA FORM 08-6231



NOTES:
1. NO. 5 SMOOTH DOWEL BAR MAY BE USED IN 6" PAVEMENT.
2. LONGITUDINAL BUTT CONSTRUCTION MAY BE USED IN PLACE OF LONGITUDINAL HINGED (KEYWAY) JOINT AT THE CONTRACTOR'S OPTION.
3. DOWEL BARS SHALL BE DRILLED INTO PAVEMENT HORIZONTALLY BY USE OF A MECHANICAL RIG.
4. DRILLING BY HAND IS NOT ACCEPTABLE. PUSHING DOWEL BARS INTO GREEN CONCRETE IS NOT ACCEPTABLE.

1 LONGITUDINAL BUTT JOINT

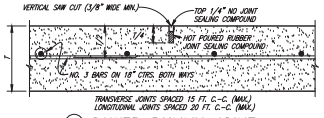
NO SCALE



NOTE:
CONTRACTOR SHALL PROTECT KEYWAY PRIOR TO SECOND POUR. IF LONGITUDINAL KEYWAY IS DAMAGED, CONTRACTOR SHALL REPAIR WITH THE USE OF LONGITUDINAL BUTT JOINT (DRILL DOWELS INTO FIRST POUR).

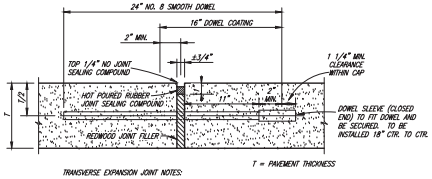
2 CONSTRUCTION JOINT

NO SCALE



3 SAWED DUMMY JOINT

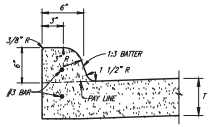
NO SCALE



TRANSVERSE EXPANSION JOINT NOTES:
1. DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE & MUST BE TIED OR CHAIRED ON EACH SIDE.
2. TRANSVERSE EXPANSION JOINTS SHALL BE SPACED AT 40 FT. MAXIMUM AND AT ALL INTERSECTIONS.

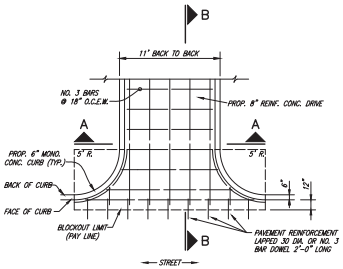
4 TRANSVERSE EXPANSION JOINT

NO SCALE

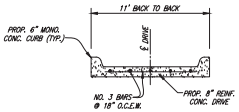


5 6" MONOLITHIC CURB

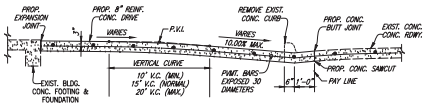
NO SCALE



DRIVEWAY RETURN TO STREET



SECTION A–A



SECTION B–B

6 CONCRETE DRIVEWAY

NO SCALE

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07-02-2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PAVING DETAILS	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CP501
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

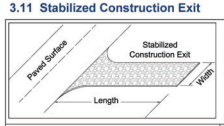
VA FORM 08-6231

NOTE:

EROSION CONSTRUCTION ENTRANCE & EXIT DETAILS (CG501) AND WHEEL CLEANING SYSTEM DETAILS (CG502 & CG503) WILL NOT BE REQUIRED UNLESS CONTRACTOR USES ONSITE GRASS AREAS OR ONSITE DIRT AREAS FOR STAGING OR STORING MATERIAL. THE USE OF ANY ONSITE STAGING AND/OR STORAGE AREAS MUST BE APPROVED BY THE COR.

3.11 Stabilized Construction Exit

Sediment Control



Description: A stabilized construction exit is a pad of crushed stone, recycled concrete or other rock material placed on geotextile filter cloth to dislodge soil and other debris from construction equipment and vehicle tires prior to exiting the construction site. The object is to minimize the tracking of soil onto public roadways where it will be suspended by stormwater runoff.

KEY CONSIDERATIONS

DESIGN CRITERIA:
- Slope exit away from offsite paved surface
- Minimum width and length dependent on size of disturbed area, which correlates to traffic volume
- 6 inches minimum thickness of stone layer
- Stone of 3 to 5 inches in size
- Add a wheel cleaning system when inspections reveal the stabilized exit does not prevent tracking

ADVANTAGES / BENEFITS:
- Reduces tracking of soil onto public streets
- Directs traffic to a controlled access point
- Protects other sediment controls by limiting the area disturbed

DISADVANTAGES / LIMITATIONS:
- Effectiveness dependent on limiting ingress and egress to the stabilized exit
- A wheel washing system may also be required to remove clay soil from tires, particularly in wet conditions

MAINTENANCE REQUIREMENTS:
- Inspect regularly
- Replace rock when sediment in the void area between the rocks is visible on the surface
- Periodically re-grade and top dress with additional stone to maintain efficiency

TARGETED POLLUTANTS

- ◒ Sediment
- ○ Nutrients & Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Wastes

APPLICATIONS

- Perimeter Control
- Slope Protection
- Sediment Barrier
- Channel Protection
- Temporary Stabilization
- Final Stabilization
- Waste Management
- Housekeeping Practices

Fe=N/A

IMPLEMENTATION CONSIDERATIONS

- ◒ Capital Costs
- ◒ Maintenance
- ○ Training
- ○ Suitability for Slopes > 5%

Other Considerations:
- *None*

1A EROSION CONTROL CONSTRUCTION EXIT

DETAIL 1 OF 4

NO SCALE

3.11.1 Primary Use

Stabilized construction exits are used to remove soil, mud and other matter from vehicles that drive off of a construction site onto public streets. Stabilized exits reduce the need to remove sediment from streets. When used properly, they also control traffic by directing vehicles a single (or two for larger sites) location. Controlling traffic onto and off of the site reduces the number and quantity of disturbed areas and provides protection for other sediment controls by decreasing the potential for vehicles to drive over the control.

3.11.2 Applications

Stabilized construction exits are used on all construction sites with a disturbed area of one acre or larger and are a recommended practice for smaller construction sites. A stabilized exit is used on individual residential lots until the driveway is placed. Stabilized construction exits may be used in conjunction with wheel cleaning systems as described in *Section 3.16 Wheel Cleaning Systems*.

3.11.3 Design Criteria

- Limit site access to one route during construction, if possible; two routes for linear and larger projects.
- Prevent traffic from avoiding or shortcutting the full length of the construction exit by installing barriers. Barriers may consist of silt fence, construction safety fencing, or similar barriers.
- Design the access point(s) to be at the upslope side of the construction site. Do not place construction access at the lowest point on the construction site.
- Stabilized construction exits are to be constructed such that drainage across the exit is directed to a controlled, stabilized outlet onsite with provisions for storage, proper filtration, and removal of wash water.
- The exit must be sloped away from the paved surface so that stormwater from the site does not discharge through the exit onto roadways.
- Minimum width of exit shall be 15 feet.
- The construction exit material shall be a minimum thickness of 6 inches. The stone or recycled concrete used shall be 3 to 5 inches in size with little or no fines.
- The geotextile fabric must meet the following minimum criteria:
  - Tensile Strength, ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles, 300 lbs.
  - Puncture Strength, ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products, 120 lbs.
  - Mullen Burst Rating, ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method, 600 psi.
  - Apparent Opening Size, ASTM D4751 Test Method for Determining Apparent Opening Size of a Geotextile, U.S. Sieve No. 40 (max).
- Rock by itself may not be sufficient to remove clay soils from wheels, particularly in wet conditions. When necessary, vehicles must be cleaned to remove sediment prior to entering paved roads, streets, or parking lots. Refer to *Section 3.16 Wheel Cleaning Systems* for additional controls.
- Using water to wash sediment from streets is prohibited
- Minimum dimensions for the stabilized exit shall be as follows:

1B EROSION CONTROL CONSTRUCTION EXIT

DETAIL 2 OF 4

NO SCALE

Table 3.9 Minimum Exit Dimensions

Disturbed Area	*Min. Width of Exit*	*Min. Length of Exit*
< 1 Acre	15 feet	20 feet
≥ 1 Acre but < 5 Acres	25 feet	50 feet
≥ 5 Acres	30 feet	50 feet

- If a wheel cleaning system is used, the width of the stabilized exit may be reduced to funnel traffic into the system. Refer to *Section 3.16 Wheel Cleaning*.

3.11.4 Design Guidance and Specifications

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction – North Central Texas Council of Governments, Section 201.10 Stabilized Construction Entrance and in the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges (TxDOT 2004) Item 506.2.E and Item 506.4.C.5.

3.11.5 Inspection and Maintenance Requirements

Construction exits should be inspected regularly (at least as often as required by the TPDES Construction General Permit). The stabilized construction exit shall be maintained in a condition that prevents tracking or flow of sediment onto paved surfaces. Periodic re-grading and top dressing with additional stone must be done to keep the efficiency of the exit from diminishing. The rock shall be re-graded when ruts appear. Additional rock shall be added when soil is showing through the rock surface.

Additional controls are needed if inspections reveal a properly installed and maintained exit, but tracking of soil outside the construction area is still evident. Additional controls may be daily sweeping of all soil spilled, dropped, or tracked onto public rights-of-way or the installation of a wheel cleaning system.

3.11.6 Example Schematics

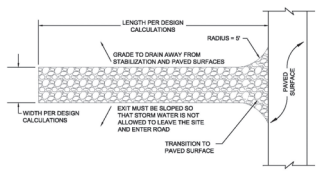
The following schematics are example applications of the construction control. They are intended to assist in understanding the control's design and function.

The schematics are **not for construction**. They may serve as a starting point for creating a construction detail, but they must be site adapted by the designer. In addition, dimensions and notes appropriate for the application must be added by the designer.

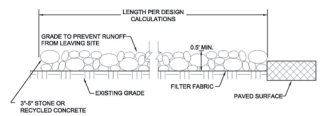
1C EROSION CONTROL CONSTRUCTION EXIT

DETAIL 3 OF 4

NO SCALE



PLAN VIEW
N.T.S.



CROSS SECTION
N.T.S.

NOTE: INSTALL SILT FENCE, CONSTRUCTION SAFETY FENCING, OR SIMILAR BARRIER ALONG THE EXIT TO DIRECT TRAFFIC INTO THE EXIT.

Figure 3.29 Schematics of Stabilized Construction Exit

1D EROSION CONTROL CONSTRUCTION EXIT

DETAIL 4 OF 4

NO SCALE

EROSION CONTROL GENERAL NOTES:

1. AT NO TIME CAN ANY RUNOFF FROM THE PROJECT, PROJECT'S PRODUCTS, VEHICLE MUD TRACKS, OR CONTAMINATED FLUIDS BE ALLOWED TO DRAIN INTO THE STORM SEWER SYSTEM. ALL DRAINS, SLUICES & ROADWAYS MUST REMAIN DUST-FREE & EFFLUENT-FREE.
2. NO POKT-O-LET SPRAY GUTS ONTO THE GROUND WILL BE PERMITTED.

Revisions:	Date:

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07-02-2025

Office of Construction and Facilities Management

U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
EROSION CONTROL DETAILS	ISSUE FOR BID	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
Approved: COR: JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG501
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

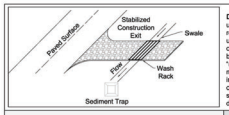
VA FORM 08-6231

NOTE:

EROSION CONSTRUCTION ENTRANCE & EXIT DETAILS (CG501) AND WHEEL CLEANING SYSTEM DETAILS (CG502 & CG503) WILL NOT BE REQUIRED UNLESS CONTRACTOR USES ONSITE GRASS AREAS OR ONSITE DIRT AREAS FOR STAGING OR STORING MATERIAL. THE USE OF ANY ONSITE STAGING AND/OR STORAGE AREAS MUST BE APPROVED BY THE COR.

3.16 Wheel Cleaning Systems

Sediment Control



Description: Wheel cleaning systems are used with a stabilized construction exit to remove soil from vehicle wheels and undercarriages prior to leaving the construction site. The cleaning system may be as simple as uneven, steel racks that "rumble" the vehicle or as complex as a pre-manufactured wash bay. Systems that include wash water must provide for collecting the water and removing sediments and other pollutants prior to discharge.

KEY CONSIDERATIONS

DESIGN CRITERIA:

- Locate within the stabilized construction exit
- Design according to type of soil and the number and size of vehicles using the cleaning system
- Provide a means of collecting wash water and removing sediment before discharge

ADVANTAGES / BENEFITS:

- Effectively reduces off-site sediment tracking
- Components of the system may be re-used on different projects

DISADVANTAGES / LIMITATIONS:

- Requires separate construction entrances and exits
- Requires frequent cleaning to remain functional
- Effectiveness dependent on operator training
- Sediment trapping controls won't remove oils or other pollutants in the wash water
- Potential overflows and discharges of wash water if sediment controls not carefully designed for the maximum amount of wash water to be generated

MAINTENANCE REQUIREMENTS:

- Inspect regularly
- Remove sediment from wheel cleaning device before sediment accumulates to half the depth of the device
- Remove sediment from sediment traps before it reaches a depth of half the design depth or 12 inches, whichever is less
- Dewater and clean wash basins using dewatering controls

TARGETED POLLUTANTS

- ● Sediment
- ○ Nutrients & Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Wastes

APPLICATIONS

Perimeter Control
Slope Protection
Sediment Barrier
Channel Protection
Temporary Stabilization
Final Stabilization
Waste Management
Housekeeping Practices

Fe=N/A

IMPLEMENTATION CONSIDERATIONS

- ● Capital Costs
- ● Maintenance
- ◒ Training
- ○ Suitability for Slopes > 5%

Other Considerations:

- *Management of wash water*
- *Prohibitions on the discharge of soaps and petroleum products*

1A EROSION CONTROL WHEEL CLEANING SYSTEMS

DETAIL 1 OF 5

NO SCALE

3.16.1 Primary Use

Wheel cleaning systems are used to remove soil from construction vehicles and equipment before they leave the site and enter paved streets. Wheel cleaning systems are used with a stabilized construction exit to minimize the tracking of soil from disturbed areas. They provide added protection and reduce the need to remove sediment from streets.

3.16.2 Applications

Wheel cleaning systems can be used on any construction site where a stabilized construction exit is not adequate to prevent off-site tracking of soil. However, because of their cost, they are most applicable for:

- Sites with large areas (> 10 acres) that are disturbed for long periods of time;
- Sites with a large number of vehicles and/or heavy equipment entering and exiting the site, which that will quickly and repeatedly degrade rock exits;
- Sites with clay soils or wet site conditions that result in tires accumulating large amounts of soil; or
- Sites where contaminated soils might be present.

3.16.3 Design Criteria

General

- Provide separate entrances and exits to the construction site so that incoming vehicles do not drive through the wheel cleaning system. Signage and employee training is critical to making the system work.
- Wheel cleaning systems should be located within the stabilized construction exit so that the vehicle does not pick up additional sediment load by traversing disturbed areas. A minimum of 25 feet of stabilized exit shall be maintained between the cleaning system and the paved road.
- The stabilized exit shall be sloped at 1 percent toward the cleaning system.
- The width of the stabilized exit may be reduced to 10 to 20 feet, depending on the size and number of vehicles using the exit, as long as all exiting traffic is funneled through the cleaning system.
- Post a sign requiring all vehicles to use the cleaning system before leaving the site. Posted speed limit through the wheel cleaning system should be 5 mph.
- Wheel cleaning systems should be designed with ease of access to areas where sediment will accumulate, so the system can be frequently cleaned.

Rumble Racks

- The minimum cleaning system shall consist of 10 foot wide, 8 foot long, steel grates with individual bars of the grates at varying heights to shake the vehicle and knock off soil. These grates are also known as rumble racks.
- Minimum length of the rumble rack shall be the length of the circumference of the largest tire on vehicles that will be using the construction exit. Two to three lengths of grates are typically necessary to provide adequate soil removal, depending on soil type and size of vehicles.
- Grates shall be placed over an excavated pit that is a minimum of one foot deep.
- Grates may be purchased pre-made from vendors or constructed by welding 10 foot lengths of structural steel tubing (rectangular section) or angle. The lengths of steel ("bars" of the rumble rack) should be welded to steel beams or other cross supports in a manner that provides for alternating heights. This is accomplished with rectangular steel tube by alternating the long and short sides of

1B EROSION CONTROL WHEEL CLEANING SYSTEMS

DETAIL 2 OF 5

NO SCALE

the tube upward. Angle iron, welded to the support structure with the angle pointed upward, may also be used. Round tubing shall not be used, as it does not adequately shake the tires.

- Size and spacing of bars and support beams shall be designed based on the size and weight of vehicles expected to be using the rumble rack.
- Welded or manufactured grates may be cleaned and re-used on multiple projects.

Wheel Washes

- Two common types of wheel wash systems constructed onsite are the corrugated metal wheel wash and the flooded basin wheel wash. In addition, several companies manufacture packaged wash systems that can be assembled onsite and re-used. All of these require a source of water, and several of the packaged systems require electricity to run pumps for water pressure.
- All wheel washes must provide a means to collect the wash water in a sediment basin or other sediment control that provides equivalent or better treatment prior to discharge from the site.
- For the flooded basin wheel wash, sedimentation occurs in the wash basin, meaning the basin cannot be used for a period of time while settling is allowed to occur. Cleaning of the basin should be done first thing in the morning after particles have settled overnight, and ideally the basin would be cleaned on Monday after settling all weekend. If the basin is pumped for cleaning, it should be accomplished using the controls in *Section 3.3 Dewatering Controls*.
- Corrugated metal wheel washes shall be constructed over a drainage swale that conveys the wash water to a sediment barrier, typically a sediment basin. However, a passive or active treatment system may be needed to adequately remove suspended solids depending on the permit requirements for the site.
- Swales, sediment basins, stone outlet sediment traps, and other controls for the wash water must be sized for the anticipated flows from the wheel wash using criteria in their respective sections of this manual. Depending on the volume of water, two sediment controls may be needed in parallel, to allow for settling and cleaning of one sediment control while the other is in operation for the wheel wash.
- Manufactured wash systems frequently collect, filter, and recycle the wash water, resulting in the use of less water and producing less wash water to treat for sediment removal. For this reason, they may be more cost-effective over the life of the project, even if their initial cost is higher.
- If a packaged wheel wash system does not include a sediment collection area, then a swale and sediment trap is required, similar to the corrugated metal wheel wash.
- Prohibit the use of soap for wheel washing. The purpose of a wheel wash is to remove soil that would otherwise fall off on the roadway, not to clean the vehicle. Refer to *Section 4.10 Vehicle and Equipment Management* for proper vehicle washing procedures. The discharge of wash water with soap in it is prohibited, and soap is not removed by a sediment control.
- Train employees to only use water in the wheel wash for removing accumulations of soil from the wheels and undercarriage. Minimize water contact with other portions of the vehicle or equipment. Wash water contaminated with oil, grease or fuel requires special handling and disposal. Refer to *Section 4.10 Vehicle and Equipment Management*.

3.16.4 Design Guidance and Specifications

No specification for construction of this item is currently available in the Standard Specifications for Public Works Construction – North Central Texas Council of Governments.

1C EROSION CONTROL WHEEL CLEANING SYSTEMS

DETAIL 3 OF 5

NO SCALE

EROSION CONTROL GENERAL NOTES:

1. AT NO TIME CAN ANY RUNOFF FROM THE PROJECT, PROJECT'S PRODUCTS, VEHICLE MUD TRACKS, OR CONTAMINATED FLUIDS BE ALLOWED TO DRAIN INTO THE STORM SEWER SYSTEM. ALL DRAINS, SLUICES & ROADWAYS MUST REMAIN DUST-FREE & EFFLUENT-FREE.
2. NO PONT-O-LET SPRAY GUTS ONTO THE GROUND WILL BE PERMITTED.

Revisions:	Date:

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3.16.5 Inspection and Maintenance Requirements

Wheel cleaning systems should be inspected regularly (at least as often as required by the TPDES Construction General Permit). Systems should be cleaned frequently, at least weekly and sometimes daily, to ensure proper operation. Grated systems should be cleaned before sediment accumulates to half the depth of the pit below the grates. Depending on volume of traffic, flooded basin systems often needed daily pumping, cleaning and refilling to be effective.

The sediment basin or other sediment trapping device shall be inspected for damaged areas and repaired as necessary. Sediment that has accumulated in the wash water sediment control (must be removed before it reaches half the design depth of the device or 12 inches, whichever is less. The removed sediment shall be stockpiled or redistributed to areas of the site that are protected by erosion and sediment controls.

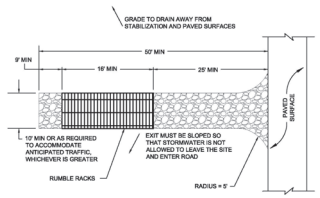
Water that ponds in the sediment basin should be inspected for sheen. If sheen is present, the water is considered contaminated by a petroleum product. Regulations of the TCEQ require this water to be pumped into containers and disposed of appropriately. It is not an authorized discharge from the construction site. Proper vehicle and equipment maintenance is essential to preventing this problem from occurring.

Manufacturer's recommendations should be followed for cleaning and maintaining packaged wheel wash systems.

3.16.6 Example Schematics

The following schematics are example applications of the construction control. They are intended to assist in understanding the control's design and function.

The schematics are **not for construction**. They may serve as a starting point for creating a construction detail, but they must be site adapted by the designer. In addition, dimensions and notes appropriate for the application must be added by the designer.



RUMBLE RACK PLAN VIEW
N.T.S.

RUMBLE RACK EXAMPLE INSTALLATION
N.T.S.

NOTE: DESIGNER SHALL SPECIFY SIZE AND SPACING OF THE STEEL BARS AND SUPPORT BEAMS BASED ON SIZE AND WEIGHT OF VEHICLES EXPECTED TO BE EXITING THE CONSTRUCTION SITE.

Figure 3.36 Schematics of Rumble Rack Wheel Cleaning

1D EROSION CONTROL WHEEL CLEANING SYSTEMS

DETAIL 4 OF 5

NO SCALE

1E EROSION CONTROL WHEEL CLEANING SYSTEMS

DETAIL 5 OF 5

NO SCALE

EROSION CONTROL GENERAL NOTES:

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VA U.S. Department of Veterans Affairs

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			Building Number: 2
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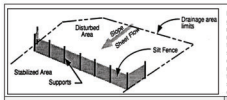
3.10 Silt Fence

Sediment Control



Description: A silt fence consists of geotextile fabric supported by wire mesh netting or other backing stretched between metal posts with the lower edge of the fabric securely embedded six-inches in the soil. The fence is typically located downstream of disturbed areas to intercept runoff in the form of sheet flow. A silt fence provides both filtration and time for sediment settling by reducing the velocity of the runoff.

KEY CONSIDERATIONS

DESIGN CRITERIA:

- Maximum drainage area of 0.25 acre per 100 linear feet of silt fence
- Maximum 200 feet distance of flow to silt fence; 50 feet if slope exceeds 10 percent
- Minimum fabric overlap of 3 feet at abutting ends; join fabric to prevent leakage
- Turn end of silt fence line upslope a minimum of 10 feet
- Install stone overflow structure at low points or spaced at approximately 300 feet if no apparent low point

ADVANTAGES / BENEFITS:

- Economical means to treat sheet flow
- Most effective with coarse to silty soil types

DISADVANTAGES / LIMITATIONS:

- Limited effectiveness with clay soils due to clogging
- Localized flooding due to minor ponding at the upslope side of the silt fence
- Not for use as check dams in swales or low areas subject to concentrated flow
- Not for use where soil conditions prevent a minimum toe-in depth of 6 inches or installation of support posts to a depth of 12 inches
- Can fail structurally under heavy storm flows, creating maintenance problems and reducing effectiveness

MAINTENANCE REQUIREMENTS:

- Inspect regularly
- Repair undercutting, sags and other fence failures
- Remove sediment before it reaches half the height of the fence
- Repair or replace damaged or clogged filter fabric

TARGETED POLLUTANTS

- ● Sediment
- ○ Nutrients & Toxic Materials
- ○ Oil & Grease
- ◒ Floatable Materials
- ○ Other Construction Wastes

APPLICATIONS

- **Perimeter Control**
- **Slope Protection**
- **Sediment Barrier**
- **Channel Protection**
- **Temporary Stabilization**
- **Final Stabilization**
- **Waste Management**
- **Housekeeping Practices**

Fe=0.50-0.75
(Depends on soil type)

IMPLEMENTATION CONSIDERATIONS

- ◒ Capital Costs
- ● Maintenance
- ○ Training
- ◒ Suitability for Slopes > 5%

Other Considerations:

- *Effects of ponding or the redirection of flow onto adjacent areas and property*

1A EROSION CONTROL SILT FENCE

DETAIL 1 OF 5
NO SCALE

3.10.1 Primary Use

Silt fence is normally used as a perimeter control on the down slope side of disturbed areas and on side slopes where stormwater may runoff the area. It is only feasible for non-concentrated, sheet flow conditions. If it becomes necessary to place a silt fence where concentrated flows may be occur (e.g. where two silt fences join at an angle, or across minor channels or gullies), it will be necessary to reinforce the silt fence at that area by a rock berm or sand bag berm, or other structural measures that will support the silt fence.

3.10.2 Applications

Silt fence is an economical means to treat overland, non-concentrated flows for all types of projects. Silt fences are used as perimeter control devices for both site developers and linear (roadway) type projects. They are most effective with coarse to silty soil types. Due to the potential of clogging and limited effectiveness, silt fences should be used with caution in areas that have predominantly clay soil types. In this latter instance, a soils engineer or soil scientist should confirm the suitability of silt fence for that application. Additional controls may be needed to remove fine silts and clay soils suspended in stormwater.

3.10.3 Design Criteria

- Fences are to be constructed along a line of constant elevation (along a contour line) where possible.
- Silt fence can interfere with construction operations; therefore, planning of access routes onto the site is critical.
- Maximum drainage area shall be 0.25 acre per 100 linear feet of silt fence.
- Maximum flow to any 20 foot section of silt fence shall be 1 CFS.
- Maximum distance of flow to silt fence shall be 200 feet or less. If the slope exceeds 10 percent the flow distance shall be less than 50 feet.
- Maximum slope adjacent to the fence shall be 2:1.
- Silt fences shall not be used where there is a concentration of water in a channel, drainage ditch or swale, nor should it be used as a control on a pipe outfall.
- If 50 percent or less soil, by weight, passes the U.S. Standard Sieve No. 200; select the apparent opening size (A.O.S.) to retain 85percent of the soil.
- If 85 percent or more of soil by weight, passes the U.S. Standard Sieve No. 200, silt fences shall not be used unless the soil mass is evaluated and deemed suitable by a soil scientist or geotechnical engineer concerning the erodibility of the soil mass, dispersive characteristics, and the potential grain-size characteristics of the material that is likely to be eroded.
- Stone overflow structures or other outlet control devices shall be installed at all low points along the fence or spaced at approximately 300 feet if there is no apparent low point.
- Filter stone for overflow structure shall be 1 ½ inches washed stone containing no fines. Angular shaped stone is preferable to rounded shapes.
- Silt fence fabric must meet the following minimum criteria:
  - Tensile Strength, ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles, 90-lbs.
  - Puncture Rating, ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products, 60-lbs.
  - Mullen Burst Rating, ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method, 280-psi.

1B EROSION CONTROL SILT FENCE

DETAIL 2 OF 5
NO SCALE

  - Apparent Opening Size, ASTM D4751 Test Method for Determining Apparent Opening Size of a Geotextile, U.S. Sieve No. 30(max) to No. 100 (min).
  - Ultraviolet Resistance, ASTM D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus, Minimum 70 percent.
- Fence posts shall be steel and may be T-section or L-section, 1.3 pounds per linear foot minimum, and 4 feet in length minimum. Wood posts may be used depending on anticipated length of service and provided they are 4 feet in length minimum and have a nominal cross section of 2 inches by 4 inches for pine or 2 inches by 2 inches for hardwoods.
- Silt fence shall be supported by steel wire fence fabric as follows:
  - 4 inch x 4 inch mesh size, W1.4 /1.4, minimum 14 gauge wire fence fabric;
  - Hog wire, 12 gauge wire, small openings installed at bottom of silt fence;
  - Standard 2 inch x 2 inch chain link fence fabric; or
  - Other welded or woven steel fabrics consisting of equal or smaller spacing as that listed herein and appropriate gauge wire to provide support.
- Silt Fence shall consist of synthetic fabric supported by wire mesh and steel posts set a minimum of 1-foot depth and spaced not more than 6-feet on center.
- A 6 inch wide trench is to be cut 6 inches deep at the toe of the fence to allow the fabric to be laid below the surface and backfilled with compacted earth or gravel to prevent bypass of runoff under the fence. Fabric shall overlap at abutting ends a minimum of 3 feet and shall be joined such that no leakage or bypass occurs. If soil conditions prevent a minimum toe-in depth of 6 inches or installation of support post to depth of 12 inches, silt fences shall not be used.
- Sufficient room for the operation of sediment removal equipment shall be provided between the silt fence and other obstructions in order to properly maintain the fence.
- The last 10 feet (or more) at the ends of a line of silt fence shall be turned upslope to prevent bypass of stormwater. Additional upslope runs of silt fence may be needed every 200 to 400 linear feet, depending on the traverse slope along the line of silt fence.

3.10.4 Design Guidance and Specifications

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction – North Central Texas Council of Governments, Section 201.5 Silt Fence and in the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges (TxDot 2004) Item 506.2.J and Item 506.4.C.9.

The American Society for Testing and Materials has established standard specifications for silt fence materials (ASTM D6461) and silt fence installation (ASTM D6462).

3.10.5 Inspection and Maintenance Requirements

Silt fence should be inspected regularly (at least as often as required by the TPDES Construction General Permit) for buildup of excess sediment, undercutting, sags, and other failures. Sediment should be removed before it reaches half the height of the fence. In addition, determine the source of excess sediment and implement appropriate measures to control the erosion. Damaged or clogged fabric must be repaired or replaced as necessary.

1C EROSION CONTROL SILT FENCE

DETAIL 3 OF 5
NO SCALE

EROSION CONTROL GENERAL NOTES:

1. *AT NO TIME CAN ANY RUNOFF FROM THE PROJECT, PROJECT'S PRODUCTS, VEHICLE MUD TRACKS, OR CONTAMINATED FLUIDS BE ALLOWED TO DRAIN INTO THE STORM SEWER SYSTEM. ALL DRAINS, SLUICES & ROADWAYS MUST REMAIN DUST-FREE & EFFLUENT-FREE.*
2. *NO PUNT-O-LET SPRAY GUTS ONTO THE GROUND WILL BE PERMITTED.*

Revisions:	Date:

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3.10.6 Example Schematics

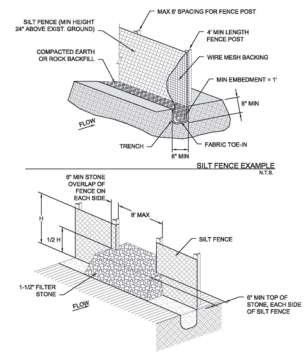
The following schematics are example applications of the construction control. They are intended to assist in understanding the control's design and function.

The schematics are **not for construction**. They may serve as a starting point for creating a construction detail, but they must be site adapted by the designer. In addition, dimensions and notes appropriate for the application must be added by the designer.

1D EROSION CONTROL SILT FENCE

DETAIL 4 OF 5

NO SCALE



SILT FENCE EXAMPLE
N.T.S.

STONE OVERFLOW STRUCTURE EXAMPLE
N.T.S.

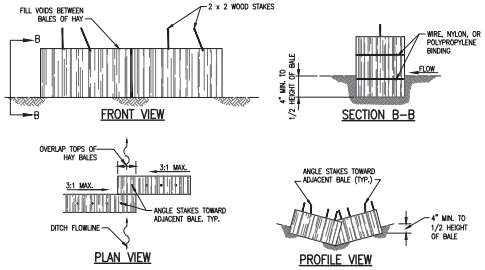
NOTES:
1. DESIGN SHALL SHOW ON THE DRAWINGS THE LOCATIONS WHERE OVERFLOW STRUCTURES SHALL BE INSTALLED. OVERFLOW STRUCTURES ARE REQUIRED AT ALL LOW POINTS AND AT A SPACING OF APPROXIMATELY 300 FT WHERE NO LOW POINT IS APPARENT.
2. DESIGNER SHALL ON THE DRAWINGS THE LOCATIONS WHERE SILT FENCE IS TO BE TURNED UPSLOPE. UPSLOPE LENGTHS SHALL BE A MINIMUM OF 10 FEET.

Figure 3.28 Schematics of Silt Fence

1E EROSION CONTROL SILT FENCE

DETAIL 5 OF 5

NO SCALE



1. TEMPORARY SILT FENCE MAY BE USED IN LIEU OF STRAW BALES.
2. HAY BALES SHALL BE A MINIMUM OF 30" IN LENGTH AND WEIGH A MINIMUM OF 50 LBS.
3. HAY BALES SHALL BE BOUND BY WIRE, NYLON, OR POLYPROPYLENE STRING. THE BALES SHALL BE COMPOSED ENTIRELY OF VEGETABLE MATTER.
4. HAY BALES SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4" AND WHERE POSSIBLE HALF THE HEIGHT OF THE BALE. TIGHTLY ABUTTING THE ADJACENT BALES.
5. HAY BALES SHALL BE PLACED IN A ROW WITH ENDS GROUND. THE BALES SHALL BE PLACED WITH BINDINGS PARALLEL TO THE GROUND.
6. HAY BALES SHALL BE SECURELY ANCHORED IN PLACE WITH 2X2 WOOD STAKES DRIVEN THROUGH THE BALES. THE FIRST STAKE SHALL BE ANGLED TOWARDS THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
7. 5 HAY BALES TYPICAL FOR LEAD-OFF DITCH.
8. 3 HAY BALES TYPICAL FOR WING DITCH.

2 BALED HAY EROSION BARRIER

DETAIL 1 OF 1

NO SCALE

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07-02-2025

Office of Construction and Facilities Management

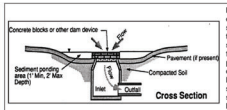
VA U.S. Department of Veterans Affairs

Drawing Title: EROSION CONTROL DETAILS	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG505
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

VA FORM 08-6231

3.4 Inlet Protection

Sediment Control



Description: Inlet protection consists of a variety of methods to intercept sediment at low point inlets through the use of depressed grading, filter stone, filter fabric, inlet inserts, organic filter tubes and other materials. The protection devices are placed around or across the inlet openings to provide localized detention or filtration of sediment and floatable materials in stormwater. Protection devices may be assembled onsite or purchased as manufactured assemblies.

KEY CONSIDERATIONS

DESIGN CRITERIA:
- Evaluate drainage patterns to ensure inlet protection will not cause flooding of roadway, property or structures
- Never block entire inlet opening
- Size according to drainage area and flow rates
- Include flow bypass for clogged controls and large storm events

ADVANTAGES / BENEFITS:
- May be the only feasible sediment control when all construction is located within rights-of-way

DISADVANTAGES / LIMITATIONS:
- Limited effectiveness and reliability
- High maintenance requirements
- Has potential to flood roadways or adjacent properties

MAINTENANCE REQUIREMENTS:
- Inspect regularly
- Check for and remove blockage of inlet after every storm event
- Remove sediment before it reaches half the design height or volume of the inlet protection, more frequently for curb inlets
- Repair or replace damaged materials
- Clean or replace filter stone and organic filter tubes is when clogged with sediment

TARGETED POLLUTANTS

- ◒ Sediment
- ○ Nutrients & Toxic Materials
- ○ Oil & Grease
- ◒ Floatable Materials
- ○ Other Construction Wastes

APPLICATIONS

- Perimeter Control
- Slope Protection
- **Sediment Barrier**
- Channel Protection
- Temporary Stabilization
- Final Stabilization
- Waste Management
- Housekeeping Practices

Fe=0.35-0.65
(Depends on soil type)

IMPLEMENTATION CONSIDERATIONS

- ◒ Capital Costs
- ● Maintenance
- ○ Training
- ○ Suitability for Slopes > 5%

Other Considerations:
- *Traffic hazards*
- *Passage of larger storm events without causing flooding*
- *Flow diversion to other inlets or drainage points*

1A EROSION CONTROL INLET PROTECTION
DETAIL 1 OF 11
NO SCALE

3.4.1 Primary Use

Inlet protection is typically used as a secondary sediment barrier, due to its limited effectiveness and numerous disadvantages. It is used to reduce sediment in storm sewer systems by serving as a back-up system for areas that have newly applied erosion controls or for other sediment controls that cannot achieve adequate sediment removal by themselves.

Inlet protection may be used as a primary sediment control only when all other primary controls are infeasible because of site configuration or the type of construction activity.

3.4.2 Applications

Inlet protection is best applied at low point (sump) inlets where stormwater runoff will pond behind the protection measure, and then either filter through the protection measure or flow over a weir created by it. Most inlet protection measures depend on ponding to be effective. These types of inlet protection are not applicable to on-grade curb inlets, where the inlet protection will cause stormwater runoff to bypass the inlet and overload downstream inlets. Only inlet protection measures that allow for use of the inlet opening (e.g. inlet inserts) are applicable as inlet protection for on-grade inlets.

Inlet protection is normally used in new developments with new inlets and roads that are not in public use. It has limited applications in developed areas due to the potential for flooding, traffic safety, pedestrian safety, and maintenance problems. Potential applications in developed areas are on parking lot inlets where water can pond without causing damage and during major repairs to existing roadways where no other controls are viable.

The application of inlet protection is highly variable due to the wide variety of inlet configurations (existing and new) and site conditions. The schematics in Section 6 show example applications; however, applications in most cases must be site adapted. Different methods and materials may be used. It is the responsibility of the designer to ensure that the methods and materials applied for inlet protection are appropriate to the site and flow conditions following the design criteria in Section 3.

3.4.3 Design Criteria

General

- Drainage patterns shall be evaluated to ensure inlet protection will not divert flow or flood the roadway or adjacent properties and structures.
- Inlet protection measures or devices that completed block the inlet are prohibited. They must also include a bypass capability in case the protection measures are clogged.
- Inlet protection must be designed to pass the conveyance storm (25-year, 24-hour) without creating a road hazard or damaging adjacent property. This may be accomplished by any of the following measures:
  - An overflow weir on the protection measure.
  - An existing positive overflow swale on the inlet.
  - Sufficient storage volume around the inlet to hold the ponded water until it can all filter into the inlet.
  - Other engineered method.
- Positive overflow drainage is critical in the design of inlet protection. If overflow is not provided for at the inlet, temporary means shall be provided to route excess flows through established swales, streets, or other watercourses to minimize damage due to flooding.
- Filter fabric and wire mesh used for inlet protection shall meet the material requirements specified in *Section 3.10 Silt Fence*.

1B EROSION CONTROL INLET PROTECTION
DETAIL 2 OF 11
NO SCALE

- Block and gravel (crushed stone or recycled concrete) protection is used when flows exceed 0.5 cubic feet per second and it is necessary to allow for overtopping to prevent flooding.
- The tube and filter for organic filter tubes shall be in accordance with the criteria in *Section 3.6 Organic Filter Tube*.
- Bags used to secure inlet protection devices on pavement shall be filled with aggregate, filter stone, or crushed rock that is less likely than sand to be washed into an inlet if the bag is broken. Filled bags shall be 24 to 30 inches long, 16 to 18 inches wide, and 6 to 8 inches thick. Bags shall be polypropylene, polyethylene, or polyamide woven fabric with a minimum unit weight of 4 ounces per square yard and meet the following criteria:
  - Greater than 300 psi Mullen Burst Strength using ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
  - Greater than 70 percent UV Stability using ASTM D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus.

Curb Inlet Protection

- Municipality approval is required before installing inlet protection on public streets.
- Special caution must be exercised when installing curb inlet protection on publicly traveled streets or in developed areas. Ensure that inlet protection is properly designed, installed and maintained to avoid flooding of the roadway or adjacent properties and structures.
- A two inch overflow gap or weir is required on all curb inlet protection devices.
- Traffic cones, warning signs, or other measures shall be installed to warn motorists when the inlet protection measures extend beyond the gutter line.
- 2 inch X 4 inch Weir Protection:
  - Bend wire mesh around the 2 inch x 4 inch board and staple to the board. Bend wire mesh around the bottom of the board, the curb opening, and along the pavement to form a cage for the rock.
  - Rock bags shall be placed perpendicular to the curb, at both ends of the wooden frame, to disrupt the flow and direct water into the rock filter. Stack the bags two high if needed.
- Organic Filter Tube Protection:
  - The diameter of the tube shall be at least 2 inches less than the height of the inlet opening. The tube should not be allowed to block the entire opening, since it will clog.
  - The tube shall be placed on 4 inch x 4 inch or 2 inch x 4 inch wire mesh to prevent the tube from sagging into the inlet.
  - The tube should be long enough to extend a minimum of 12 inches past the curb opening on each side of the inlet.
- Hog Wire Weir Protection:
  - The filter fabric and wire mesh shall extend a minimum of 12 inches past the curb opening on each side of the inlet.
  - Filter fabric shall be placed on 2 inch x 4 inch wire mesh to prevent the tube from sagging into the inlet.
  - Rock bags are used to hold the wire mesh and filter fabric in contact with the pavement. At least one bag shall be placed on either side of the opening, parallel to and up against the concrete curb. The bags are in intended to disrupt and slow the flow and ensure it does not go under the fabric. Add bags if needed.

1C EROSION CONTROL INLET PROTECTION
DETAIL 3 OF 11
NO SCALE

- If a board is used to anchor the wire mesh and fabric instead of rock bags, the board shall be secured with concrete nails at 3 inches on center. Upon removal clean any dirt or debris from the nailing locations, apply chemical sanding agent, and apply non-shrink grout flush with surface of concrete.
- Block and Gravel Protection:
  - Concrete blocks shall be standard 8 inch x 8 inch x 16 inch concrete masonry units and shall be in accordance with ASTM C139, Concrete Masonry Units for Construction. Filter gravel shall be ¾ inch washed stone containing no fines. Angular shaped stone is preferable to rounded shapes.
  - Concrete blocks are to be placed on their sides in a single row around the perimeter of the inlet, with ends abutting. Openings in the blocks should face outward, not upward. ½ inch x ½ inch wire mesh shall then be placed over the outside face of the blocks covering the holes. Filter gravel shall then be piled against the wire mesh to the top of the blocks with the base of the stone being a minimum of 18 inches from the blocks.
  - Alternatively, where loose stone is a concern (streets, etc.), the filter gravel may be placed in appropriately sized filter fabric bags.
  - Periodically, when the gravel filter becomes clogged, the gravel must be removed and cleaned in a proper manner or replaced with new gravel and piled back against the wire mesh.
- Organic Filter Tube On-Grade Protection:
  - Organic filter tubes may be used to provide sediment control at on-grade curb inlets where the tube will not be a traffic hazard, such as on residential streets where the pavement adjacent to the curb is allocated to parked cars. Tubes should not be used in this manner where they will extend into an active travel lane.
  - The filter tube shall be secured in a U-shape by rock bags. Runoff flowing in the gutter will pond within the U until it filters through the tube or overflows around the end.
- Inlet protection shall be phased on curb inlets being constructed. Controls shall be installed on the pipe inlet at the bottom of the catch basin as soon as it is installed and while the inlet box and top are being formed or placed.

Area Inlet Protection

- Installation methods for protection on area inlets vary depending on the type of inlet (drop, "Y," or other) and the type and use of the surface surrounding the inlet (parking lot, playground, etc.). It is the responsibility of the designer to appropriately adapt inlet protection measures and their installation methods for each site condition. Several types may be needed on one project.
- Filter Fabric Protection:
  - Filter fabric protection is appropriate where the drainage area is less than one acre and the basin slope is less than five (5) percent. Filter fabric, posts, and wire mesh shall meet the material requirements specified in *Section 3.10 Silt Fence*.
  - A 6 inch wide trench is to be cut 6 inches deep at the toe of the fence to allow the fabric to be laid below the surface and backfilled with compacted earth or gravel. This entrenchment prevents any bypass of runoff under the fence.
  - Stone overflow structures, according to the criteria in *Section 3.10 Silt Fence* shall be installed where flow to the inlet is concentrated and more than 1 cubic feet per second.
- Excavated Impoundment Protection:
  - Excavated inlet protection is usually the most effective type of area inlet protection; however, it is only applicable to drop inlets. It should not be applied to Y inlets because it will undermine the concrete pad surrounding the inlet opening. Nor can it be used for inlets on pavement.

1D EROSION CONTROL INLET PROTECTION
DETAIL 4 OF 11
NO SCALE

EROSION CONTROL GENERAL NOTES:

1. AT NO TIME CAN ANY RUNOFF FROM THE PROJECT, PROJECT'S PRODUCTS, VEHICLE MUD TRACKS, OR CONTAMINATED FLUIDS BE ALLOWED TO DRAIN INTO THE STORM SEWER SYSTEM. ALL DRAINS, SLUICES & ROADWAYS MUST REMAIN DUST-FREE & EFFLUENT-FREE.
2. NO POINT-O-LET SPRAY GUTS ONTO THE GROUND WILL BE PERMITTED.

Revisions:	Date:

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07-02-2025

Office of Construction and Facilities Management
U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
EROSION CONTROL DETAILS	ISSUE FOR BID	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
Approved: COR: JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG506
		Issue Date: 06/16/2025; Checked: JEL; Drawn: GAD	

VA FORM 08-6231

- With this protection method, it is necessary to install weep holes to allow the impoundment to drain completely.
- The impoundment shall be sized such that the volume of excavation is equal to or exceeds the runoff volume from the temporary control design storm (2-year, 24-hour) for the inlet's drainage area.
- The trap shall have a minimum depth of one foot and a maximum depth of 2 feet as measured from the top of the inlet and shall have side slopes of 2:1 or flatter.

- Block and Gravel Protection:
  - Block and gravel inlet protection is the most stable area inlet protection and can handle more concentrated flows. It may be installed on paved or vegetated surfaces. Loose stone shall be carefully removed from vegetated surfaces at the end of construction to prevent the stone from becoming a mowing hazard.
  - The inlet protection may be one or two blocks high. Single block heights are applicable for drainage areas up to 3 acres in size. The double block height shall be used for larger drainage areas.
  - Concrete blocks shall be standard 8 inch x 8 inch x 16 inch concrete masonry units and shall be in accordance with ASTM C139, Concrete Masonry Units for Construction. Filter gravel shall be ¾ inch washed stone containing no fines. Angular shaped stone is preferable to rounded shapes.
- Organic Filter Tube Protection:
  - Organic filter tubes may be used on paved or unpaved surfaces.
  - On paved surfaces, tubes shall be secured in place by rock bags. On unpaved surfaces, the tubes shall be embedded in the ground a minimum of 3 inches and staked at 4 foot spacing.
  - Designer shall provide calculations and specify the diameter of tube to be used based on the inlet's drainage area and the flow rate of runoff to the inlet. The minimum allowable diameter is 12 inches.

Proprietary Inlet Protection

- Numerous proprietary protection devices are available from commercial vendors. The devices often have the advantage of being reusable on several projects if they are maintained in good condition.
- It is the policy of this manual not to recommend any specific commercial vendors for proprietary controls. However, this subsection is included in order to provide municipalities with a rationale for approving the use of a proprietary inlet protection device within their jurisdiction.
- The designer shall work with the supplier to provide the municipality with flow calculations or independent third-party tests that document the device's performance for conditions similar to the ones in which it is proposed to be installed. The conditions that should be considered include: type and size of inlet, inlet configuration, size of contributing drainage area, design flow rate, soil particle sizes to be removed, and other pollutants to be removed.
- The designer or vendor of the proprietary device shall provide a minimum of three references for projects where the device has been installed and maintained in operation at a construction site for at least six months. Local references are preferred; but references from other regions can be accepted if a similarity between the reference project and the proposed application can be demonstrated.
- Proprietary devices must not completely block the inlet. The device shall have a minimum of a 2 inch wide opening for the length of the inlet when it will be used in areas that water can safely pond to depths deeper than the design depths for the inlet. If ponding is not an option, then the device must have overflow capacity equal to the inlet design flow rate.
- Some proprietary devices are available with replaceable pads or filters. These pads or filters have the added benefit or removing pollutants such as metals and oils in addition to removing sediment.

1E EROSION CONTROL INLET PROTECTION

DETAIL 5 OF 11

NO SCALE

These types of inserts are recommended in applications where prior or current land use in or adjacent to the construction areas may result in the discharge of pollutants.

- Proprietary protection devices shall be in accordance with the General criteria at the beginning of this section and any criteria listed under Curb Inlet Protection and Area Inlet Protection that are not specific to an inlet protection method.

3.4.4 Design Guidance and Specifications

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction – North Central Texas Council of Governments, Section 201.15 Inlet Protection.

3.4.5 Inspection and Maintenance Requirements

Inlet protection should be inspected regularly (at least as often as required by the TPDES Construction General Permit). Inlet controls should also be inspected after every storm event to check for collapse into the inlet or other damages that may block flow in the inlet. In addition to routine inspection, inlet protection devices should be observed and monitored during larger storm events to verify that they are not ponding or diverting water in a manner that floods a roadway or damages property.

Floatable debris and other trash caught by the inlet protection should be removed after each storm event. Sediment should also be removed from curb inlet protection after each storm event because of the limited storage area associated with curb inlets.

Sediment collected at area inlet protection should be removed before it reaches half the height of the protection device. Sediment should be removed from inlets with excavated impoundment protection before the volume of the excavation is reduced by 50 percent. In addition, the weep holes should be checked and kept clear of blockage.

Concrete blocks, 2 inch x 4 inch boards, stakes, and other materials used to construct inlet protection should be checked for damaged and repaired or replaced if damaged.

When filter fabric or organic filter tubes are used, they should be cleaned or replaced when the material becomes clogged. For systems using filter stone, when the filter stone becomes clogged with sediment, the stones must be pulled away from the inlet and cleaned or replaced.

Because of the potential for inlet protection to divert runoff or cause localized flooding, remove inlet protection as soon as the drainage area contributing runoff to the inlet is stabilized. Ensure that all inlet protection devices are removed at the end of the construction.

3.4.6 Example Schematics

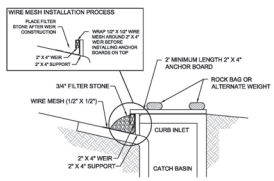
The following schematics are example applications of the construction control. They are intended to assist in understanding the control's design and function.

The schematics are **not for construction**. They may serve as a starting point for creating a construction detail, but they must be site adapted by the designer. In addition, dimensions and notes appropriate for the application must be added by the designer.

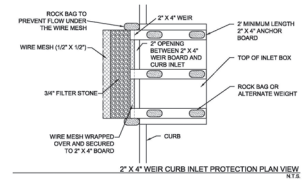
1F EROSION CONTROL INLET PROTECTION

DETAIL 6 OF 11

NO SCALE



2" X 4" WEIR CURB INLET PROTECTION CROSS SECTION
N.T.S.



2" X 4" WEIR CURB INLET PROTECTION PLAN VIEW
N.T.S.

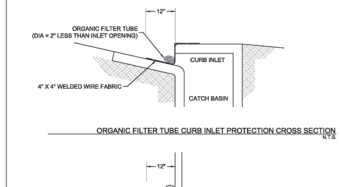
NOTE: THIS CONTROL WILL DECREASE THE CAPACITY OF THE INLET. IT SHALL ONLY BE USED WHEN AN ENGINEER HAS DETERMINED THERE IS ADEQUATE STORAGE OR POSITIVE OVERFLOW.

Figure 3.5 Schematics of 2"x4" Weir Curb Inlet Protection
(Source: Modified from Washington Suburban Sanitary Commission Detail SC-16.0)

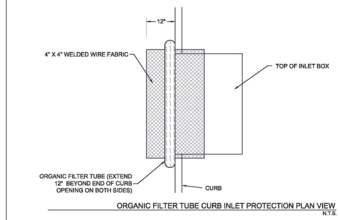
1G EROSION CONTROL INLET PROTECTION

DETAIL 7 OF 11

NO SCALE



ORGANIC FILTER TUBE CURB INLET PROTECTION CROSS SECTION
N.T.S.



ORGANIC FILTER TUBE CURB INLET PROTECTION PLAN VIEW
N.T.S.

NOTE: THIS CONTROL WILL DECREASE THE CAPACITY OF THE INLET. IT SHALL ONLY BE USED WHEN AN ENGINEER HAS DETERMINED THERE IS ADEQUATE STORAGE OR POSITIVE OVERFLOW.

Figure 3.6 Schematics of Organic Filter Tube Curb Inlet Protection
(Source: Modified from City of Plano BMP SP-4)

1H EROSION CONTROL INLET PROTECTION

DETAIL 8 OF 11

NO SCALE

EROSION CONTROL GENERAL NOTES:

1. AT NO TIME CAN ANY RUNOFF FROM THE PROJECT, PROJECT'S PRODUCTS, VEHICLE MUD TRACKS, OR CONTAMINATED FLUIDS BE ALLOWED TO DRAIN INTO THE STORM SEWER SYSTEM. ALL DRAINS, SLUICES & ROADWAYS MUST REMAIN DUST-FREE & EFFLUENT-FREE.
2. NO POINT-O-LET SPRAY GUTS ONTO THE GROUND WILL BE PERMITTED.

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Drawing Title: EROSION CONTROL DETAILS	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	Drawing Number: CG507

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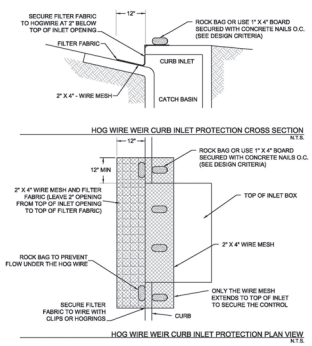


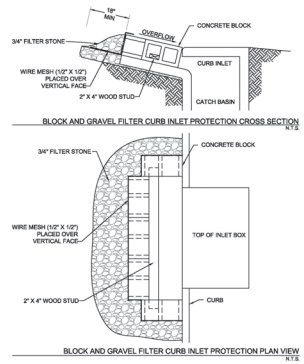
NOTE: THIS CONTROL WILL DECREASE THE CAPACITY OF THE INLET. IT SHALL ONLY BE USED WHEN AN ENGINEER HAS DETERMINED THERE IS ADEQUATE STORAGE OR POSITIVE OVERFLOW.

Figure 3.7 Schematics of Hog Wire Weir Curb Inlet Protection
(Source: Modified from City of Round Rock Detail E-03)

(1I) EROSION CONTROL INLET PROTECTION

DETAIL 9 OF 11

NO SCALE



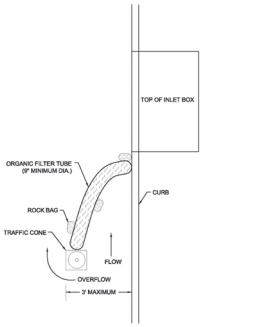
NOTES:
1. DO NOT INSTALL ON INLETS IN A PUBLIC STREET OR OTHER ACTIVE TRAVEL LANE. BLOCK AND GRAVEL FILTER IS INTENDED FOR USE ON LOW POINT (SUMP) INLETS IN PARKING LOTS AND OTHER PAVEMENT THAT IS NOT AN ACTIVE TRAVEL LANE. THIS INLET PROTECTION METHOD ALLOWS FOR FULL USE OF THE INLET DESIGN CAPACITY.
2. INSTALL TRAFFIC CONES AS NEEDED TO MINIMIZE THE POTENTIAL FOR CARS HITTING THE BLOCK AND GRAVEL.

Figure 3.8 Schematics of Block and Gravel Filter Curb Inlet Protection

(1J) EROSION CONTROL INLET PROTECTION

DETAIL 10 OF 11

NO SCALE



NOTES:
1. THIS DETAIL IS INTENDED FOR USE WITH ON-GRADE INLETS (NOT A LOW POINT) WHERE WATER WOULD BE DIVERTED INSTEAD OF PONDING BEHIND THE OTHER TYPES OF INLET PROTECTION.
2. DO NOT INSTALL ON INLETS WHERE THE ORGANIC FILTER TUBE WOULD EXTEND INTO AN ACTIVE TRAVEL LANE.

Figure 3.9 Schematic of Organic Filter Tube On-Grade Curb Inlet Protection

(1K) EROSION CONTROL INLET PROTECTION

DETAIL 11 OF 11

NO SCALE

EROSION CONTROL GENERAL NOTES:

1. AT NO TIME CAN ANY RUNOFF FROM THE PROJECT, PROJECT'S PRODUCTS, VEHICLE MUD TRACKS, OR CONTAMINATED FLUIDS BE ALLOWED TO DRAIN INTO THE STORM SEWER SYSTEM. ALL DRAINS, SLUICES & ROADWAYS MUST REMAIN DUST-FREE & EFFLUENT-FREE.
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Drawing Title: EROSION CONTROL DETAILS	Phase: ISSUE FOR BID	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
Approved: COR JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: CG508
		Issue Date: 06/16/2025 · Checked: JEL · Drawn: GAD	

VA FORM 08-6231

GENERAL NOTES

GENERAL CONDITIONS

1. Design loads are as follows:
   A. Roof live loads 20 PSF
   B. Floor live loads:
      i. Boiler Room 125 PSF
      ii. Mezzanine 40 PSF
   C. Equipment loads:
      i. New boilers (operating 22,960 pounds
      ii. Roof and floor supported HVAC equipment as noted on plan
   D. Ground snow loads: 16 PSF
   E. Wind pressure: unless noted otherwise, per ASCE 7-22 for:
      i. Basic wind speed = 117 mph (Risk Category IV)
      ii. Exposure B
      iii. Component and cladding wind pressure, PSF, for Wind Area = 10 SF:
         a. Roof zone 1: 11.22, -43.91
         b. Roof zone 2: 11.22, -57.97
         c. Roof zone 3: 11.22, -79.00
         d. Wall zone 4: 27.597, -29.926
         e. Wall zone 5: 27.597, -36.982
   F. Seismic design (per ASCE 7):
      a. Seismic Risk Category IV
      b. Seismic Importance Factor: 1.0
      c. Mapped Spectral Response Acceleration Parameters:
         S_S=.078g
         S_1=.024g
      d. Spectral Response Coefficients: S_{ds} = 0.083; S_{d1} = 0.038
      e. Site Class: D
      f. Seismic Design Category: A
      g. Seismic Force Resisting System: Ordinary Concrete Frame
      h. Design Base Shear: na
      i. Seismic Response Coefficient (CS) = 0.01
      j. Analysis procedure: Equivalent Frame Method
2. Structure was designed in accordance with the IBC 2024 edition.
3. Consult structural engineer for locations or design weights of roof, floor, and mezzanine supported Mech'l units differ from those indicated on structural plans.
4. All existing conditions shall be field verified.
5. Contractor shall verify all dimensions prior to start of construction.
6. General contractor shall be responsible for coordination of other trades (Mech'l, Elec'l, etc.) Prior to fabrication and installation of materials.
7. General contractor shall be responsible for coordination of architectural and structural drawings prior to fabrication, forming, or placement of materials. General contractor shall report discrepancies immediately to architect and shall proceed with construction only after discrepancy has been resolved.
8. The details designated as "Typical Details" apply generally to the drawings in all areas where conditions are similar to those shown in the details.

SITE

1. Soil preparation beneath new footings:
   A. Soil beneath new footings shall be either site borrow material (excavated beneath existing slab in demolition areas or imported select fill.
   B. Select fill shall be a clayey sand or sandy clay with Plasticity Indices between 4 and 15.
   C. Fill shall be placed in 8" lifts (6" for hand operated tampers) and compacted to between 95 and 100 percent of proctor at moisture content between -2 to +3 of optimum.
   D. The subgrade shall be firm and able to support the construction equipment without displacement and be compacted as recommended in geotechnical report. Soft or yielding subgrade shall be corrected and made stable before construction proceeds. Any old fill found on the site shall be reworked to provide adequate support for foundations and pavements or shall be removed.
2. Contractor shall provide a 15-mil vapor barrier beneath all building slabs or footings cast on grade.

CONCRETE

1. Unless noted otherwise, concrete shall be composed of Type I/II Portland Cement (ASTM C150), fine and coarse aggregates (ASTM C33), and potable water. Fly ash (ASTM C618, class C or F) may replace up to 25 percent of cementitious material. Set altering or water reducing admixtures (ASTM C494) may be used as conditions warrant.
2. Maximum water/cement ratio is 0.4 for exposed-to-view building slabs and 0.5 for all other concrete.
3. All concrete shall have a minimum compressive strength of 3000 psi at 28 days.
4. Maximum nominal coarse aggregate size shall be 1" max., unless noted otherwise.
5. Concrete building slabs and grade beams that are exposed to weather shall be air entrained to between 4 and 6%.
6. Unless noted otherwise, concrete slump shall be: 5" max., 3" min.
7. Unless noted otherwise, reinforcing steel shall be ASTM A615 grade.
8. Unless noted otherwise, concrete protection for reinforcement shall be as follows:
   Footings 3" bottom, 2" sides, 2" top
   Grade beams 3" bottom, 2" sides, 1 ½" top
   Slabs on grade centered
9. Reinforcing bars may be spliced only as shown on the drawings, except that beam reinforcing designated as "cont." may be contact lap spliced 20 bar diameters with locations of splices located at center of span for top bars and over supports for bottom and intermediate bars.
10. Unless noted otherwise, lap all reinforcing splices as follows:

Bar size	Class A splice	Class B splice
3	16"	21"
4	22"	28"
5	28"	36"
6	32"	42"

11. All reinforcement shall be detailed in accordance with the latest ACI Detailing Manual.
12. Contractor shall coordinate all penetrations, conduit, chamfers and embedded items prior to concrete placement.

MASONRY

1. Concrete masonry units: ASTM C90, grade N for load-bearing and reinforced masonry. Provide hollow normal weight units.
2. Unless noted otherwise, mortar for structural masonry shall be Type S, Portland Cement-Lime mortar. Masonry cement mortar is not allowed.
3. Bond shall be provided by lapping units in successive vertical courses.
4. Vertical cells to be filled shall have clear, unobstructed vertical cell of 2" x 3" minimum.
5. Cells to be grouted shall be filled solid. Grout shall have minimum 28-day compressive strength of 2500 PSI.
6. Unless noted otherwise masonry shall be constructed using low-lift grouting procedures.
7. Vertical reinforcing bars shall be secured with bar supported to properly position bar in cells. Unless noted otherwise, the first cell at wall corners, each side of masonry control joints, door jamms, window jambs, and ends of walls shall be reinforced with 1-#4 and grouted solid.
8. When a foundation dowel does not line up with a vertical reinforced cell, it shall not be sloped more than one horizontal to six vertical to achieve alignment. If the dowel cannot be aligned, it shall be grouted into an adjacent cell, in vertical alignment.
9. Temporary construction bracing of load-bearing walls shall remain in place until after the floor and roof deck attachments have been completed and all permanent bracing has been installed.

STRUCTURAL STEEL

1. Structural steel shall conform to AISC "Specification For The Design, Fabrication And Erection Of Structural Steel For Buildings", latest edition.
2. Galvanizing of steel members shall conform to ASTM A123/A123M.
3. All structural steel wide flange shapes shall be ASTM A992 (grade 50). HSS shapes shall be A500 gr. B. Standard pipe shall be ASTM A53, grade B. All other structural steel shall be A36.
4. Welded construction shall conform to the American Welding Society "Structural Welding Code", D1.1
5. All welding shall be performed by welders certified with the last 12 months.
6. Full and partial penetration welds performed in the field shall be ultrasonically tested.
7. When welds are not called-out on drawings, they are minimum size continuous fillet welds in accordance with AWS D1.1.
8. All welds shall be made using E70 series electrodes.
9. Headed studs (H.S.) shall be nelson or better.
10. Structural steel connections not detailed shall be AISC standard type 2 connections.
11. All bolted connections shall use ASTM F3125 bolts unless noted otherwise. Temporary erection bolts may be ASTM A307
12. All bolts exposed to the elements shall be hot dipped galvanized or group 1, alloy 304 stainless steel
13. All type 2 beam connections shall be standard double angle type unless detailed otherwise. Angle sizes, number and size of bolts for field connections shall be designed using the shear scheduled or shown on the drawings or, when not indicated, 55% of the value found for the appropriate beam span from the beam tables shown in table 3-6 of the AISC Manual, fourteenth edition. In no case shall the number of rows of bolts in the beam connections be less than the number found by dividing the nominal beam depth by six (6) and rounding any fraction up to the next highest number.
14. Steel members shall not be spliced except where shown on the drawings.
15. Temporary construction bracing of the structural steel frame shall remain in place until after the roof deck attachments have been completed and all permanent bracing has been installed.
16. Submit structural steel shop drawings to architect for approval prior to fabrication.
17. All structural steel shall be shop primed and field painted. Primer shall be gray oxide with minimum 2 mil dry thickness. Finish paint shall be 2 coats of rust-inhibiting paint as selected by owner.
18. Temporary construction bracing of the structural steel frame shall remain in place until after the floor and roof deck attachments have been completed and all permanent bracing has been installed.
19. The lifting and erection of pre-assembled elements, such as trusses or pre-fabricated framing, are considered special erection conditions. The selection of lift points and erection techniques are the responsibility of the contractor. Locate and provide sufficient lift points to prevent overstress and/or distortion of any components within the assembly. Provide temporary strong-backs, stiffeners and/or lifting devices as required.

METAL ROOF DECK (at roof fill-in areas)

1. Provide 1-1/2" metal decking 22 gage, type "A", "B", or "F" roof deck, as noted.
2. Unless noted otherwise, provide positive attachment to edge angles with either 5/8" diameter puddle welds at 12" on center or powder actuated nails at the same spacing.
3. Use a single (un-spliced) section of decking for each fill-in area.
4. All deck welds shall be made using E60 series electrodes.
5. Installation of powder-actuated and screw fasteners shall be in accordance with manufacturer's recommendations.

METAL ROOF DECK (at roof infill)

1. Provide 1-1/2" metal decking 22 gage, type "B" or "F" roof deck.
2. Unless noted otherwise, provide positive attachment to edge angle with either 5/8" diameter puddle welds at the lap flutes and 12" on center between lap flutes or powder actuated nails at the same spacing.
3. All deck welds shall be made using E60 series electrodes.
4. Installation of powder-actuated and screw fasteners shall be in accordance with manufacturer's recommendations.

POST-INSTALLED ANCHORS

A. Rebar doweling into concrete
   i. Adhesive anchors for cracked and uncracked concrete use:
      a. Hilti HIT-HY 200 safe set system with Hilti hollow drill bit and vacuum with continuously deformed rebar per ICC ESR-3187
      b. Hilti HIT-HY 500V3 safe set system with Hilti hollowdrill bit and vacuum with continuously DEFORMED REBAR PER ICC ESR-3814
   ii Basis of design includes the following design parameters:
      a. Cracked concrete
      b. Water-saturated concrete
      c. Base material temperature of 23-104 degrees Fahrenheit
      d. Allowable with hammer-drill, hollow drill bit system, and core drilling methods
      e. Current ICC-ES report with approval for development of bar using ACI provisions for embedment depths greater than 20 bar diameters
B. Anchorage to solid grouted masonry
   i. Mechanical anchors use:
      a. Hilti KWIK BOLT-TZ2

1. Anchor capacity used in design shall be based on the technical data published by Hilti or other such method as approved by the structural engineer of record. Substitution requests for alternate products must be approved in writing by the structural engineer of record prior to use. Contractor shall provide calculations that have been sealed by another licensed engineer demonstrating that the substituted product is capable of meeting the performance of the specified product. Fasteners submitted for substitution must also have an ICC ESR showing compliance with the relevant building code for seismic uses, load resistance, installation category, and availability of comprehensive installation instructions for that particular fastener. Adhesive anchor evaluation will also consider creep, in-service temperature, installation temperature, moisture condition of concrete, and drilling methods.
2. Install anchors per the manufacturer's printed installation instructions, as included in the anchor packaging.
3. Anchor capacity is dependent upon spacing between adjacent anchors and proximity of anchors to edge of concrete. Install anchors in accordance with spacing and edge clearances indicated on the drawings.
4. Existing reinforcing bars in the concrete structure may conflict with specific anchor locations. Unless noted otherwise on the drawings, existing bars may not be cut. The contractor shall review the existing structural drawings and shall undertake to locate the position of the reinforcing bars at the locations of the concrete anchors by GPR, X-ray, chipping or other approved means.

SHOP DRAWING REVIEW AND SUBMITTAL NOTES

1. Shop drawings and/or product data for the following items are to be submitted to the structural engineer for review:
   A. Reinforcing steel data and shop drawings
   B. Concrete formwork data
   C. Concrete mix designs
   D. Masonry product data
   E. Masonry reinforcing shop drawings and data
   F. Structural steel shop drawings and data
   G. Metal decking shop drawings and data.
   H. Metal grating data.
2. General contractor shall pre-check all shop drawings before submission to the engineer for review. All submittals materials must bear the review stamp of the general contractor.
3. Allow 10 working days after date of delivery to the architect/or engineer's review of shop drawings.
4. The use of reproductions of theses contract drawings, including the use of electronic files, by any contractor, subcontractor, erector, fabricator, or material supplier in lieu of the independent preparation of shop drawings signified their acceptance of all information shown hereon as correct and obligates themselves to any job expense, real or implied, arising due to any errors that may occur thereon. Such use of reproductions of these contract documents will not be allowed without prior consent from the engineer.

TESTING LAB SERVICES

1. An independent testing lab shall be engaged to perform quality control testing and inspections.
2. Contractor shall cooperate and coordinate activities with owner's testing lab.
3. Testing lab shall perform the following services:
   A. Observe reinforcing steel and items embedded in concrete.
   B. Observe concrete pours.
   C. Provide concrete testing as follows:
      i. Prepare one set of six cylinders, from each day's pour for each type of concrete used, for compressive strength testing. Break two cylinders at 7 days, two at 28 days, and hold two for future testing, if required. Note, the above counts are based on 6-in diameter cylinders, if smaller cylinders are used, the count for each break increases to three.
      ii. Perform one slump test for each set of cylinders prepared. Perform additional slump tests as required when changes in concrete consistency are discernable.
   D. Provide inspection of structural steel connections with testing of a minimum of 20 percent of bolts and welds, per specifications.
   E. Provide inspection of roof and floor grating attachments.
   F. Perform periodic masonry grout and mortar testing as specified and observation of masonry reinforcement.
4. Refer to special inspections notes for special inspections required by code. Special inspections are in addition to the general quality control inspections indicated above.

ABBREVIATIONS USED ON STRUCTURAL DRAWINGS

ABOVE FIN. FL.	- A.F.F.	LARGER THAN OR EQUAL TO	- >=
ADDITIONAL	- ADDT'L.	LESS THAN OR EQUAL TO	- <=
ADJACENT	- ADJ.	LIVE LOAD	- L.L.
ALTERNATE	- ALT.	LONGITUDINAL	- LONG.
ANCHOR BOLT	- A.B.	LONG LEG HORIZONTAL	- LLH
AND	- &	LONG LEG VERTICAL	- LLV
ANGLE	- L	LOW POINT	- L.P.
APPROXIMATE	- APPROX.	LONG SIDE VERTICAL	- LSV
ARCHITECTURAL	- ARCH'L.	MANUFACTURER	- MFR.
AT	- @	MATERIAL	- MAT'L.
AIR CONDITIONER	- A/C	MAXIMUM	- MAX.
AIR HANDLING UNIT	- AHU	MECHANICAL	- MECH'L.
		METAL	- MET.
BACK TO BACK	- B/B	MEZZANINE	- MEZZ.
BASE PLATE	- BP.	MINIMUM	- MIN.
BEAM	- BM.	MISCELLANEOUS	- MISC.
BEARING	- BRG.	MOMENT	- M.
BETWEEN	- BTWN.	MOMENT CONNECTIONS	- M.C.
BLOCKING	- BLK'G.	NEAR SIDE	- N.S.
BOTH WAYS	- B.W.	NEW	- (N)
BOTTOM	- BOT.	NOT TO SCALE	- N.T.S.
BOTTOM CHORD EXTENSION	- BCX	NUMBER	- NO.
BRIDGING	- BRDG.		
BUILDING	- BLDG.	ON CENTER	- O.C.
BUILDING LINE	- B.L.	OPENING(S)	- OPNG.(S)
		OPPOSITE	- OPP.
CAMBER	- C	OPPOSITE HAND	- O.H.
CEILING	- CLG.	OUTSIDE DIAMETER	- O.D.
CENTER TO CENTER	- C/C	OUTSIDE FACE	- O.F.
CENTER LINE	- ℄		
CENTERED	- CNTRD.	PENETRATION	- PEN.
CHANNEL	- C	PERIMETER	- PERIM.
CLEAR	- CL.	PERPENDICULAR	- PERP.
COLUMN	- COL.	PIPE BRACE	- P.B.
COMPRESSION	- C.	PLYWOOD SHEATHING	- PLY SHTG.
CONCRETE	- CONC.	PLATE	- PL ; PL.
CONCRETE MASONRY UNIT	- CMU	POINT	- PT.
CONDENSING UNIT	- CU	PRECAST CONCRETE	- P/C
CONNECTION(S)	- CONN.(S)	PROJECTION	- PROJ.
CONTINUOUS	- CONT.		
CONSTRUCTION JOINT	- C.J.	RADIUS	- RAD.
COORDINATE	- COORD.	REFER	- REF.
		REINFORCING	- REINF.
DEFORMED BAR ANCHOR	- DBA.	REMAINDER	- REM.
DETAIL	- DET.	REQUIRED	- REQ'D.
DEAD LOAD	- D.L.	RIGID FRAME	- R.F.
DIAGONAL	- DIAG.	ROOF TOP UNIT	- RTU
DIAGONAL BRACE	- D.B.	ROOF DRAIN	- R.D.
DIAMETER	- DIA. OR ∅		
DIMENSION	- DIM.	SAWN JOINT	- S.J.
DOUBLE	- DBL.	SCHEDULE	- SCHED.
DOWELS	- DWL(S)	SECTION	- SECT.
DOWN	- DN.	SHEAR	- V.
DRAWING	- DRWG.	SHEET	- SHT.
		SIMILAR	- SIM.
EACH	- EA.	SLIP CONNECTION	- S.C.
EACH FACE	- E.F.	SPACE	- SP.
EACH WAY	- E.W.	SPECIFICATIONS	- SPEC.
ELECTRICAL	- ELEC'L.	STANDARD	- STD.
ELEVATION	- EL.	STEEL	- STL.
ELEVATOR	- ELEV.	STIFFENER	- STIFF.
ENGINEER	- ENGR.	STIRRUPS	- STIR.
EQUAL(EQUALLY)	- EQ.	STRUCTURE	- STRUCT.
EXPANSION	- EXP.	STRUCTURAL	- STRUCT'L.
EXPANSION JOINT	- E.J.	SUPPORT	- SUPT.
EXISTING	- EXIST. ; (E)	SYMMETRICAL	- SYMM.
EXTERIOR	- EXT.		
FACE TO FACE	- F/F	TOP CHORD EXTENSION	- TCX
FAR SIDE	- F.S.	TEMPERATURE	- TEMP.
FIELD VERIFY	- F.V.	TENSION	- T.
FINISH(ED)	- FIN.	THICK	- THK.
FINISHED FLOOR	- FIN. FL.	TONGUE & GROOVE	- T & G
FIXED CONNECTION	- F.C.	TOP & BOTTOM	- T & B
FLANGE	- FLG.	TOP OF BEAM	- T.O.B.
FLOOR	- FL.	TOP OF FOOTING	- T.O.F.
FOOTING	- FTG.	TOP OF JOIST	- T.O.J.
FOUNDATION	- FDN.	TOP OF METAL DECK	- T.M.D.
		TOP OF PIER	- T.O.P.
GAGE OR GAUGE	- GA.	TOP OF PIER CAP	- T.O.P.C.
GALVANIZED	- GALV.	TOP OF STRUCTURAL STEEL	- T.O.S.S.
GENERAL	- GEN.	TOP OF STRUCTURAL CONCRETE	- T.O.S.C.
GRADE	- GR.	TOP OF WALL	- T.O.W.
GRADE BEAM	- G.B.	TOTAL LOAD	- T.L.
GYPSUM BOARD	- GYP. BD.	TRANSVERSE	- TRAN.
		TYPICAL	- TYP.
HEADED STUD	- H.S.		
HEIGHT	- HT.	UNLESS OTHERWISE NOTED	- U.N.O.
HIGH POINT	- H.P.		
HORIZONTAL	- HORIZ.	VENT THROUGH ROOF	- VTR.
HORIZONTAL LOAD	- H.L.	VERTICAL	- VERT.
INDEPENDENT WIRE ROPE CORE	- IWRC	WATERSTOP	- W.S.
INFORMATION	- INFO.	WEIGHT	- WT.
INSIDE DIAMETER	- I.D.	WELDED WIRE MESH (FABRIC)	- W.W.F.
INSIDE FACE	- I.F.	WIND LOAD	- W.L.
INTERIOR	- INT.	WITH	- W/
INTERMEDIATE	- INTERM.	WOOD	- WD.
		WORK POINT	- W.P.
JOINT	- JT.		
JOISTS	- JST(S)	X-BRACING	- XB
KIPS	- K.		

Revisions:	Date:

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10/07/2025

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
GENERAL NOTES	100% CONSTRUCTION DOCUMENT	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: SS001
		Issue Date: 10/07/2025 · Checked: RLW · Drawn: BWT	

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SPECIAL INSPECTIONS

SI-1 The registered design professional in responsible charge (RDP/RC) for this project is the architect. Submit all inspection reports directly to the RDP/RC for review. Also, submit file structurally related special inspection reports to the structural engineer for review.

SI-2 The RDP/RC contracts with or is employed by the owner. In order to comply with the code requirements, the RDP/RC And the special inspectors and testing technicians may not be in the employ of the general contractor (GC), Subcontractors or material suppliers. In the case of an owner / contractor, the building official shall specify who employs the RDP/RC, special inspectors and testing technicians.

SI-3 These inspections are in addition to the inspections specified in Section 110 of the 2024 International Building Code (IBC). Refer to the building code, and any amendments to the building code for this jurisdiction, to determine all the required inspections in addition to the special inspections listed below.

SI-4 Inspection of Fabricators - Fabricator shall submit to the RDP/RC, with a copy to the owner and the GC, a certificate of compliance stating the he fabricated his work under the inspections services of a special inspector or under the inspection services of a nationally recognized trade organization that requires quality control inspections.

<<The following special inspections in table form are required only if marked by a 'X', 'C', or 'P'.
X - Denotes that the inspection is required, one time occurrence.
C - Denotes that the inspection is required and shall be continuous.
P - Denotes that the inspection is required and shall be periodic.
R - Denotes that inspection/testing is required and shall be performed with applicable standards.
NA - Denotes not applicable to this project.
"- - -" - Observe, or perform in accordance with applicable standards.

SI-5 Open Web Steel Joist & Joist Girders (Per 2024 IBC Table 1705.2.3) - NOT APPLICABLE

SI-6 Structural Steel Construction

Mark	Description	REFERNCED STANDARD	IBC REFERNCED	Remark
	Structural Steel:	AISC 360 Ch.N	1705.2	
P	1. Material verification of structural steel.	ASTM 6 ASTM Standards AISC 360 A3.1		Review Structural steel mill certificates and test reports
P	2. Verify structural steel identification markings.	Applicable ASTM Standards		
	3. Structural steel welding:	AWS D1.1 AISC 360M2.4		
- - -	a. Inspection asks Prior to Welding.			QA tasks listed in AISC 360, Table N5.4-1
- - -	b. Inspection asks During Welding.			QA tasks listed in AISC 360, Table N5.4-2
- - -	c. Inspection asks After Welding.			QA tasks listed in AISC 360, Table N5.4-3
NA	d. Nondestructive testing (NDT) of welded joints:			EXCEPTION: NDT of welds completed in an approved fabricator's shop. See AISC 360, N6
NA	1) Complete penetration groove welds 5/16" or greater in risk category III or IV			AISC 360 N5b UT on 100%, may reduce to 25% per AISC 360, N5e
NA	2) Complete penetration groove welds 5/16" or greater in risk category II			AISC 360, N5b UT on 10%, may increase to 100% per AISC 360, N5f
NA	3) Welded joints subject to fatigue when required by Aisc 360, Appendix 3, Table A-3.1			AISC 360, N5c
NA	4) Fabricator's NDT reports when fabricator performs NDT			AISC 360, N6
	4. Structural steel bolting:	RCSC Specification		
- - -	a. Inspection tasks Prior to Bolting			QA tasks listed in AISC 360, Table N5.6-1
- - -	b. Inspection tasks During Bolting			QA tasks listed in AISC 360, Table N5.6-2
- - -	c. Inspection tasks After Bolting			QA tasks listed in AISC 360, Table N5.6-3
NA	5. Visual inspection of exposed cut surfaces of galvanized structural steel main members and exposed corners of the rectangular HSS for cracks subsequent to galvanizing.			
	Other Inspection Tasks:	AISC 360 N5.8		
P	1. Inspect steel frames to verify compliance with the details shown on the construction documents, such as braces, stiffeners, member locations and proper application of joint details at each connection.			
P	2. Inspect the placement of anchor rods and other embedments supporting structural steel for compliance with the construction documents. The diameter, grade, type and length of the anchor rod or embedded item, and the extent or depth of embedment into the concrete, shall be verified prior to the placement of concrete.			
NA	Cold-Formed Steel Deck:	SDI QA/QC		
NA	1. Manufacturer documents listed in SDI QA/QC, Section 2.1 & 2.2	SDI QA/QC Sec. 2		
NA	2. Cold-formed steel deck placement:			
NA	a. Inspection tasks prior to deck placement			SDI QA/QC, Appendix 1 Table 1.1
NA	b. Inspection tasks after deck placement			SDI QA/QC, Appendix 1 Table 1.2
NA	3. Cold-formed steel deck welding:	AWS D1.3		
NA	a. Inspection tasks prior to welding			SDI QA/QC, Appendix 1 Table 1.3
NA	b. Inspections asks during welding			SDI QA/QC, Appendix 1 Table 1.4
NA	c. Inspection tasks after welding			SDI QA/QC, Appendix 1 Table 1.5
NA	4. Cold-formed steel deck mechanical fastening:			
NA	a. Inspection tasks prior to mechanical fastening			SDI QA/QC, Appendix 1 Table 1.6
NA	b. Inspections asks during mechanical fastening			SDI QA/QC, Appendix 1 Table 1.7
NA	c. Inspection tasks after mechanical fastening			SDI QA/QC, Appendix 1 Table 1.8
NA	Inspection of steel elements of composite construction prior to concrete placement:			
NA	1. Placement and installation of steel headed stud anchors	AWS D1.1, D1.5, D1.6		
NA	Verification of Steel Construction Other Than Structural Steel:			
NA	1. Inspection of welding:			
NA	a. Reinforcing steel:			
NA	1) Verification of weldability of reinforcing steel other than ASTM A706	AWS D1.4 ACI 318: Ch. 26.6.1.1(g), 26.6.4.1		
NA	2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.	AWS D1.4 ACI 318: Ch. 26.6.1.1(g), 26.6.4.1		
NA	3) Shear reinforcement	AWS D1.4 ACI 318: Ch. 26.6.1.1(g), 26.6.4.1		
NA	4) Other reinforcement	AWS D1.4 ACI 318: Ch. 26.6.1.1(g), 26.6.4.1		

SI-7 Metal Building Systems (Per 2024 IBC Table 1705.2.6) - NOT APPLICABLE

SI-8 Concrete Construction (Per 2024 IBC Table 1705.3)

Mark	Description	Referenced Standard	IBC Reference
P	1. Inspect reinforcement, including prestressing tendons, and verify placement.	ACI 318: Ch. 23; 25.2, 25.3, 26.6.1-26.6.3	
NA	2. Reinforcing bar welding:		
NA	a. Verify weldability of reinforcing bars other than ASTM A706;	AWS D1.4 ACI 318: 26. 3.1.4	
NA	b. Inspect welding of reinforcement for special moment frames, boundary elements of special structural walls and coupling beams.	ACI 318: 26.6.4	
NA	c. Inspect welded reinforcement splices		
NA	d. Inspect welding of primary tension reinforcement in corbels.		
NA	e. Inspect single-pass fillet welds, maximum 5/16".	AWS D1.4 ACI 318: 26 13.3	
NA	f. Inspect all other welds.	AWS D1.4 ACI 318: 26 13.3	
P	3. Inspect anchors cast in concrete.	ACI 318: 26.13.3.3	
	4. Inspect anchors post-installed in hardened concrete members [a]		
C	a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	ACI 318: 26 13.3.2	
P	b. Mechanical anchors and adhesive anchors not defined in 4.a.	ACI 318: 26.13.3	
P	5. Verify use of required design mix.	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2
C	6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	ASTM C172 ASTM C31 ACI 318: 26.5, 26.12	
C	7. Inspect concrete and shotcrete placement for proper application techniques.	ACI 318: 26.5	
P	8. Verify maintenance of specified curing temperature and techniques.	ACI 318: 26.5.3-26.5.5	
NA	9. Inspect prestressed concrete for:		
NA	a. Application of prestressing forces; and	ACI 318: 26.10	
NA	b. Grouting of bonded prestressing tendons.		
NA	10. Inspect erection of precast concrete members.	ACI 318: Ch. 26.9	
NA	11. For precast concrete diaphragm connections or reinforcement at joints classified as moderate (MDE or HDE) in structures assigned to Seismic Design Category C, D, E, or F, inspect such connections and reinforcement in the field for:	ACI 318: 26. 3.1.3 ACI 550.5	
NA	a. Installation of the embedded parts		
NA	b. Completion of the continuity of reinforcement across joints.		
NA	c. Completion of connections in the field.		
NA	12. Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5.	ACI 318: 26.13.1.3	
P	13. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	ACI 318: 26.11.2	
P	14. Inspect formwork for shape, location and dimensions of the concrete member being formed.	ACI 318: 26.11.1.2(b)	

Note:
a. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 17.8.2 in ACI 318, or other qualification procedure. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

SI-9A Masonry Construction (Per TMS 602-16 Table 4)

Mark	MINIMUM TESTS
R	Verification of Slump flow and Visual Stability Index (VSI) as delivered to the project site in accordance with Specification Article 1.5 B.1.b.3 for self-consolidating grout.
R	Verification of f'_m and f'_{AAC} in accordance with Specification Article 1.4 B prior to construction, except where specifically exempted by TMS 402-13/ACI 530-13/ASCE 5-13.

Mark	MINIMUM SPECIAL INSPECTIONS Inspection Task	Frequency Level 1	Level 2	Level 3	Reference for Criteria TMS 402	TMS 602
FREQUENCY AS NOTED	1. As masonry construction begins, verify that the following are in compliance:					
	a. Proportions of site-prepared mortar.	NA	NA	P		Art. 2.1, 2.6 A. & 2.6 C
	b. Grade and size of prestressing tendons and anchorages.	NA	NA	P		Art. 2.4 B & 2.4 H
	c. Grade, type and size of reinforcement, connectors, anchor bolts, and prestressing tendons and anchorages.	NA	NA	P		Art. 3.4 & 3.6 A
	d. Prestressing technique.	NA	NA	NA		Art. 3.6 B
	e. Properties of thin-bed mortar for AAC masonry.	NA	NA	NA		Art. 2.1 C.1
	f. Sample panel construction.	NA	NA	NA		Art. 1.6 D
	2. Prior to grouting, verify that the following are in compliance:					
	a. Grout space.	NA	NA	C		Art. 3.2 D & 3.2 F
	b. Placement of prestressing tendons and anchorages.	NA	NA	NA	Sec. 10.8 & 10.9	Art. 2.4 & 3.6
	c. Placement of reinforcement, connectors, and anchor bolts.	NA	NA	C	Sec. 6.1, 6.3.1, 3.3.6 & 6.3.7	Art. 2.4 & 3.6
	d. Proportions of site-prepared grout and prestressing grout for bonded tendons	NA	NA	P		Art. 2.6 B & 2.4 G.1.b
	3. Verify compliance of the following during construction:					
	a. Materials and procedures with the appoved submittals.	NA	NA	P		Art. 1.5
	b. Placement of masonry units and mortar joint construction.	NA	NA	P		Art. 3.3 B
	c. Size and location of structural members.	NA	NA	P		Art. 3.3 F
	d. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	NA	NA	C	Sec. 1.2.1 (e), 6.2.1, & 6.3.1	
	e. Welding of reinforcement.	NA	NA	NA	Sec. 6.1 & 1.2	
	f. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F (44°C)) or hot weather (temperature above 90°F (32.2°)).	NA	NA	P		Art. 1.8 C & 1.8 D
	g. Application and measurement of prestressing force.	NA	NA	NA		Art. 3.6 B
	h. Placement of grout and prestressing grout for bonded tendons is in compliance.	NA	NA	NA		Art. 3.5 & 3.6 C
	i. Placement of AAC masonry units and construction of thin-bed mortar joints.	NA	NA	NA		Art. 3.3 B.9 & 3.3 F.1.b
	4. Observe preparation of grout specimens, mortar specimens, and/or prisms.	NA	NA	C		Art. 1.4 B.2.a.3, 1.4 B.2.b.3, 1.4 B.3.c.3, 1.4 B.3.f & 1.4 B.4

Note:
(a) Required for the first 5000 square feet (465 square meters) of AAC masonry.
(b) Required after the first 5000 square feet (465 square meters) of AAC masonry.

SI-9E Masonry Construction (Per TMS 602-16 Table 3)

Mark	Minimum Verification Requirements	Required for Quality Assurance [a] Level 1	Level 2	Level 3	Reference for Criteria TMS 602
FREQUENCY AS NOTED	Prior to construction, verification of compliance of submittals.	NA	NA	R	Art. 1.5
	Prior to construction, verification of f'_m and f'_{AAC}, except where specifically exempted by Code.	NA	NA	R	Art. 1.4 B
	During construction, verification of Slump flow and Visual Stability Index (VSI) when self-consolidating grout is delivered to project site.	NA	NA	R	Art. 1.5 & 1.6.3
	During construction, verification of f'_m and f'_{AAC}, for every 5,000 sq. f. (465 sq. m).	NA	NA	R	Art. 1.4 B
	During construction, verification of proportions of materials as delivered to the project site for premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout.	NA	NA	R	Art. 1.4 B

Note:
(a) R = Required, NR = Not Required

SI-10 Wood Construction - NOT APPLICABLE

SI-11 Mass Timber Construction (Per 2024 IBC Table 1705.5.3) - NOT APPLICABLE

SI-12 Cold-Formed Steel Light-Frame Construction - NOT APPLICABLE

SI-13 Soils (Per 2024 IBC Table 1705.6)

Mark	Description
P	1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.
P	2. Verify excavations are extended to proper depth and have reached proper material.
P	3. Perform classification and testing of compacted fill materials.
C	4. During fill placement, verify use of proper materials and procedure in accordance with the provisions of the approved geotechnical report. Verify densities and lift thicknesses during placement and compaction of compacted fill.
P	5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.

SI-14 Pile Foundations (Per IBC 2024 Table 1705.7) - NOT APPLICABLE

SI-15 Pier Foundations (Per 2024 IBC Table 1705.8) - NOT APPLICABLE

SI-16 Required Inspections of Storage Rack Systems (Per 2024 IBC Table 1705.13) (Seismic Design Category D, E or F) - NOT APPLICABLE

SI-17 Wind Resistance - NOT APPLICABLE

Revisions:	Date:

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10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: SPECIAL INSPECTIONS	Phase: 100% CONSTRUCTION DOCUMENT	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: RLW · Drawn: BWT	Drawing Number: SS002

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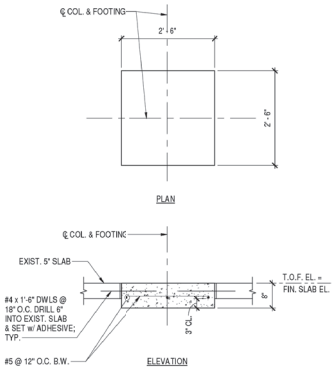

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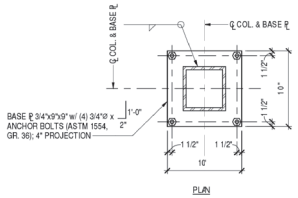

BASE PLATE - TS COLUMN W/ FOUR BOLTS

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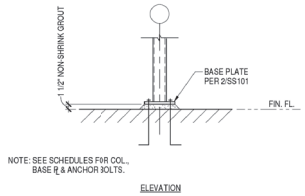

STEEL COL. BRG. ON GRADE BEAM

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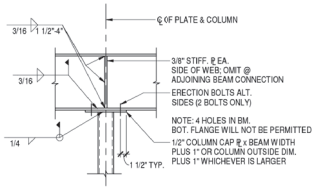

COLUMN TO BEAM CONNECTON

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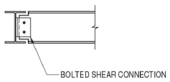

STEEL BEAM CONNECTION

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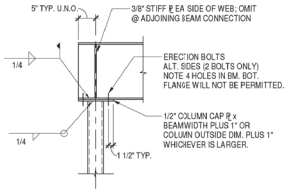

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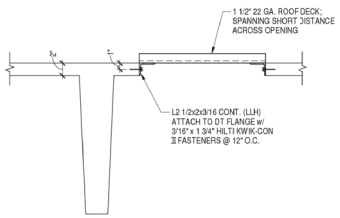

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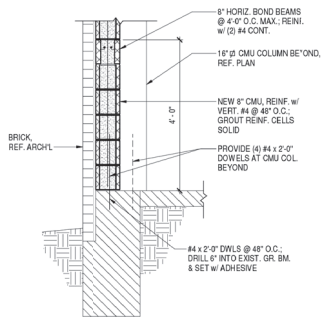

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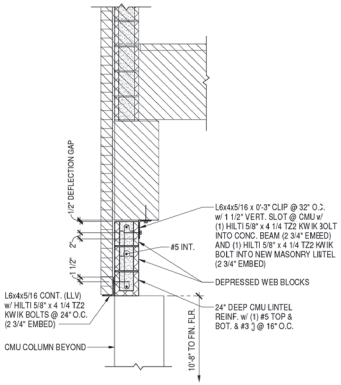

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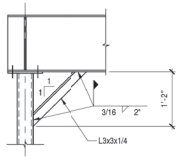

DIAGONAL KNEE BRACE

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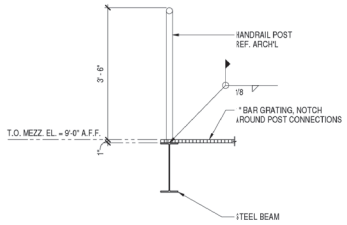
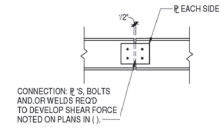


GUARDRAIL POST TO BEAM CONNECTON

11 DETAIL

SCALE: 3/4" = 1'-0"



SHEAR CONNECTION

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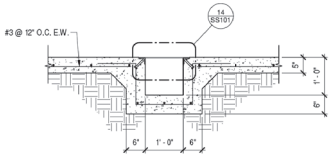

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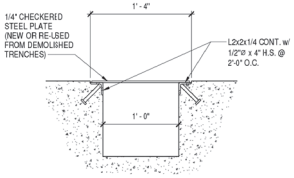

14 TYPICAL DETAIL

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
FOUNDATION AND FRAMING DETAILS	100% CONSTRUCTION DOCUMENT	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: SS101
		Issue Date: 10/07/2025 · Checked: RLW · Drawn: BWT	

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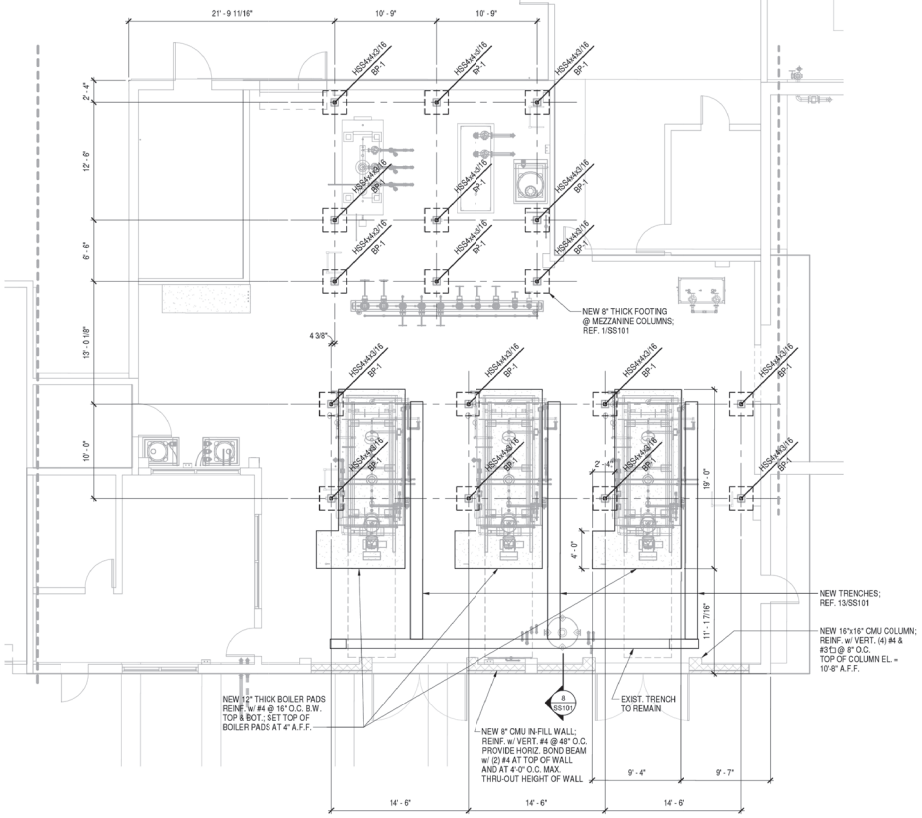

N ACTUAL NORTH

N PLAN NORTH

1 FOUNDATION PLAN

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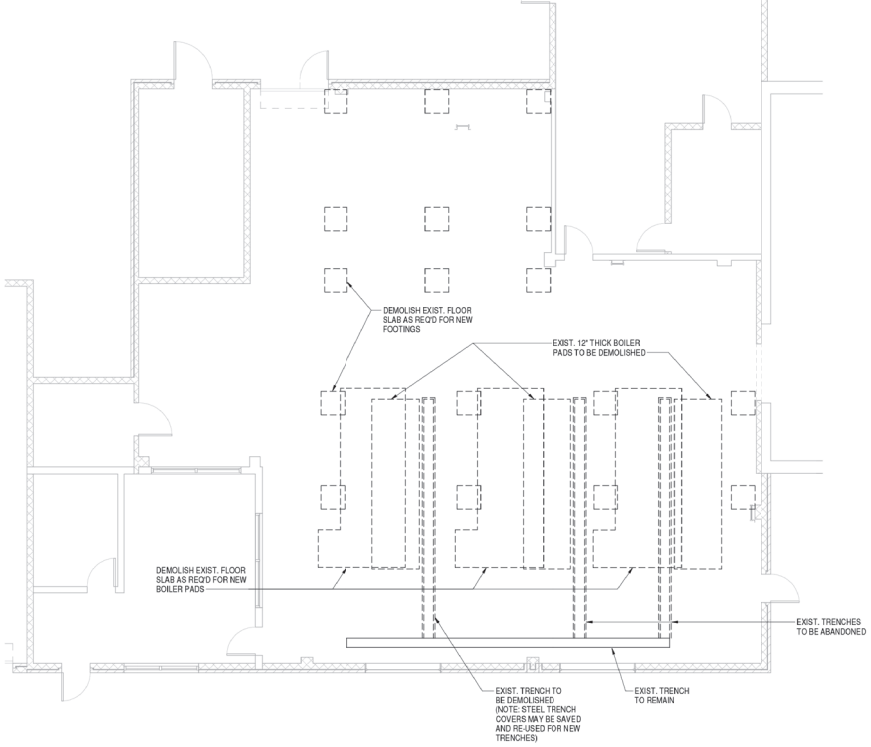

N ACTUAL NORTH

N PLAN NORTH

2 FOUNDATION DEMO PLAN

SCALE: 3/16" = 1'-0"

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FOUNDATION PLAN	100% CONSTRUCTION DOCUMENT	A/E REPLACE BOILERS	519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: RLW · Drawn: BWT	Drawing Number: SS201

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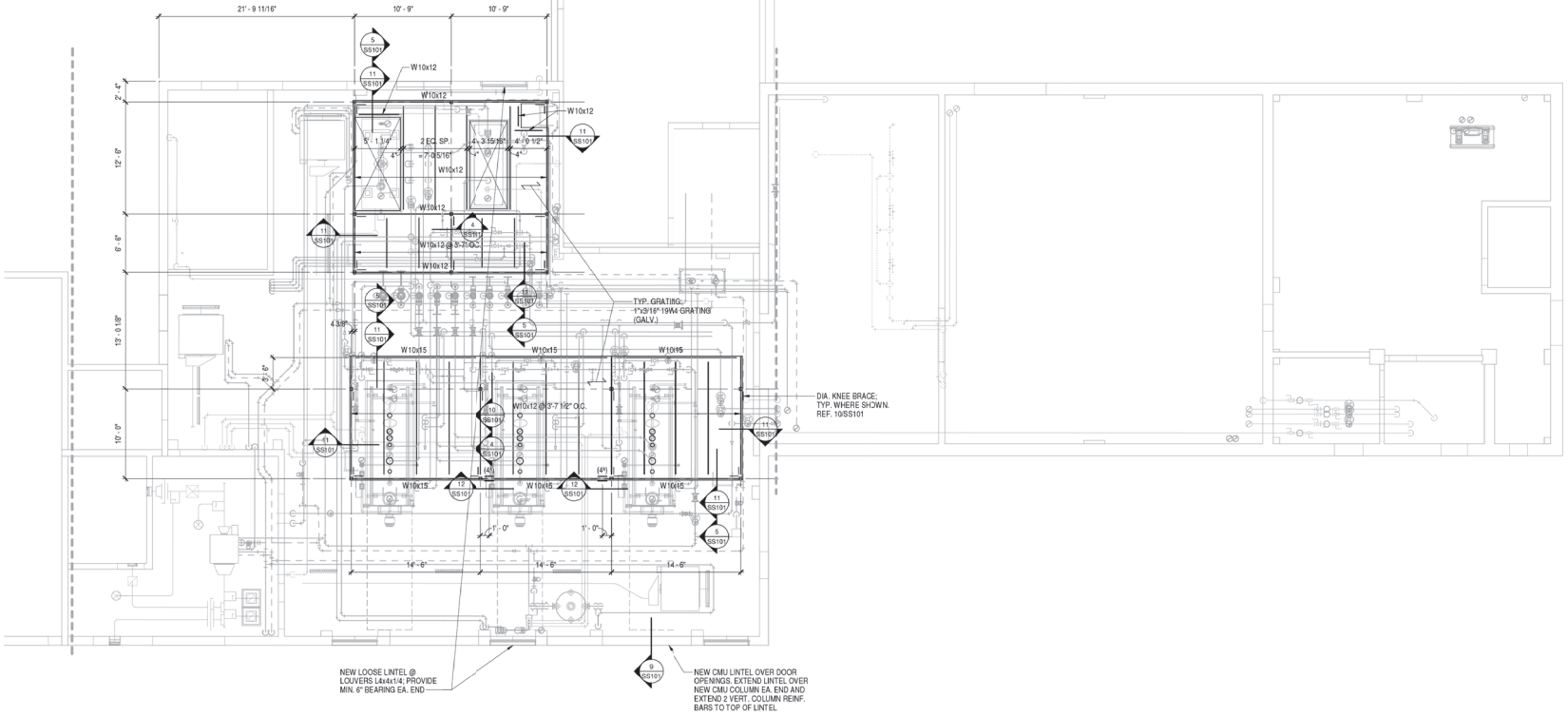

N ACTUAL NORTH

N PLAN NORTH

1 MEZZANINE FRAMING PLAN

SCALE: 3/16" = 1'-0"

Revisions:	Date:

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APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: RLW · Drawn: BWT	Drawing Number: SS202

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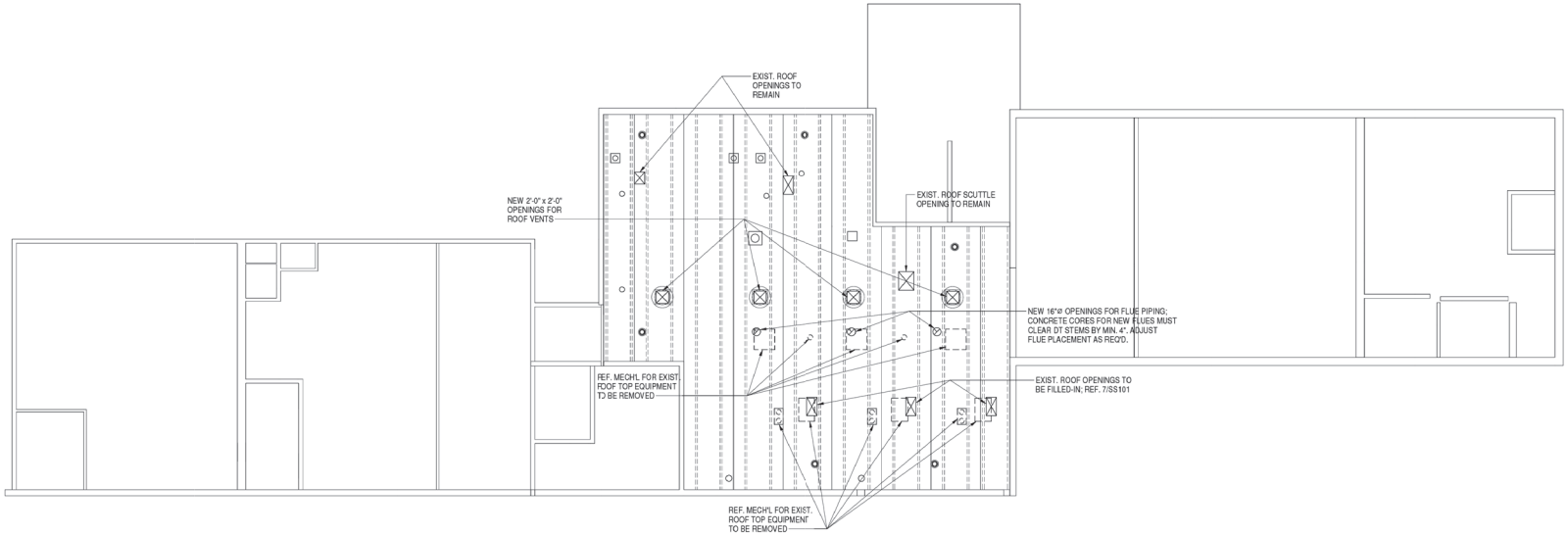

N ACTUAL NORTH

N PLAN NORTH

1 ROOF FRAMING PLAN

SCALE: 1/8" = 1'-0"

Revisions:	Date:

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APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: RLW · Drawn: BWT	Drawing Number: SS203

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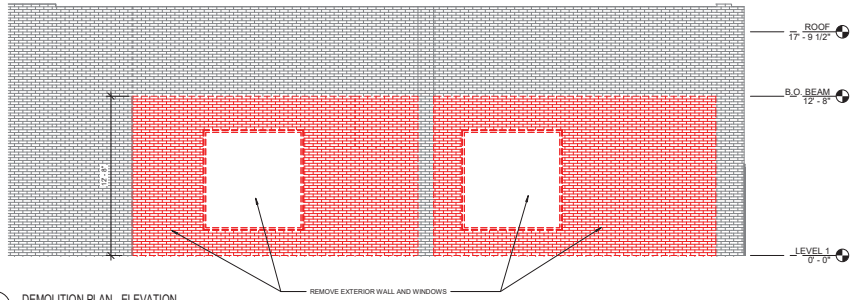


2 DEMOLITION PLAN - ELEVATION
1/4" = 1'-0"

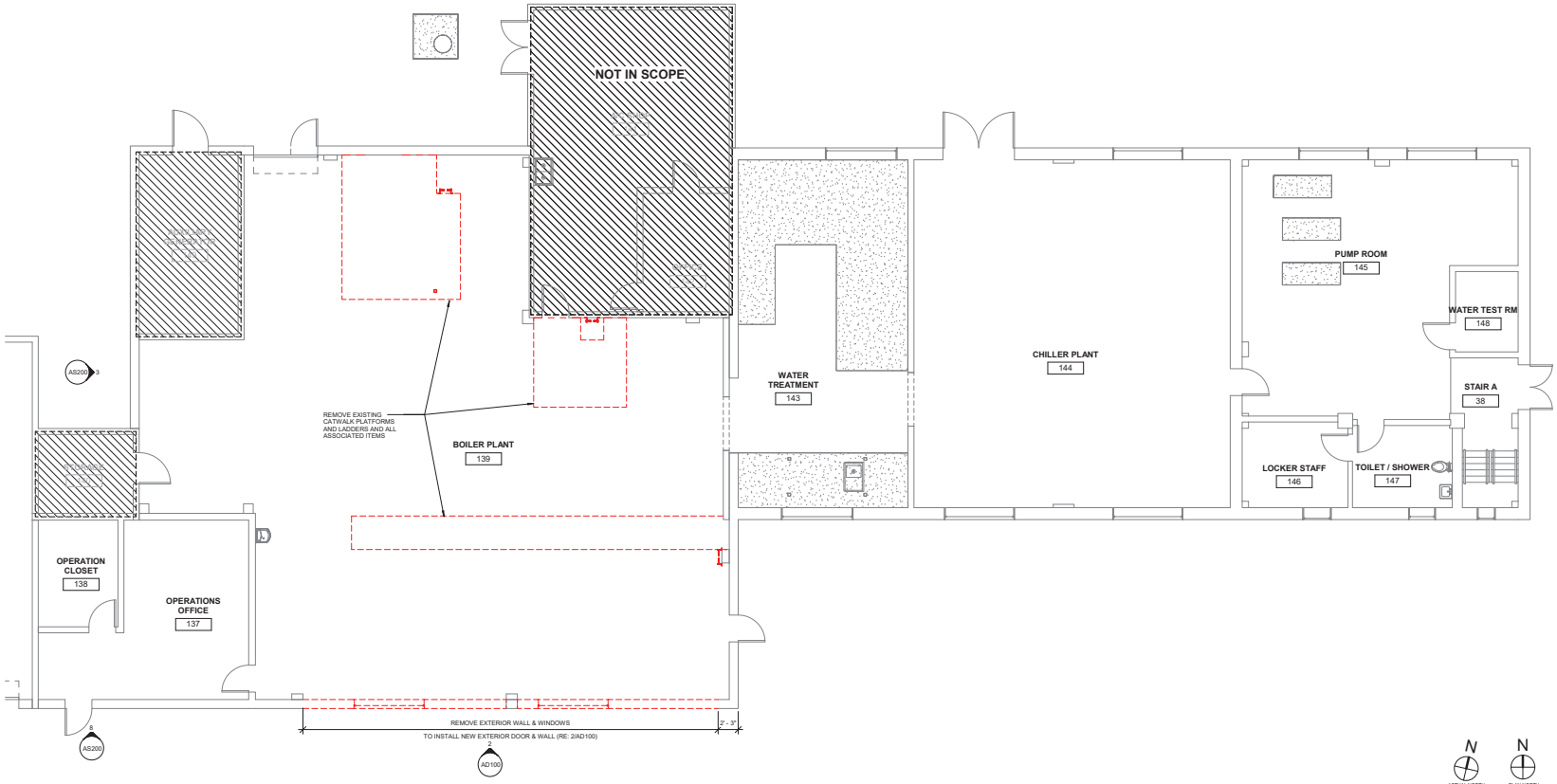
GENERAL SHEET NOTE:

1. REFER TO MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS FOR ALL MECHANICAL, ELECTRICAL, AND PLUMBING DEMOLITION WORKS
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND MATERIALS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE COR.
3. REFER TO MECHANICAL DRAWINGS FOR DEMO PHASING

DEMOLITION PLAN LEGEND

EXISTING TO BE DEMOLISHED

NOT IN SCOPE



1 DEMOLITION PLAN
3/16" = 1'-0"

Revisions:	Date:

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REGISTERED ARCHITECT JONATHAN WEST 22633 STATE OF TEXAS
10/07/2025

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VA U.S. Department of Veterans Affairs

Drawing Title: DEMOLITION PLAN	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	Drawing Number: AD100

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GENERAL SHEET NOTE:

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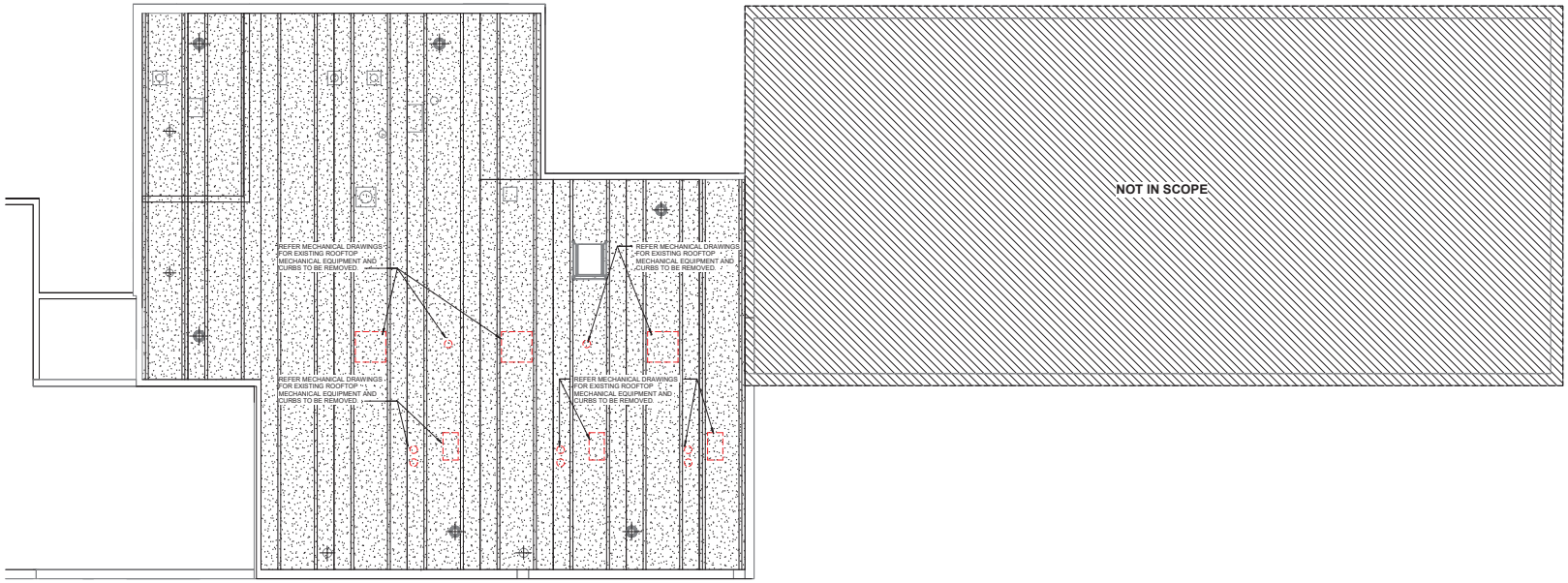
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND MATERIALS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE COR.
3. REFER TO MECHANICAL DRAWINGS FOR DEMO PHASING

DEMOLITION PLAN LEGEND

EXISTING TO BE DEMOLISHED

NOT IN SCOPE



1 DEMOLITION PLAN - ROOF
3/16" = 1'-0"

N ACTUAL NORTH

N PLAN NORTH

Revisions:	Date:

CONSULTANT

A/E:
O'Brien Engineering, Inc.,
17300 Dallas Parkway, Suite 1000
Dallas, TX 75248
972-233-2288
www.obrieneng.com

OEI O'BRIEN ENGINEERING | ARCHITECTURE

ARCHITECT/ENGINEER OF RECORD

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O'Brien Engineering Inc., Managing Partner
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REGISTERED ARCHITECT JONATHAN YEE 72637 STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: DEMOLITION PLAN	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: AD101
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	

Autodesk Docs://0489001013 VABS Boiler Replacement/0489001013_ARCHR25.rvt

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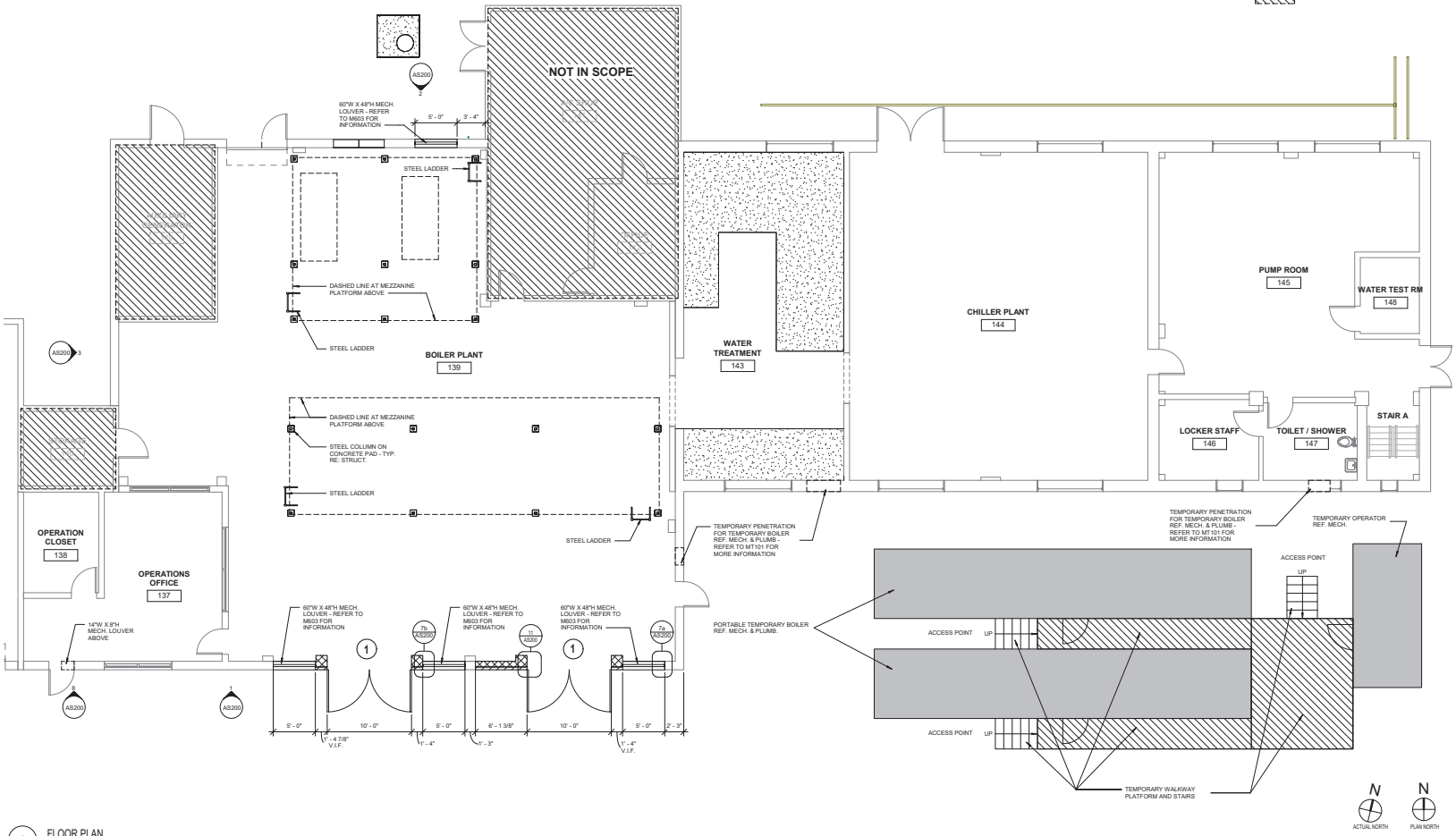
VA FORM 08 - 6231

KEYNOTE: 1

1. SOUTH EXTERIOR WALL OF BUILDING #2, BOILERS RM.. TO BE DEMOED FOR REMOVAL OF EXISTING UNITS AND INSTALLATION OF NEW UNITS. DEMOLITION WILL INCLUDE, BUT NOT LIMITED TO, THE SUBSURFACE OR NON-DECORATIVE CLADDING NECESSARY FOR STRUCTURAL SUPPORT, COLUMNS, STUDS, OR SIMILAR VERTICAL LOAD-BEARING ELEMENTS AND ASSOCIATED WINDOWS, OR DOORS. ANY EXTERIOR ELEMENTS SUPPORTING A ROOF THAT REQUIRES MODIFICATION TO ACCOMMODATED DESIGN SHALL CONTINUE TO BE CONSIDERED NECESSARY AND INTEGRAL STRUCTURAL COMPONENTS.
RECONSTRUCTION OF THE SOUTH EXTERIOR WALL SHALL INCLUDE, BUT NOT LIMITED TO, VERIFICATION OF DEMOED COMPONENTS ARE / WERE SUFFICIENT TO SUPPORT RECONSTRUCTION REQUIREMENTS, COMMERCIAL ELEMENTS MEET OR EXCEED BUILDING SUPPORT BY EXTERIOR BEARING WALL REQUIREMENTS, DESIGN, AND INSTALLATION OF COLUMNS, STUDS, STRUCTURAL SUPPORT, CONSIDERATION, EXTERIOR WALL ENVELOPE AND OPENINGS DESIGNED AND CONSTRUCTED TO RESIST SAFELY SUPERIMPOSED LOAD REQUIREMENTS, STRUCTURAL INTEGRITY AND CODE COMPLIANCE, WEATHER PROTECTION, VERTICAL AND LATERAL FRAME PROPAGATION, ADDITION OF EXTERIOR DOUBLE SWING DOORS AND ADDITIONAL VENTING EXTERIOR AND / OR ROOF FOR ROOM VENTILATION.
MATCH TO EXISITING INTERIOR PAINT COLOR.
KEEP EXISTING FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS

FLOOR PLAN LEGEND:

NOT IN SCOPE



1 FLOOR PLAN
3/16" = 1'-0"

Revisions:	Date:

CONSULTANT

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REGISTERED ARCHITECT KIMBERLY LEE BOWEN 72637 STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
OVERALL FLOOR PLAN	100% CONSTRUCTION DOCUMENTS	A/E REPLACE BOILERS	519-20-200
			Building Number: 2
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Drawing Number: AS101
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	

VA FORM 08 - 6231

Autodesk Docs://0489001013 VABS Boiler Replacement/0489001013_ARCHR25.rvt

10/7/2025 10:49:49 AM

KEYNOTE:

1. SOUTH EXTERIOR WALL OF BUILDING #2, BOILERS RM., TO BE DEMOED FOR REMOVAL OF EXISTING UNITS AND INSTALLATION OF NEW UNITS. DEMOLITION WILL INCLUDE, BUT NOT LIMITED TO, THE SUBSURFACE OR NON-DECORATIVE CLADDING NECESSARY FOR STRUCTURAL SUPPORT, COLUMNS, STUDS, OR SIMILAR VERTICAL LOAD-BEARING ELEMENTS AND ASSOCIATED WINDOWS, OR DOORS. ANY EXTERIOR ELEMENTS SUPPORTING A ROOF THAT REQUIRES MODIFICATION TO ACCOMMODATED DESIGN SHALL CONTINUE TO BE CONSIDERED NECESSARY AND INTEGRAL STRUCTURAL COMPONENTS.
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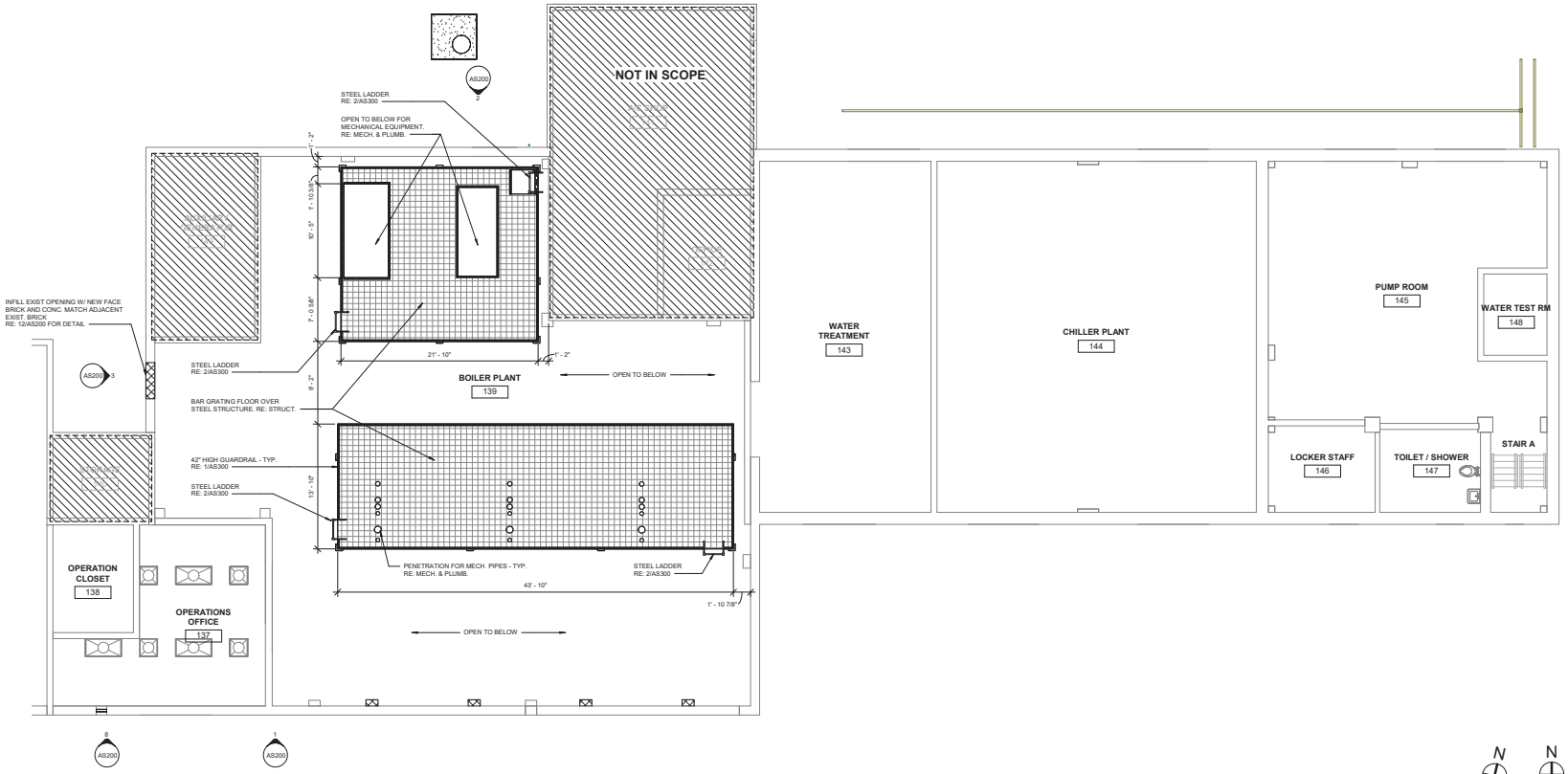
MATCH TO EXISITING INTERIOR PAINT COLOR.
KEEP EXISTING FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS

FLOOR PLAN LEGEND:

NOT IN SCOPE



1 FLOOR PLAN - MEZZANINE
3/16" = 1'-0"

N ACTUAL NORTH
N PLAN NORTH

Revisions:	Date:

CONSULTANT

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OEI O'BRIEN ENGINEERING | ARCHITECTURE

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REGISTERED ARCHITECT
JONATHAN W. KLEIN
72633
STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL FLOOR PLAN - MEZZANINE	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	Drawing Number: AS102

Autodesk Docs://0489001/0131/VBB Boiler Replacement/0489001-01-03_ARCHR25.rvt

10/7/2025 10:49:49 AM

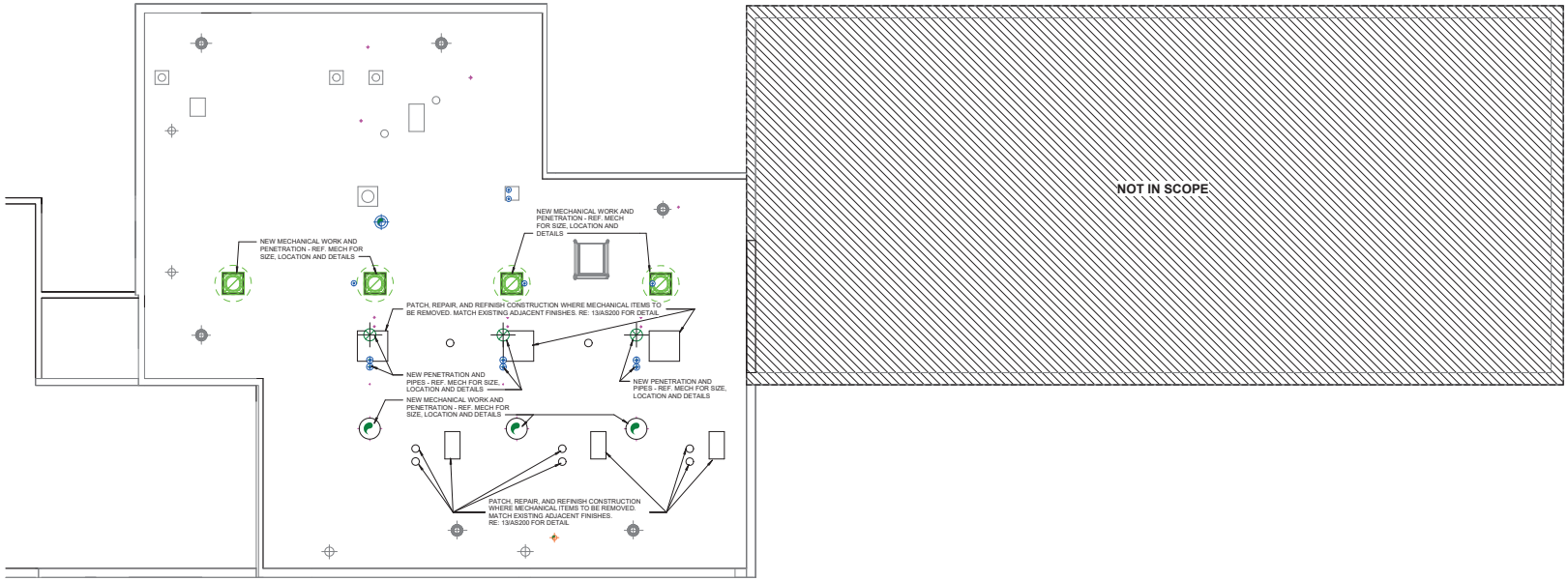
VA FORM 08 - 6231

GENERAL SHEET NOTE:

1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND MATERIALS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE COR.
2. REFER TO MECHANICAL DRAWINGS FOR NEW PENETRATION LOCATION, SIZE AND DETAILS

FLOOR PLAN LEGEND:

NOT IN SCOPE



1 ROOF PLAN
3/16" = 1'-0"

N ACTUAL NORTH
N PLAN NORTH

Revisions:	Date:

CONSULTANT

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REGISTERED ARCHITECT JOSHUA T. JUNKIN 72637 STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: ROOF PLAN

APPROVED: COR, Mr. JOSHUA JUNKIN

Phase: 100% CONSTRUCTION DOCUMENTS

FULLY SPRINKLERED

Project Title: A/E REPLACE BOILERS

Location: BIG SPRING, TEXAS

Issue Date: 10/07/2025 | Checked: JOW | Drawn: KL

Project Number: 519-20-200

Building Number: 2

Drawing Number: AS121

VA FORM 08 - 6231

Autodesk Docs://0489001013 VABS Boiler Replacement/0489001013_ARCHR25.rvt

10/7/2025 10:49:50 AM

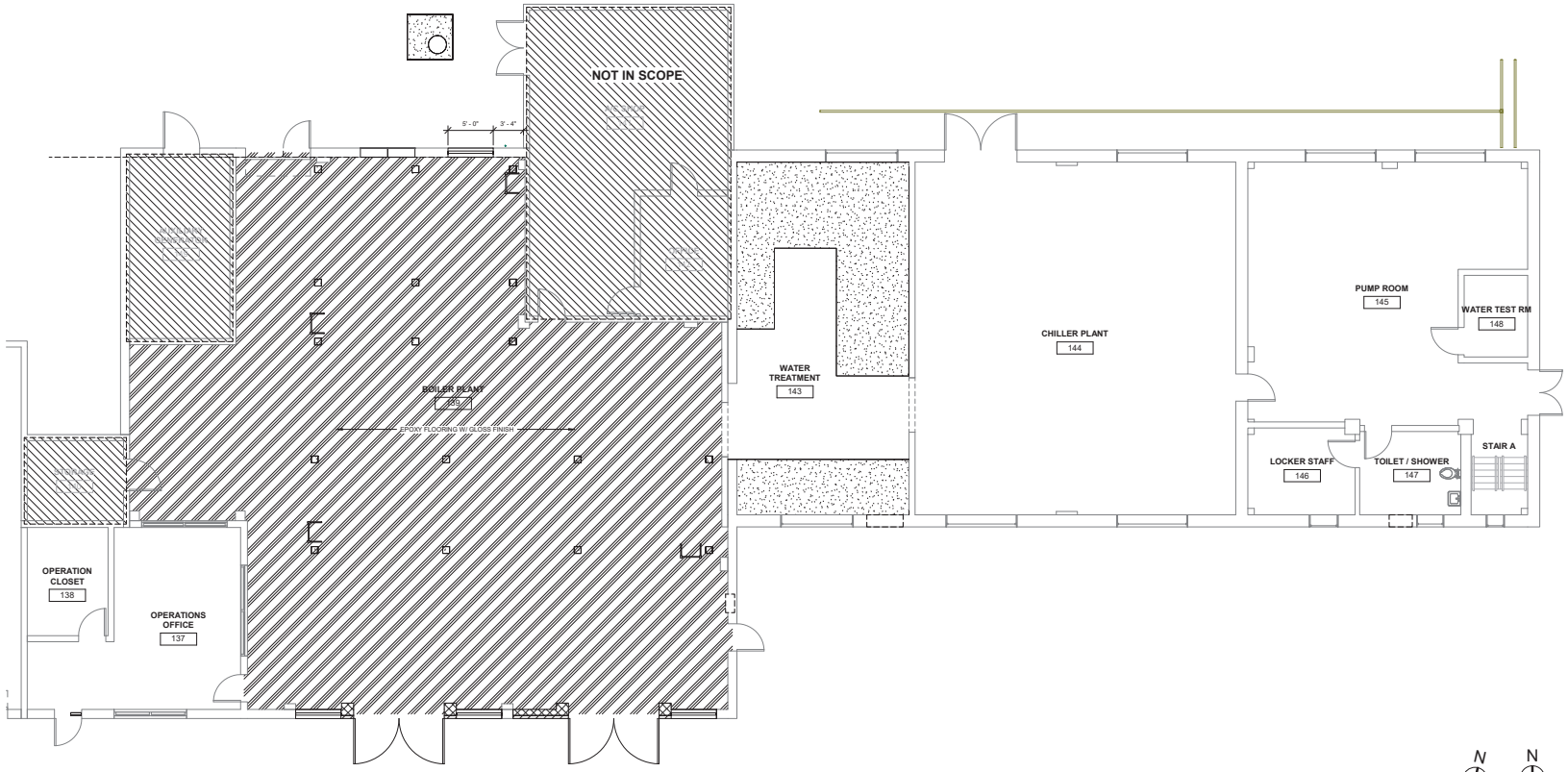
FINISH PLAN NOTES:

1. NEWLY INSTALLED CMU TO RECEIVE ONE COAT OF BLOCK FILLER AND TWO COATS OF PAINT TO MATCH EXISTING.
2. PATCH / PAINT WALLS TO MATCH EXISTING WHERE UNFINISHED OR DAMAGED.

FINISH PLAN LEGEND:

NOT IN SCOPE

EPOXY FLOORING W/ GLOSS FINISH



1 FINISH PLAN
3/16" = 1'-0"

Revisions:	Date:

CONSULTANT

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REGISTERED ARCHITECT JONATHAN W. KEMP 72637 STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management

VA | U.S. Department of Veterans Affairs

Drawing Title: FINISH PLAN	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	Drawing Number: AS131

VA FORM 08 - 6231

Autodesk Docs://0489001/0131-VABS Boiler Replacement/0489001-01-03_ARCHR25.rvt

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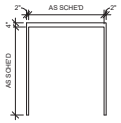
DOOR TYPES SCHEDULE

MARK	DOOR TYPE	DOORS WIDTH	DOORS HEIGHT	DOORS MATL	DOORS GLAZ	FRAME ELEV	FRAME MATL	FRAME GLAZ	REMARKS
1	F	10' - 0"	10' - 6"	HM	--	1	HM	--	

DOUBLE DOORS **F** FLUSH

DOOR ELEVATIONS
SIZES AS SCHEDULED



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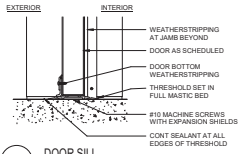
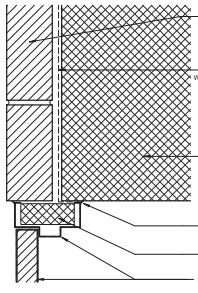
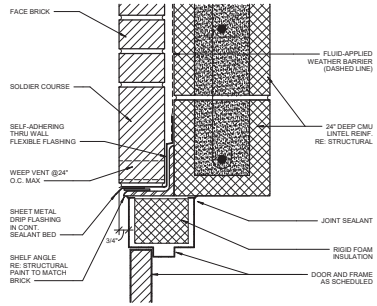
FRAME TYPE ELEVATIONS
SIZES AS SCHEDULED



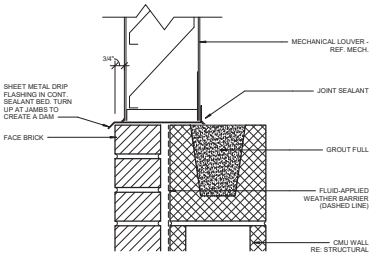
12 DOOR SILL
3" = 1'-0"



11 DOOR JAMB AT CMU COLUMN
3" = 1'-0"



10 DOOR HEAD
3" = 1'-0"



9 LOUVER SILL
3" = 1'-0"

KEYNOTE: 1

1. SOUTH EXTERIOR WALL OF BUILDING #2, BOILERS RM., TO BE DEMOED FOR REMOVAL OF EXISTING UNITS AND INSTALLATION OF NEW UNITS. DEMOLITION WILL INCLUDE, BUT NOT LIMITED TO, THE SUBSURFACE OR NON-DECORATIVE CLADDING NECESSARY FOR STRUCTURAL SUPPORT, COLUMNS, STUDS, OR SIMILAR VERTICAL LOAD-BEARING ELEMENTS AND ASSOCIATED WINDOWS, OR DOORS. ANY EXTERIOR ELEMENTS SUPPORTING A ROOF THAT REQUIRES MODIFICATION TO ACCOMMODATED DESIGN SHALL CONTINUE TO BE CONSIDERED NECESSARY AND INTEGRAL STRUCTURAL COMPONENTS.
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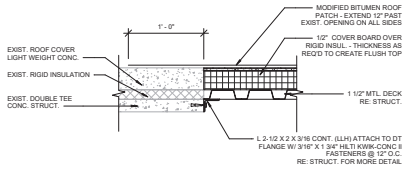
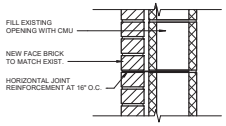
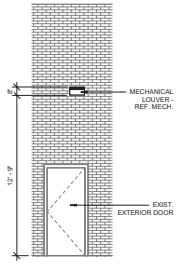
MATCH TO EXISTING INTERIOR PAINT COLOR.
KEEP EXISTING FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS



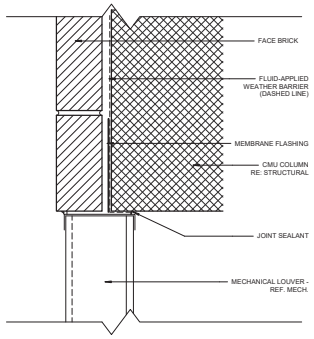
14 TYP. DETAIL - ROOF INFILL
1 1/2" = 1'-0"



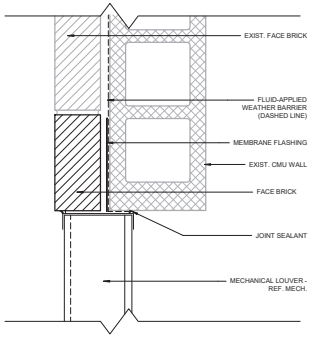
13 TYP. DETAIL - WALL INFILL
1 1/2" = 1'-0"



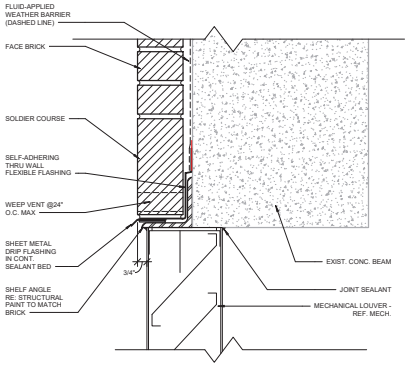
8 SOUTH ELEVATION
1/4" = 1'-0"



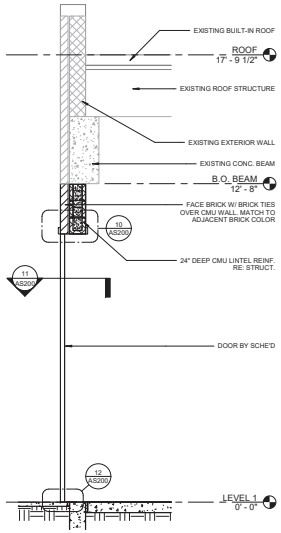
7b LOUVER JAMB AT CMU COLUMN
3" = 1'-0"



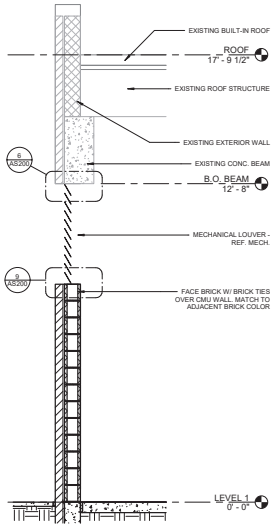
7a LOUVER JAMB AT CMU WALL
3" = 1'-0"



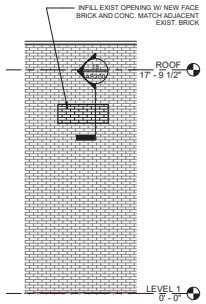
6 LOUVER HEAD
3" = 1'-0"



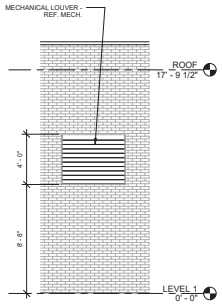
5 WALL SECTION
1/2" = 1'-0"



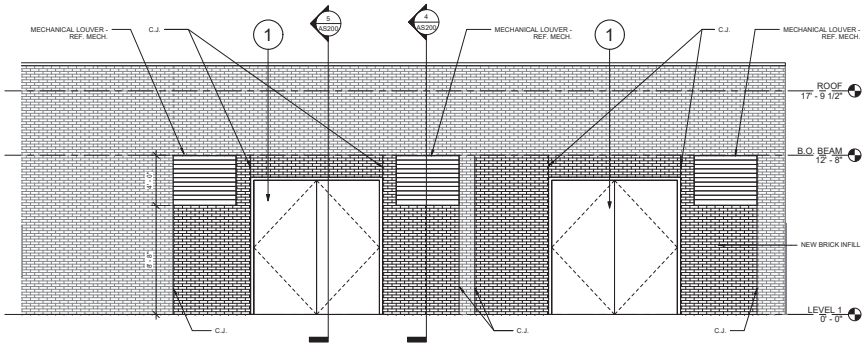
4 WALL SECTION
1/2" = 1'-0"



3 WEST ELEVATION
1/4" = 1'-0"



2 NORTH ELEVATION
1/4" = 1'-0"



1 SOUTH ELEVATION
1/4" = 1'-0"

Revisions:	Date:

CONSULTANT

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ARCHITECT/ENGINEER OF RECORD

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www.obrieneng.com

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REGISTERED ARCHITECT JONATHAN KLEIN 22633 STATE OF TEXAS
10/07/2025

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: EXTERIOR ELEVATION & WALL SECTIONS	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 / Checked: JOW / Drawn: KL	Drawing Number: AS200

VA FORM 08 - 6231

Autodesk Docs://0489/0101310 VABS Boiler Replacement/0489/0101310_ARCHITECT.rvt
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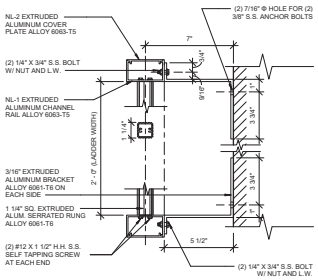
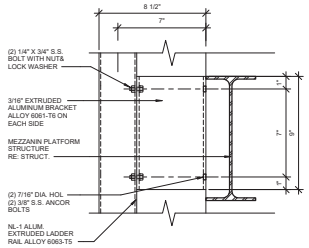
GENERAL SHEET NOTE:

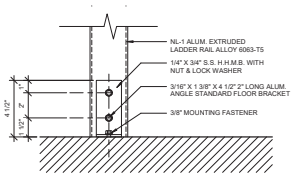
1. ALL RAILINGS SHALL BE PAINTED YELLOW IN ACCORDANCE WITH OSHA STANDARDS



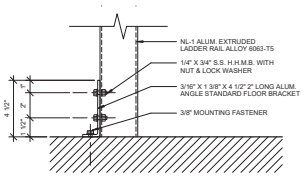
6 PLAN DETAIL AT TOP BRACKET - LADDER
3" = 1'-0"



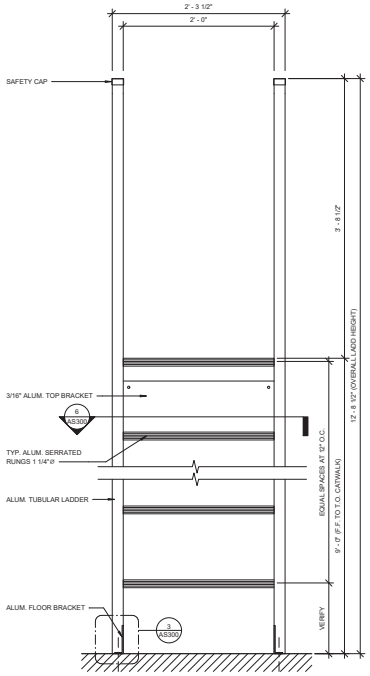
5 SECTION DETAIL AT TOP BRACKET - LADDER
3" = 1'-0"



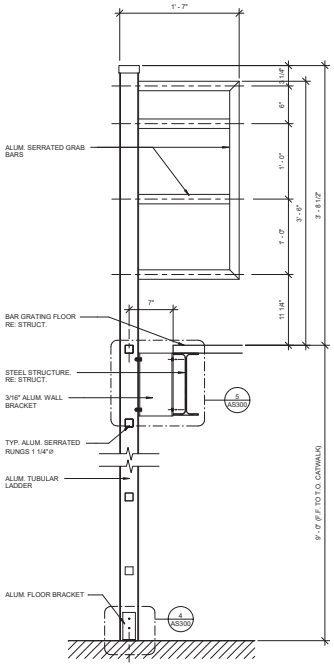
4 DETAIL AT FLOOR BRACKET - LADDER
3" = 1'-0"



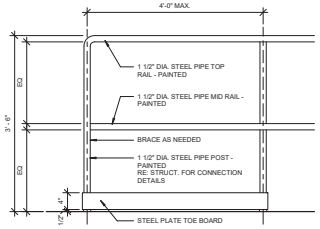
3 DETAIL AT FLOOR BRACKET - LADDER
3" = 1'-0"



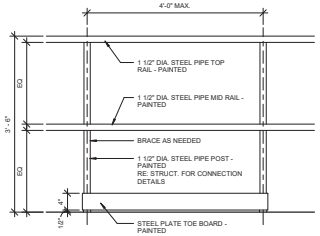
FRONT ELEVATION



SIDE ELEVATION



END OF PART



MID OF PART

2 TYP. DETAIL - FRONT/SIDE ELEVATION LADDER
1 1/2" = 1'-0"

1 TYP. DETAIL - GUARDRAIL & MEZZANINE PLATFORM
1" = 1'-0"

Revisions:	Date:

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STAMP: REGISTERED ARCHITECT, JOSHUA KYLE JUNKIN, #26637, STATE OF TEXAS, 10/07/2025

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MISC. DETAILS	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
APPROVED: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BIG SPRING, TEXAS	Building Number: 2
		Issue Date: 10/07/2025 · Checked: JOW · Drawn: KL	Drawing Number: AS300

VA FORM 08 - 6231

Autodesk Docs://0489001013 VABS Boiler Replacement/0489001013_ARCHITECT.rvt

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VA WEST TEXAS HEALTH CARE

A/E REPLACE BOILERS

519-20-200

BIG SPRING, TEXAS

GENERAL NOTES

1. GENERAL REQUIREMENTS
   A. GENERAL
      1. RELATED WORK
         a. PLUMBING WORK SHALL COMPLY WITH THE FOLLOWING SPECIFICATIONS:
            - ALL ISSUED SECTIONS OF THE DIVISION 22 PLUMBING SPECIFICATIONS.
            - SECTION 230510, COMMON WORK RESULTS FOR BOILER PLANT AND STEAM GENERATION.
            - SECTION 232111, BOILER PLANT PIPING SYSTEMS.
            - SECTION 235011, BOILER PLANT MECHANICAL EQUIPMENT.
      2. APPLICABLE PUBLICATIONS
         a. PLUMBING WORK SHALL COMPLY WITH THE FOLLOWING CODES AND STANDARDS:
            - ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AND STANDARDS.
            - 2018 INTERNATIONAL PLUMBING CODE.
            - U.S. DEPARTMENT OF VETERANS AFFAIRS, PG-18-10 PLUMBING DESIGN MANUAL, LATEST EDITION.
      3. SUBMITTALS
         a. CONTRACTOR SHALL MAKE ALL NECESSARY FIELD MEASUREMENTS AND INVESTIGATIONS TO ASSURE THAT THE EQUIPMENT AND ASSEMBLIES WILL MEET CONTRACT REQUIREMENTS, AND ALL EQUIPMENT THAT REQUIRES REGULAR MAINTENANCE, CALIBRATION, ETC ARE ACCESSIBLE FROM THE FLOOR OR PERMANENT WORK PLATFORM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ALL SUBMITTALS MEET THE SPECIFICATIONS AND REQUIREMENTS AND IT IS ASSUMED THAT ALL SUBMITTALS DO MEET SPECIFICATIONS UNLESS THE CONTRACTOR HAS REQUESTED A VARIANCE IN WRITING AND APPROVED PRIOR TO THE SUBMITTAL. IF AT ANY TIME DURING THE PROJECT IT IS FOUND THAT ANY ITEM DOES NOT MEET SPECIFICATIONS AND THERE WAS NO VARIANCE APPROVAL THE CONTRACTOR SHALL CORRECT AT NO ADDITIONAL COST OR TIME EVEN IF A SUBMITTAL WAS APPROVED.
         b. SUBMITTALS AND SHOP DRAWINGS FOR INTERDEPENDENT ITEMS, CONTAINING APPLICABLE DESCRIPTIVE INFORMATION, SHALL BE FURNISHED TOGETHER AND COMPLETE IN A GROUP. COORDINATE AND PROPERLY INTEGRATE MATERIALS AND EQUIPMENT IN EACH GROUP TO PROVIDE A COMPLETELY COMPATIBLE AND EFFICIENT INSTALLATION. FINAL REVIEW AND APPROVALS WILL BE MADE ONLY BY GROUPS.
      4. COORDINATION/SHOP DRAWINGS:
         a. SUBMIT COMPLETE CONSOLIDATED AND COORDINATED SHOP DRAWINGS FOR ALL NEW SYSTEMS, AND FOR EXISTING SYSTEMS THAT ARE IN THE SAME AREAS.
         b. THE COORDINATION/SHOP DRAWINGS SHALL INCLUDE PLAN VIEWS, ELEVATIONS AND SECTIONS OF ALL SYSTEMS AND SHALL CLEARLY IDENTIFY AND DIMENSION THE PROPOSED LOCATIONS OF THE PRINCIPAL ITEMS OF EQUIPMENT. THE DRAWINGS SHALL CLEARLY SHOW LOCATIONS AND ADEQUATE CLEARANCE FOR ALL EQUIPMENT, PIPING, VALVES, CONTROL PANELS AND OTHER ITEMS. SHOW THE ACCESS MEANS FOR ALL ITEMS REQUIRING ACCESS FOR OPERATIONS AND MAINTENANCE. PROVIDE DETAILED COORDINATION/SHOP DRAWINGS OF ALL PIPING AND DUCT SYSTEMS. THE DRAWINGS SHOULD INCLUDE ALL LOCKOUT/TAGOUT POINTS FOR ALL ENERGY/HAZARD SOURCES FOR EACH PIECE OF EQUIPMENT. COORDINATE LOCKOUT/TAGOUT PROCEDURES AND PRACTICES WITH LOCAL VA REQUIREMENTS.
         c. DO NOT INSTALL EQUIPMENT FOUNDATIONS, EQUIPMENT OR PIPING UNTIL COORDINATION/SHOP DRAWINGS HAVE BEEN APPROVED.
      5. QUALITY ASSURANCE:
         a. ALL ITEMS SHALL BE APPLIED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. CONFLICTS BETWEEN THE MANUFACTURER'S INSTRUCTIONS AND THE CONTRACT DOCUMENTS SHALL BE REFERRED TO THE CLIENT PROJECT REPRESENTATIVE FOR RESOLUTION. PRINTED COPIES OR ELECTRONIC FILES OF MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE PROVIDED AT LEAST 10 WORKING DAYS PRIOR TO COMMENCING INSTALLATION OF ANY ITEM.
         b. ALL ITEMS THAT REQUIRE ACCESS, SUCH AS FOR OPERATING, CLEANING, SERVICING, MAINTENANCE, AND CALIBRATION, SHALL BE EASILY AND SAFELY ACCESSIBLE BY PERSONS STANDING AT FLOOR LEVEL, OR STANDING ON PERMANENT PLATFORMS, WITHOUT THE USE OF PORTABLE LADDERS. EXAMPLES OF THESE ITEMS INCLUDE BUT ARE NOT LIMITED TO: ALL TYPES OF VALVES, FILTERS AND STRAINERS, TRANSMITTERS, AND CONTROL DEVICES. PRIOR TO COMMENCING INSTALLATION WORK, REFER CONFLICTS BETWEEN THIS REQUIREMENT AND CONTRACT DOCUMENTS FOR RESOLUTION. FAILURE OF THE CONTRACTOR TO RESOLVE OR CALL ATTENTION TO ANY DISCREPANCIES OR DEFICIENCIES WILL RESULT IN THE CONTRACTOR CORRECTING AT NO ADDITIONAL COST OR TIME.
         c. COMPLETE LAYOUT DRAWINGS SHALL BE REQUIRED BY PARAGRAPH, SUBMITTALS. CONSTRUCTION WORK SHALL NOT START ON ANY SYSTEM UNTIL THE LAYOUT DRAWINGS HAVE BEEN APPROVED.
         d. AS-BUILT DRAWINGS:
            - THE INSTALLING CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS OF EACH COMPLETED PHASE FOR VERIFICATION, AND SHALL PROVIDE THEM TO THE CLIENT AT THE TIME OF FINAL SYSTEMS VERIFICATION TESTING.
            - THE AS-BUILT DRAWINGS SHALL INDICATE THE LOCATION AND TYPE OF ALL LOCKOUT/TAGOUT POINTS FOR ALL ENERGY SOURCES FOR ALL EQUIPMENT AND PUMPS TO INCLUDE BREAKER LOCATION AND NUMBERS, VALVE TAG NUMBERS, ETC. COORDINATE LOCKOUT/TAGOUT PROCEDURES AND PRACTICES WITH LOCAL VA REQUIREMENTS.
         e. JOB CONDITIONS: BUILDING WORKING ENVIRONMENT: MAINTAIN THE ARCHITECTURAL AND STRUCTURAL INTEGRITY OF THE BUILDING AND THE WORKING ENVIRONMENT AT ALL TIMES. MAINTAIN THE INTERIOR OF BUILDING AT 18 DEGREES C (65 DEGREES F) MINIMUM. LIMIT THE OPENING OF DOORS, WINDOWS OR OTHER ACCESS OPENINGS TO BRIEF PERIODS AS NECESSARY FOR RIGGING PURPOSES. STORM WATER DRAINAGE OR GROUND WATER LEAKAGE IS PROHIBITED. PROVIDE DAILY CLEAN-UP OF CONSTRUCTION AND DEMOLITION DEBRIS ON ALL FLOOR SURFACES AND ON ALL EQUIPMENT BEING OPERATED BY BUILDING USERS/FACILITIES. MAINTAIN ALL EGRESS ROUTES AND SAFETY SYSTEMS/DEVICES.

   B. PRODUCTS
      1. COMPATIBILITY OF RELATED EQUIPMENT: EQUIPMENT AND MATERIALS INSTALLED SHALL BE COMPATIBLE IN ALL RESPECTS WITH OTHER ITEMS BEING FURNISHED AND WITH EXISTING ITEMS SO THAT THE RESULT WILL BE A COMPLETE AND FULLY OPERATIONAL SYSTEM THAT CONFORMS TO CONTRACT REQUIREMENTS.
      2. SAFETY GUARDS: ALL EQUIPMENT SHALL HAVE MOVING PARTS PROTECTED FROM PERSONAL INJURY.
      3. ELECTRIC MOTORS, MOTOR CONTROL, CONTROL WIRING
         a. ALL MATERIAL AND EQUIPMENT FURNISHED AND INSTALLATION METHODS USED SHALL CONFORM TO THE REQUIREMENTS OF GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT, MOTOR CONTROLLERS, AND, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES, ALL ELECTRICAL WIRING, CONDUIT, AND DEVICES NECESSARY FOR THE PROPER CONNECTION, PROTECTION AND OPERATION OF THE SYSTEMS DESCRIBED. PREMIUM EFFICIENT MOTORS SHALL BE PROVIDED.
         b. WIRE AND CABLE MATERIALS SPECIFIED IN THE ELECTRICAL DIVISION OF THE SPECIFICATIONS SHALL BE MODIFIED AS FOLLOWS:
         c. WIRING MATERIAL LOCATED WHERE TEMPERATURES CAN EXCEED 71° C (160° F) SHALL BE STRANDED COPPER WITH 105°C/90 C FEP INSULATION WITH JACKET. THIS INCLUDES WIRING ON THE BOILERS AND WATER HEATERS.
         d. OTHER WIRING AT BOILERS AND WATER HEATERS, AND TO CONTROL PANELS, SHALL BE NFPA 70 DESIGNATION THWN.
         e. SHIELDED CONDUCTORS OR WIRING IN SEPARATE CONDUITS FOR ALL INSTRUMENTATION AND CONTROL SYSTEMS SHALL BE PROVIDED WHERE RECOMMENDED BY MANUFACTURER OF EQUIPMENT.
      4. VARIABLE SPEED MOTOR CONTROLLERS
         a. THE COMBINATION OF CONTROLLER AND MOTOR SHALL BE PROVIDED BY THE RESPECTIVE PUMP MANUFACTURER AND SHALL BE RATED FOR 100 PERCENT EFFICIENT PERFORMANCE MULTIPLE UNITS OF THE SAME SIZE OF EQUIPMENT, I.E. PUMPS, SHALL BE PRODUCT OF A SINGLE MANUFACTURER.
         b. MOTORS SHALL BE PREMIUM EFFICIENT TYPE, "INVERTER DUTY", AND BE APPROVED BY THE MOTOR CONTROLLER MANUFACTURER. THE CONTROLLER-MOTOR COMBINATION SHALL BE GUARANTEED TO PROVIDE FULL MOTOR NAMEPLATE HORSEPOWER IN VARIABLE FREQUENCY OPERATION. BOTH DRIVING AND DRIVEN MOTOR SHEAVES SHALL BE FIXED PITCH.
      5. EQUIPMENT AND MATERIALS IDENTIFICATION
         a. INTERIOR (INDOOR) EQUIPMENT: ENGRAVED NAMEPLATES, WITH LETTERS NOT LESS THAN 7 MM (3/16 INCH) HIGH OF BRASS WITH BLACK-FILLED LETTERS, OR RIGID BLACK PLASTIC WITH WHITE LETTERS SPECIFIED IN PAINTING SHALL BE PERMANently FASTENED TO THE EQUIPMENT. UNIT COMPONENTS SUCH AS WATER HEATERS, TANKS, COILS, FILTERS, ETC. SHALL BE IDENTIFIED.
         b. EXTERIOR (OUTDOOR) EQUIPMENT: BRASS NAMEPLATES, WITH ENGRAVED BLACK FILLED LETTERS, NOT LESS THAN 7 MM (3/16 INCH) HIGH RIVETED OR BOLTED TO THE EQUIPMENT.
         c. CONTROL ITEMS: ALL TEMPERATURE, PRESSURE, AND CONTROLLERS SHALL BE LABELED AND THE COMPONENTS FUNCTION IDENTIFIED. IDENTIFY DEVICES AS THEY APPEAR ON THE CONTROL DIAGRAMS.
      6. VALVE TAGS AND LISTS:
         a. PLUMBING: ALL VALVES SHALL BE PROVIDED WITH VALVE TAGS AND LISTED ON A VALVE LIST (FIXTURE STOPS NOT INCLUDED).
         b. VALVE TAGS: ENGRAVED BLACK FILLED NUMBERS AND LETTERS NOT LESS THAN 15 MM (1/2 INCH) HIGH FOR NUMBER DESIGNATION, AND NOT LESS THAN 8 MM (1/4 INCH) FOR SERVICE DESIGNATION ON 19 GAUGE, 40 MM (1-1/2 INCHES) ROUND BRASS DISC, ATTACHED WITH BRASS "S" HOOK OR BRASS CHAIN.
      7. PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS
         a. SUSPENDED EQUIPMENT SUPPORT AND RESTRAINTS MAY BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE (IBC) SECTION 1613. SUBMITTALS SHALL INCLUDE DESIGN CALCULATIONS AND REQUIREMENTS, OR BASED UPON OTHER RELEVANT PARAGRAPH SECTIONS SHALL BE STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE WHERE THE PROJECT IS LOCATED. THE ENGINEER SUPPORT OF SUSPENDED EQUIPMENT OVER 227 KG (500 POUNDS) SHALL BE SUBMITTED FOR APPROVAL IN ALL CASES. SEE SPECIFICATIONS FOR LATERAL FORCE DESIGN REQUIREMENTS.
         b. TYPE NUMBERS SPECIFIED: FOR MATERIALS, DESIGN, MANUFACTURE, SELECTION, APPLICATION, AND INSTALLATION REFER TO MSS SP-58. REFER TO METAL FABRICATIONS, FOR MISCELLANEOUS METAL SUPPORT MATERIALS AND PRIME COAT PAINTING.
         c. FOR ATTACHMENT TO CONCRETE CONSTRUCTION: CONCRETE INSERT: TYPE 18, MSS SP-58.
         d. FOR ATTACHMENT TO STEEL CONSTRUCTION: MSS SP-58.
         e. ATTACHMENT TO METAL PAN OR DECK: AS REQUIRED FOR MATERIALS SPECIFIED IN SECTION STEEL DECKING, SECTION COMPOSITE METAL DECKING OR PER METAL PAN OR DECK MANUFACTURER'S REQUIREMENTS.
         f. HANGER RODS: HOT-ROLLED STEEL, ASTM A36/A36M OR ASTM A575 FOR ALLOWABLE LOADS LISTED IN MSS SP-58. FOR PIPING, PROVIDE ADJUSTMENT MEANS FOR CONTROLLING LEVEL OR SLOPE. TYPES 13 OR 15 TURN-BUCKLES SHALL PROVIDE 40 MM (1-1/2 INCHES) MINIMUM OF ADJUSTMENT AND INCORPORATE LOCKNUTS. ALL-THREAD RODS ARE ACCEPTABLE.
         g. MULTIPLE (TRAPEZE) HANGERS: GALVANIZED, COLD FORMED, LIPPED STEEL CHANNEL HORIZONTAL MEMBER, NOT LESS THAN 43 MM BY 43 MM (1-5/8 INCHES BY 1-5/8 INCHES), 2.7 MM (NO. 12 GAUGE), DESIGNED TO ACCEPT SPECIAL SPRING HELD, HARDENED STEEL NUTS.
            - ALLOWABLE HANGER LOAD: MANUFACTURERS RATING LESS 91KG (200 POUNDS).
            - GUIDE INDIVIDUAL PIPES ON THE HORIZONTAL MEMBER OF EVERY OTHER TRAPEZE HANGER WITH 8 MM (1/4 INCH) U-BOLT FABRICATED FROM STEEL ROD. PROVIDE TYPE 40 INSULATION SHIELD, SECURED BY TWO 15 MM (1/2 INCH) GALVANIZED STEEL BANDS, OR INSULATED CALCIUM SILICATE SHIELD FOR INSULATED PIPING AT EACH HANGER.
         h. PIPE HANGERS AND SUPPORTS: (MSS SP-58), USE HANGERS SIZED TO ENCIRCLE INSULATION ON INSULATED PIPING. REFER TO SECTION 22 07 11, PLUMBING INSULATION FOR INSULATION THICKNESS. TO PROTECT INSULATION, PROVIDE TYPE 39 SADDLES FOR ROLLER TYPE SUPPORTS OR INSULATED CALCIUM SILICATE SHIELDS. PROVIDE TYPE 40 INSULATION SHIELD OR INSULATED CALCIUM SILICATE SHIELD AT ALL OTHER TYPES OF SUPPORTS AND HANGERS INCLUDING THOSE FOR INSULATED PIPING.
            - GENERAL TYPES (MSS SP-58):
            - STANDARD CLEVIS HANGER: TYPE 1; PROVIDE LOCKNUT.
            - RISER CLAMPS: TYPE 8.
            - WALL BRACKETS: TYPES 31, 32 OR 33.
            - ROLLER SUPPORTS: TYPE 41, 43, 44 AND 46.
            - SADDLE SUPPORT: TYPE 36, 37 OR 38.
            - TURNBUCKLE: TYPES 13 OR 15.
            - U-BOLT OJAMP: TYPE 24.
         i. COPPER TUBE:
            - HANGERS, CLAMPS AND OTHER SUPPORT MATERIAL IN CONTACT WITH TUBING SHALL BE PAINTED WITH COPPER COLORED EPOXY PAINT, COPPER-COATED, PLASTIC COATED OR TAPED WITH ISOLATION TAPE TO PREVENT ELECTROLYSIS.
            - FOR VERTICAL RUNS USE EPOXY PAINTED, COPPER-COATED OR PLASTIC COATED RISER CLAMPS.
            - FOR SUPPORTING TUBE TO STRUT: PROVIDE EPOXY PAINTED PIPE STRAPS FOR COPPER TUBE OR PLASTIC INSERTED VIBRATION ISOLATION CLAMPS.
            - INSULATED LINES: PROVIDE PRE-INSULATED CALCIUM SILICATE SHIELDS SIZED FOR COPPER TUBE.
         j. SPRING HANGERS ARE REQUIRED ON ALL PLUMBING SYSTEM PUMPS ONE HORSEPOWER AND GREATER.
         k. PLUMBING PIPING (OTHER THAN GENERAL TYPES):
            - HORIZONTAL PIPING: TYPE 1, 5, 7, 9, AND 10.
         l. CHROME PLATED PIPING: CHROME PLATED SUPPORTS.
         m. HANGERS AND SUPPORTS IN PIPE CHASE: PREFABRICATED SYSTEM ABS SELF-EXTINGUISHING MATERIAL, NOT SUBJECT TO ELECTROLYTIC ACTION, TO HOLD PIPING, PREVENT VIBRATION AND COMPENSATE FOR ALL STATIC AND OPERATIONAL CONDITIONS.
         n. BLOCKING, STAYS AND BRACING: ANGLE IRON OR PREFORMED METAL CHANNEL SHAPES, 1.3 MM (18 GAUGE) MINIMUM.
      8. PIPE PENETRATIONS
         a. PIPE PENETRATION SLEEVES SHALL BE INSTALLED FOR ALL PIPE OTHER THAN RECTANGULAR BLOCKED OUT FLOOR OPENINGS FOR RISERS IN MECHANICAL BAYS.
         b. PIPE PENETRATION SLEEVE MATERIALS SHALL COMPLY WITH ALL FIRESTOPPING REQUIREMENTS FOR EACH PENETRATION.
         c. TO PREVENT ACCIDENTAL LIQUID SPILLS FROM PASSING TO A LOWER LEVEL, PROVIDE THE FOLLOWING:
            - FOR SLEEVES: EXTEND SLEEVE 25 MM (1 INCH) ABOVE FINISHED FLOOR AND PROVIDE SEALANT FOR WATERTIGHT JOINT.
            - FOR BLOCKED OUT FLOOR OPENINGS: PROVIDE 40 MM (1-1/2 INCH) ANGLE SET IN SILICONE ADHESIVE AROUND OPENING.
            - FOR DRILLED PENETRATIONS: PROVIDE 40 MM (1-1/2 INCH) ANGLE RING OR SQUARE SET IN SILICONE ADHESIVE AROUND PENETRATION.
         d. PENETRATIONS ARE PROHIBITED THROUGH BEAMS OR RIBS, BUT MAY BE INSTALLED IN CONCRETE BEAM FLANGES, WITH STRUCTURAL ENGINEER PRIOR APPROVAL. ANY DEVIATION FROM THESE REQUIREMENTS MUST RECEIVE PRIOR APPROVAL.
         e. SHEET METAL, PLASTIC, OR MOISTURE RESISTANT FIBER SLEEVES SHALL BE PROVIDED FOR PIPE PASSING THROUGH FLOORS, INTERIOR WALLS, AND PARTITIONS, UNLESS BRASS OR STEEL PIPE SLEEVES ARE SPECIFICALLY CALLED FOR BELOW.
         f. CAST IRON OR ZINC COATED PIPE SLEEVES SHALL BE PROVIDED FOR PIPE PASSING THROUGH EXTERIOR WALLS BELOW GRADE. THE SPACE BETWEEN THE SLEEVE AND PIPE SHALL BE MADE WATERTIGHT WITH A MODULAR OR LINK RUBBER SEAL. THE LINK SEAL SHALL BE APPLIED AT BOTH ENDS OF THE SLEEVE.
         g. GALVANIZED STEEL OR AN ALTERNATE BLACK IRON PIPE WITH ASPHALT COATING SLEEVES SHALL BE FOR PIPE PASSING THROUGH CONCRETE BEAM FLANGES, EXCEPT WHERE BRASS PIPE SLEEVES ARE CALLED FOR. A GALVANIZED STEEL SLEEVE SHALL BE PROVIDED FOR PIPE PASSING THROUGH FLOOR OF MECHANICAL ROOMS, LAUNDRY WORK ROOMS, AND ANIMAL ROOMS ABOVE BASEMENT. EXCEPT IN MECHANICAL ROOMS, SLEEVES SHALL BE CONNECTED WITH A FLOOR PLATE.
         h. BRASS PIPE SLEEVES SHALL BE PROVIDED FOR PIPE PASSING THROUGH QUARRY TILE, TERRAZZO OR CERAMIC TILE FLOORS. THE SLEEVE SHALL BE CONNECTED WITH A FLOOR PLATE.
         i. SLEEVE CLEARANCE THROUGH FLOORS, WALLS, PARTITIONS, AND BEAM FLANGES SHALL BE 25 MM (1 INCH) GREATER IN DIAMETER THAN EXTERNAL DIAMETER OF PIPE. SLEEVE FOR PIPE WITH INSULATION SHALL BE LARGE ENOUGH TO ACCOMMODATE THE INSULATION PLUS 25 MM (1 INCH) IN DIAMETER. INTERIOR OPENINGS SHALL BE CAULKED TIGHT WITH FIRESTOPPING MATERIAL AND SEALANT TO PREVENT THE SPREAD OF FIRE, SMOKE, WATER AND GASES.
         j. SEALANT AND ADHESIVES: SHALL BE AS SPECIFIED IN JOINT SEALANTS. BIO-BASED MATERIALS SHALL BE UTILIZED WHEN POSSIBLE.
         k. PIPE PASSING THROUGH ROOF SHALL BE INSTALLED THROUGH A 4.9 KG PER SQUARE METER COPPER FLASHING WITH AN INTEGRAL SKIRT OR FLANGE. SKIRT OR FLANGE SHALL EXTEND NOT LESS THAN 200 MM (8 INCHES) FROM THE PIPE AND SET IN A SOLID COATING OF BITUMINOUS CEMENT. EXTEND FLASHING A MINIMUM OF 250 MM (10 INCHES) UP THE PIPE. PIPE PASSING THROUGH A WATERPROOFING MEMBRANE SHALL BE PROVIDED WITH A CLAMPING FLANGE. THE ANNULAR SPACE BETWEEN THE SLEEVE AND PIPE SHALL BE SEALED WATERTIGHT.
      9. WALL, FLOOR, CEILING PLATES
         a. MATERIAL AND TYPE: CHROME PLATED BRASS OR CHROME PLATED STEEL, ONE PIECE OR SPLIT TYPE WITH CONCEALED HINGE, WITH SET SCREW. PLATE SHALL BE SUFFICIENT TO COVER THE SLEEVE. USE PLATES THAT FIT TIGHT AROUND PIPES, COVER OPENINGS AROUND PIPES AND COVER THE ENTIRE PIPE SLEEVE PROJECTION.
         b. LOCATIONS: USE PLATES IN FINISHED FLOORS, WALLS AND CEILINGS IN EXPOSED LOCATIONS, IN FINISHED AREAS ONLY. WALL PLATES SHALL BE USED WHERE INSULATION ENDS ON EXPOSED WATER SUPPLY PIPE DROP FROM OVERHEAD. A WATERTIGHT JOINT SHALL BE PROVIDED IN SPACES WHERE BRASS OR STEEL PIPE SLEEVES ARE SPECIFIED.

   C. EXECUTION
      1. INSTALLATION
         a. LOCATION OF PIPING, SLEEVES, INSERTS, HANGERS, AND EQUIPMENT. ACCESS PROVISIONS SHALL BE COORDINATED WITH THE WORK OF ALL TRADES. PIPING, SLEEVES, INSERTS, HANGERS, AND EQUIPMENT SHALL BE LOCATED CLEAR OF WINDOWS, DOORS, OPENINGS, LIGHT OUTLETS, AND OTHER SERVICES AND UTILITIES. EQUIPMENT LAYOUT DRAWINGS SHALL BE PREPARED TO COORDINATE PROPER LOCATION AND PERSONNEL ACCESS OF ALL FACILITIES. THE DRAWINGS SHALL BE SUBMITTED FOR REVIEW.
         b. MANUFACTURER'S PUBLISHED RECOMMENDATIONS SHALL BE FOLLOWED FOR INSTALLATION METHODS NOT OTHERWISE SPECIFIED.
         c. OPERATING PERSONNEL ACCESS AND OBSERVATION PROVISIONS: ALL EQUIPMENT AND SYSTEMS SHALL BE ARRANGED TO PROVIDE CLEAR ACCESS AND PROVIDE SAFE ACCESS, WITHOUT USE OF PORTABLE LADDERS, FOR MAINTENANCE, TESTING AND OPERATION OF ALL DEVICES INCLUDING, BUT NOT LIMITED TO: ALL EQUIPMENT ITEMS, VALVES, BACKFLOW PREVENTERS, FILTERS, STRAINERS, TRANSMITTERS, SENSORS, METERS AND CONTROL DEVICES. ALL GAUGES AND INDICATORS SHALL BE CLEARLY VISIBLE BY PERSONNEL STANDING ON THE FLOOR OR ON PERMANENT PLATFORMS. MAINTENANCE AND OPERATING SPACE AND ACCESS PROVISIONS THAT ARE SHOWN IN THE DRAWINGS SHALL NOT BE CHANGED NOR REDUCED.
         d. STRUCTURAL SYSTEMS NECESSARY FOR PIPE AND EQUIPMENT SUPPORT SHALL BE COORDINATED TO PERMIT PROPER INSTALLATION.
         e. LOCATION OF PIPE SLEEVES, TRENCHES AND CHASES SHALL BE ACCURATELY COORDINATED WITH EQUIPMENT AND PIPING LOCATIONS.
         f. CUTTING HOLES:
            - HOLES SHALL BE LOCATED TO AVOID INTERFERENCE WITH STRUCTURAL MEMBERS SUCH AS BEAMS OR GRADE BEAMS. HOLES SHALL BE LAID OUT IN ADVANCE AND DRILLING DONE ONLY AFTER APPROVAL BY COR. IF THE CONTRACTOR CONSIDERS IT NECESSARY TO DRILL THROUGH STRUCTURAL MEMBERS, THIS MATTER SHALL BE REFERRED TO COR FOR APPROVAL.
            - WATERPROOF MEMBRANE SHALL NOT BE PENETRATED. PIPE FLOOR PENETRATION BLOCK OUTS SHALL BE PROVIDED OUTSIDE THE EXTENTS OF THE WATERPROOF MEMBRANE.
            - HOLES THROUGH CONCRETE AND MASONRY SHALL BE CUT BY ROTARY CORE DRILL. PNEUMATIC HAMMER, IMPACT ELECTRIC, AND HAND OR MANUAL HAMMER TYPE DRILL WILL NOT BE ALLOWED, EXCEPT AS PERMITTED WHERE WORKING AREA SPACE IS LIMITED.
         g. MINOR PIPING GENERALLY: SMALL DIAMETER PIPE RUNS FROM DRIPS AND DRAINS, WATER COOLING, AND OTHER SERVICES ARE NOT SHOWN BUT MUST BE PROVIDED.
         h. PROTECTION AND CLEANING:
            - EQUIPMENT AND MATERIALS SHALL BE CAREFULLY HANDLED, PROPERLY STORED, AND ADEQUATELY PROTECTED TO PREVENT DAMAGE BEFORE AND DURING INSTALLATION. IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND AS APPROVED, DAMAGED OR DEFECTIVE ITEMS IN THE OPINION OF THE CLIENT PROJECT REPRESENTATIVE, SHALL BE REPLACED AT NO ADDITIONAL COST OR TIME.
            - PROTECT ALL FINISHED PARTS OF EQUIPMENT, SUCH AS SHAFTS AND BEARINGS WHERE ACCESSIBLE, FROM RUST PRIOR TO OPERATION BY MEANS OF PROTECTIVE GREASE COATING AND WRAPPING. CLOSE PIPE OPENINGS WITH CAPS OR PLUGS DURING INSTALLATION. PIPE OPENINGS, EQUIPMENT, AND PLUMBING FIXTURES SHALL BE TIGHTLY COVERED AGAINST DIRT OR MECHANICAL INJURY. AT COMPLETION OF ALL WORK THOROUGHLY CLEAN FIXTURES, EXPOSED MATERIALS AND EQUIPMENT.
         i. WORK IN BATHROOMS, RESTROOMS, HOUSEKEEPING CLOSETS: ALL PIPE PENETRATIONS BEHIND ESCUTCHEONS SHALL BE SEALED WITH PLUMBERS' PUTTY.
         j. SWITCHGEAR DRIP PROTECTION: EVERY EFFORT SHALL BE MADE TO ELIMINATE THE INSTALLATION OF PIPE ABOVE DATA EQUIPMENT, AND ELECTRICAL AND TELEPHONE SWITCHGEAR. IF THIS IS NOT POSSIBLE, ENCASE PIPE IN A SECOND PIPE WITH A MINIMUM OF JOINTS. DRAIN VALVE SHALL BE PROVIDED IN LOW POINT OF CASEMENT PIPE.
         k. INACCESSIBLE EQUIPMENT:
            - WHERE THE CLIENT REPRESENTATIVE DETERMINES THAT THE CONTRACTOR HAS INSTALLED EQUIPMENT NOT CONVENIENTLY ACCESSIBLE FOR OPERATION AND MAINTENANCE, EQUIPMENT SHALL BE REMOVED AND REINSTALLED OR OTHERWISE MADE ACCESSIBLE AS DIRECTED AT NO ADDITIONAL COST OR ADDITIONAL TIME.
            - THE TERM "CONVENIENTLY ACCESSIBLE" IS DEFINED AS CAPABLE OF BEING REACHED WITHOUT THE USE OF LADDERS, OR WITHOUT CLIMBING OR CRAWLING UNDER OR OVER OBSTACLES SUCH AS ELECTRICAL CONDUIT, MOTORS, FANS, PUMPS, BELT GUARDS, TRANSFORMERS, HIGH VOLTAGE LINES, PIPING, AND DUCTWORK.
      2. PIPE EQUIPMENT AND SUPPORTS
         a. WHERE HANGER SPACING DOES NOT CORRESPOND WITH JOIST OR RIB SPACING, USE STRUCTURAL STEEL CHANNELS SECURED DIRECTLY TO JOIST AND RIB STRUCTURE THAT WILL CORRESPOND TO THE REQUIRED HANGER SPACING, AND THEN SUSPEND THE PIPING FROM THE STRUCTURAL CHANNELS. SUBMITTALS SHALL BE DRILLED FOR AND LAYOUT OF STRUCTURAL STEEL ONLY WITH THE PRIOR WRITTEN APPROVAL.
         b. THE USE OF CHAIN PIPE SUPPORTS, WIRE OR STRAP HANGERS, WOOD FOR BLOCKING, STAYS AND BRACING, OR HANGERS SUSPENDED FROM PIPING ABOVE SHALL NOT BE PERMITTED. RUSTY PRODUCTS SHALL BE REPLACED.
         c. HANGER RODS SHALL BE USED THAT ARE STRAIGHT AND VERTICAL. TURNBUCKLES FOR VERTICAL ADJUSTMENTS MAY BE OMITTED WHERE LIMITED SPACE PREVENTS USE. A MINIMUM OF 15 MM (1/2 INCH) CLEARANCE BETWEEN PIPE OR PIPING COVERING AND ADJACENT WORK SHALL BE PROVIDED.
         d. FOR HORIZONTAL AND VERTICAL PLUMBING PIPE SUPPORTS, REFER TO THE INTERNATIONAL PLUMBING CODE (IPC) AND THESE SPECIFICATIONS.
         e. OVERHEAD SUPPORTS:
            - THE BASIC STRUCTURAL SYSTEM OF THE BUILDING IS DESIGNED TO SUSTAIN THE LOADS IMPOSED BY EQUIPMENT AND PIPING TO BE SUPPORTED OVERHEAD.
            - PROVIDE STEEL STRUCTURAL MEMBERS, IN ADDITION TO THOSE SHOWN, OF ADEQUATE CAPABILITY TO SUPPORT THE IMPOSED LOADS, LOCATED IN ACCORDANCE WITH THE FINAL APPROVED LAYOUT OF EQUIPMENT AND PIPING.
            - TUBING AND CAPILLARY SYSTEMS SHALL BE SUPPORTED IN CHANNEL TROUGHS.
         f. FLOOR SUPPORTS:
            - PROVIDE CONCRETE BASES, CONCRETE ANCHOR BLOCKS AND PEDESTALS, AND STRUCTURAL STEEL SYSTEMS FOR SUPPORT OF EQUIPMENT AND PIPING. CONCRETE BASES AND STRUCTURAL SYSTEMS SHALL BE ANCHORED AND DOWELED TO RESIST FORCES UNDER OPERATING AND SEISMIC CONDITIONS (IF APPLICABLE) WITHOUT EXCESSIVE DISPLACEMENT OR STRUCTURAL FAILURE.
            - BASES AND SUPPORTS SHALL NOT BE LOCATED AND INSTALLED UNTIL EQUIPMENT MOUNTED THEREON HAS BEEN APPROVED. BASES SHALL BE SIZED TO MATCH EQUIPMENT MOUNTED THEREON PLUS 50 MM (2 INCH) EXCESS ON ALL EDGES. STRUCTURAL DRAWINGS SHALL BE REVIEWED FOR ADDITIONAL REQUIREMENTS. BASES SHALL BE NEATLY FINISHED AND SMOOTHED, SHALL HAVE CHAMFERED EDGES AT THE TOP, AND SHALL BE SUITABLE FOR PAINTING.
            - ALL EQUIPMENT SHALL BE SHIMMED, LEVELED, FIRMLY ANCHORED, AND GROUTED WITH EPOXY GROUT. ANCHOR BOLTS SHALL BE PLACED IN SLEEVES, ANCHORED TO THE BASES. FILL THE ANNULAR SPACE BETWEEN SLEEVES AND BOLTS WITH A GROUT MATERIAL TO PERMIT ALIGNMENT AND REALIGNMENT.
      3. LUBRICATION
         a. ALL EQUIPMENT AND DEVICES REQUIRING LUBRICATION SHALL BE LUBRICATED PRIOR TO INITIAL OPERATION. ALL DEVICES AND EQUIPMENT SHALL BE FIELD CHECKED FOR PROPER LUBRICATION.
         b. ALL LUBRICATION POINTS SHALL BE ACCESSIBLE WITHOUT DISASSEMBLING EQUIPMENT, EXCEPT TO REMOVE ACCESS PLATES.
      4. PLUMBING SYSTEM DEMOLITION
         a. RIGGING ACCESS, OTHER THAN INDICATED IN THE DRAWINGS, SHALL BE PROVIDED AFTER APPROVAL FOR STRUCTURAL INTEGRITY BY CLIENT PROJECT REPRESENTATIVE. SUCH ACCESS SHALL BE PROVIDED AT NO ADDITIONAL COST OR TIME. WHERE WORK IS IN AN OPERATING PLANT, APPROVED PROTECTION FROM DUST AND DEBRIS SHALL BE PROVIDED AT ALL TIMES FOR THE SAFETY OF PLANT PERSONNEL AND MAINTENANCE OF PLANT OPERATION AND ENVIRONMENT OF THE PLANT.
         b. UNLESS SPECIFIED OTHERWISE, ALL PIPING, WIRING, CONDUIT, AND OTHER DEVICES ASSOCIATED WITH THE EQUIPMENT NOT RE-USED IN THE NEW WORK SHALL BE COMPLETELY REMOVED FROM PER SECTION CONSTRUCTION WASTE MANAGEMENT. THIS INCLUDES ALL CONCRETE EQUIPMENT PADS, PIPE, VALVES, FITTINGS, INSULATION, AND

GENERAL NOTES

4. **GENERAL-DUTY VALVES FOR PLUMBING PIPING**
   A. **GENERAL**
      1. **DESCRIPTION**: GENERAL-DUTY VALVES FOR DOMESTIC WATER AND SEWER SYSTEMS: BALL VALVES: GATE VALVES: BUTTERFLY VALVES: BALANCING VALVES: CHECK VALVES: GLOBE VALVES: WATER PRESSURE REDUCING VALVES AND CONNECTIONS: BACKWATER VALVES: BACKFLOW PREVENTERS: CHAINWHEELS: THERMOSTATIC MIXING VALVES. RE: SPECIFICATIONS.
      2. **SUBMITTALS**
         a. MANUFACTURER'S LITERATURE AND DATA INCLUDING: FULL ITEM DESCRIPTION AND OPTIONAL FEATURES AND ACCESSORIES. INCLUDE DIMENSIONS, WEIGHTS, MATERIALS, APPLICATIONS, STANDARD COMPLIANCE, MODEL NUMBERS, SIZE, AND CAPACITY.
      3. **DELIVERY AND STORAGE**: VALVES SHALL BE PREPARED FOR STORAGE AS FOLLOWS:
         a. MAINTAIN VALVE END PROTECTION.
         b. STORE VALVES INDOORS AND MAINTAIN AT HIGHER THAN AMBIENT DEW POINT TEMPERATURE.
   B. **PRODUCTS**
      1. **SHUT-OFF VALVES**
         a. COLD, HOT AND RE-CIRCULATING HOT WATER:
         b. BALL, MSS SP-110, BALL VALVE SHALL BE FULL PORT, THREE PIECE OR TWO PIECE WITH A UNION DESIGN WITH ADJUSTABLE STEM PACKAGE.
         c. BUTTERFLY SHALL HAVE AN IRON BODY WITH EPDM SEAL AND ALUMINUM BRONZE DISC. THE BUTTERFLY VALVE SHALL MEET MSS SP-67, TYPE I STANDARD.
         d. CLASS 125, OS&Y, CAST IRON GATE VALVE; THE GATE VALVE SHALL MEET MSS SP-70 TYPE I STANDARD.
         e. SINGLE FLANGE, DUCTILE IRON BUTTERFLY VALVES: THE SINGLE FLANGED BUTTERFLY VALVE SHALL MEET THE MSS SP-67 STANDARD.
         f. GROOVED END, DUCTILE IRON BUTTERFLY VALVES. THE GROOVED BUTTERFLY VALVE SHALL MEET THE MSS SP-67 STANDARD.
         g. REAGENT GRADE WATER; VALVES FOR REAGENT GRADE, REVERSE OSMOSIS, OR DEIONIZED WATER SERVICE SHALL BE BALL TYPE OF SAME MATERIAL AS USED FOR PIPE.
      2. **CHECK VALVES**
         a. SHALL BE CLASS 125, BRONZE SWING CHECK VALVES WITH NON-METALLIC DISC SUITABLE FOR TYPE OF SERVICE. THE CHECK VALVE SHALL MEET MSS SP-80 TYPE 4 STANDARD. THE CHECK VALVE SHALL HAVE A Y PATTERN HORIZONTAL BODY DESIGN WITH BRONZE BODY MATERIAL CONFORMING TO ASTM B62, SOLDER JOINTS, AND PTFE OR TFE DISC.
         b. CHECK VALVES SHALL BE CLASS 125, IRON SWING CHECK VALVE WITH LEVER AND WEIGHT CLOSURE CONTROL. THE CHECK VALVE SHALL MEET MSS SP-71 TYPE I STANDARD. THE CHECK VALVE SHALL HAVE A CLEAR OR FULL WATERWAY BODY DESIGN WITH GRAY IRON BODY MATERIAL CONFORMING TO ASTM A126, BOLTED BONNET, FLANGED ENDS, BRONZE TRIM.
      3. **GLOBE VALVES**
         a. CLASS 150, BRONZE GLOBE VALVE WITH NON-METALLIC DISC. THE GLOBE VALVE SHALL MEET MSS SP-80, TYPE 2 STANDARD. THE VALVE MATERIAL SHALL BE BRONZE WITH INTEGRAL SEAL AND UNION RING BONNET CONFORMING TO ASTM B62 WITH SOLDER ENDS, COPPER-SILICON BRONZE STEM, PTFE OR TFE DISC, AND MALLEABLE IRON HAND WHEEL.
         b. SIMILAR TO ABOVE, EXCEPT WITH CAST IRON BODY AND BRONZE TRIM, CLASS 125, IRON GLOBE VALVE. THE GLOBE VALVE SHALL MEET MSS SP-85, TYPE I STANDARD. THE VALVE MATERIAL SHALL BE GRAY IRON WITH BOLTED BONNET CONFORMING TO ASTM A126 WITH FLANGED ENDS, BRONZE TRIM, AND MALLEABLE IRON HANDWHEEL.
      4. **WATER PRESSURE REDUCING VALVE AND CONNECTIONS**
         a. THE PRESSURE REDUCING VALVE SHALL CONSIST OF A BRONZE BODY AND BELL HOUSING, A SEPARATE ACCESS COVER FOR THE PLUNGER, AND A BOLT TO ADJUST THE DOWNSTREAM PRESSURE. THE PRESSURE REDUCING VALVE SHALL MEET ASSE 1003. THE ASSEMBLY SHALL BE OF THE BALANCED PISTON DESIGN AND SHALL REDUCE PRESSURE IN BOTH FLOW AND NO FLOW CONDITIONS.
         b. THE PRESSURE REDUCING VALVE SHALL CONSIST OF A FLANGED CAST IRON BODY THE VALVE SHALL HAVE A LARGE ELASTOMER DIAPHRAGM FOR SENSITIVE RESPONSE. THE PRESSURE REDUCING VALVE SHALL MEET ASSE 1003.
         c. CONNECTIONS VALVES AND STRAINERS: SHUT OFF VALVES SHALL BE INSTALLED ON EACH SIDE OF REDUCING VALVE AND A BYPASS LINE EQUAL IN SIZE TO THE REGULATOR INLET PIPE SHALL BE INSTALLED WITH A NORMALLY CLOSED GLOBE VALVE. A STRAINER SHALL BE INSTALLED ON THE INLET SIDE OF, AND SAME SIZE AS PRESSURE REDUCING VALVE. A PRESSURE GAUGE SHALL BE INSTALLED ON THE INLET AND OUTLET OF THE VALVE.
      5. **BACKFLOW PREVENTERS**
         a. THE REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE ASSE LISTED 1013 WITH FULL PORT OS&Y POSITIVE-SEAL RESILIENT GATE VALVES AND AN INTEGRAL RELIEF MONITOR SWITCH. THE MAIN BODY AND ACCESS COVER SHALL BE EPOXY COATED DUCTILE IRON CONFORMING TO ASTM A536 GRADE 4. THE SEAT RING AND CHECK VALVE SHALL BE THE THERMOPLASTIC TYPE SUITED FOR WATER SERVICE. THE STEM SHALL BE STAINLESS STEEL CONFORMING TO ASTM A276/A276M. THE SEAT DISC SHALL BE THE ELASTOMER TYPE SUITED FOR WATER SERVICE. THE CHECKS AND THE RELIEF VALVE SHALL BE ACCESSIBLE FOR MAINTENANCE WITHOUT REMOVING THE DEVICE FROM THE LINE. AN EPOXY COATED WYE TYPE STRAINER WITH FLANGED CONNECTIONS SHALL BE INSTALLED ON THE INLET. REDUCED PRESSURE BACKFLOW PREVENTERS SHALL BE INSTALLED IN THE FOLLOWING APPLICATIONS:
            - REVERSE OSMOSIS WATER SYSTEMS, WATER MAKE UP TO HEATING SYSTEMS, COOLING TOWER, CHILLED WATER SYSTEM, AND SIMILAR EQUIPMENT CONSUMING WATER; WATER SERVICE ENTRANCE FROM LOOP SYSTEM.
         b. THE PIPE APPLIED OR INTEGRAL ATMOSPHERIC VACUUM BREAKER SHALL BE ASSE LISTED 1001. THE MAIN BODY SHALL BE CAST BRONZE. THE SEAT DISC SHALL BE THE ELASTOMER TYPE SUITED FOR WATER SERVICE. THE DEVICE SHALL BE ACCESSIBLE FOR MAINTENANCE WITHOUT REMOVING THE DEVICE FROM THE SERVICE LINE. THE INSTALLATION SHALL NOT BE IN A CONCEALED OR INACCESSIBLE LOCATION OR WHERE THE VENTING OF WATER FROM THE DEVICE DURING NORMAL OPERATION IS DEEMED OBJECTIONABLE. ATMOSPHERIC VACUUM BREAKERS SHALL BE INSTALLED IN THE FOLLOWING APPLICATIONS:
            - HOSE BIBS AND SINKS WITH THREADED OUTLETS, SERVICE SINKS (INTEGRAL WITH FAUCET ONLY).
         c. THE HOSE CONNECTION VACUUM BREAKER SHALL BE ASSE LISTED 1011. THE MAIN BODY SHALL BE CAST BRASS WITH STAINLESS STEEL WORKING PARTS. THE DIAPHRAGM AND DISC SHALL BE THE ELASTOMER TYPE SUITED FOR WATER SERVICE. THE DEVICE SHALL PERMIT THE ATTACHMENT OF PORTABLE HOSES TO HOSE THREAD OUTLETS. HOSE CONNECTION VACUUM BREAKERS SHALL BE INSTALLED IN THE FOLLOWING LOCATIONS REQUIRING NON-CONTINUOUS PRESSURE: HOSE BIBBS AND WALL HYDRANTS.
         d. THE LABORATORY FAUCET VACUUM BREAKER SHALL BE ASSE LISTED 1035. THE MAIN BODY SHALL BE CAST BRASS. DUAL CHECK VALVES WITH STAINLESS STEEL WORKING PARTS. THE DIAPHRAGM AND DISC SHALL BE THE ELASTOMER TYPE SUITED FOR WATER SERVICE. THE DEVICE SHALL PERMIT THE ATTACHMENT OF PORTABLE HOSES TO LABORATORY FAUCETS FOR NON-CONTINUOUS PRESSURE APPLICATIONS.
   C. **EXECUTION**
      1. **EXAMINATION**
         a. VALVES SHALL BE OPERATED IN POSITIONS FROM FULLY OPEN TO FULLY CLOSED. GUIDES AND SEATS SHALL BE EXAMINED AND MADE ACCEPTABLE BY SUCH OPERATIONS.
         b. MATING FLANGE FACES SHALL BE EXAMINED FOR CONDITIONS THAT MIGHT CAUSE LEAKAGE. BOLTING SHALL BE CHECKED FOR PROPER SIZE, LENGTH, AND MATERIAL. GASKETS SHALL BE VERIFIED FOR PROPER SIZE AND THAT ITS MATERIAL COMPOSITION IS SUITABLE FOR SERVICE AND FREE FROM DEFECTS AND DAMAGE.
         c. DO NOT ATTEMPT TO REPAIR DEFECTIVE VALVES; REPLACE WITH NEW VALVES.
      2. **INSTALLATION**
         a. INSTALL VALVES WITH UNIONS OR FLANGES AT EACH PIECE OF EQUIPMENT ARRANGED TO ALLOW SERVICE, MAINTENANCE, AND EQUIPMENT REMOVAL WITHOUT SYSTEM SHUTDOWN.
         b. VALVES SHALL BE LOCATED FOR EASY ACCESS AND SHALL BE PROVIDE WITH SEPARATE SUPPORT. VALVES SHALL BE ACCESSIBLE WITH ACCESS DOORS WHEN INSTALLED INSIDE PARTITIONS OR ABOVE HARD CEILINGS.
         c. VALVES SHALL BE INSTALLED IN HORIZONTAL PIPING WITH STEM AT OR ABOVE CENTER OF PIPE.
         d. INSTALL BACKFLOW PREVENTERS IN EACH WATER SUPPLY TO MECHANICAL EQUIPMENT AND SYSTEMS AND TO OTHER EQUIPMENT AND WATER SYSTEMS THAT SHALL BE SOURCES OF CONTAMINATION. COMPLY WITH AUTHORITIES HAVING JURISDICTION. LOCATE BACKFLOW PREVENTERS IN SAME ROOM AS CONNECTED EQUIPMENT OR SYSTEM.
         e. INSTALL DRAIN FOR BACKFLOW PREVENTERS WITH ATMOSPHERIC-VENT DRAIN CONNECTION WITH AIR-GAP FITTING, FIXED AIR-GAP FITTING, OR EQUIVALENT POSITIVE PIPE SEPARATION OF AT LEAST TWO PIPE DIAMETERS IN DRAIN PIPING AND PIPE TO FLOOR DRAIN. LOCATE AIR-GAP DEVICE ATTACHED TO OR UNDER BACKFLOW PREVENTER. SIMPLE AIR BREAKS ARE PROHIBITED FOR THIS APPLICATION.
      3. **STARTUP AND TESTING**. PERFORM TESTS AS RECOMMENDED BY PRODUCT MANUFACTURER AND LISTED STANDARDS AND UNDER ACTUAL OR SIMULATED OPERATING CONDITIONS AND PROVE FULL COMPLIANCE WITH DESIGN AND SPECIFIED REQUIREMENTS. TESTS OF THE VARIOUS ITEMS OF EQUIPMENT SHALL BE PERFORMED SIMULTANEOUSLY WITH THE SYSTEM OF WHICH EACH ITEM IS AN INTEGRAL PART.

5. **PLUMBING INSULATION**
   A. **GENERAL**
      1. **DESCRIPTION**: FIELD APPLIED INSULATION FOR THERMAL EFFICIENCY AND CONDENSATION CONTROL FOR THE FOLLOWING:
         a. PLUMBING PIPING AND EQUIPMENT.
         b. ALL INSULATION SYSTEMS INSTALLED WITHIN SUPPLY, RETURN, EXHAUST, RELIEF AND VENTILATION AIR PLENUMS SHALL BE LIMITED TO UNINHABITED CRAWL SPACES, AREAS ABOVE A CEILING OR BELOW THE FLOOR, ATTIC SPACES, INTERIORS OF AIR CONDITIONED OR HEATING DUCTS, AND MECHANICAL EQUIPMENT ROOMS SHALL BE NONCOMBUSTIBLE OR SHALL BE LISTED AND LABELED AS HAVING A FLAME SPREAD INDEXES OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84 OR UL 723. NOTE: IDC IMC, SECTION 602.2.1.
      2. **SUBMITTALS**
         a. ALL INFORMATION, CLEARLY PRESENTED, SHALL BE INCLUDED TO DETERMINE COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS AND ASTM DESIGNATION, FEDERAL AND MILITARY SPECIFICATIONS.
         b. INSULATION MATERIALS: SPECIFY EACH TYPE USED AND STATE SURFACE BURNING CHARACTERISTICS.
         c. INSULATION FACINGS AND JACKETS: EACH TYPE USED AND STATE SURFACE BURNING CHARACTERISTICS.
         d. INSULATION ACCESSORY MATERIALS: EACH TYPE USED.
         e. ALL INSULATION FITTINGS (EXCEPTION FLEXIBLE UNICELLULAR INSULATION) SHALL BE FABRICATED IN ACCORDANCE WITH ASTM C450 AND THE REFERENCED ADJUNCT TO ASTM C450.
         f. SUBMIT MANUFACTURER'S LITERATURE AND DATA UPDATED TO INCLUDE SUBMITTAL REVIEW COMMENTS AND ANY EQUIPMENT SUBSTITUTIONS.
      3. **STORAGE AND HANDLING OF MATERIAL**: STORE MATERIALS IN CLEAN AND DRY ENVIRONMENT. PIPE INSULATION JACKETS SHALL BE CLEAN AND UNMARRED. PLACE ADHESIVES IN ORIGINAL CONTAINERS. MAINTAIN AMBIENT TEMPERATURES AND CONDITIONS AS REQUIRED BY PRINTED INSTRUCTIONS OF MANUFACTURERS OF ADHESIVES, MASTICS AND FINISHING CEMENTS.
   B. **PRODUCTS**: RE: SPECIFICATION FOR INSULATION AND INSULATION ACCESSORIES MATERIAL REQUIREMENTS
   C. **EXECUTION**
      1. **GENERAL REQUIREMENTS**
         a. EXCEPT FOR SPECIFIC EXCEPTIONS OR AS NOTED, INSULATE ALL SPECIFIED EQUIPMENT, AND PIPING (PIPE, FITTINGS, VALVES, ACCESSORIES). INSULATE EACH PIPE INDIVIDUALLY. DO NOT USE SCRAP PIECES OF INSULATION WHERE A FULL LENGTH SECTION WILL FIT.
         b. INSULATION MATERIALS SHALL BE INSTALLED WITH SMOOTH AND EVEN SURFACES, WITH JACKETS AND FACINGS DRAWN TIGHT AND SMOOTHLY CEMENTED DOWN AND SEALED AT ALL LAPS. INSULATION SHALL BE CONTINUOUS THROUGH ALL SLEEVES AND OPENINGS, EXCEPT AT FIRE DAMPERS AND DUCT HEATERS (NFPA 90A).
         c. VAPOR RETARDERS SHALL BE CONTINUOUS AND UNINTERRUPTED THROUGHOUT SYSTEMS WITH OPERATING TEMPERATURE 15 DEGREES C (60 DEGREES F) AND BELOW. LAP AND SEAL VAPOR BARRIER OVER ENDS AND EXPOSED EDGES OF INSULATION. ANCHORS, SUPPORTS AND OTHER METAL PROJECTIONS THROUGH INSULATION ON COLD SURFACES SHALL BE INSULATED AND VAPOR SEALED FOR A MINIMUM LENGTH OF 150 MM (6 INCHES).
         d. INSTALL VAPOR STOPS WITH OPERATING TEMPERATURE 15 DEGREES C (60 DEGREES F) AND BELOW AT ALL INSULATION TERMINATIONS ON EITHER SIDE OF VALVES, PUMPS, FITTINGS, AND EQUIPMENT AND PARTICULARLY IN STRAIGHT LENGTHS EVERY 4.6 TO 6.1 METERS (APPROX. 15 TO 20 FEET) OF PIPE INSULATION. THE ANNULAR SPACE BETWEEN THE PIPE AND PIPE INSULATION OF APPROX. 25 MM (1 INCH) IN LENGTH AT EVERY VAPOR STOP SHALL BE SEALED WITH APPROPRIATE VAPOR BARRIER SEALANT. BIO-BASED MATERIALS SHALL BE UTILIZED WHEN POSSIBLE.
         e. CONSTRUCT INSULATION ON PARTS OF EQUIPMENT SUCH AS COLD WATER PUMPS AND HEAT EXCHANGERS THAT MUST BE OPENED PERIODICALLY FOR MAINTENANCE OR REPAIR, SO INSULATION CAN BE REMOVED AND REPLACED WITHOUT DAMAGE. INSTALL INSULATION WITH BOLTED 1 MM THICK (20 GAGE) GALVANIZED STEEL OR ALUMINUM COVERS AS COMPLETE UNITS, OR IN SECTIONS, WITH ALL NECESSARY SUPPORTS, AND SPLIT TO COINCIDE WITH FLANGES/SPLIT OF THE EQUIPMENT. DO NOT INSULATE OVER EQUIPMENT NAMEPLATE DATA.
         f. INSULATION ON HOT PIPING AND EQUIPMENT SHALL BE TERMINATED SQUARE AT ITEMS NOT TO BE INSULATED, ACCESS OPENINGS AND NAMEPLATES. COVER ALL EXPOSED RAW INSULATION WITH WHITE SEALER COATING (CAUTION ABOUT COATING'S MAXIMUM TEMPERATURE LIMIT) OR JACKET MATERIAL.
         g. PROTECT ALL INSULATIONS OUTSIDE OF BUILDINGS WITH ALUMINUM JACKET USING LOCK JOINT OR OTHER APPROVED SYSTEM FOR A CONTINUOUS WEATHER TIGHT SYSTEM. ACCESS DOORS AND OTHER ITEMS REQUIRING MAINTENANCE OR ACCESS SHALL BE REMOVABLE AND SEALABLE.
         h. PLUMBING WORK NOT TO BE INSULATED UNLESS OTHERWISE NOTED:
            - CHROMIUM PLATED BRASS PIPING.
            - WATER PIPING IN CONTACT WITH EARTH.
         i. APPLY INSULATION MATERIALS SUBJECT TO THE MANUFACTURER'S RECOMMENDED TEMPERATURE LIMITS. APPLY ADHESIVES, MASTIC AND COATINGS AT THE MANUFACTURER'S RECOMMENDED MINIMUM WET OR DRY FILM THICKNESS. BIO-BASED MATERIALS SHALL BE UTILIZED WHEN POSSIBLE.
         j. ELBOWS, FLANGES AND OTHER FITTINGS SHALL BE INSULATED WITH THE SAME MATERIAL AS IS USED ON THE PIPE STRAIGHTS. USE OF POLYURETHANE OR PCL VISCOYANURATE SPRAY-FOAM TO FILL A PVC ELBOW JACKET IS PROHIBITED ON COLD APPLICATIONS.
         k. FIRESTOP PIPE INSULATION.
         l. PROVIDE FIRESTOPPING INSULATION AT FIRE AND SMOKE BARRIERS THROUGH PENETRATIONS. FIRESTOPPING INSULATION SHALL BE UL LISTED AS DEFINED IN SECTION 07 84 00, FIRESTOPPING.
         m. PIPE PENETRATIONS REQUIRING FIRE STOP INSULATION INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:
            - PIPE RISERS THROUGH FLOORS
            - PIPE CHASE WALLS AND FLOORS
            - SMOKE PARTITIONS
            - FIRE PARTITIONS
            - HOURLY RATED WALLS
         n. FREEZE PROTECTION OF ABOVE GRADE OUTDOOR PIPING (OVER HEAT TRACING TAPE): 20 MM (3/4 INCH) THICK INSULATION, FOR ALL PIPE SIZES 75 MM (3 INCHES) AND SMALLER AND 25 MM (1 INCH) THICK INSULATION FOR LARGER PIPES. PROVIDE METAL JACKETS FOR ALL PIPE INSULATIONS. PROVIDE FREEZE PROTECTION FOR COLD WATER MAKE-UP PIPING AND EQUIPMENT WHERE INDICATED ON THE DRAWINGS AS DESCRIBED IN SECTION HYDRONIC PIPING (ELECTRICAL HEAT TRACING SYSTEMS).
         o. PROVIDE VAPOR BARRIER SYSTEMS AS FOLLOWS:
            - FOR THREADED JOINTS, THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. THE THREADS SHALL BE CUT FULL AND CLEAN USING SHARP DISC CUTTERS. THREADED PIPE ENDS SHALL BE REAMED TO REMOVE BURRS AND RESTORED TO FULL PIPE INSIDE DIAMETER. PIPE FITTINGS AND VALVES SHALL BE JOINED AS FOLLOWS:
            - APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS UNLESS DRY SEAL THREADING IS REQUIRED BY THE PIPE SERVICE.
            - PIPE SECTIONS WITH DAMAGED THREADS SHALL BE REPLACED WITH NEW SECTIONS OF PIPE.
      2. **JOINT CONSTRUCTION**
         a. HUB AND SPIGOT, CAST IRON PIPING WITH GASKET JOINTS SHALL BE JOINED IN ACCORDANCE WITH CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR COMPRESSION JOINTS.
         b. HUBLESS OR NO-HUB, CAST IRON PIPING SHALL BE JOINED IN ACCORDANCE WITH CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR HUBLESS PIPING COUPLING JOINTS.
         c. FOR THREADED JOINTS, THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. THE THREADS SHALL BE CUT FULL AND CLEAN USING SHARP DISC CUTTERS. THREADED PIPE ENDS SHALL BE REAMED TO REMOVE BURRS AND RESTORED TO FULL PIPE INSIDE DIAMETER. PIPE FITTINGS AND VALVES SHALL BE JOINED AS FOLLOWS:
            - APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS UNLESS DRY SEAL THREADING IS REQUIRED BY THE PIPE SERVICE.
            - PIPE SECTIONS WITH DAMAGED THREADS SHALL BE REPLACED WITH NEW SECTIONS OF PIPE.
      3. **COPPER TUBE AND FITTINGS** WITH SOLDERED JOINTS SHALL BE JOINED ACCORDING TO ASTM B828. A WATER FLUSHABLE, LEAD FREE FLUX CONFORMING TO ASTM B813 AND A LEAD-FREE ALLOY SOLDER CONFORMING TO ASTM B32 SHALL BE USED.
      4. **PIPE HANGERS, SUPPORTS AND ACCESSORIES**
         a. ALL PIPING SHALL BE SUPPORTED ACCORDING TO THE INTERNATIONAL PLUMBING CODE (IPC), SECTION COMMON WORK RESULTS FOR PLUMBING, AND THESE SPECIFICATIONS. WHERE CONFLICTS ARISE BETWEEN THESE THE CODE AND SECTION COMMON WORK RESULTS FOR PLUMBING THE MOST RESTRICTIVE OR THE REQUIREMENT THAT SPECIFIES SUPPORTS WITH HIGHEST LOADING OR SHORTEST SPACING SHALL APPLY.
         b. HORIZONTAL PIPING AND TUBING SHALL BE SUPPORTED WITHIN 300 MM (12 INCHES) OF EACH FITTING OR COUPLING.
         c. HORIZONTAL CAST IRON PIPING SHALL BE SUPPORTED WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM HANGER ROD DIAMETERS. RE: SPECIFICATIONS.
         d. VERTICAL PIPING AND TUBING SHALL BE SUPPORTED AT THE BASE, AT EACH FLOOR, AND AT INTERVALS NO GREATER THAN 4.6 M (15 FEET).
         e. MISCELLANEOUS MATERIALS SHALL BE PROVIDED AS SPECIFIED, REQUIRED, DIRECTED OR AS NOTED IN THE CONTRACT DOCUMENTS FOR PROPER INSTALLATION OF HANGERS, SUPPORTS AND ACCESSORIES. IF THE VERTICAL DISTANCE EXCEEDS 6.1 M (20 FEET) FOR CAST IRON PIPE ADDITIONAL SUPPORT SHALL BE PROVIDED IN THE CENTER OF THAT SPAN. ALL NECESSARY AUXILIARY STEEL SHALL BE PROVIDED TO PROVIDE THAT SUPPORT.
         f. CAST ESCUTCHEON WITH SET SCREW SHALL BE PROVIDED AT EACH WALL, FLOOR AND CEILING PENETRATION IN EXPOSED FINISHED LOCATIONS AND WITHIN CABINETS AND MILLWORK.
         g. PENETRATIONS:
            - FIRE STOPPING. WHERE PIPES PASS THROUGH FIRE PARTITIONS, FIRE WALLS, SMOKE PARTITIONS, OR FLOORS, A FIRE STOP SHALL BE INSTALLED THAT PROVIDES AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FIRE, SMOKE, AND GASES AS SPECIFIED IN SECTION FIRESTOPPING. COMPLETELY FILL AND SEAL CLEARANCES BETWEEN RACEWAYS AND OPENINGS WITH THE FIRESTOPPING MATERIALS.
            - WATERPROOFING: AT FLOOR PENETRATIONS, COMPLETELY SEAL CLEARANCES AROUND THE PIPE AND MAKE WATERTIGHT WITH SEALANT AS SPECIFIED IN SECTION JOINT SEALANTS. BIO-BASED MATERIALS SHALL BE UTILIZED WHEN POSSIBLE.
         c. ACOUSTICAL SEALANT: WHERE PIPES PASS THROUGH SOUND RATED WALLS, SEAL AROUND THE PIPE PENETRATION WITH AN ACOUSTICAL SEALANT THAT IS COMPLIANT WITH ASTM C919.
         3. **DOMESTIC WATER PIPING SHALL CONFORM TO THE FOLLOWING:**
            a. GRADE ALL LINES TO FACILITATE DRAINAGE. PROVIDE DRAIN VALVES AT BOTTOM OF RISERS AND ALL LOW POINTS IN SYSTEM. DESIGN DOMESTIC HOT AND COLD WATER CIRCULATING LINES WITH NO TRAPS.
            b. CONNECT BRANCH LINES AT BOTTOM OF MAIN SERVING FIXTURES BELOW AND PITCH DOWN SO THAT MAIN MAY BE DRAINED THROUGH FIXTURE. CONNECT BRANCH LINES TO TOP OF MAIN SERVING ONLY FIXTURES LOCATED ON FLOOR ABOVE.
         4. **TESTS**: GENERAL: TEST SYSTEM EITHER IN ITS ENTIRETY OR IN SECTIONS. SUBMIT TESTING PLAN TO COR 10 WORKING DAYS PRIOR TO TEST DATE.
         5. **STERILIZATION**: AFTER TESTS HAVE BEEN SUCCESSFULLY COMPLETED, THOROUGHLY FLUSH AND STERILIZE THE INTERIOR DOMESTIC WATER DISTRIBUTION SYSTEM IN ACCORDANCE WITH AWWA C651.

6. **FACILITY WATER DISTRIBUTION**
   A. **GENERAL**
      1. DESCRIPTION: DOMESTIC WATER SYSTEMS, INCLUDING PIPING, EQUIPMENT AND ALL NECESSARY ACCESSORIES AS DESIGNATED IN THIS SECTION.
   B. **PRODUCTS**: RE: SPECIFICATION FOR PIPE, PIPE FITTING, PIPE JOINING MATERIAL REQUIREMENTS
   C. **EXECUTION**
      1. **INSTALLATION**: GENERAL: COMPLY WITH THE INTERNATIONAL PLUMBING CODE AND THE FOLLOWING:
         a. INSTALL BRANCH PIPING FOR WATER FROM THE PIPING SYSTEM AND CONNECT TO ALL FIXTURES, VALVES, COCKS, OUTLETS, CASEWORK, CABINETS AND EQUIPMENT, INCLUDING THOSE FURNISHED BY THE GOVERNMENT OR SPECIFIED IN OTHER SECTIONS.
         b. ALL PIPE RUNS SHALL BE LAID OUT TO AVOID INTERFERENCE WITH OTHER WORK/TRADES.
         c. INSTALL UNION AND SHUT-OFF VALVE ON PRESSURE PIPING AT CONNECTIONS TO EQUIPMENT.
         d. PIPE HANGERS, SUPPORTS AND ACCESSORIES:
            - ALL PIPING SHALL BE SUPPORTED PER THE IPC, H-18-8 SEISMIC DESIGN HANDBOOK, MSS SP-58, AND SMACNA AS REQUIRED.
            - SHOP PAINTING AND PLATING: HANGERS, SUPPORTS, RODS, INSERTS AND ACCESSORIES USED FOR PIPE SUPPORTS SHALL BE SHOP COATED WITH ZINC CHROMATE PRIMER PAINT. ELECTROPLATED COPPER HANGER RODS, HANGERS AND ACCESSORIES MAY BE USED WITH COPPER TUBING.
            - FLOOR, WALL AND CEILING PLATES, SUPPORTS, HANGERS.
            - PIPE HANGERS: HEIGHT ADJUSTABLE CLEVIS TYPE.
            - HANGERS AND SUPPORTS UTILIZED WITH INSULATED PIPE AND TUBING SHALL HAVE 180-DEGREE (MINIMUM) METAL PROTECTION SHIELD CENTERED ON AND WELDED TO THE HANGER AND SUPPORT. THE SHIELD THICKNESS AND LENGTH SHALL BE ENGINEERED AND SIZED FOR DISTRIBUTION OF LOADS TO PRECLUDE CRUSHING OF INSULATION WITHOUT BREAKING THE VAPOR BARRIER. THE SHIELD SHALL BE SIZED FOR THE INSULATION AND HAVE FLARED EDGES TO PROTECT VAPOR-RETARDANT JACKET FACING. TO PREVENT THE SHIELD FROM SLIDING OUT OF THE CLEVIS HANGER DURING PIPE MOVEMENT, CENTER-RIBBED SHIELDS SHALL BE USED.
         e. INSTALL CHROME PLATED CAST BRASS ESCUTCHEON WITH SET SCREW AT EACH WALL, FLOOR AND CEILING PENETRATION IN EXPOSED FINISHED LOCATIONS AND WITHIN CABINETS AND MILLWORK.
      2. **PENETRATIONS**
         a. FIRESTOPPING: WHERE PIPES PASS THROUGH FIRE PARTITIONS, FIRE WALLS, SMOKE PARTITIONS, OR FLOORS, INSTALL A FIRE STOP THAT PROVIDES AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FIRE, SMOKE, AND GASES AS SPECIFIED IN SECTION FIRESTOPPING. COMPLETELY FILL AND SEAL CLEARANCES BETWEEN RACEWAYS AND OPENINGS WITH THE FIRESTOPPING MATERIALS.
         b. WATERPROOFING: AT FLOOR PENETRATIONS, COMPLETELY SEAL CLEARANCES AROUND THE PIPE AND MAKE WATERTIGHT WITH SEALANT AS SPECIFIED IN SECTION JOINT SEALANTS. BIO-BASED MATERIALS SHALL BE UTILIZED WHEN POSSIBLE.
         c. ACOUSTICAL SEALANT: WHERE PIPES PASS THROUGH SOUND RATED WALLS, SEAL AROUND THE PIPE PENETRATION WITH AN ACOUSTICAL SEALANT THAT IS COMPLIANT WITH ASTM C919.
      3. **DOMESTIC WATER PIPING SHALL CONFORM TO THE FOLLOWING:**
         a. GRADE ALL LINES TO FACILITATE DRAINAGE. PROVIDE DRAIN VALVES AT BOTTOM OF RISERS AND ALL LOW POINTS IN SYSTEM. DESIGN DOMESTIC HOT AND COLD WATER CIRCULATING LINES WITH NO TRAPS.
         b. CONNECT BRANCH LINES AT BOTTOM OF MAIN SERVING FIXTURES BELOW AND PITCH DOWN SO THAT MAIN MAY BE DRAINED THROUGH FIXTURE. CONNECT BRANCH LINES TO TOP OF MAIN SERVING ONLY FIXTURES LOCATED ON FLOOR ABOVE.
      4. **TESTS**: GENERAL: TEST SYSTEM EITHER IN ITS ENTIRETY OR IN SECTIONS. SUBMIT TESTING PLAN TO COR 10 WORKING DAYS PRIOR TO TEST DATE.
      5. **STERILIZATION**: AFTER TESTS HAVE BEEN SUCCESSFULLY COMPLETED, THOROUGHLY FLUSH AND STERILIZE THE INTERIOR DOMESTIC WATER DISTRIBUTION SYSTEM IN ACCORDANCE WITH AWWA C651.

7. **FACILITY SANITARY AND VENT PIPING**
   A. **GENERAL**
      1. **DESCRIPTION**: THIS SECTION PERTAINS TO SANITARY SEWER AND VENT SYSTEMS, INCLUDING PIPING, EQUIPMENT AND ALL NECESSARY ACCESSORIES AS DESIGNATED IN THIS SECTION.
      2. **SUBMITTALS**
         a. MANUFACTURER'S LITERATURE AND DATA INCLUDING: FULL ITEM DESCRIPTION AND OPTIONAL FEATURES AND ACCESSORIES. INCLUDE DIMENSIONS, WEIGHTS, MATERIALS, APPLICATIONS, STANDARD COMPLIANCE, MODEL NUMBERS, SIZE, AND CAPACITY. PIPING, FITTINGS, CLEANOUTS, TRAP SEAL PROTECTION, PENETRATION SLEEVES, PIPE FITTINGS, TRAPS, EXPOSED PIPING, AND FITTINGS.
   B. **PRODUCTS**: RE: SPECIFICATION FOR PLUMBING FIXTURES, PIPE, PIPE FITTING, PIPE ACCESSORIES, PIPE JOINING MATERIAL REQUIREMENTS
   C. **EXECUTION**
      1. **PIPE INSTALLATION**
         a. THE PIPE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF THE INTERNATIONAL PLUMBING CODE (IPC) AND THESE SPECIFICATIONS.
         b. BRANCH PIPING SHALL BE INSTALLED FOR WASTE FROM THE RESPECTIVE PIPING SYSTEMS AND CONNECT TO ALL FIXTURES, VALVES, COCKS, OUTLETS, CASEWORK, CABINETS AND EQUIPMENT, INCLUDING THOSE FURNISHED BY THE GOVERNMENT OR SPECIFIED IN OTHER SECTIONS.
         c. ALL PIPE RUNS SHALL BE LAID OUT TO AVOID INTERFERENCE WITH OTHER WORK.
         d. THE PIPING SHALL BE INSTALLED ABOVE ACCESSIBLE CEILINGS WHERE POSSIBLE.
         e. THE PIPING SHALL BE INSTALLED TO PERMIT VALVE SERVICING OR OPERATION.
         f. CAST IRON PIPING SHALL BE INSTALLED ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK," CHAPTER IV, "INSTALLATION OF CAST IRON SOIL PIPE AND FITTINGS".
         g. ABOVEGROUND COPPER TUBING SHALL BE INSTALLED ACCORDING TO COPPER DEVELOPMENT ASSOCIATION'S (CDA) "COPPER TUBE HANDBOOK".
      2. **JOINT CONSTRUCTION**
         a. HUB AND SPIGOT, CAST IRON PIPING WITH GASKET JOINTS SHALL BE JOINED IN ACCORDANCE WITH

FIXTURE & EQUIPMENT SCHEDULE

TAG	DESCRIPTION	PIPE SIZE CW	PIPE SIZE HW	PIPE SIZE WASTE	PIPE SIZE VENT	SPECIFICATION
DRAINS						
FCO	FLOOR CLEANOUT	-	-	4"	-	COATED CAST IRON BODY, BRONZE PLUG, ADJUSTABLE SQUARE SCORIATED NICKEL BRONZE TOP.
FD-E	FLOOR DRAIN	-	-	4"	-	HEAVY DUTY, COATED CAST IRON BODY, BOTTOM OUTLET, DOUBLE DRAINAGE PATTERN, MINIMUM 12" SQUARE HEAVY DUTY NON-TILTING DUCTILE IRON GRATE, AND REMOVABLE SEDIMENT BUCKET.
TD-A	TRENCH DRAIN	-	-	4"	-	6" WIDE X 12" LONG MODULAR TRENCH DRAIN, HEAVY DUTY, COATED CAST IRON BODY, BOTTOM OUTLET, SECONDARY DOME STRAINER, HEAVY DUTY SLOTTED CAST IRON GRATE. SET DRAIN WITH TOP 12" ABOVE FINISHED FLOOR.
EQUIPMENT						
RCP-1	RO WATER DELIVERY PUMP	-	-	-	-	INLINE BOOSTER PUMP, WITH TYPE 304 STAINLESS STEEL CASING, SHAFT, AND IMPELLER, 8 GPM @ 20' HEAD.
RST-1	RO WATER STORAGE TANK	-	-	-	-	1,000 GALLON CAPACITY, VERTICAL, POLYETHYLENE, WITH ACCESS OPENING, 2" TOP INLET CONNECTION, AND 2" BOTTOM SIDE OUTLET CONNECTION.
FIXTURES						
P-514	SINK	1/2"	-	1-1/2"	1-1/2"	FLOOR MOUNTED, SINGLE COMPARTMENT, WITH DRAINBOARD, 14 GAUGE TYPE 304 STAINLESS STEEL, 24" X 24" X 14" DEEP BOWL, 8" HIGH BACKSPLASH, 24" RIGHT, OR LEFT DRAINBOARD AS SHOWN ON FLOOR PLANS, TUBULAR LEGS WITH ADJUSTABLE FEET, POLISHED CHROME PLATED CAST BRASS CW ONLY FAUCET, BACK MOUNTED, WITH LEVER HANDLE AND GOOSENECK SPOUT, STAINLESS STEEL DRAIN, WITH REMOVABLE CUP STRAINER, 1-1/2" CHROME PLATED BRASS TAILPIECE, 1-1/2" 17 GAUGE CHROME PLATED CAST BRASS P-TRAP. INCLUDE P-807 RO WATER FAUCET, REFER TO SPECIFICATIONS.
P-707	EMERGENCY SHOWER AND EYE/FACE WASH	1-1/4"	-	-	-	COMBINATION SHOWER AND EYE/FACE WASH SAFETY STATION, 10" DIAMETER STAINLESS STEEL 20 GPM SHOWER HEAD, WITH CHROME PLATED BRASS STAY-OPEN BALL VALVE, AND STAINLESS STEEL ACTUATING ARM AND PULL ROD; STAINLESS STEEL EYE/FACE WASH BOWL, TWO SPRAY HEADS WITH DUST COVERS, CHROME PLATED BRASS STAY-OPEN BALL VALVE WITH PUSH FLAG OPERATING HANDLE; SCHEDULE 40 GALVANIZED STEEL PIPE STANCHION WITH FLOOR FLANGE.
VALVES						
BFP-1	BACKFLOW PREVENTER	1-1/4"	-	-	-	REDUCED PRESSURE PRINCIPLE ASSEMBLY, LEAD FREE BRONZE, ASSE 1013 COMPLIANT, WITH FULL-PORT BALL VALVES, AND WYE STRAINER. PROVIDE AIR GAP FITTING FOR DISCHARGE PORT AND EXTEND DISCHARGE PIPING FULL SIZE TO EXTERIOR.

ABBREVIATIONS

ABS	ACRYLONITRILE BUTADIENE STYRENE
AC	ALTERNATING CURRENT
ACR	AIR CONDITIONING AND REFRIGERATION
A/E	ARCHITECT/ENGINEER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AG	AIR GAP
AI	ANALOG INPUT
AISI	AMERICAN IRON AND STEEL INSTITUTE
AO	ANALOG OUTPUT
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION, AIR CONDITIONING ENGINEERS
ASJ	ALL SERVICE JACKET
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASR	AUTOMATIC SPRINKLER RISER
AWG	AMERICAN WIRE GAUGE
BACNET	BUILDING AUTOMATION AND CONTROL NETWORK
BAG	SILVER-COPPER-ZINC BRAZING ALLOY
BAS	BUILDING AUTOMATION SYSTEM
BCLP	SILVER-COPPER-PHOSPHORUS BRAZING ALLOY
BFP	REDUCED PRESSURE BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BSG	BOROSILICATE GLASS PIPE
C	CELSIUS
CD	COMPACT DISK
CDA	COPPER DEVELOPMENT ASSOCIATION
CGA	COMPRESSED GAS ASSOCIATION
CFM	CUBIC FEET PER MINUTE
CO	CLEANOUT
COR	CONTRACTING OFFICER'S REPRESENTATIVE
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CHLOROPRENE
CRS	CORROSION RESISTENT STEEL
CV	CONTROL VALVE
CXA	COMMISSIONING AGENT
DB	DECIBELS
DB(A)	DECIBELS (A WEIGHTED)
DDC	DIRECT DIGITAL CONTROL
DFU	DRAINAGE FIXTURE UNITS
DI	DIGITAL INPUT
DI	DEIONIZED WATER
DISS	DIAMETER INDEX SAFETY SYSTEM
DN	DIAMETER NOMINAL
DO	DIGITAL OUTPUT
DOE	DEPARTMENT OF ENERGY
DVD	DIGITAL VIDEO DISC
DW	DISHWASHER
DWG	DRAWING
DWV	DRAIN, WASTE AND VENT
ECC	ENGINEERING CONTROL CENTER AKA BAS
EL	ELEVATION
EPA	ENVIRONMENTAL PROTECTION AGENCY
EPACT	ENERGY POLICY ACT
EPDM	ETHYLENE PROPYLENE DIENE MONOMER
EPT	ETHYLENE PROPYLENE TERPOLYMER
ETO	ETHYLENE OXIDE
EX	EXISTING
F	FAHRENHEIT
FAR	FEDERAL ACQUISITION REGULATIONS
FCO	FLOOR CLEANOUT
FD	FLOOR DRAINS
FDC	FIRE DEPARTMENT (HOSE) CONNECTION
FNPT	FEMALE NATIONAL PIPE THREAD
FOP	FUEL OIL PUMP
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FPM	FLUOROELASTOMER POLYMER
FS	FLOW SWITCH
FSK	FOIL-SCRIM-KRAFT FACING
FSS	VA CONSTRUCTION & FACILITIES MANAGEMENT, FACILITIES STANDARDS SERVICE
FU	FIXTURE UNITS
GAL	GALLON
GCO	GRADE CLEANOUTS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPR	GAS PRESSURE REGULATOR
GRS	GAS REGULATOR STATION
GT	GREASE TRAP
GVTR	GAS VENT THROUGH ROOF
HEX	HEAT EXCHANGER
HG	MERCURY
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HVE	HIGH VOLUME EVACUATION
HWCP	HOT WATER CIRCULATING PUMP
HYD	HYDRANT
HZ	HERTZ
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
INV	INVERT
IPC	INTERNATIONAL PLUMBING CODE
IPS	IRON PIPE SIZE
KG	KILOGRAM
KPA	KILOPASCAL
KW	KILOWATT
KWH	KILOWATT HOUR
LAV	LAVATORY
LB	POUND
LBS/HR	POUNDS PER HOUR
LNG	LIQUID NATURAL GAS
LM/N	LITERS PER MINUTE
L/S	LITERS PER SECOND
M	METER
MA	MEDICAL AIR
MAV	MEDICAL AIR VENT
MAX	MAXIMUM
MBH	1,000 BTU PER HOUR
MER	MECHANICAL EQUIPMENT ROOM
MFG	MANUFACTURER
MG	MILLIGRAM
MG/L	MILLIGRAM PER LITER
ML	MILLILITER
MM	MILLIMETER
MIN	MINIMUM
MV	MEDICAL VACUUM
N2	NITROGEN
N2O	NITROUS OXIDE
NC	NORMALLY CLOSED
NF	OIL FREE DRY (NITROGEN)
NG	NATURAL GAS
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NPTF	NATIONAL PIPE THREAD FEMALE
NPS	NOMINAL PIPE SIZE
NPT	NOMINAL PIPE THREAD
NTS	NOT TO SCALE
O2	OXYGEN
OC	ON CENTER
OC/AMES	REPLACED BY HEFP
OD	OUTSIDE DIAMETER
OR	OPERATING ROOM
OSD	OPEN SIGHT DRAIN
OS&Y	OUTSIDE STEM & YOKE
OXY	OXYGEN
PA	PASCAL
PBPU	PREFABRICATED BEDSIDE PATIENT UNITS
PD	PRESSURE DROP OR DIFFERENCE
PDI	PLUMBING AND DRAINAGE INSTITUTE
PG	PRESSURE GAUGE
PH	POWER OF HYDROGEN
PID	PROPORTIONAL-INTEGRAL-DIFFERENTIAL
PLC	PROGRAMMABLE LOGIC CONTROLLERS
PP	POLYPROPYLENE
PPB	PARTS PER BILLION
PPM	PARTS PER MILLION
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE IN ATMOSPHERE
PSIG	POUNDS PER SQUARE IN GAUGE
PTFE	POLYTETRAFLUOROETHYLENE
PVC	POLYVINYL CHLORIDE
PVDF	POLYVINYLIDENE FLUORIDE
PW	POTABLE WATER
RAD	RADIANS
RD	ROOF DRAIN
RO	REVERSE OSMOSIS
RPM	REVOLUTIONS PER MINUTE
RTD	RESISTANCE TEMPERATURE DETECTORS
RTRP	REINFORCED THERMOSETTING RESIN PIPE
SAN	SANITARY
SCFM	STANDARD CUBIC FEET PER MINUTE
SDI	SILT DENSITY INDEX
SDMH	STORM DRAINAGE MANHOLE
SF	SQUARE FEET
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
SPEC	SPECIFICATION
SPS	STERILE PROCESSING SERVICES
SQFT	SQUARE FEET
SS	STAINLESS STEEL
STD	STANDARD
SUS	SAYBOLT UNIVERSAL SECOND
SW	STORM WATER
SWP	STEAM WORKING PRESSURE
TCV	TEMPERATURE CONTROL VALVE
TD	TRENCH DRAIN
TDH	TOTAL DYNAMIC HEAD
TEFC	TOTALLY ENCLOSED FAN-COOLED
TEMP	TEMPERATURE
TFE	TETRAFLUOROETHYLENE
THERM	100,000 BTU
THIN	THERMOPLASTIC HIGH-HEAT RESISTANT NYLON COATED WIRE
THWN	THERMOPLASTIC HEAT & WATER RESISTANT NYLON COATED WIRE
TMV	THERMOSTATIC MIXING VALVE
T/P	TEMPERATURE AND PRESSURE
TP	TRAP PRIMER
TSTAT	THERMOSTAT
TYP	TYPICAL
USDA	U.S. DEPARTMENT OF AGRICULTURE
V	VOLT
VA	VETERANS ADMINISTRATION
VA CFM	VA CONSTRUCTION & FACILITIES MANAGEMENT
VA CFM CSS	VA CFM CONSULTING SUPPORT SERVICE
VAC	VACUUM
VAC	VOLTAGE IN ALTERNATING CURRENT
VAMC	VETERANS ADMINISTRATION MEDICAL CENTER
VA TIL	WWW.CFM.VA.GOV/TIL/INDEX.ASP
VHA	VETERANS HEALTH ADMINISTRATION
VSD	VARIABLE SPEED DRIVE
VTR	VENT THROUGH ROOF
W	WASTE
WAGD	WASTE ANESTHESIA GAS DISPOSAL
WC	WATER CLOSET
WCO	WALL CLEANOUT
WG	WATER GAUGE
WH	WALL HYDRANT
WOG	WATER, OIL, GAS
WPD	WATER PRESSURE DROP
WS	WASTE STACK
WSFU	WATER SUPPLY FIXTURE UNITS
YCO	YARD CLEANOUT
YH	YARD HYDRANT

PLUMBING SYMBOLS

- DIRECTION OF PIPE PITCH (DOWN)
- DIRECTION OF FLOW
- ANCHOR
- REDUCER OR INCREASER
- ECCENTRIC REDUCER
- TOP CONNECTION, 45° OR 90°
- BOTTOM CONNECTION, 45° OR 90°
- SIDE CONNECTION
- CAPPED OUTLET
- RISE OR DROP IN PIPE
- UNION
- PIPE UP
- PIPE DOWN
- PIPE CONTINUES
- POINT OF CONNECTION BETWEEN NEW AND EXISTING WORK
- LIMIT OF DEMOLITION
- FLOOR DRAIN
- FLOOR SINK
- ROOF DRAIN
- STRAINER
- THERMOMETER
- PRESSURE GAUGE
- WALL CLEANOUT
- CO FLOOR OR GRADE CLEANOUT
- HOSE BIBB

DRAWING SYMBOLS

CALLOUT (ENLARGED VIEW)
- DETAIL NUMBER
- DRAWING NUMBER WHERE DRAWN

SECTION
- SECTION LETTER
- DRAWING NUMBER WHERE SHOWN

EQUIPMENT TAG
- BUILDING NO. WHERE EQUIPMENT IS LOCATED
- EQUIPMENT ABBREVIATION (PUMP)
- PUMP NO. 3 IN BUILDING NO. 28

- TYPICAL UNIT NO.

EQUIPMENT TAG
- BUILDING NO. WHERE EQUIPMENT IS LOCATED
- ITEM (TERMINAL UNIT SHOWN)
- SERVED BY AIR HANDLER UNIT NO. 1
- ITEM NUMBER (TERMINAL UNIT NO. 1)

PLUMBING PIPING SYMBOLS

- DOMESTIC COLD WATER, COLD WATER
- DOMESTIC HOT WATER, HOT WATER
- DOMESTIC HOT WATER RETURN, HOT WATER RETURN
- -MA- MEDICAL AIR
- -MV- MEDICAL VACUUM
- -LA- LABORATORY AIR
- -LV- LABORATORY VACUUM
- -OA- ORAL EVACUATION
- -IA- INDUSTRIAL AIR
- -D- DRAIN
- VENT (SANITARY)
- -SS- SOIL, WASTE, OR SANITARY SEWER
- -SAN- SANITARY SEWER, BELOW GRADE
- -SD- STORM WATER
- -SD- STORM WATER, BELOW GRADE
- -SCW- SOFTENED COLD WATER
- -FCW- FILTERED COLD WATER
- -DWS- DRINKING WATER SUPPLY
- -DWR- DRINKING WATER RETURN
- -TWS- TEMPERED WATER SUPPLY
- -TWR- TEMPERED WATER RETURN
- -N2O- NITROUS OXIDE
- -O- OXYGEN
- -N- NITROGEN
- -NG- NATURAL GAS
- -NG- NATURAL GAS, BELOW GRADE
- -FOD- FUEL OIL DISCHARGE
- -FOS- FUEL OIL SUPPLY
- -FOV- FUEL OIL VENT
- -FOR- FUEL OIL RETURN

PLUMBING VALVE SYMBOLS

- GATE VALVE
- GLOBE VALVE
- GATE VALVE WITH 3/4" HOSE ADAPTER
- CHECK VALVE
- ANGLE GLOBE VALVE
- BUTTERFLY VALVE
- BALL VALVE
- MODULATING CONTROL VALVE
- TWO-POSITION CONTROL VALVE
- THREE-WAY MODULATING CONTROL VALVE
- THREE-WAY TWO-POSITION CONTROL VALVE
- PRESSURE REGULATING VALVE
- AUTOMATIC BALANCING CONTROL VALVE
- PRESSURE SAFETY VALVE
- MANUAL AIR VENT
- TEST PLUG (PRESSURE/TEMPERATURE)
- AV AUTOMATIC AIR VENT

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VA U.S. Department of Veterans Affairs

Drawing Title: SYMBOLS & LEGENDS

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025 | Checked: LRL | Drawn: DMB

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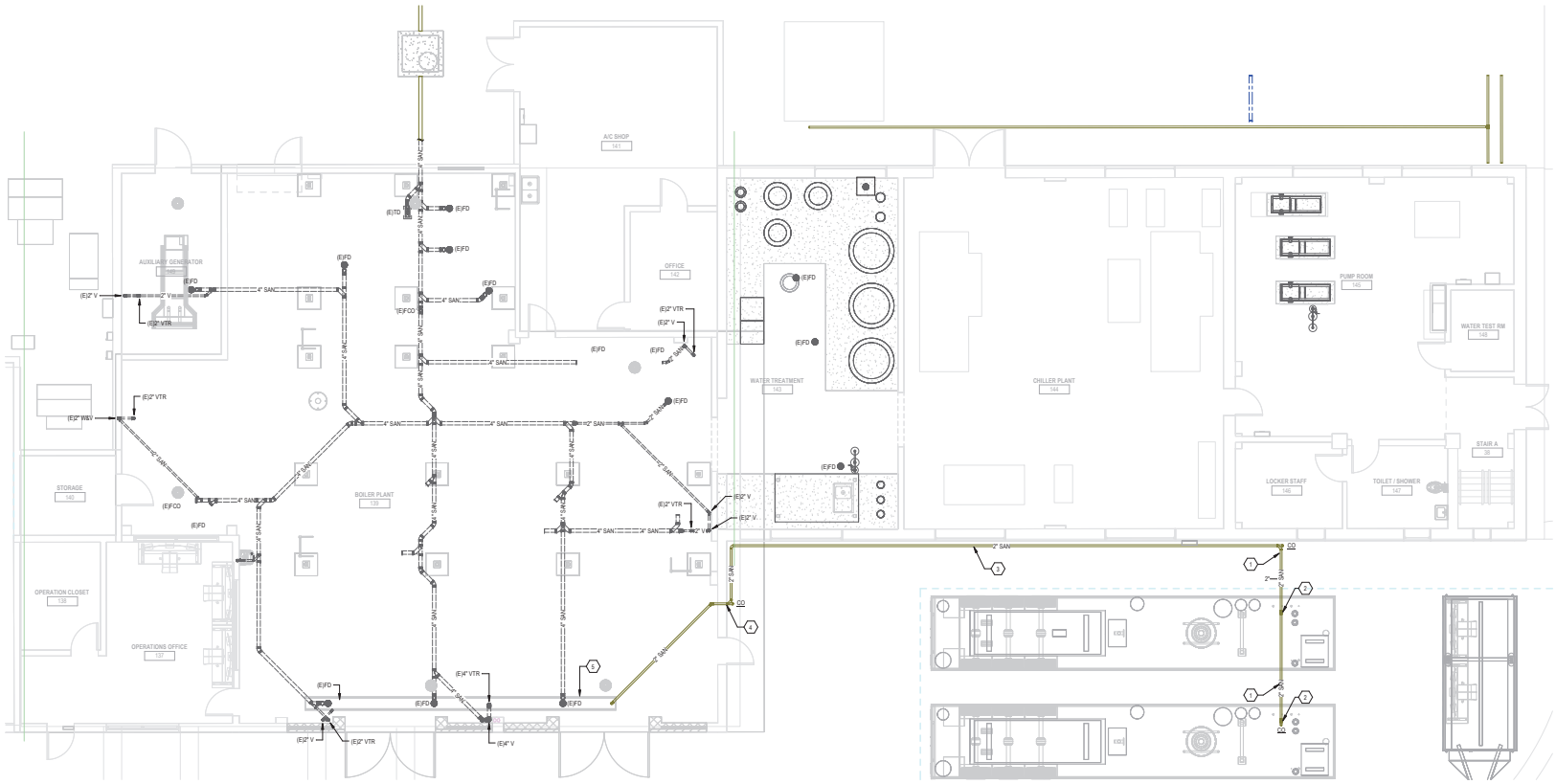


1 PLUMBING TEMPORARY PLAN - WASTE & VENT

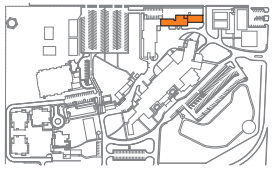
SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) W, V PIPE ROUTING, INVERT ELEVATIONS.

KEY NOTES

NO.	DESCRIPTION
1	ROUTE NEW TEMP D BELOW TEMP BOILER PLANT TRAILER DECK AS INDICATED. COORD ROUTING WITH OTHER DISTRIBUTION SYSTEMS IN THIS AREA. FIELD VERIFY.
2	1" D UP. FIELD VERIFY PENETRATION LOCATION, PIPE ROUTING.
3	ROUTE TEMP D ADJACENT TO EXTERIOR WALL AS INDICATED. PROVIDE GROUND MOUNTED PIPE SUPPORT AS REQUIRED. FIELD VERIFY ROUTING.
4	ROUTE D PIPE THRU EXTERIOR WALL AS INDICATED. COORD PENETRATION LOCATION. FIELD VERIFY. OFFSET ON AND ROUTE TO (E) TRENCH DRAIN AS INDICATED. PROVIDE INDIRECT CONNECTION THRU BELOW TRENCH DRAIN COVER.
5	(E) TRENCH DRAIN TO REMAIN.



KEY PLAN

PLAN TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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PROFESSIONAL ENGINEER

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL PLUMBING TEMPORARY FLOOR PLAN - WASTE & VENT	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BOILER PLANT	Drawing Number: PT101
		Issue Date: 10/07/2025 · Checked: LRL · Drawn: DMB	

VA FORM 08 - 6231

Autodesk Docs://0489001/0131 VBS Boiler Replacement/0489001 0131R_BG R23.rvt

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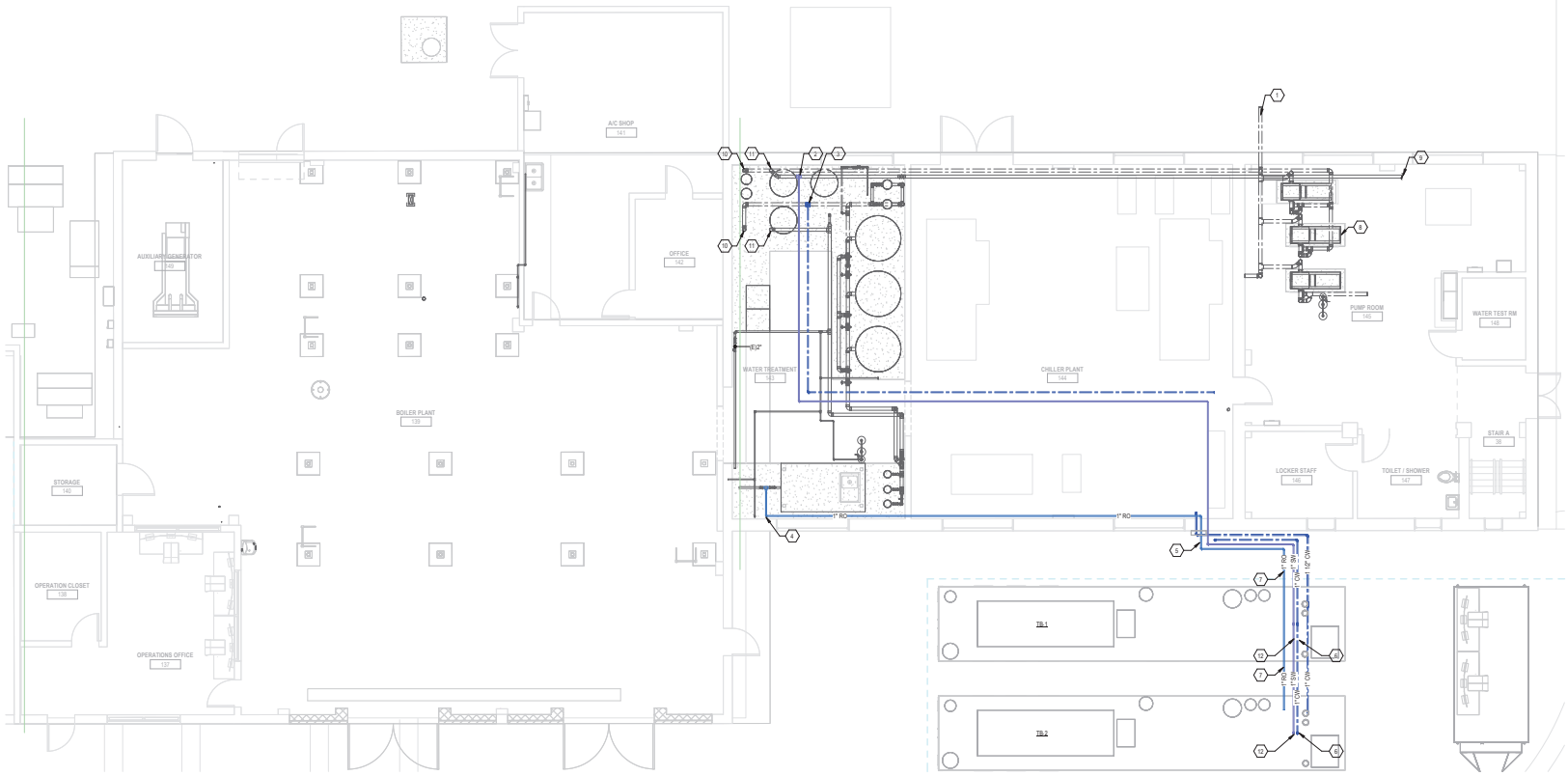


1 PLUMBING TEMPORARY PLAN - WATER

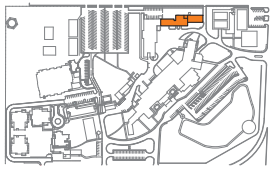
SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
4. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
5. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
6. RE: SHEET PT112 FOR PIPES UP.

KEY NOTES

NO.	DESCRIPTION
1	(E) CW SERVICE ENTRANCE TO REMAIN. FIELD VERIFY.
2	CONNECT TO (E) SW MAIN. ROUTE TO TEMP BOILER PLANT AS INDICATED. FIELD VERIFY ROUTING.
3	CONNECT TO (E) DCW MAIN. ROUTE TO TEMP BOILER PLANT AS INDICATED.
4	CONNECT TO (E) RO TANK DISCHARGE. ROUTE GRAVITY FED TO TEMP BOILER PLANT. COORDINATE TERMINATION LOCATION, PIPE INVERT ELEVATIONS PRIOR TO INSTALLING PIPE. FIELD VERIFY.
5	ROUTE SW, DCW PIPE ADJACENT TO EXTERIOR WALL AS INDICATED. OFFSET ON TO ROUTE UNDER TRAILER DECK TO PIPE TRAILER DECK PIPE PENETRATIONS.
6	ROUTE SW, DCW UP TO TEMP BOILER PLANT. PROVIDE RE: SHEET MT SERIES SHEETS FOR EQUIPMENT PLAN.
7	ROUTE RO THRU TRAILER SIDEWALL TO TEMP BOILER PLANT. CONFIRM PENETRATION LOCATION WITH TEMP BOILER PLANT SUPPLIER PRIOR TO INSTALLING PIPE.
8	(E) DOMESTIC WATER BOOSTER PUMPS TO REMAIN, TYP.
9	(E) SW TO HOSPITAL TO REMAIN.
10	(E) DCW MAIN UP TO BACKFLOW PREVENTER ASSEMBLY. FIELD VERIFY.
11	(E) SW BRANCH MAIN UP TO BACKFLOW PREVENTER ASSEMBLY. FIELD VERIFY.
12	PROVIDE SW, RO, DCW MAKE-UP WATER VALVE TRAINS HEADERED TO TEMP BOILER PLANT MAKE-UP WATER CONNECTION. COORDINATE WITH TEMP BOILER PLANT SUPPLIER. FIELD VERIFY LOCATION. RE: SHEET M605.



KEY PLAN

PLAN TRUE

SCALE: 3/16" = 1'-0"

Revisions:	Date:
100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024

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VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL PLUMBING TEMPORARY FLOOR PLAN - WATER

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: PT111

VA FORM 08 - 6231

Autodesk Docs://0489001/0131 VABS Boiler Replacement/0489001.0131R_BG R23.rvt

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KEY NOTES	
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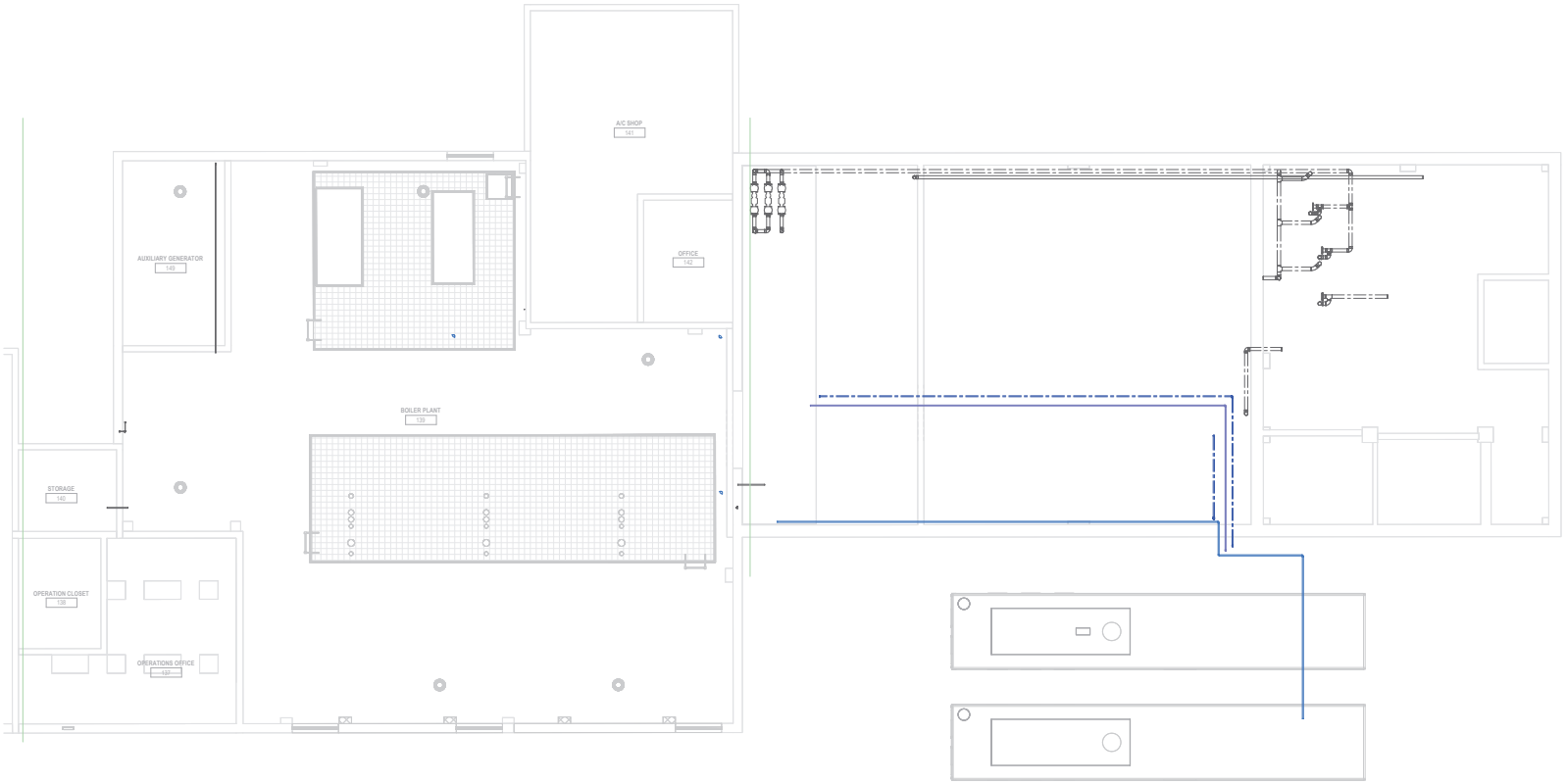
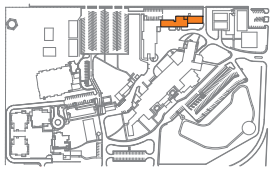


1 OVERALL PLUMBING TEMPORARY MEZZANINE PLAN - WATER
SCALE: 3/16" = 1'-0"



KEY PLAN

PLAN
TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL PLUMBING TEMPORARY MEZZANINE PLAN - WATER

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: PT112

VA FORM 08 - 6231

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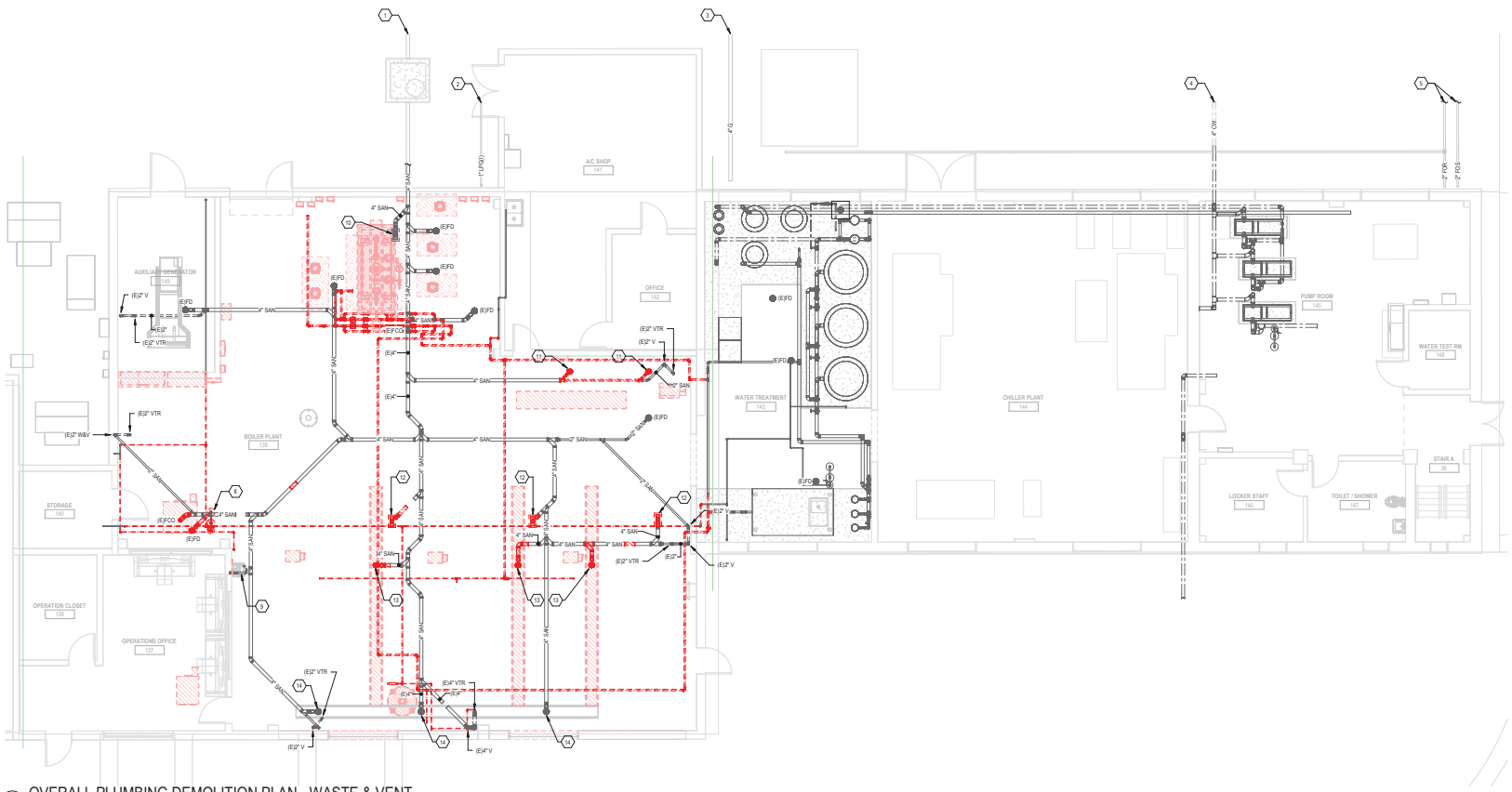


1 OVERALL PLUMBING DEMOLITION PLAN - WASTE & VENT

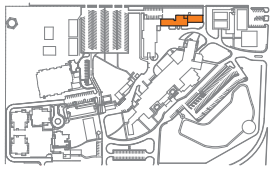
SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
4. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
5. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
6. RE: SHEET PT102 FOR PIPES UP.
7. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
8. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) W TO REMAIN. FIELD VERIFY LOCATION, IE.
2	(E) LPG SERVICE ENTRANCE TO REMAIN. LPG BOTTLE ASSEMBLY AND ASSOCIATED PIPING ON EXTERIOR WALL. FIELD COORDINATE.
3	(E) NATURAL GAS MAIN SERVICE ENTRANCE TO REMAIN.
4	(E) DCW SERVICE ENTRANCE TO REMAIN.
5	(E) FOG / FOR PIPING TO (E) FUEL STORAGE TANKS TO REMAIN.
8	REPLACE (E) SHOWER / EYE WASH STATION. DISCONNECT PIPING AND REMOVE.
9	(E) WATER COOLER TO REMAIN. PROTECT FROM DUST/DAMAGE DURING CONSTRUCTION.
10	(E) ELEVATED TRENCH DRAIN. DISCONNECT AND REMOVE FIXTURE. DRAIN PIPE TO REMAIN FOR NEW CONSTRUCTION.
11	REMOVE (E) FLOOR DRAINS SET IN TRENCH. RECONNECT PER NEW CONSTRUCTION DRAWINGS.
12	(E) ELEVATED TRENCH DRAIN. DISCONNECT AND REMOVE AS INDICATED.
13	REMOVE (E) FLOOR DRAINS SET IN TRENCH AS INDICATED.
14	(E) FD SET IN TRENCH TO REMAIN.



KEY PLAN

PLAN TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL PLUMBING DEMOLITION FLOOR PLAN - WASTE & VENT

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: PD101

VA FORM 08 - 6231

Autodesk Docs://0489001/0131 VBS Boiler Replacement/0489001013 PLBG R23.rvt

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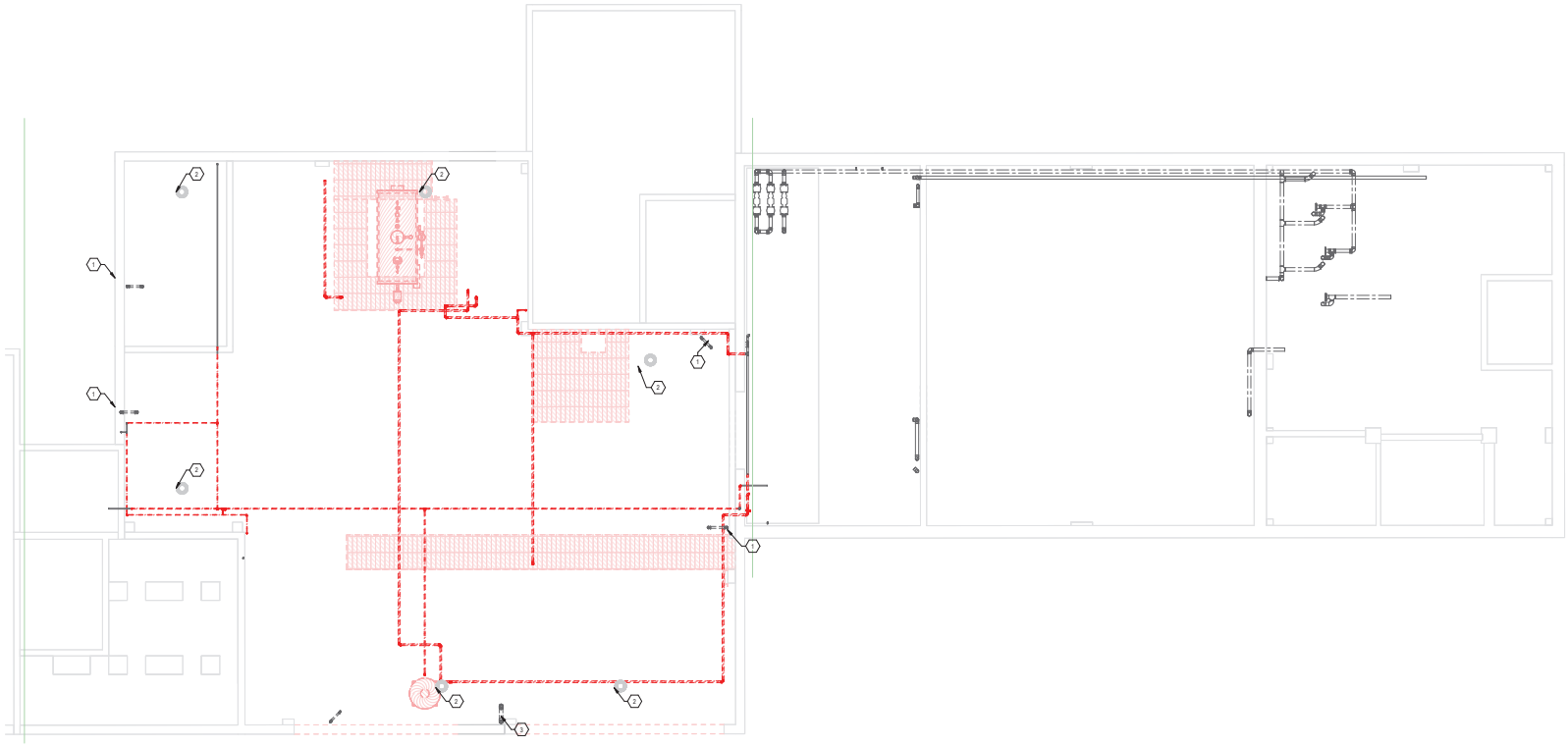


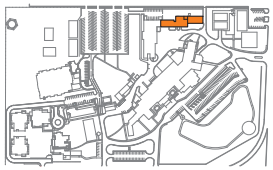
1 OVERALL PLUMBING DEMOLITION MEZZANINE PLAN - WASTE & VENT
SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
4. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
5. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
6. RE: SHEET PD103 FOR PIPES DN.
7. RE: SHEET PD103 FOR PIPES UP.
8. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
9. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) 2" V TO (E) VTR TO REMAIN. FIELD VERIFY LOCATION.
2	(E) STORM LEADER UP TO ROOF DRAIN. FIELD VERIFY HORIZ PIPE ROUTING TO PIPE ROUTING DN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION.
3	(E) 4 V TO (E) VTR TO REMAIN. FIELD VERIFY LOCATION.



KEY PLAN

PLAN
TRUE
SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL PLUMBING DEMOLITION MEZZANINE PLAN - WASTE & VENT

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: PD102

VA FORM 08 - 6231

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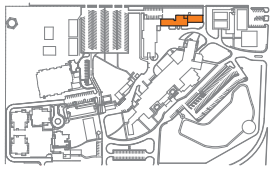
GENERAL NOTES

1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
4. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
5. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
6. RE: SHEET PD102 FOR PIPES DN.
7. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
8. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) 2" VTR TO REMAIN. FIELD VERIFY LOCATION.
2	(E) ROOF DRAIN TO REMAIN. FIELD VERIFY HORIZ PIPE ROUTING TO PIPE ROUTING DN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION.
3	(E) 4" VTR TO REMAIN. FIELD VERIFY LOCATION.
4	(E) ROOF HATCH TO REMAIN.
5	(E) BOILER PLANT MECHANICAL EQUIPMENT PRESSURE RELIEF PIPE. RE: MECHANICAL SHEETS FOR DEMO SCOPE OF WORK.
6	(E) ROOF MOUNTED HVAC EQUIPMENT. RE: MECHANICAL SHEETS FOR DEMO SCOPE OF WORK.
7	(E) BOILER FLUE VENT. RE: MECHANICAL SHEETS FOR DEMO SCOPE OF WORK.

1 PARTIAL PLUMBING ROOF PLAN
SCALE: 1/4" = 1'-0"



KEY PLAN

PLAN
TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PARTIAL PLUMBING DEMOLITION ROOF PLAN	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BOILER PLANT	Drawing Number: PD103A
		Issue Date: 10/07/2025 · Checked: LRL · Drawn: DMB	

VA FORM 08 - 6231

Autodesk Docs://048900/1013 VBES Boiler Replacement/048900 1013 PLBG R23.rvt

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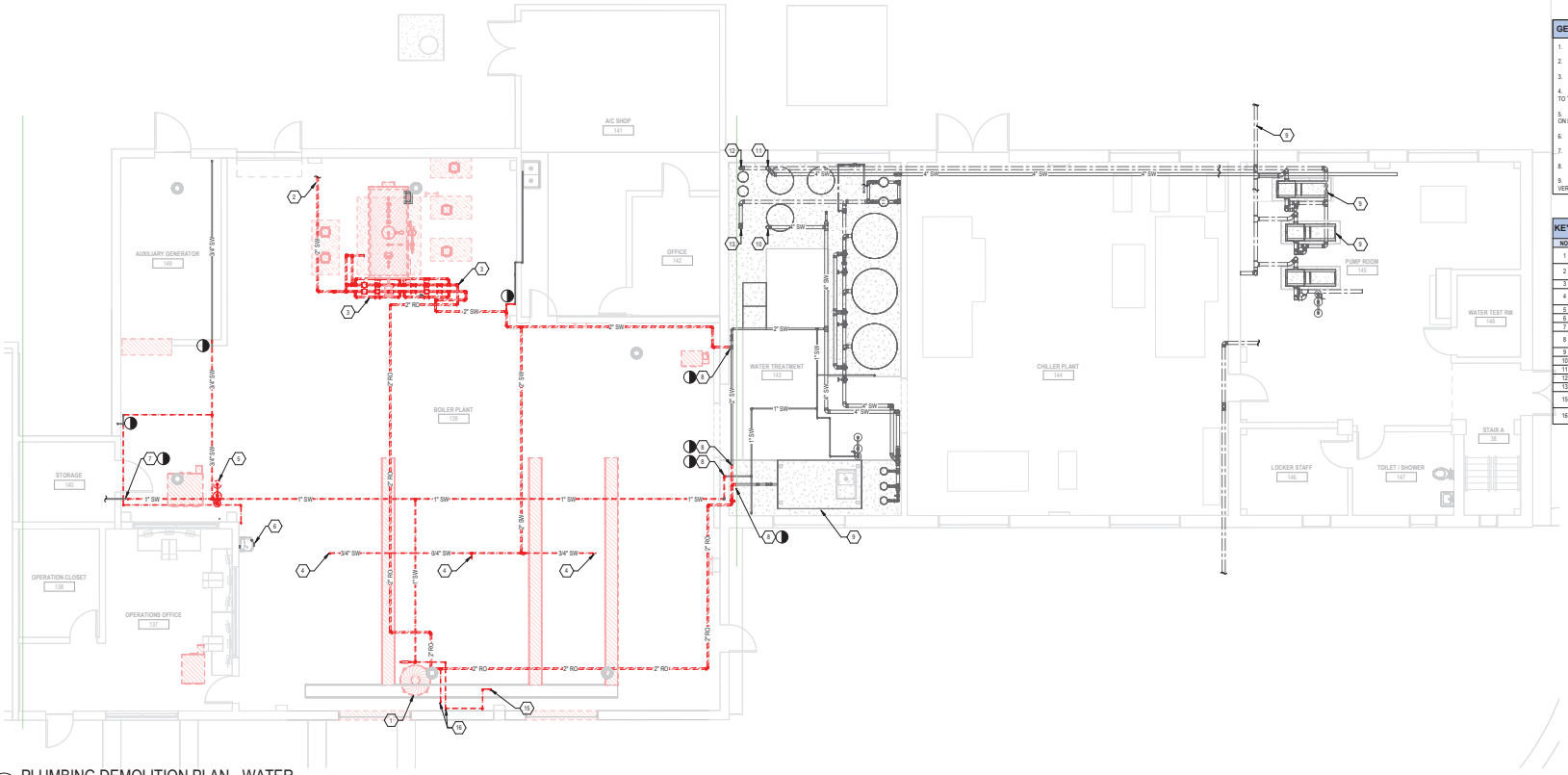


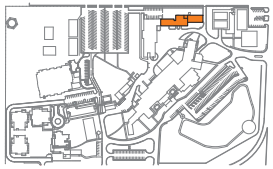
1 PLUMBING DEMOLITION PLAN - WATER
SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
4. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
5. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
6. RE: SHEET PD112 FOR PIPES UP.
7. NOT USED
8. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
9. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) BLOWDOWN TANK. DISCONNECT AND REMOVE (E) BACKFLOW PREVENTER, DCW, SW, RO, DRAIN PIPING BACK TO POINTS OF DISCONNECTION AT BRANCH MAINS AS INDICATED. FIELD VERIFY.
2	(E) 2" SW TO (E) CONDENSATE TANK. DISCONNECT AND REMOVE BACK TO POINT OF DISCONNECTION AS INDICATED.
3	REMOVE (E) 2" SW, 2" RO AND ASSOCIATED VALVE TRAINS FROM CONDENSATE TANK AS INDICATED.
4	(E) SW DN TO (E) HOSE BIBB. DISCONNECT PIPING BACK TO POINTS OF DISCONNECTION AND REMOVE AS INDICATED.
5	(E) SHOWER / EYEWASH STATION. DISCONNECT PIPING AND REMOVE AS INDICATED.
6	(E) WATER COOLER TO REMAIN. PROTECT FROM DUST/DAMAGE DURING CONSTRUCTION.
7	(E) SW. DISCONNECT PIPE AND CAP FOR FUTURE CONNECTION.
8	POINT OF DISCONNECTION. DISCONNECT (E) PIPE AS INDICATED. CAP PER NEW CONSTRUCTION DRAWINGS.
9	(E) DCW SERVICE ENTRANCE. (E) DCW BOOSTER PUMPS TO REMAIN.
10	(E) SW UP TO BFP TO REMAIN. FIELD VERIFY LOCATION.
11	(E) SW FROM BFP TO REMAIN. FIELD VERIFY LOCATION.
12	(E) DCW UP TO BFP TO REMAIN. FIELD VERIFY LOCATION.
13	(E) DCW FROM BFP TO REMAIN. FIELD VERIFY LOCATION.
15	(E) 1/2" SW DN TO (E) LAVATORY MOUNTED ON WATER TESTING RACK. DISCONNECT PIPING BACK TO POINTS OF DISCONNECTION AND REMOVE AS INDICATED.
16	(E) 1/2" RO AND (E) 1/2" CW DN TO WATER TESTING RACK. DISCONNECT PIPING TO POINTS OF DISCONNECTION AND REMOVE AS INDICATED



KEY PLAN

PLAN
TRUE
SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL PLUMBING DEMOLITION FLOOR PLAN - WATER

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025 | Checked: LRL | Drawn: DMB

Drawing Number: PD111

VA FORM 08 - 6231

Autodesk Docs://0489001/0131 VABS Boiler Replacement/0489001-0131R_BIS R23.rvt

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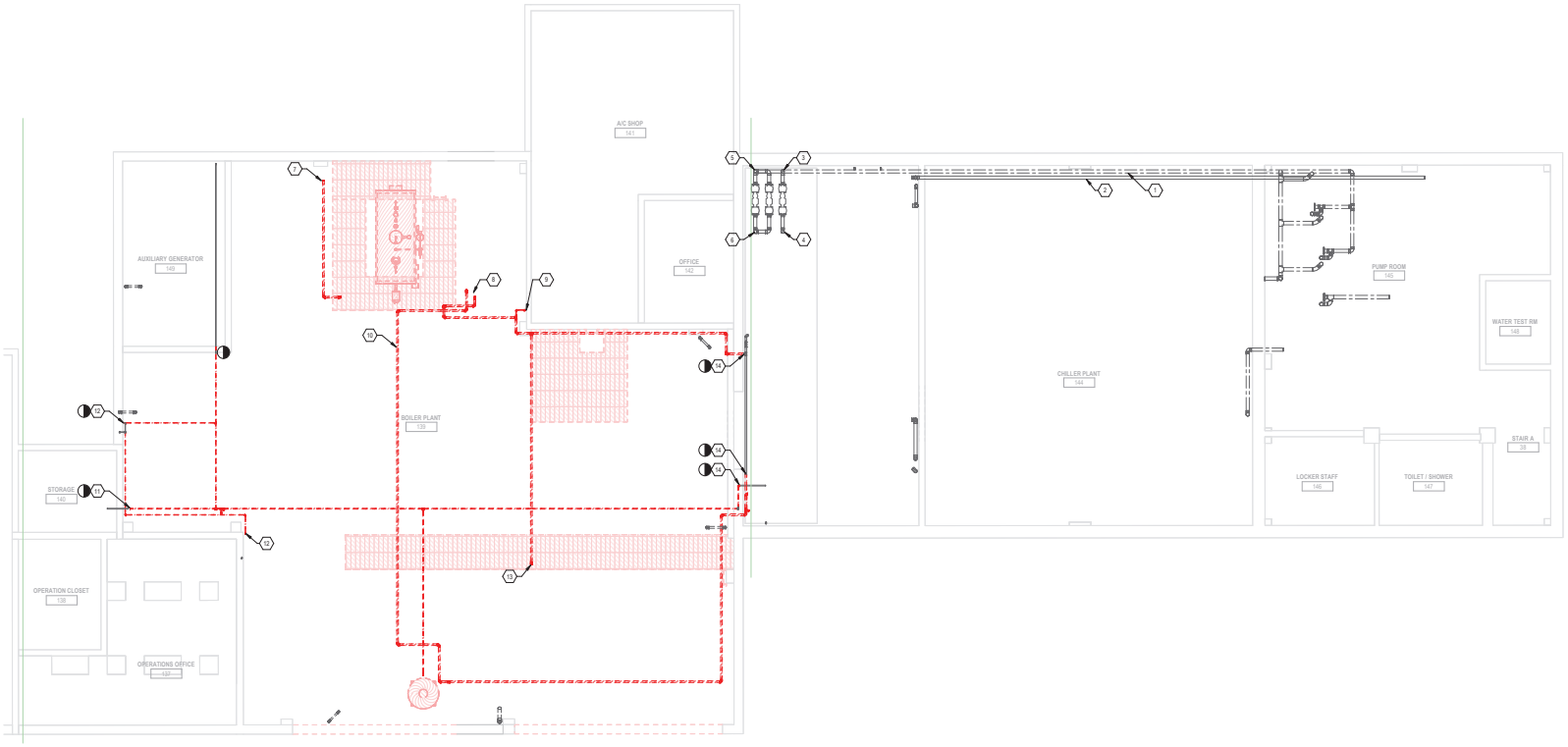


GENERAL NOTES

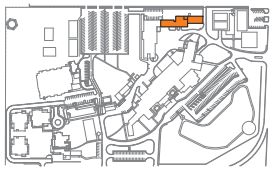
1. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
2. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
3. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
4. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
5. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
6. RE: SHEET PD111 FOR PIPES DN.
7. NOT USED
8. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
9. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) DOW MAIN TO REMAIN.
2	(E) SW MAIN TO REMAIN.
3	(E) SW UP TO BFP TO REMAIN. FIELD VERIFY LOCATION.
4	(E) SW FROM BFP TO REMAIN. FIELD VERIFY LOCATION.
5	(E) DOW UP TO BFP TO REMAIN. FIELD VERIFY LOCATION.
6	(E) DOW FROM BFP TO REMAIN. FIELD VERIFY LOCATION.
7	(E) SW DN. REMOVE BACK TO POINT OF DISCONNECTION AS INDICATED.
8	(E) RO, SW PIPE DN. REMOVE BACK TO POINT OF DISCONNECTION AS INDICATED.
9	(E) DOW DN. DISCONNECT AND REMOVE AS INDICATED.
10	(E) RO. REMOVE AS INDICATED.
11	(E) SW. DISCONNECT PIPE AND CAP FOR FUTURE CONNECTION.
12	(E) DOW, SW DN TO FIXTURE. DISCONNECT AND REMOVE AS INDICATED.
13	(E) SW DN. DISCONNECT AND REMOVE AS INDICATED. (E) SW DN. REMOVE BACK TO POINT OF DISCONNECTION AS INDICATED.
14	POINT OF DISCONNECTION. DISCONNECT (E) PIPE AS INDICATED. CAP PER NEW CONSTRUCTION DRAWINGS.

1 OVERALL PLUMBING DEMOLITION MEZZANINE PLAN - WATER

SCALE: 3/16" = 1'-0"



KEY PLAN

PLAN

TRUE

SCALE: 3/16" = 1'-0"

Revisions:	Date:
100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title	OVERALL PLUMBING DEMOLITION MEZZANINE PLAN - WATER
Phase	100% CONSTRUCTION DOCUMENTS
Project Title	A/E REPLACE BOILERS
Project Number	519-20-200
Building Number	2
APPROVING OFFICIAL	COR, Mr. JOSHUA JUNKIN
	FULLY SPRINKLERED
Location	BOILER PLANT
Issue Date	10/07/2025
Checked	LRL
Drawn	DMB
Drawing Number	PD112

VA FORM 08 - 6231

Autodesk Docs://0489001/0131 VBS Boiler Replacement/0489001 0131R_BIS R23.rvt

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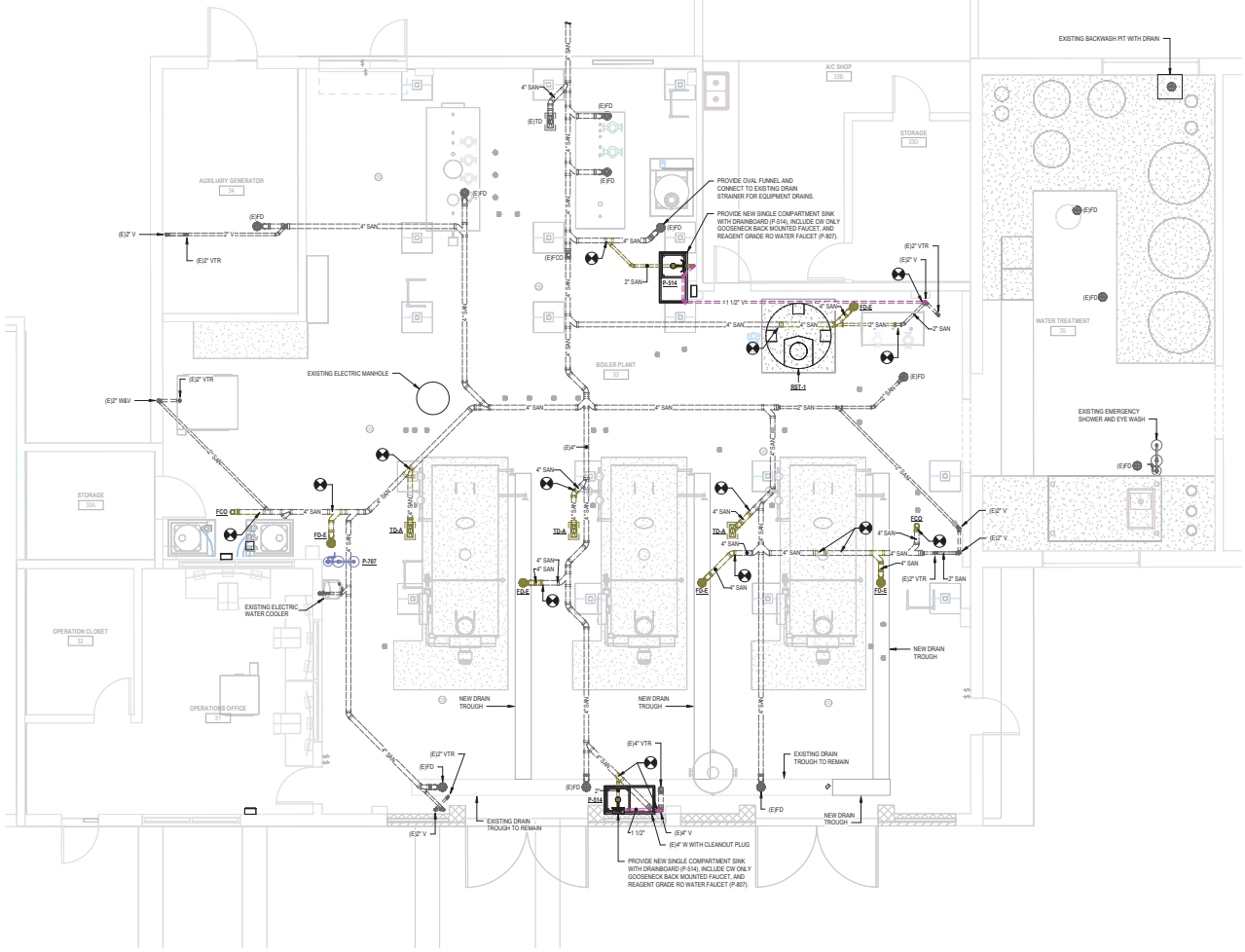
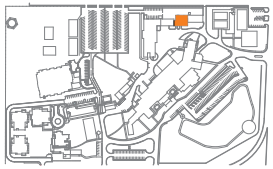
GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE, AND LOCAL CODES.
2. ALL WORK SHALL BE IN COMPLIANCE WITH VA DESIGN STANDARDS AND SPECIFICATIONS. REFERENCE ALL DIVISION 22 PLUMBING SPECIFICATIONS, AND DIVISION 23 MECHANICAL SECTION 230510, COMMON WORK RESULTS FOR BOILER PLANT AND STEAM GENERATION, AND SECTION 232111, BOILER PLANT PIPING SYSTEMS.
3. ALL EXISTING WATER SUPPLY AND WASTE & VENT SYSTEMS WILL BE DISCONNECTED FROM EXISTING MECHANICAL EQUIPMENT AND EXISTING MECHANICAL PIPING SYSTEMS AND WILL BE RECONNECTED TO NEW MECHANICAL EQUIPMENT AND NEW MECHANICAL PIPING SYSTEMS. EXISTING PLUMBING SYSTEMS WILL BE EXTENDED AND MODIFIED AS NEEDED.
4. EXISTING WATER SUPPLY AND WASTE & VENT SYSTEMS WILL BE EXTENDED AND CONNECTED TO TEMPORARY MECHANICAL EQUIPMENT AND PIPING AS NEEDED. LOCATIONS OF TEMPORARY EQUIPMENT AND PLUMBING CONNECTIONS TO BE COORDINATED IN FIELD.



1 PLUMBING PLAN - WASTE AND VENT
SCALE: 1/4" = 1'-0"



KEY PLAN

PLAN TRUE

SCALE: 1/4" = 1'-0"

Revisions:	Date:
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95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PARTIAL PLUMBING FLOOR PLAN - WASTE & VENT

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025 | Checked: LRL | Drawn: DMB

Drawing Number: PP101A

VA FORM 08 - 6231

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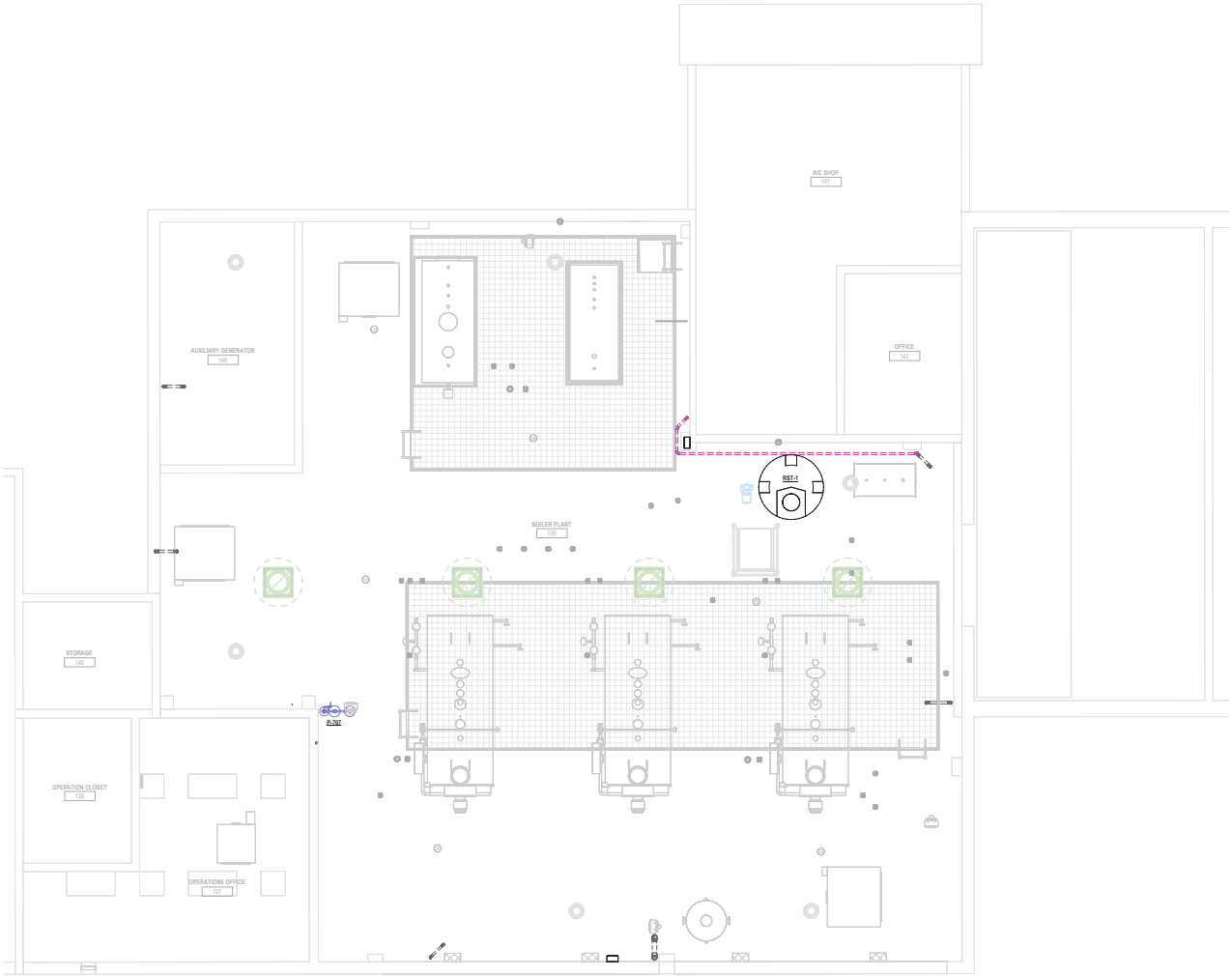
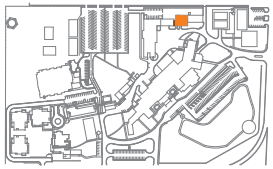
KEY NOTES	
NO.	DESCRIPTION



1 PLUMBING MEZZANINE PLAN - WASTE & VENT
SCALE: 1/4" = 1'-0"



KEY PLAN

PLAN
TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
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VA | U.S. Department of Veterans Affairs

Drawing Title: PARTIAL PLUMBING MEZZANINE PLAN - WASTE & VENT

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: PP102A

VA FORM 08 - 6231

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KEY NOTES	
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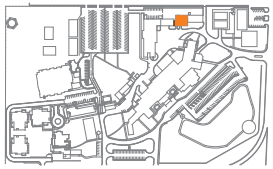
1 PARTIAL PLUMBING ROOF PLAN
SCALE: 1/4" = 1'-0"



KEY PLAN

PLAN
TRUE

SCALE: 1/4" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
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Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PARTIAL PLUMBING ROOF PLAN	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BOILER PLANT	Drawing Number: PP103A
		Issue Date: 10/07/2025 · Checked: LRL · Drawn: DMB	

VA FORM 08 - 6231

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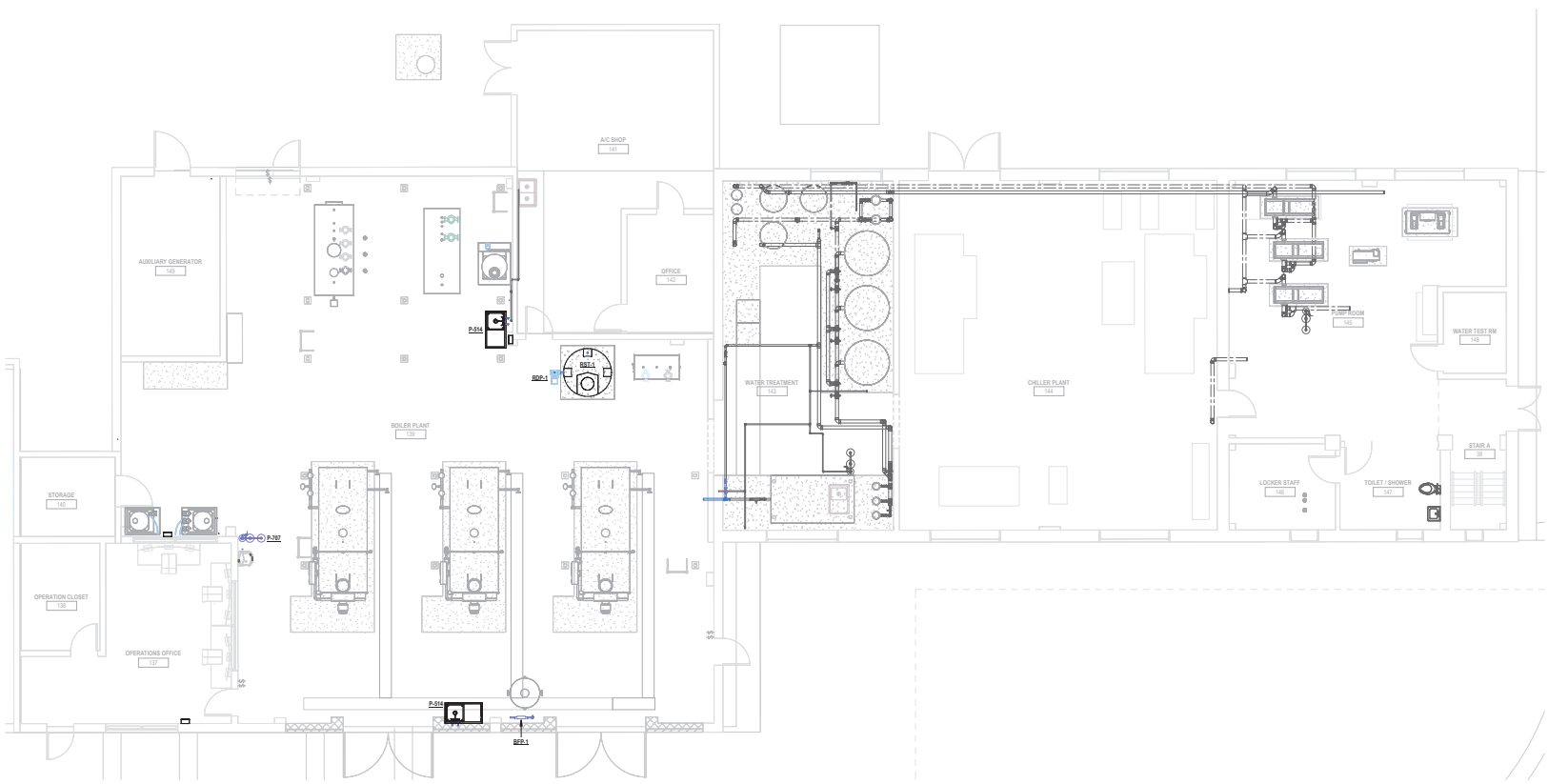
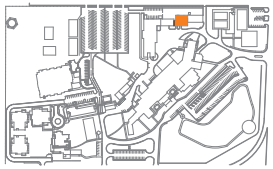


1 OVERALL PLUMBING FLOOR PLAN - WATER

SCALE: 3/16" = 1'-0"

KEY NOTES	
NO.	DESCRIPTION



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PLAN

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100% CONSTRUCTION DOCUMENTS	10/07/2025
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VA U.S. Department of Veterans Affairs

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Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: PP111

VA FORM 08 - 6231

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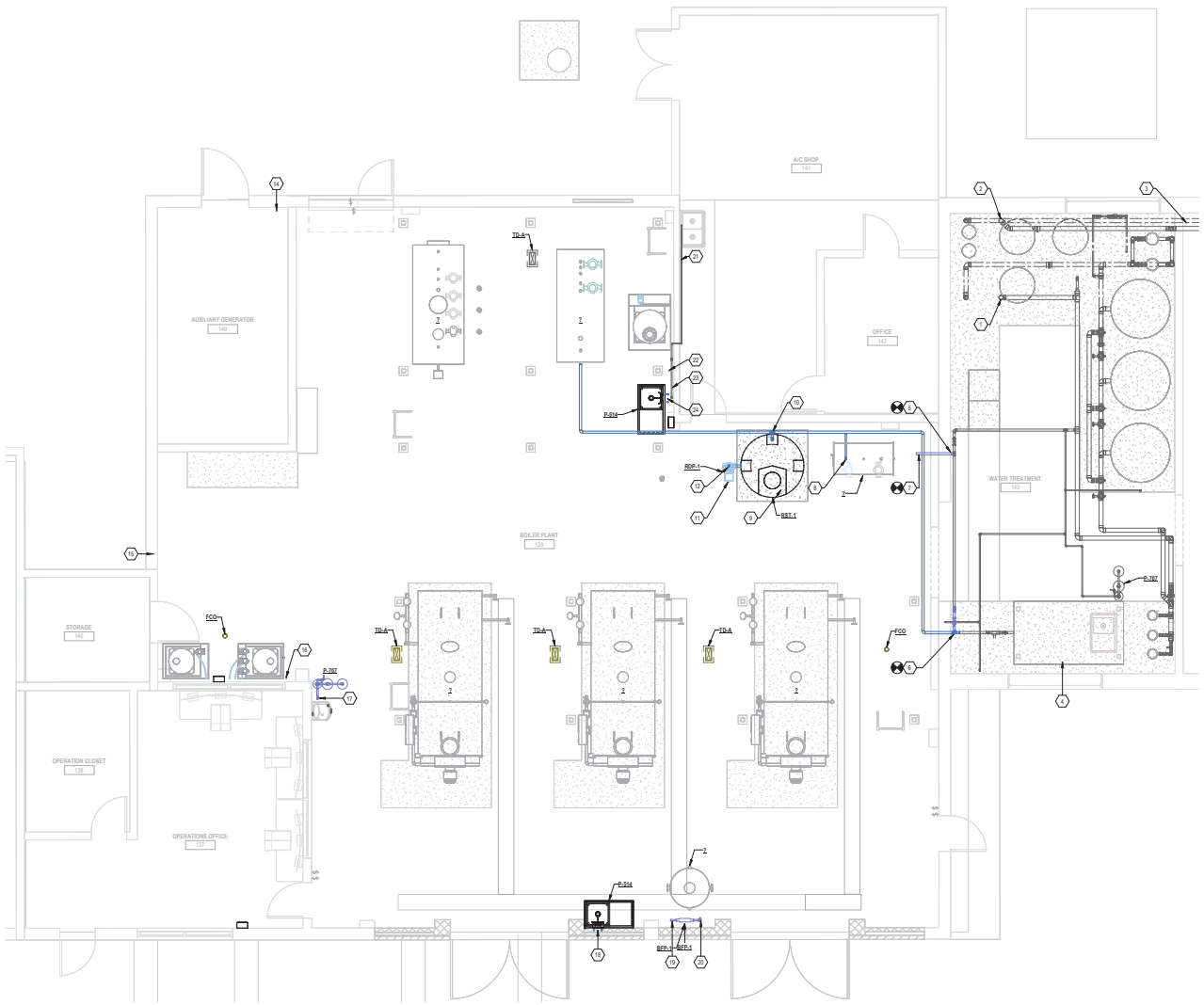

1 PARTIAL PLUMBING FLOOR PLAN - WATER
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE, AND LOCAL CODES.
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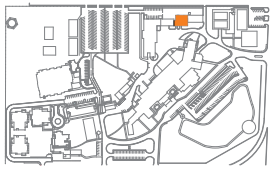
5. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
6. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
7. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
8. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
9. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
10. NOT USED.
11. RE: SHEET PP110A FOR PIPES UP.
12. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
13. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) 4" SW UP.
2	(E) 4" SW UP.
3	(E) SW, DCW MAINS TO HOSPITAL.
4	(E) RO TANK TO REMAIN. FIELD VERIFY RO TANK GRAVITY DISCHARGE SUPPLY PIPE I.E.
5	(E) 2" SW BRANCH MAIN. CONNECT NEW 2" SW AND ROUTE TO BOILER PLANT EQUIPMENT AS INDICATED.
6	CONNECT (E) 2" BRANCH MAIN TO 2" RO TANK DISCHARGE. PROVIDE ISOLATION SHUTOFF VALVE. ROUTE RO SUPPLY TO BOILER PLANT EQUIPMENT AS INDICATED. FIELD VERIFY PIPE ROUTING, CONNECTION LOCATION.
7	2" SW UP.
8	1" SW DN TO CDT-2. RE: MECH DRAWINGS.
9	RST-1. RO WATER STORAGE TANK. SET ON HOUSEKEEPING PAD AS INDICATED.
10	1" RO WATER SUPPLY TO TANK. PROVIDE TANK ISOLATION VALVE AT INLET.
11	RDP-1. RO WATER SUPPLY PUMP. CONNECT 2" RO WATER PIPE FROM TANK TO PUMP SUCTION, 2" RO PIPE TO PUMP DISCHARGE.
12	2" RO PIPE UP.
14	(E) 3/4" SW UP.
15	1/2" SW DN.
16	3/4" SW UP, DN TO FIXTURE.
17	1 1/4" DCW UP, DN TO FIXTURE.
18	1/2" RO, 1/2" SW UP, DN TO FIXTURE.
19	1 1/4" SW TO BT-1. RE: MECH DRAWINGS.
20	1 1/4" SW UP, DN TO BFP-1.
21	(E) SW TO (E) LAVATORY TO REMAIN.
22	3/4" SW UP, DN TO FIXTURE.
23	3/4" UP, OFFSET AND CONNECT TO (E) SW.
24	1/2" SW, 1/2" RO UP, DN TO FIXTURE.



KEY PLAN

PLAN
TRUE
SCALE: 1/4" = 1'-0"

Revisions:	Date:
100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024

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Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title	PARTIAL PLUMBING FLOOR PLAN - WATER
Phase	100% CONSTRUCTION DOCUMENTS
Project Title	A/E REPLACE BOILERS
Project Number	519-20-200
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APPROVING OFFICIAL	COR, Mr. JOSHUA JUNKIN
	FULLY SPRINKLERED
Location	BOILER PLANT
Issue Date	10/07/2025
Checked	LRL
Drawn	DMB
Drawing Number	PP111A

VA FORM 08 - 6231

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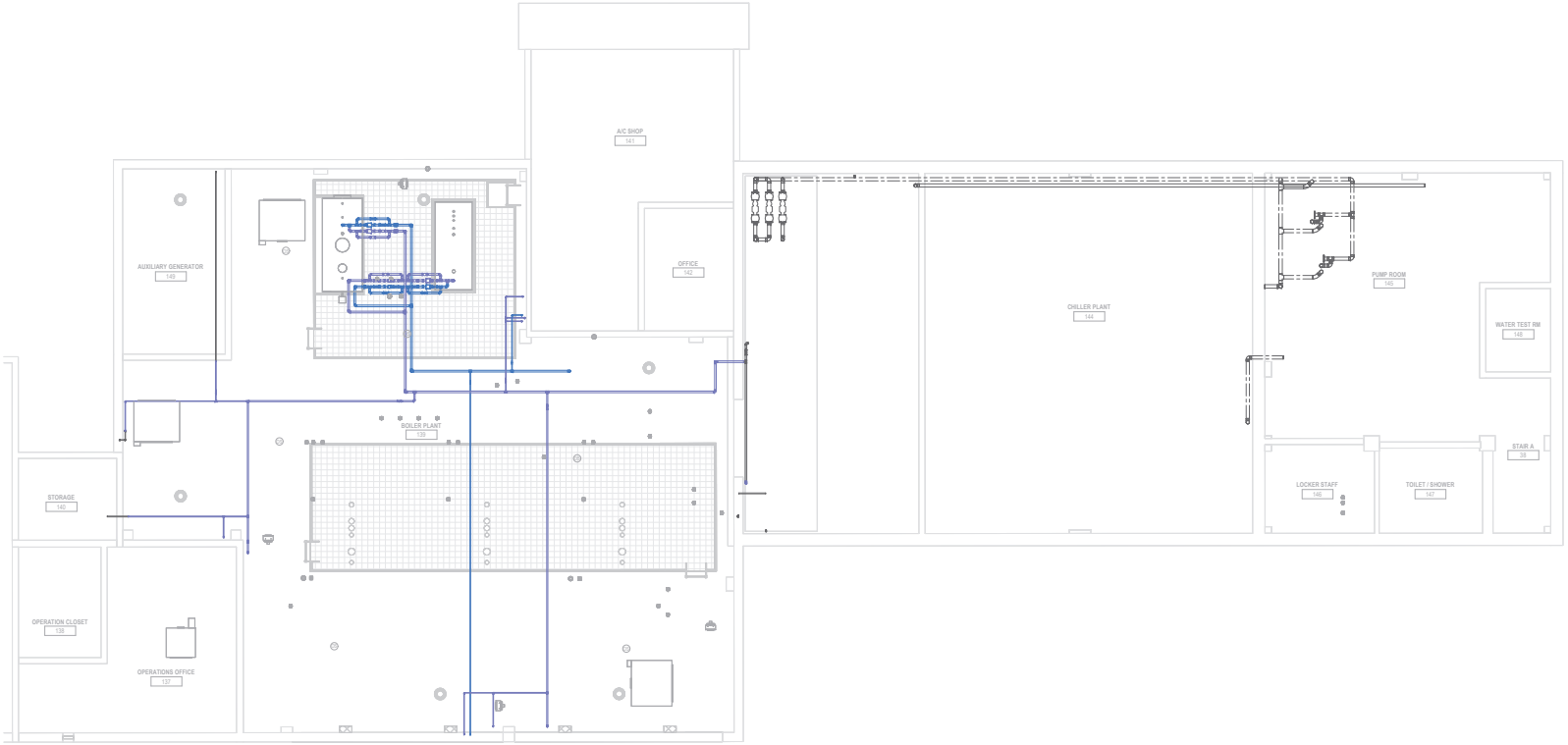
KEY NOTES	
NO.	DESCRIPTION



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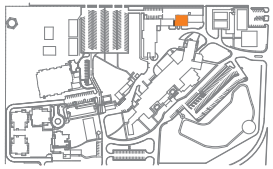
SCALE: 3/16" = 1'-0"



KEY PLAN

PLAN
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SCALE: 3/16" = 1'-0"

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65% DESIGN DEVELOPMENT	11/21/2024
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Office of Construction and Facilities Management

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Drawing Title: OVERALL PLUMBING MEZZANINE PLAN - WATER

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025 | Checked: LRL | Drawn: DMB

Drawing Number: PP112

VA FORM 08 - 6231

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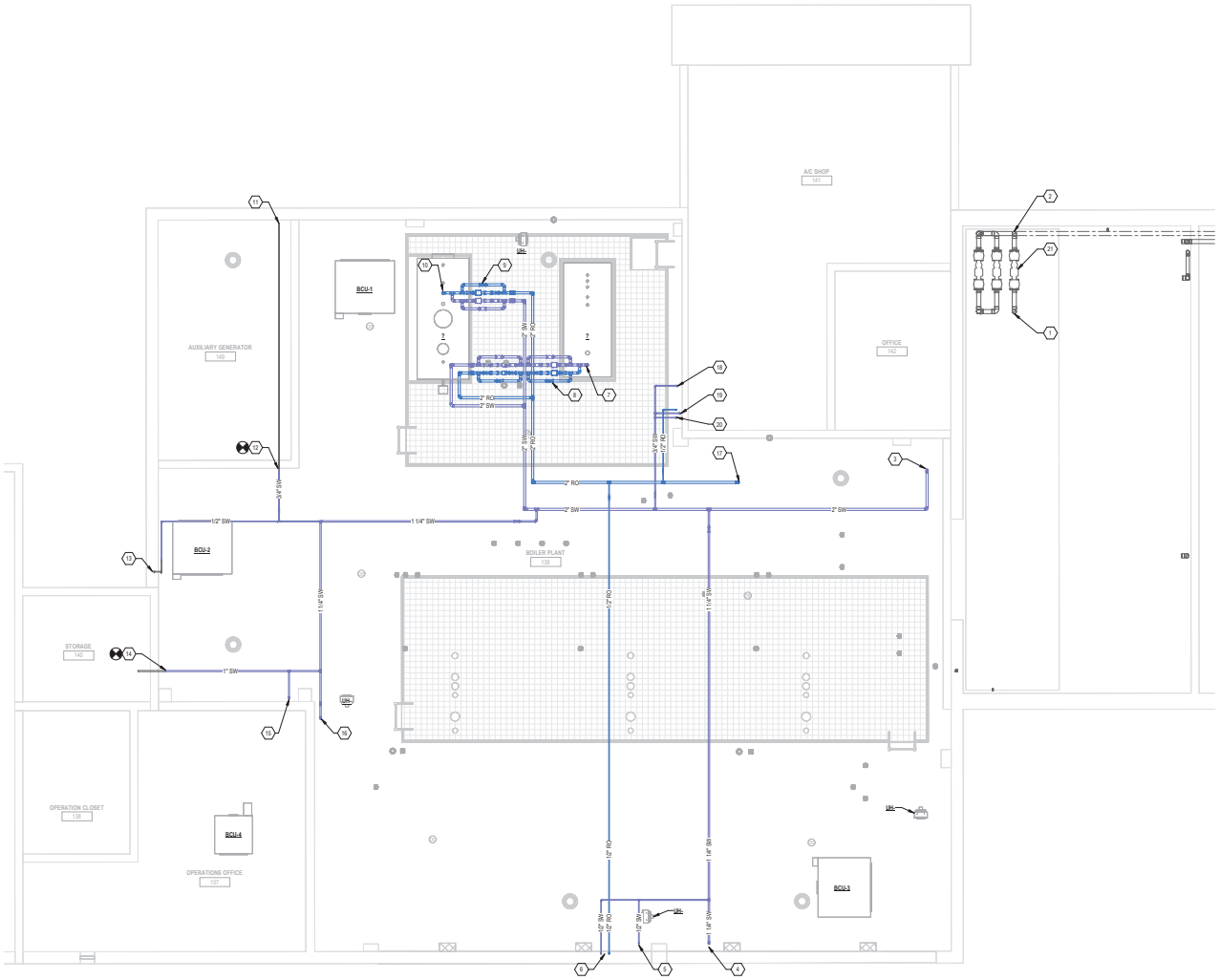

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SCALE: 1/4" = 1'-0"

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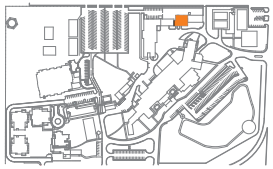
1. ALL WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE, AND LOCAL CODES.
2. ALL WORK SHALL BE IN COMPLIANCE WITH VA DESIGN STANDARDS AND SPECIFICATIONS. REFERENCE ALL DIVISION 22 PLUMBING SPECIFICATIONS, AND DIVISION 23 MECHANICAL SECTION 230510, COMMON WORK RESULTS FOR BOILER PLANT AND STEAM GENERATION, AND SECTION 232111, BOILER PLANT PIPING SYSTEMS.
3. ALL EXISTING WATER SUPPLY AND WASTE & VENT SYSTEMS WILL BE DISCONNECTED FROM EXISTING MECHANICAL EQUIPMENT AND EXISTING MECHANICAL PIPING SYSTEMS AND WILL BE RECONNECTED TO NEW MECHANICAL EQUIPMENT AND NEW MECHANICAL PIPING SYSTEMS. EXISTING PLUMBING SYSTEMS WILL BE EXTENDED AND MODIFIED AS NEEDED.
4. EXISTING WATER SUPPLY AND WASTE & VENT SYSTEMS WILL BE EXTENDED AND CONNECTED TO TEMPORARY MECHANICAL EQUIPMENT AND PIPING AS NEEDED. LOCATIONS OF TEMPORARY EQUIPMENT AND PLUMBING CONNECTIONS TO BE COORDINATED IN FIELD.
5. RE: MP SHEETS FOR NG, FOS/FOR, LPG SCOPES OF WORK.
6. RE: MT SHEETS FOR TEMPORARY BOILER PLANT PIPING CONNECTIONS.
7. FIELD VERIFY (E) SW, RO, CW PIPE PENETRATIONS, ROUTING, TERMINATIONS.
8. PROVIDE TEMP CONNECTIONS TO (E) SW, RO, CW PIPE SYSTEMS. FIELD VERIFY LOCATIONS. ROUTE TO TEMP BOILER PLANT.
9. PROVIDE INSULATION, PIPE JACKET, AND FREEZE PROTECTION FOR DOMESTIC WATER PIPE ROUTED ON EXTERIOR. FIELD COORDINATE.
10. NOT USED.
11. RE: SHEET PP11A FOR PIPES DN.
12. RE: MP SHEETS FOR EQUIPMENT DEMO SCOPES OF WORK.
13. (E) STORM DRAIN PIPING TO REMAIN. OFFSET AS REQUIRED FOR NEW CONSTRUCTION. FIELD VERIFY.

KEY NOTES

NO.	DESCRIPTION
1	(E) 4" SW DN.
2	(E) 4" SW DN.
3	2" SW DN.
4	1 1/4" SW DN.
5	1/2" SW DN.
6	1/2" SW, 1/2" RO DN.
7	1" MAKE-UP WATER DN TO CST-1. RE: MECH DRAWINGS.
8	PROVIDE NEW RO, SW MAKE-UP WATER VALVE ASSEMBLY. CONNECT TO CST-1 AS INDICATED.
9	PROVIDE NEW RO, SW MAKE-UP WATER VALVE ASSEMBLY. CONNECT TO DAT-1 AS INDICATED.
10	1" MAKE-UP WATER DN.
11	(E) 3/4" SW DN.
12	CONNECT NEW 3/4" SW TO (E) 3/4" AS INDICATED. FIELD VERIFY POINT OF CONNECTION.
13	1/2" SW DN.
14	CONNECT NEW 1" SW TO (E) 1" AS INDICATED. FIELD VERIFY POINT OF CONNECTION.
15	3/4" SW DN.
16	1 1/4" SW DN.
17	2" PUMPED RO DN.
18	3/4" SW DN.
19	3/4" SW DN.
20	1/2" SW, 1/2" RO DN.
21	(E) BFP TO REMAIN.



KEY PLAN

PLAN
TRUE
SCALE: 1/4" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
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PROFESSIONAL ENGINEER

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PARTIAL PLUMBING MEZZANINE PLAN - WATER	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BOILER PLANT	Drawing Number: PP112A
		Issue Date: 10/07/2025 · Checked: LRL · Drawn: DMB	

VA FORM 08 - 6231

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WEST TEXAS VA HEALTHCARE SYSTEM

A/E REPLACE BOILERS

519-20-200

BIG SPRING, TEXAS

GENERAL NOTES

1. **GENERAL REQUIREMENTS**
   A. **GENERAL**
      1. **DESCRIPTION**: EXPOSED: PIPING, DUCTWORK, AND EQUIPMENT EXPOSED TO VIEW IN FINISHED ROOMS.
      2. **EXTERIOR**: PIPING, DUCTWORK, AND EQUIPMENT EXPOSED TO WEATHER BE IT TEMPERATURE, HUMIDITY, PRECIPITATION, WIND, OR SOLAR RADIATION.
      3. **SUBMITTALS**
         a. CONTRACTOR SHALL MAKE ALL NECESSARY FIELD MEASUREMENTS AND INVESTIGATIONS TO ASSURE THAT THE EQUIPMENT AND ASSEMBLIES WILL MEET CONTRACT REQUIREMENTS, AND ALL EQUIPMENT THAT REQUIRES REGULAR MAINTENANCE, CALIBRATION, ETC ARE ACCESSIBLE FROM THE FLOOR OR PERMANENT WORK PLATFORM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ALL SUBMITTALS MEET THE SPECIFICATION REQUIREMENTS AND IT IS ASSUMED THAT ALL SUBMITTALS DO MEET THE SPECIFICATIONS UNLESS THE CONTRACTOR HAS REQUESTED A VARIANCE IN WRITING AND APPROVED PRIOR TO THE SUBMITTAL. IF AT ANY TIME DURING THE PROJECT IT IS FOUND THAT ANY ITEM DOES NOT MEET SPECIFICATIONS AND WHERE WAS NO VARIANCE APPROVAL THE CONTRACTOR SHALL CLIENT PROJECT REPRESENTATIVERECT AND NO ADDITIONAL COST OR TIME EVEN IF A SUBMITTAL WAS APPROVED.
         b. COORDINATION/SHOP DRAWINGS:
            1. SUBMIT COMPLETE CONSOLIDATED AND COORDINATED SHOP DRAWINGS FOR ALL NEW SYSTEMS, AND FOR EXISTING SYSTEMS THAT ARE IN THE SAME AREAS.
            2. DO NOT INSTALL EQUIPMENT FOUNDATIONS, EQUIPMENT OR PIPING UNTIL COORDINATIONSHOP DRAWINGS HAVE BEEN APPROVED.
         c. IN ADDITION, FOR HVAC SYSTEMS, PROVIDE DETAILS OF THE FOLLOWING:
            1. MECHANICAL EQUIPMENT ROOMS.
            2. INTERSTITIAL SPACE.
            3. HANGERS, INSERTS, SUPPORTS, AND BRACING.
            4. PIPE SLEEVES.
            5. DUCT OR EQUIPMENT PENETRATIONS OF FLOORS, WALLS, CEILINGS, OR ROOFS.
   B. **QUALITY ASSURANCE**
      a. MECHANICAL, ELECTRICAL AND ASSOCIATED SYSTEMS SHALL BE SAFE, RELIABLE, EFFICIENT, DURABLE, EASILY AND SAFELY OPERABLE AND MAINTAINABLE, EASILY AND SAFELY ACCESSIBLE, AND IN COMPLIANCE WITH APPLICABLE CODES AS SPECIFIED. THE SYSTEMS SHALL BE COMPRISED OF HIGH-QUALITY INSTITUTIONAL-CLASS AND INDUSTRIAL-CLASS PRODUCTS OF MANUFACTURERS THAT ARE EXPERIENCED SPECIALISTS IN THE REQUIRED PRODUCT LINES. ALL CONSTRUCTION FIRMS AND PERSONNEL SHALL BE EXPERIENCED AND QUALIFIED SPECIALISTS IN INDUSTRIAL AND INSTITUTIONAL HVAC.
      b. REFER TO ALL OTHER SECTIONS FOR QUALITY ASSURANCE REQUIREMENTS FOR SYSTEMS AND EQUIPMENT SPECIFIED THEREIN.
      c. ALL ITEMS FURNISHED SHALL BE FREE FROM DEFECTS THAT WOULD ADVERSELY AFFECT THE PERFORMANCE, MAINTAINABILITY AND APPEARANCE OF INDIVIDUAL COMPONENTS AND OVERALL ASSEMBLY.
      d. THE PRODUCTS AND EXECUTION OF WORK SPECIFIED IN DIVISION 23 SHALL CONFORM TO THE REFERENCED CODES AND STANDARDS AS REQUIRED BY THE SPECIFICATIONS. LOCAL CODES AND AMENDMENTS SHALL BE ENFORCED, ALONG WITH REQUIREMENTS OF LOCAL UTILITY COMPANIES. THE MOST STRINGENT REQUIREMENTS OF THESE SPECIFICATIONS, LOCAL CODES, OR UTILITY COMPANY REQUIREMENTS SHALL ALWAYS APPLY. ANY CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF CLIENT PROJECT REPRESENTATIVE.
      e. MANUFACTURERS RECOMMENDATIONS: WHERE INSTALLATION PROCEDURES OR ANY PART THEREOF ARE REQUIRED TO BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER OF THE MATERIAL BEING INSTALLED, PRINTED COPIES OF THESE RECOMMENDATIONS SHALL BE FURNISHED TO THE CLIENT PROJECT REPRESENTATIVE WITH SUBMITTALS. INSTALLATION OF THE ITEM WILL NOT BE ALLOWED TO PROCEED UNTIL THE RECOMMENDATIONS ARE RECEIVED. FAILURE TO FURNISH THESE RECOMMENDATIONS CAN BE CAUSE FOR REJECTION OF THE MATERIAL AND REMOVAL BY THE CONTRACTOR AND NO ADDITIONAL COST OR TIME.
      f. REFER TO ALL OTHER SECTIONS FOR QUALITY ASSURANCE REQUIREMENTS FOR SYSTEMS AND EQUIPMENT SPECIFIED THEREIN.
   C. **EXECUTION (INSTALLATION, CONSTRUCTION) QUALITY:**
      a. APPLY AND INSTALL ALL ITEMS IN ACCORDANCE WITH MANUFACTURERS WRITTEN INSTRUCTIONS. REFER CONFLICTS BETWEEN THE MANUFACTURER'S INSTRUCTIONS AND THE CONTRACT DOCUMENTS TO THE CLIENT PROJECT REPRESENTATIVE FOR RESOLUTION. PROVIDE WRITTEN HARD COPIES AND COMPUTER FILES ON CD OR DVD OF MANUFACTURER'S INSTALLATION INSTRUCTIONS TO THE CLIENT PROJECT REPRESENTATIVE WITH SUBMITTALS PRIOR TO COMMENCING INSTALLATION OF ANY ITEM. INSTALLATION OF THE ITEM WILL NOT BE ALLOWED TO PROCEED UNTIL THE RECOMMENDATIONS ARE RECEIVED AND APPROVED. FAILURE TO FURNISH THESE RECOMMENDATIONS IS A CAUSE FOR REJECTION OF THE MATERIAL.
      b. ALL ITEMS THAT REQUIRE ACCESS, SUCH AS FOR OPERATING, CLEANING, SERVICING, MAINTENANCE, AND CALIBRATION, SHALL BE EASILY AND SAFELY ACCESSIBLE BY PERSONS STANDING AT FLOOR LEVEL, OR STANDING ON PERMANENT PLATFORMS, WITHOUT THE USE OF PORTABLE LADDERS. EXAMPLES OF THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO, ALL TYPES OF VALVES, FILTERS AND STRAINERS, TRANSMITTERS, CONTROL DEVICES. PRIOR TO COMMENCING INSTALLATION WORK, REFER CONFLICTS BETWEEN THIS REQUIREMENT AND CONTRACT DOCUMENTS TO CLIENT PROJECT REPRESENTATIVE FOR RESOLUTION. FAILURE OF THE CONTRACTOR TO RESOLVE OR POINT OUT ANY ISSUES WILL RESULT IN THE CONTRACTOR CLIENT PROJECT REPRESENTATIVECTING AT NO ADDITIONAL COST OR TIME.
      c. COMPLETE COORDINATIONSHOP DRAWINGS SHALL BE REQUIRED IN ACCORDANCE WITH ARTICLE: SUBMITTALS. CONSTRUCTION WORK SHALL NOT START ON ANY SYSTEM UNTIL THE COORDINATIONSHOP DRAWINGS HAVE BEEN APPROVED. WORKMANSHIPCRAFTSMANSHIP WILL BE OF THE HIGHEST QUALITY AND STANDARDS. THE CLIENT RESERVES THE RIGHT TO REJECT WORK BASED ON POOR QUALITY OF WORKMANSHIP THIS WORK SHALL BE REMOVED AND DONE AGAIN AT NO ADDITIONAL COST OR TIME.
   E. **DELIVERY, STORAGE AND HANDLING**
      a. PROTECTION OF EQUIPMENT:
         1. EQUIPMENT AND MATERIAL PLACED ON THE JOB SITE SHALL REMAIN IN THE CUSTODY OF THE CONTRACTOR UNTIL PHASED ACCEPTANCE, WHETHER OR NOT THE CONTRACTOR HAS BEEN REIMBURSED FOR THE EQUIPMENT AND MATERIAL. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE PROTECTION OF SUCH EQUIPMENT AND MATERIAL AGAINST ANY DAMAGE OR THEFT.
         2. LARGE EQUIPMENT SUCH AS BOILERS, CHILLERS, COOLING TOWERS, FANS, AND AIR HANDLING UNITS IF SHIPPED ON OPEN TRAILER TRUCKS SHALL BE COVERED WITH SHRINK ON PLASTICS OR WATER PROOF TARPAULINS THAT PROVIDE PROTECTION FROM EXPOSURE TO RAIN, WIND, DUST AND OTHER TRANSIT HAZARDS. PROTECTION SHALL BE KEPT IN PLACE UNTIL EQUIPMENT IS MOVED INTO A BUILDING OR INSTALLED AS DESIGNED.
         3. REPAIR DAMAGED EQUIPMENT IN FIRST CLASS, NEW OPERATING CONDITION AND APPEARANCE; OR REPLACE SAME AS DETERMINED AND DIRECTED BY THE CLIENT PROJECT REPRESENTATIVE. SUCH REPAIR OR REPLACEMENT SHALL BE AT NO ADDITIONAL COST OR TIME.
         4. PROTECT INTERIORS OF NEW EQUIPMENT AND PIPING SYSTEMS AGAINST ENTRY OF FOREIGN MATTER. CLEAN BOTH INSIDE AND OUTSIDE BEFORE PAINTING OR PLACING EQUIPMENT IN OPERATION.
         5. EXISTING EQUIPMENT AND PIPING BEING WORKED ON BY THE CONTRACTOR SHALL BE UNDER THE CUSTODY AND RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE PROTECTED AS REQUIRED FOR NEW WORK.
         6. PROTECT PLASTIC PIPING AND TANKS FROM ULTRAVIOLET LIGHT (SUNLIGHT).
      b. CLEANLINESS OF PIPING AND EQUIPMENT SYSTEMS:
         1. EXERCISE CARE IN STORAGE AND HANDLING OF EQUIPMENT AND PIPING MATERIAL TO BE INCLIENT PROJECT REPRESENTATIVEPORATED INTO THE WORK. REMOVE DEBRIS ARISING FROM CUTTING, THREADING AND WELDING OF PIPING.
         2. PIPING SYSTEMS SHALL BE FLUSHED, BLOWN OR PIGGED AS NECESSARY TO DELIVER CLEAN SYSTEMS.
   F. **ABSULT – RECLIENT PROJECT REPRESENTATIVED DOCUMENTS**
      a. THE INSTALLING CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS OF EACH COMPLETED PHASE FOR VERIFICATION, AND SHALL PROVIDE THE FINAL SET AT THE TIME OF FINAL SYSTEMS CERTIFICATION TESTING.
      b. THE AS-BUILT DRAWINGS SHALL INDICATE THE LOCATION AND TYPE OF ALL LOCKOUT/TAGOUT POINTS FOR ALL ENERGY SOURCES FOR ALL EQUIPMENT AND PUMPS (TO INCLUDE BREAKER LOCATION AND NUMBERS, VALVE TAG NUMBERS, ETC. COORDINATE LOCKOUT/TAGOUT PROCEDURES AND PRACTICES WITH LOCAL VA REQUIREMENTS.
   G. **GENERAL CONDITIONS**: BUILDING WORKING ENVIRONMENT: MAINTAIN THE ARCHITECTURAL AND STRUCTURAL INTEGRITY OF THE BUILDING AND THE WORKING ENVIRONMENT AT ALL TIMES. MAINTAIN THE INTERIOR OF BUILDING AT 18 DEGREES C (65 DEGREES F) MINIMUM. LIMIT THE OPENING OF DOORS, WINDOWS OR OTHER ACCESS OPENINGS TO BRIEF PERIODS AS NECESSARY FOR DESIGNED PURPOSES. STORM WATER OR GROUND WATER LEAKAGE IS PROHIBITED. PROVIDE DAILY CLEAN-UP OF CONSTRUCTION AND DEBRIS FROM FLOOR AREAS. PROTECT FLOOR ON ALL EQUIPMENT BEING OPERATED BY VA. MAINTAIN ALL EGRESS ROUTES AND SAFETY SYSTEMSSERVICES.
   B. **PRODUCTS**
      1. **FACTORY ASSEMBLED PRODUCTS**
         a. PERFORMANCE AND WARRANTY OF ALL COMPONENTS THAT MAKE UP AN ASSEMBLED UNIT SHALL BE THE RESPONSIBILITY OF THE MANUFACTURER OF THE COMPLETED ASSEMBLY.
      2. **V-BELT DRIVES**: RE: SPECIFICATIONS
      3. **SYNCHRONOUS BELT DRIVES**: RE: SPECIFICATIONS
      4. **ELECTRICAL MOTORS**: RE: SPECIFICATIONS
      5. **VARIABLE SPEED MOTOR CONTROLLERS**: RE: SPECIFICATIONS
      6. THE COMBINATION OF CONTROLLER AND MOTOR SHALL BE PROVIDED BY THE MANUFACTURER OF THE DRIVEN EQUIPMENT. SUCH AS PUMPS AND FANS, AND SHALL BE RATED FOR 100 PERCENT OUTPUT PERFORMANCE. MULTIPLE UNITS OF THE SAME CLASS OF EQUIPMENT, I.E. AIR HANDLERS, FANS, PUMPS, SHALL BE PRODUCT OF A SINGLE MANUFACTURER.
      7. **FIRESTOPPING**: ARCH SPEC SECTION FIRESTOPPING SPECIFIES AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FIRE, SMOKE AND GASES WHERE PENETRATIONS OCCUR FOR PIPING AND DUCTWORK. REFER TO SECTION HVAC AND BOILER PLANT INSULATION, FOR FIRESTOP PIPE AND DUCT INSULATION.
   C. **EXECUTION**
      1. **ARRANGEMENT AND INSTALLATION OF EQUIPMENT**
         a. LOCATION OF PIPING, SLEEVES, INSERTS, HANGERS, AND EQUIPMENT. ACCESS PROVISIONS SHALL BE COORDINATED WITH THE WORK OF ALL TRADES. THE COORDINATIONSHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW. LOCATE PIPING, SLEEVES, INSERTS, HANGERS, DUCTWORK AND EQUIPMENT CLEAR OF WINDOWS, DOORS, OPENINGS, LIGHT FIXTURES, AND OTHER SERVICES AND UTILITIES. EQUIPMENT COORDINATIONSHOP DRAWINGS SHALL BE PREPARED TO COORDINATE PROPERLY THE LOCATION AND PERSONNEL ACCESS OF ALL FACILITIES. THE DRAWINGS SHALL BE SUBMITTED FOR REVIEW. FOLLOW MANUFACTURER'S PUBLISHED RECOMMENDATIONS FOR INSTALLATION METHODS NOT OTHERWISE SPECIFIED.
         b. OPERATING PERSONNEL ACCESS AND OBSERVATION PROVISIONS: SELECT AND ARRANGE ALL EQUIPMENT AND SYSTEMS TO PROVIDE CLEAR VIEW AND EASY ACCESS, WITHOUT USE OF PORTABLE LADDERS, FOR MAINTENANCE AND OPERATION OF ALL DEVICES INCLUDING, BUT NOT LIMITED TO: ALL EQUIPMENT ITEMS, VALVES, FILTERS, STRAINERS, TRANSMITTERS, SENSORS, CONTROL DEVICES. ALL GAUGES AND INDICATORS SHALL BE CLEARLY VISIBLE BY PERSONNEL STANDING ON THE FLOOR OR ON PERMANENT PLATFORMS. DO NOT REDUCE OR CHANGE MAINTENANCE AND OPERATING SPACE AND ACCESS PROVISIONS THAT ARE SHOWN ON THE CONTRACT DOCUMENTS.
         c. EQUIPMENT AND PIPING SUPPORT: COORDINATE THE SUPPORT SYSTEMS NECESSARY FOR PIPE AND EQUIPMENT SUPPORT WITH PIPE AND EQUIPMENT LOCATIONS TO PERMIT PROPER INSTALLATION.
         d. LOCATION OF PIPE SLEEVES, TRENCHES AND CHASES SHALL BE ACCURATELY COORDINATED WITH EQUIPMENT AND PIPING LOCATIONS.
         e. CUTTING HOLES:
            1. CUT HOLES THROUGH CONCRETE AND MASONRY BY ROTARY CLIENT PROJECT REPRESENTATIVE DRILL, PNEUMATIC HAMMER, ELECTRIC DRILL, AND HAND OR MANUAL HAMMER TYPE DRILL IS PROHIBITED, EXCEPT AS PERMITTED BY CLIENT PROJECT REPRESENTATIVE WHERE WORKING AREA SPACE IS LIMITED.
            2. LOCATE HOLES TO AVOID INTERFERENCE WITH STRUCTURAL MEMBERS SUCH AS BEAMS OR GIRDERS. RIBS, BEAMS OR REINFORCING MUST HOLES BE CAUT OUT IN ADVANCE AND DRILLING DONE ONLY AFTER APPROVAL BY CLIENT PROJECT REPRESENTATIVE. IF THE CONTRACTOR CONSIDERS IT NECESSARY TO DRILL THROUGH STRUCTURAL MEMBERS, THIS MATTER SHALL BE REFERRED TO CLIENT PROJECT REPRESENTATIVE FOR APPROVAL.
         f. DO NOT PENETRATE MEMBRANE WATERPROOFING.
         g. MINOR PIPING: GENERALLY, SMALL DIAMETER PIPE RUNS FROM DRIPS AND DRAINS, WATER COOLING, LUBRICATION AND SIMILAR SERVICES WILL NOT BE SHOWN but MUST BE PROVIDED.
         h. PROTECTION CLEANING
            1. EQUIPMENT AND MATERIALS SHALL BE CAREFULLY HANDLED, PROPERLY STORED, AND ADEQUATELY PROTECTED TO PREVENT DAMAGE BEFORE AND DURING INSTALLATION. IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND AS PROVIDED BY THE CLIENT PROJECT REPRESENTATIVE. DAMAGED OR DEFECTIVE ITEMS IN THE OPINION OF THE CLIENT PROJECT REPRESENTATIVE, SHALL BE REPLACED.
            2. PROTECT ALL FINISHED PARTS OF EQUIPMENT, SUCH AS SHAFTS AND BEARINGS WHERE EXPOSED TO VIEW, FROM RUST OR OTHER DAMAGE BY MEANS OF PROTECTIVE GREASE COATING AND WRAPPING. CLOSE PIPE OPENINGS WITH CAPS OR PLUGS DURING INSTALLATION. PROTECT DRAIN OUTLET AND INSTRUMENT FIXTURES AND EQUIPMENT AGAINST DIRT, WATER CHEMICAL, OR MECHANICAL INJURY. AT THE COMPLETION OF ALL WORK, THOROUGHLY CLEAN FIXTURES, EXPOSED MATERIALS AND EQUIPMENT.
         i. INSTALL GAUGES, THERMOMETERS, VALVES AND OTHER DEVICES WITH DUE REGARD FOR EASE IN READING OR OPERATING AND MAINTAINING THE DEVICES. LOCATE AND POSITION THERMOMETERS AND GAUGES TO BE EASILY READ BY OPERATOR OR STAFF STANDING ON FLOOR OR WALKWAY PROVIDED. SERVICING SHALL NOT REQUIRE DISMANTLING ADJACENT EQUIPMENT OR PIPE WORK. SWITCHGEARELECTRICAL EQUIPMENT DIRECTIONAL PROVIDED EFFORT SHALL BE MADE TO ELIMINATE THE INSTALLATION OF PIPE ABOVE ELECTRICAL AND DATATELEPHONE EQUIPMENT. THIS IS NOT POSSIBLE, PLACE PIPE IN A SECOND PIPE WITH A MINIMUM OF JOINTS. INSTALLATION OF PIPING, DUCTWORK, LEAK PROTECTION APPARATUS OR OTHER INSTALLATIONS FOREIGN TO THE ELECTRICAL INSTALLATION SHALL NOT BE LOCATED IN THE SPACE DEFINED TO THE WIDTH AND DEPTH OF THE EQUIPMENT AND EXTENDING FROM TO A HEIGHT OF 1.8 M (7 FEET) ABOVE THE EQUIPMENT OR TO CEILING STRUCTURE, WHICHEVER IS LOWER (NFPA 70).
      2. **PIPE AND EQUIPMENT SUPPORTS**
         a. USE OF CHAIN PIPE SUPPORTS; WIRE OR STRAP HANGERS; WOOD FOR BLOCKING, STAYS AND BRACING, AND HANGERS SUSPENDED FROM PIPING ARE NOT PROHIBITED. REPLACE OR THOROUGHLY CLEAN RUSTY PRODUCTS AND PAINT WITH ZINC PRIMER.
         b. HANGER RODS SHALL BE USED THAT ARE STRAIGHT AND VERTICAL. TURNBUCKLES FOR VERTICAL ADJUSTMENTS MAY BE OMITTED WHERE LIMITED SPACE PREVENTS USE. PROVIDE A MINIMUM OF 16 MM (1/2 INCH) CLEARANCE BETWEEN ROD OR PIPING COVERING AND ADJACENT WORK.
         c. HVAC HORIZONTAL PIPE SUPPORTS SPACING: REFER TO MSS SP-58. PROVIDE ADDITIONAL SUPPORTS AT VALVES, STRAINERS, IN-LINE PUMPS AND OTHER HEAVY COMPONENTS WHERE REQUIRED TO PREVENT SAGGING OF EACH SUCH ITEM.
         d. HVAC VERTICAL PIPE SUPPORTS:
            1. UP TO 150 MM (6 INCHES) PIPE, 8 M (30 FEET) LONG, BOLT RISER CLAMPS TO THE PIPE BELOW COUPLINGS, OR WELDED TO THE PIPE AND RESTS SUPPORTS SECURELY ON THE BUILDING STRUCTURE.
            2. VERTICAL ANCHORS: IN ADDITION TO THE FOREGOING, SUPPORT ON BASE ELBOWS OR TEES, OR SUBSTANTIAL PIPE LEGS EXTENDING TO THE BUILDING STRUCTURE.
         e. FLOOR SUPPORTS:
            1. PROVIDE CONCRETE BASES. CONCRETE ANCHOR BLOCKS AND PEDESTALS, AND STRUCTURAL STEEL SYSTEMS FOR SUPPORT OF EQUIPMENT AND PIPING. CONCRETE BASES AND STRUCTURAL SYSTEMS SHALL BE ANCHORED AND DOWELED TO RESIST FORCES UNDER OPERATING AND SEISMIC CONDITIONS (IF APPLICABLE) WITHOUT EXCESSIVE DISPLACEMENT OR STRUCTURAL FAILURE.
            2. BASES AND SUPPORTS SHALL NOT BE LOCATED AND INSTALLED UNTIL EQUIPMENT MOUNTED THEREON HAS BEEN APPROVED. BASES SHALL BE SIZED TO MATCH EQUIPMENT MOUNTED THEREON PLUS 50 MM (2 INCH) EXCESS ON ALL EDGES. CHECK FOUNDATIONS SHALL HAVE HORIZONTAL DIMENSIONS THAT EXCEED CHILLER BASE FRAME DIMENSIONS BY AT LEAST 150 MM (6 INCHES) ON ALL SIDES FOR ISOLATION PADS. CONCRETE BASES SHALL BE REVIEWED FOR ADDITIONAL REQUIREMENTS. BASES SHALL BE NEATLY FINISHED AND SMOOTHED. SHALL HAVE CHAMFERED EDGES AT THE TOP, AND SHALL BE SUITABLE FOR PAINTING.
            3. ALL EQUIPMENT SHALL BE SHIMMED, LEVELED, FIRMLY ANCHORED, AND GROUTED WITH EPOXY GROUT. ANCHOR BOLTS SHALL BE PLACED IN SLEEVES, ANCHORED TO THE BASES. FILL THE ANNULAR SPACE BETWEEN SLEEVES AND BOLTS WITH A GRANULAR MATERIAL TO PERMIT ALIGNMENT AND REALIGNMENT.
      3. **MECHANICAL ANCHORS**
         a. UNLESS SPECIFIED OTHERWISE, ALL PIPING, WIRING, CONDUIT, AND OTHER DEVICES ASSOCIATED WITH THE EQUIPMENT OR PART OF EQUIPMENT IN THE WORK SHALL BE COMPLETELY REMOVED FROM PROJECT SITE PER SECTION CONSTRUCTION WASTE MANAGEMENT. THIS INCLUDES ALL CONCRETE PADS, PIPE, VALVES, FITTINGS, INSULATION, AND ALL HANGERS INCLUDING THE TOP CONNECTION AND ANY FASTENINGS TO BUILDING STRUCTURAL SYSTEMS. ALL OPENINGS SHALL BE SEALED AFTER REMOVAL OF EQUIPMENT, PIPES, DUCTS, AND OTHER PENETRATIONS IN ROOF, WALLS, FLOORS, IN AN APPROVED MANNER AND IN ACCORDANCE WITH CONTRACT DOCUMENTS WHERE SPECIFICALLY COVERED. STRUCTURAL INTEGRITY OF THE BUILDING SYSTEM SHALL BE MAINTAINED. REFERENCE SHALL ALSO BE MADE TO THE CONTRACT DOCUMENTS OF THE OTHER DISCIPLINES IN THE PROJECT FOR ADDITIONAL FACILITIES TO BE DEMOLISHED OR HANDLED.
         b. ALL ANCHORED VALVES INCLUDING GATE, GLOBE, BALL, BUTTERFLY AND CHECK, ALL PRESSURE GAUGES AND THERMOMETERS WITH WELLS SHALL REMAIN CLIENT PROPERTY AND SHALL BE REMOVED AND DELIVERED TO CLIENT PROJECT REPRESENTATIVE AND STORED AS DIRECTED. THE CONTRACTOR SHALL REMOVE ALL OTHER EQUIPMENT AND MATERIALS NOT DESIGNED TO BE REUSED UNDER THESE CONTRACT DOCUMENTS. SUCH MATERIAL SHALL BE REMOVED FROM PROJECT SITE EXPEDITIOUSLY AND SHALL NOT BE ALLOWED TO ACCUMULATE.
      4. **PAINT**
         a. PRIOR TO FINAL INSPECTION AND ACCEPTANCE OF THE PLANT AND FACILITIES FOR BENEFICIAL USE BY THE PLANT FACILITIES, EQUIPMENT AND SYSTEMS SHALL BE THOROUGHLY CLEANED AND PAINTED. REFER TO PAINTING SPECIFICATIONS.
      5. **MOTOR DRIVES**
         a. USE SYNCHRONOUS BELT DRIVES ONLY ON EQUIPMENT CONTROLLED BY SOFT STARTERS OR VARIABLE FREQUENCY DRIVE MOTOR CONTROLLERS WITHOUT A BYPASS CONTACTOR. USE V-BELT DRIVES ON ALL OTHER APPLICATIONS.
         b. ALL EQUIPMENT DEVICES REQUIRING LUBRICATION SHALL BE LUBRICATED PRIOR TO INITIAL OPERATION. FIELD-CHECK ALL DEVICES FOR PROPER LUBRICATION.
         c. STARTUP OF EQUIPMENT SHALL BE PERFORMED AS DESCRIBED IN EQUIPMENT SPECIFICATIONS. VIBRATION WITHIN SPECIFIED TOLERANCE SHALL BE VERIFIED PRIOR TO EXTENDED OPERATION. TEMPORARY USE OF EQUIPMENT IS SPECIFIED IN SECTION GENERAL REQUIREMENTS, ARTICLE, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.
   2. **GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT**
      A. **GENERAL**: FURNISHING, INSTALLATION AND CONNECTION OF MOTORS FOR HVAC AND STEAM GENERATION EQUIPMENT.
      B. **PRODUCTS**
         1. DESCRIPTION: ALL MATERIAL AND EQUIPMENT FURNISHED AND INSTALLATION METHODS SHALL CONFORM TO THE REQUIREMENTS OF SECTION MOTOR CONTROLLERS, AND SECTION LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES. PROVIDE ALL ELECTRICAL WIRING, CONDUIT, AND DEVICES NECESSARY FOR THE PROPER CONNECTION, PROTECTION AND OPERATION OF THE SYSTEMS. PROVIDE PREMIUM EFFICIENCY TYPE MOTORS. UNLESS OTHERWISE SPECIFIED FOR A PARTICULAR APPLICATION, USE ELECTRIC MOTORS WITH THE FOLLOWING REQUIREMENTS.
      C. **EXECUTION**
         1. **INSTALLATION**
            a. INSTALL MOTORS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. THE NEC, NEMA, AS SHOWN ON THE DRAWINGS AND/OR AS REQUIRED BY OTHER SECTIONS OF THESE SPECIFICATIONS.
   3. **NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT**
      A. **GENERAL**: APPLICATION OF NOISE CONTROL MEASURES, AND VIBRATION CONTROL TECHNIQUES TO BOILER PLANT ROTATING EQUIPMENT AND PARTS INCLUDING CHILLERS, COOLING TOWERS, BOILERS, PUMPS, FANS, COMPRESSORS, MOTORS AND STEAM TURBINES.
      B. **PRODUCTS**
         1. GENERAL REQUIREMENTS:
            a. TYPE OF ISOLATOR, BASE, AND MINIMUM STATIC DEFLECTION SHALL BE AS REQUIRED FOR EACH SPECIFIC EQUIPMENT APPLICATION AS RECOMMENDED BY ISOLATOR OR EQUIPMENT MANUFACTURER BUT SUBJECT TO MINIMUM REQUIREMENTS INDICATED HEREIN AND IN THE SCHEDULE ON THE DRAWINGS.
      C. **EXECUTION**
         1. **INSTALLATION**: INSPECTION AND ADJUSTMENTS. CHECK FOR VIBRATION AND NOISE TRANSMISSION THROUGH CONNECTIONS, PIPING, DUCTWORK, FOUNDATIONS, AND WALLS. ADJUST, REPAIR, OR REPLACE ISOLATORS AS REQUIRED TO REDUCE VIBRATION AND NOISE TRANSMISSIONS TO SPECIFIED LEVELS.
         2. **ADJUSTING**: ADJUST VIBRATION ISOLATORS AFTER PIPING SYSTEMS ARE FILLED AND EQUIPMENT IS AT OPERATING WEIGHT.
   4. **TESTING, ADJUSTING, AND BALANCING FOR HVAC**
      A. **GENERAL**
         1. DESCRIPTION
         2. RE: SPECIFICATIONS FOR TESTING, ADJUSTING, AND BALANCING (TAB) OF HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEM(S) REQUIREMENTS
         3. TAB INCLUDES THE FOLLOWING:
            a. BALANCING AIR AND WATER DISTRIBUTION SYSTEMS; ADJUSTMENT OF TOTAL SYSTEM TO PROVIDE DESIGN PERFORMANCE; AND TESTING PERFORMANCE OF EQUIPMENT AND AUTOMATIC CONTROLS.
         4. **HYDRONIC SYSTEMS**: INCLUDES CHILLED WATER, CONDENSER WATER, HEATING HOT WATER AND GLYCOL WATER SYSTEMS.
         5. **AIR SYSTEMS**: INCLUDES ALL OUTSIDE AIR, SUPPLY AIR, RETURN AIR, EXHAUST AIR AND RELIEF AIR SYSTEMS.
         6. **TAB PROCEDURES**
            a. TAB SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENT OF THE STANDARD UNDER WHICH THE EQUIPMENT IS OFFERED FOR EITHER AABC, TABB OR NEBB. BALANCING SHALL BE done PROPORTIONALLY TO ALL APPLICABLE SYSTEMS.
            b. GENERAL: DURING TAB ALL RELATED SYSTEM COMPONENTS SHALL BE IN FULL OPERATION. FAN AND PUMP ROTATION, MOTOR LOADS AND EQUIPMENT VIBRATION SHALL BE CHECKED AND CLIENT PROJECT REPRESENTATIVERECTED AS NECESSARY BEFORE PROCEEDING WITH TAB. SET CONTROLS AND/OR BLOCK OFF PARTS OF DISTRIBUTION SYSTEMS TO SIMULATE DESIGN OPERATION OF VARIABLE VOLUME AIR OR WATER SYSTEMS FOR TEST AND BALANCE WORK.
      B. **PRODUCT**
         1. PROVIDE PLASTIC PLUGS TO SEAL HOLES DRILLED IN DUCTWORK FOR TEST PURPOSES.
         2. SEE SECTION HVAC AND BOILER PLANT INSULATION PROVIDE FOR REPAIR OF INSULATION REMOVED OR DAMAGED FOR TAB WORK.
      C. **EXECUTION**
         1. FOLLOWING APPROVAL OF TAB FINAL REPORT, THE SETTING OF ALL HVAC ADJUSTMENT DEVICES INCLUDING VALVES, SPLITTERS AND DAMPERS SHALL BE PERMANENTLY MARKED BY THE TAB SPECIALIST SO THAT ADJUSTMENT CAN BE RESTORED IF DISTURBED AT ANY TIME. STYLE AND COLORS USED FOR MARKINGS SHALL BE COORDINATED PRIOR TO MARKING.
   5. **HVAC AND BOILER PLANT INSULATION**
      A. **GENERAL**
         1. DESCRIPTION: FIELD APPLIED INSULATION FOR THERMAL EFFICIENCY AND CONDENSATION CONTROL FOR HVAC PIPING, DUCTWORK AND EQUIPMENT.
      B. **PRODUCTS**: RE: SPECIFICATIONS FOR INSULATION MATERIALS, INSULATION FACINGS AND JACKETS, INSULATION ACCESSORY MATERIALS.
      C. **EXECUTION**
         1. **GENERAL REQUIREMENTS**
            a. INSULATION MATERIALS SHALL BE INSTALLED IN A FIRST CLASS MANNER WITH SMOOTH AND EVEN SURFACES, WITH JACKETS DRAWN TIGHT AND SMOOTHLY CEMENTED DOWN AT ALL LAPS. INSULATION SHALL BE CONTINUOUS THROUGH ALL SLEEVES AND OPENINGS, EXCEPT AT FIRE DAMPERS and HEATERS (NFPA 90A). VAPOR RETARDERS SHALL BE CONTINUOUS AND UNINTERRUPTED THROUGHOUT SYSTEMS WITH OPERATING TEMPERATURE 16 DEGREES C (60 DEGREES F) AND BELOW. LAP AND SEAL VAPOR RETARDER OVER ENDS AND EXPOSED EDGES OF INSULATION, INCHOKES, SUPPORTS and OTHER METAL PROJECTIONS THROUGH INSULATION ON COLD SURFACES SHALL BE INSULATED AND VAPOR SEALED FOR A MINIMUM LENGTH OF 150 MM (6 INCHES).
            b. INSTALL VAPOR STOPS AT ALL INSULATION TERMINATIONS ON EITHER SIDE OF VALVES, PUMPS AND EQUIPMENT AND PARTICULARLY IN STRAIGHT LENGTHS OF PIPE INSULATION.
            c. CONSTRUCT INSULATION ON PARTS OF EQUIPMENT SUCH AS CHILLED WATER PUMPS AND HEADERS OF CHILLERS, CONVERTORS AND OTHER PARTS REQUIRING MAINTENANCE OR INSPECTION SO INSULATION CAN BE REMOVED AND REPLACED WITHOUT DAMAGE. INSTALL INSULATION WITH BOLTED 1 MM THICK (20 GAGE) GALVANIZED STEEL OR ALUMINUM COVERS AS COMPLETE UNITS, OR IN SECTIONS, WITH ALL NECESSARY SUPPORTS, AND SPLIT TO CONNECT WITH FLANGES/PLIT OF THE EQUIPMENT.
            d. INSULATION ON HOT PIPING AND EQUIPMENT SHALL BE TERMINATED SQUARE AT ITEMS NOT TO BE INSULATED. ACCESS OPENINGS AND NAMEPLATES SHALL BE EXPOSED RAW INSULATION WITH WHITE SEALER OR JACKET MATERIAL.
            e. PROTECT ALL INSULATIONS OUTSIDE OF BUILDINGS WITH AN ALUMINUM JACKET USING LOCK JOINT OR OTHER APPROVED SYSTEM FOR A CONTINUOUS WEATHER TIGHT SYSTEM. ACCESS DOORS AND OTHER ITEMS REQUIRING MAINTENANCE OR ACCESS SHALL BE REMOV

PIPING SYSTEMS

SYMBOL	DESCRIPTION
S-125	HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
CR-125	HIGH PRESSURE STEAM CONDENSATE RETURN
S-40	MEDIUM PRESSURE STEAM (16 PSIG THRU 59 PSIG)
CR-40	MEDIUM PRESSURE STEAM CONDENSATE RETURN
S-5	LOW PRESSURE STEAM (15 PSIG AND BELOW)
CR-5	LOW PRESSURE STEAM CONDENSATE RETURN
PC	CONDENSATE PUMP DISCHARGE
HWS	HOT WATER HEATING SUPPLY
HWR	HOT WATER HEATING RETURN
GHS	GLYCOL WATER HEATING SUPPLY
GHR	GLYCOL WATER HEATING RETURN
SWS	SOLAR WATER SUPPLY
SWR	SOLAR WATER RETURN
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RHS	REFRIGERANT HOT GAS
CWS	CONDENSER WATER SUPPLY (FROM TOWER)
CWR	CONDENSER WATER RETURN (TO TOWER)
CHS	CHILLED WATER SUPPLY
CHR	CHILLED WATER RETURN
GCS	CHILLED GLYCOL WATER SUPPLY
GCR	CHILLED GLYCOL WATER RETURN
MW	MAKE UP WATER
D	DRAIN LINE
V	VENT LINE
GRS	GLYCOL WATER RUN AROUND SUPPLY
GRR	GLYCOL WATER RUNAROUND RETURN
FWPD	FEED WATER PUMP DISCHARGE
FWPS	FEED WATER PUMP SUCTION
VR	VACUUM CONDENSATE RETURN
T	TUBE CLEANER WATER SUPPLY
BO	BOILER BLOWOFF
CBD	CONTINUOUS BLOWDOWN
BWS	BOILER WATER SAMPLE
FWS	FEEDWATER SAMPLE (FROM DEAERATOR)
CF	CHEMICAL FEED
A	COMPRESSED AIR
G	NATURAL GAS MAIN FUEL
GI	NATURAL GAS IGNITER FUEL
LPGI	LIQUID PETROLEUM GAS IGNITER FUEL
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
CW	COLD WATER (CITY WATER)
SW	SOFTENED WATER
HW	HOT WATER

* *TYPE NUMBERS REFERS TO MANUFACTURER'S STANDARDIZATION SOCIETY STANDARD PRACTICE SP-58*

ABBREVIATIONS

A/E	ARCHITECT/ENGINEER
AHX	AIR TO AIR HEAT EXCHANGER
AAV	AUTOMATIC AIR VENT
AB	AIR BLENDER
ACC	AIR COOLED CONDENSER
ACH	AIR COOLED CHILLER
ACCU	AIR COOLED CONDENSING UNIT
ACD	AUTOMATIC CONTROL DAMPER, MODULATING
ACD-TP	AUTOMATIC CONTROL DAMPER, TWO POSITION
ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
AF	AFTER FILTER
AFCV	AIR FLOW CONTROL VALVE
AFF	ABOVE FINISHED FLOOR
AFMS	AIR FLOW MEASURING STATION
AFW	AIR FOIL WHEEL (FAN)
AHU	AIR HANDLING UNIT
AMP	AMPERE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
AQST	AQUASTAT
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE
AS	AIR SEPARATOR
ASHRAE	AMERICAN SOCIETY OF HEATING REFRIGERATION AIR CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AW	AIR WASH
AXF	AXIAL FLOW
B	BOILER
BD	BUTTERFLY DAMPER
BDD	BACKDRAFT DAMPER
BDR	BASEBOARD RADIATOR
BFP	BACKFLOW PREVENTOR
BFT	BOILER PLANT FIRE TUBE
BG	BOTTOM GRILLE
BHP	BRAKE HORSEPOWER
BHW	HOT WATER HEATING BOILER
BHX	BOILER BLOWDOWN HEAT EXCHANGER
BIW	BACKWARD INCLINED WHEEL (FAN)
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BMT	BONE MARROW TRANSPLANT
BR	BOTTOM OF REGISTER
BSC	BIOLOGICAL SAFETY CABINETS
BT	BLOWOFF TANK
BTC	BLOWOFF TANK CONTROL VALVE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BWT	BOILER PLANT WATER TUBE
C	CENTIGRADE (CELSIUS)
CAV	CONSTANT AIR VOLUME
CC	COOLING COIL
CCD	COOLING COIL CONDENSATE DRAIN
CD	CEILING DIFFUSER
CD-1	CONSTRUCTION DOCUMENTS (SUBMISSION 1)
CD-2	CONSTRUCTION DOCUMENTS (SUBMISSION 2)
CENT	CENTRIFUGAL
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CFT	CUBIC FEET
CFP	CHEMICAL FEED PUMP
CG	CEILING GRILLE
CH	CHILLER
CHP	CHILLED WATER PUMP
CHW	CHILLER WATER
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CI	CAST IRON
CM	CARBON MONOXIDE
CM	CUBIC METER
CMES	CUBIC METER PER SECOND
CO	CLEAN OUT
CO2	CARBON DIOXIDE
COMP	COMPRESSOR UNIT
COP	COEFFICIENT OF PERFORMANCE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CS	CONDENSATE STORAGE TANK
CSG	CLEAN STEAM GENERATOR
CT	COOLING TOWER
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CWCC	CHILLED WATER COOLING COIL
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN (TO COOLING TOWER)
CWS	CONDENSER WATER SUPPLY (FROM COOLING TOWER)
D	DAMPER - AUTOMATIC
db	DRY BULB
DB	DECIBELS
DCW	DOMESTIC COLD WATER
DD-1	DESIGN DEVELOPMENT (SUBMISSION 1)
DD-2	DESIGN DEVELOPMENT (SUBMISSION 2)
DDC	DIRECT DIGITAL CONTROLS
DEG	DEGREE
DF	DIFFUSER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN
DIA	DIAMETER
DIW	DEIONIZED WATER
DP	DEWPOINT TEMPERATURE
DP	DIFFUSER PLATE
DPA	DIFFERENTIAL PRESSURE ASSEMBLY
DPS	DIFFERENTIAL PRESSURE SENSOR
DX	DIRECT EXPANSION
DXCC	DIRECT EXPANSION COOLING COIL
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	EVAPORATIVE COOLER
ECC	ENGINEERING CONTROL CENTER
ECU	EVAPORATIVE CONDENSING UNIT
EDH	ELECTRIC DUCT HEATER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EGS	EMERGENCY GAS SHUTOFF
EGT	ENTERING GLYCOL TEMPERATURE
EH	EXHAUST HOOD
EJ	EXPANSION JOINT
EMD	END OF MAIN DRIP (STEAM)
ENT	ENTERING
ER	EXHAUST REGISTER
ERC	ELECTRIC REHEAT COIL
ERP	ELECTRIC RADIANT PANEL
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
ETO	ETHYLENE OXIDE
EUH	ELECTRIC UNIT HEATER
EWC	EVAPORATIVE WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
F	FAHRENHEIT
F&T	FLOAT AND THERMOSTATIC
FD/SD	COMBINATION FIRE/SMOKE DAMPER
FA	FREE AREA
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT (4 PIPE)
FCUC	FAN COIL UNIT COOLING ONLY
FCUH	FAN COIL UNIT HEATING ONLY
FOW	FORWARD CURVED WHEEL (FAN)
FD	FLOOR DRAIN
FD	FIRE DAMPER
FF	FINAL FILTER
FHX	FLUE GAS/FEEDWATER HEAT EXCHANGER
FM	FLOW METER
FOP	FUEL OIL PUMP
FOT	FUEL OIL TANK
FOHX	FUEL OIL HEAT EXCHANGER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FPTU	FAN POWERED TERMINAL UNIT
FR	FLOOR REGISTER
FRP	FIBER REINFORCED POLYESTER
FS	FLOW SWITCH
FSTAT	FREEZESTAT
FT	FEET
FT3	CUBIC FEET
FT HD	FEET OF HEAD
FT WC	FEET OF WATER COLUMN
FT-LB	FOOT-POUND
FTR	FIN TUBE RADIATION
FV	FACE VELOCITY
G	GAUGE
GAL	GALLONS
GH	GRAVITY HOOD
GLWSHP	GROUND LOOP WATER SOURCE HEAT PUMP
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPR	GAS PRESSURE REGULATOR
GS	GALVANIZED STEEL
H	HUMIDIFIER
HAC	HOUSEKEEPING AND CLOSET
HBP	HOSE BIBB
HC	HEATING COIL
HD	HOOD
HOA	HAND/OFF/AUTOMATIC
HP	HEAT PUMP
HP	HORSEPOWER
HDPT	HIGH PRESSURE DRIP TRAP
HPR	HIGH PRESSURE RETURN (STEAM)
HPS	HIGH PRESSURE SUPPLY (STEAM)
HRC	HEAT RECOVERY COIL
HRD	HEAT RECOVERY DEVICE
HRP	HORIZONTAL RADIANT (CEILING) PANEL
HRW	HEAT RECOVERY WHEEL
HSTAT	HUMIDISTAT
HTM	HUMIDIFIER TERMINAL
HUM	HUMIDIFIER UNIT MOUNTED
HVU	HEATING AND VENTILATING UNIT
HW	HOT WATER
HWC	HOT WATER COIL
HWP	HEATING HOT WATER PUMP
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HWUH	HOT WATER UNIT HEATER
HVD	HOSTWAY VENT DAMPER
HX	HEAT EXCHANGER
HZ	HERTZ
I/O	INPUT/OUTPUT
IAQ	INDOOR AIR QUALITY
IBT	INVERTED BUCKET TRAP
ICF	IN-LINE CENTRIFUGAL FAN
ICU	INTENSIVE CARE UNIT
ID	INSIDE DIAMETER
IFP	INTEGRAL FACE AND BYPASS
IN	INCHES
IN HG	INCHES OF MERCURY
IN WC	INCHES WATER GAUGE
IN WG	INCH WATER GAUGE
IN-LB	INCH-POUND
IPLV	INTEGRATED PART LOAD VALUE
IRH	INFRARED HEATER
IS	INSECT SCREEN
IU	INDUCTION UNIT
IV	INLET VANES
J	(INTENTIONALLY LEFT BLANK)
L	LITER
L/h	LITERS PER HOUR (OR LITERS/HOUR)
L/m	LITERS PER MINUTE (OR LITERS/MINUTE)
L/s	LITERS PER SECOND (OR LITERS/SECOND)
LAT	LEAVING AIR TEMPERATURE
LBS/HR	POUNDS PER HOUR
LF	LINEAR FEET
LGT	LEAVING GLYCOL TEMPERATURE
LH	LATENT HEAT
LPG	LIQUEFIED PETROLEUM GAS
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
LLHX	LIQUID TO LIQUID HEAT EXCHANGER
LPS	LOW PRESSURE STEAM
LPSC	LOW PRESSURE STEAM (CLEAN)
LSD	LINEAR SLOT DIFFUSER
LTCP	LOCAL TEMPERATURE CONTROL PANEL
LVG	LEAVING
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
M	METER, SI UNIT
M/S	METERS PER SECOND (OR METERS/SECOND)
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MB	MIXING BOX
MBH	1000 BTUH
MCA	MINIMUM CIRCUIT AMPACITY
MER	MECHANICAL EQUIPMENT ROOM
MERV	MINIMUM EFFICIENCY REPORTING VALUE
MH	MANHOLE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MM	MILLIMETER
MOV	MOTOR OPERATED VALVE
MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS	MEDIUM PRESSURE STEAM
MRI	MAGNETIC RESONANCE IMAGING
MTD	MEAN TEMPERATURE DIFFERENCE
MVD	MANUAL VOLUME DAMPER
MZ	MULTI-ZONE
NA	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NG	NATURAL GAS
NGFM	NATURAL GAS FLOW METER
Nm	NEWTON METER
NO	NORMALLY OPEN
NOAA	NATIONAL OCEANIC & ATMSPHERIC ADMINISTRATION
NPLV	NON-STANDARD PART LOAD VALUE
NPSH	NET POSITIVE SUCTION HEAD
NPSHA	NET POSITIVE SUCTION HEAD AVAILABLE
NPSHR	NET POSITIVE SUCTION HEAD REQUIRED
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAD	OUTDOOR AIR DAMPER
OAG	OUTSIDE AIR GRILLE
OAI	OUTSIDE AIR INTAKE
OD	OUTSIDE DIAMETER
OFM	OIL FLOWMETER
OR	OPERATING ROOM
P	PUMP
Pa	PASCAL
PC	PROPANE CONDENSATE
PCF	POUNDS PER CUBIC FOOT (FEET)
PD	PRESSURE DROP
PEF	PROPELLER (TYPE) EXHAUST FAN
PF	PRE FILTER
PG	PRESSURE GAUGE
PGW	PROPYLENE GLYCOL-WATER (SOLUTION)
PHC	PREHEAT COIL
PPM	PARTS PER MILLION
PRS	PRESSURE REGULATING (VALVE) STATION
PRV	PRESSURE REGULATING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH - ABSOLUTE
PSIG	POUNDS PER SQUARE INCH - GAUGE
PSS	PRIMARY SECONDARY SYSTEM
PSV	PRESSURE SAFETY VALVE
PTAC	PACKAGED TERMINAL AIR CONDITIONER
R/E	RETURN OR EXHAUST
RA	RETURN AIR
RAD	RETURN AIR DAMPER
RAF	RADIO FREQUENCY
RAHX	ROTARY AIR HEAT EXCHANGER
RAT	RETURN AIR TEMPERATURE
RCCH	REMOTE CONDENSER CHILLER
RCU	RECIPROCATING CHILLER UNIT
RD	REFRIGERANT DISCHARGE
RDS	ROOM DATA SHEETS
REA	RELIEF AIR
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RL	REFRIGERANT LIQUID LINE
RLA	RUN LOAD AMPS
RO	REVERSE OSMOSIS
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
RV	RELIEF VALVE
SA	SUPPLY AIR
SAD	SOUND ATTENUATING DEVICE
SAT	SUPPLY AIR TEMPERATURE
SC	SHADING COEFFICIENT
SCFM	STANDARD CUBIC FEET PER MINUTE
SCI	SPINAL CORD INJURY
SCR	SILICON CONTROLLED RECTIFIER
SD	SMOKE DETECTOR
SD	SUPPLY DIFFUSER
SD-1	SCHEMATIC DESIGN (SUBMISSION 1)
SD-2	SCHEMATIC DESIGN (SUBMISSION 2)
SDPR	SMOKE DAMPER
SDR	SMOKE DAMPER (RETURN)
SDS	SMOKE DAMPER (SUPPLY)
SEN	SENSIBLE HEAT
SF	SUPPLY FAN
SG	SUPPLY AIR GRILLE
SH	STEAM HUMIDIFIER
SHC	STEAM HEATING COIL
SI	SQUARE INCHES
SP	STATIC PRESSURE
SP GR	SPECIFIC GRAVITY
SPD	SUPPLY PROCESS AND DISTRIBUTION
SPRV	STEAM PRESSURE REDUCING VALVE
SPS	STATIC PRESSURE SENSOR
SQFT	SQUARE FEET
SR	SUPPLY AIR REGISTER
SS	STAINLESS STEEL
SSHX	STEAM TO STEAM HEAT EXCHANGER
SSR	SOLID SEPARATOR
ST	STEAM TRAP
SUH	STEAM UNIT HEATER
SV	STEAM PRESSURE REDUCING VALVE
SVS	STEAM VENT SILENCER
SW	SOFT WATER
SWHX	STEAM TO WATER HEAT EXCHANGER
T&PCV	TEMPERATURE AND PRESSURE CONTROL VALVE
TAB	TESTING, ADJUSTING, BALANCE
TD	TEMPERATURE DIFFERENCE
TDH	TOTAL DYNAMIC HEAD
TDS	TOTAL DISOLVED SOLIDS
TG	TRANSFER GRILLE
TP	TRAP
TR	TOP REGISTER
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TU	TERMINAL UNIT
TWU	THRU-WALL UNIT
UC	UNDERCUT
UH	UNIT HEATER
U	UNDERWRITERS LABORATORY
URV	UPBLAST UNIT VENTILATOR
V	VALVE
VAF	VANE-AXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER (MANUAL, OPPOSED BLADE)
VFD	VARIABLE FREQUENCY DRIVE
VHA	VETERANS HEALTH ADMINISTRATION
VI	VIBRATION ISOLATOR
VP	VACUUM PUMP
VPS	VARIABLE PRIMARY SYSTEM
VR	VACUUM (STEAM CONDENSATE) RETURN
VSD	VARIABLE SPEED DRIVE
VUH	VERTICAL UNIT HEATER
W	WATTS
WAG	WASTE ANESTHESIA GAS
wb	WET BULB (TEMPERATURE)
WC	WATER COOLED
WCCH	WATER COOLED CHILLER
WCCU	WATER COOLED CONDENSING UNIT
WCHP	WATER COOLED HEAT PUMPS
WCPU	WATER COOLED PACKAGED UNIT
WEF	WALL EXHAUST FAN
WF	WATER FILTER
WFCV	WATER FLOW CONTROL VALVE
WFM	WATER FLOWMETER
WFMD	WATER FLOW MEASURING DEVICE
WG	WATER GAUGE
WPD	WATER SIDE PRESSURE DROP
WSHP	WATER SOURCE HEAT PUMP
YR	YEAR

DRAWING SYMBOLS

CALLOUT (ENLARGED VIEW): 2 / PL105 — DETAIL NUMBER; DRAWING NUMBER WHERE DRAWN

SECTION: 3 / PL105 — SECTION LETTER; DRAWING NUMBER WHERE SHOWN

EQUIPMENT TAG: 26 - F - 3 — BUILDING NO. WHERE EQUIPMENT IS LOCATED; EQUIPMENT ABBREVIATION (PUMP); PUMP NO. 3 IN BUILDING NO. 26

TYPICAL UNIT NO.

DUCT SYSTEMS

DUCT, EXISTING — DUCT, DEMO

SA — SUPPLY AIR

RA — RETURN AIR

OA — OUTSIDE AIR

EA — EXHAUST AIR

CONTROLS SYMBOLS

- T — ROOM THERMOSTAT/TRANSMITTER - WALL MOUNT
- H — ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER - WALL MOUNT
- TT — TEMPERATURE TRANSMITTER
- TT — TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
- MT — MOISTURE (HUMIDITY) TRANSMITTER
- PT — PRESSURE TRANSMITTER
- SPS — STATIC PRESSURE SENSOR
- FT — FLOW TRANSMITTER
- IT — CURRENT TRANSMITTER
- CT — CONDUCTIVITY TRANSMITTER
- SD — SMOKE DETECTOR
- PDT — PRESSURE DIFFERENTIAL TRANSMITTER
- PDS — PRESSURE DIFFERENTIAL SWITCH
- HS — HAND SWITCH (HAND-OFF-AUTO SWITCH)
- CV — VALVE OR DAMPER POSITION CONTROLLER
- MS — LOCAL RECORDING TIME CLOCK (RUNTIME)
- TS — TEMPERATURE SWITCH, LOW (FREEZESTAT)
- TSH — TEMPERATURE SWITCH, HIGH (FREEZESTAT)
- LC — LEVEL CONTROLLER
- LT — LEVEL TRANSMITTER
- PSH — PRESSURE SWITCH HIGH
- PSL — PRESSURE SWITCH LOW
- EPT — ELECTRONIC TO PNEUMATIC TRANSDUCER
- AT CO2 — CARBON DIXIXDE TRANSMITTER
- AT CO — CARBON MONOXIDE TRANSMITTER
- AT OC — OCCUPANCY SENSOR
- LTCP — LOCAL TEMPERATURE CONTROL PANEL
- HVAC — HVAC CONTROL PANEL
- VSMC — VARIABLE SPEED MOTOR CONTROLLER
- EOC — INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
- TS — TEMPERATURE CONTROLLER, SEE SEQUENCE OF OPERATION
- PC — PRESSURE CONTROLLER, SEE SEQUENCE OF OPERATION
- SC — SPEED CONTROLLER, SEE SEQUENCE OF OPERATION
- FC — FLOW CONTROLLER, SEE SEQUENCE OF OPERATION
- FSH — FLOW SWITCH HIGH
- FSL — FLOW SWITCH LOW
- XC — TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE

GENERAL NOTES

c. STEAM TRAP PIPING: INSTALL TO PERMIT GRAVITY FLOW TO THE TRAP. PROVIDE GRAVITY FLOW (AVOID LIFTING CONDENSATE) FROM THE TRAP WHERE MODULATING CONTROL VALVES ARE USED. SUPPORT TRAPS WEIGHING OVER 11 KG (24 POUNDS) INDEPENDENTLY OF CONNECTING PIPING.

d. LEAK TESTING: INSPECT ALL JOINTS AND CONNECTIONS FOR LEAKS AND WORKMANSHIP AND MAKE CLIENT PROJECT REPRESENTATIVE/DIRECTIONS AS NECESSARY. TO THE SATISFACTION OF THE CLIENT PROJECT REPRESENTATIVE IN ACCORDANCE WITH THE SPECIFIED REQUIREMENTS. TESTING SHALL BE PERFORMED IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS.

e. FLUSHING AND CLEANING PIPING SYSTEMS: STEAM, CONDENSATE AND VENT PIPING: THE PIPING SYSTEM SHALL BE FLUSHED CLEAN PRIOR TO EQUIPMENT CONNECTION. CLEANING INCLUDES PULLING ALL STRAINER SCREENS AND CLEANING ALL SEDIMENT LEGS DURING STARTUP OPERATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE CAUSED BY INADEQUATELY CLEANED/FLUSHED SYSTEMS.

9. **HVAC DUCTS AND CASINGS**

A. **GENERAL**

1. **DESCRIPTION**: DUCTWORK AND ACCESSORIES FOR HVAC INCLUDING THE FOLLOWING: SUPPLY AIR, RETURN AIR, OUTSIDE AIR, EXHAUST, MAKE-UP AIR, AND RELIEF SYSTEMS.

B. **PRODUCTS**

1. **GENERAL**: EXCEPT FOR SYSTEMS SPECIFIED OTHERWISE, CONSTRUCT DUCTS, CASINGS, AND ACCESSORIES OF GALVANIZED SHEET STEEL, ASTM A653, COATING G90; OR, ALUMINUM SHEET, ASTM B209, ALLOY 1100, 3003 OR 5052.
2. **JOINT SEALING**: REFER TO SMACNA HVAC DUCT CONSTRUCTION STANDARDS.
3. REGARDLESS OF THE PRESSURE CLASSIFICATIONS OUTLINED IN THE SMACNA STANDARDS, FABRICATE AND SEAL THE DUCTWORK IN ACCORDANCE WITH THE FOLLOWING PRESSURE CLASSIFICATIONS:
   a. **DUCT PRESSURE CLASSIFICATION**:
   a. 0 TO 50 MM (2 INCH)
   b. 50 MM TO 75 MM (2 INCH TO 3 INCH)
   c. 75 MM TO 100 MM (3 INCH TO 4 INCH)
5. **SEAL CLASS**: ALL DUCTWORK SHALL RECEIVE CLASS A SEAL.
6. **CASINGS AND PLENUMS**: CONSTRUCT IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS SECTION 6, INCLUDING CURBS, ACCESS DOORS, PIPE PENETRATIONS, ELIMINATORS AND DRAIN PANS. ACCESS DOORS SHALL BE HOLLOW METAL, INSULATED, WITH LATCHES AND DOOR PULLS. 500 MM (20 INCHES) WIDE BY 1200 - 1350 MM (48 - 54 INCHES) HIGH. PROVIDE VIEW PORT IN THE DOORS WHERE SHOWN. PROVIDE DRAIN FOR OUTSIDE AIR LOUVER PLENUM. OUTSIDE AIR PLENUM SHALL HAVE EXTERIOR INSULATION. DRAIN PIPING SHALL BE ROUTED TO THE NEAREST FLOOR DRAIN.
7. PROVIDE ACCESS DOORS, SIZED AND LOCATED FOR MAINTENANCE WORK, UPSTREAM, IN THE FOLLOWING LOCATIONS:
8. EACH DUCT MOUNTED COIL AND HUMIDIFIER.
9. EACH FIRE DAMPER (FOR LINK SERVICE), SMOKE DAMPER AND AUTOMATIC CONTROL DAMPER.
10. EACH DUCT MOUNTED SMOKE DETECTOR.
11. **FIRE DAMPER**: THE DAMPER FRAME MAY BE OF DESIGN AND LENGTH AS TO FUNCTION AS THE MOUNTING SLEEVE. THUS ELIMINATING THE NEED FOR A SEPARATE SLEEVE, AS ALLOWED IN UL 555. OTHERWISE PROVIDE SLEEVES AND MOUNTING ANGLES, MINIMUM 1.5 MM (14 GAGE), REQUIRED TO PROVIDE INSTALLATION EQUIVALENT TO THE DAMPER MANUFACTURER'S UL TEST INSTALLATION.
12. **SMOKE DAMPER OPERATION**: AUTOMATIC OPEN/CLOSE. NO SMOKE DAMPER THAT REQUIRES MANUAL RESET OR LINK REPLACEMENT AFTER ACTUATION IS ACCEPTABLE. SEE DRAWINGS FOR SEQUENCE CONTROL OPERATION.
13. **COMBINATION FIRE AND SMOKE DAMPERS**: MULTI-BLADE TYPE UNITS MEETING ALL REQUIREMENTS OF BOTH FIRE DAMPERS AND SMOKE DAMPERS SHALL BE USED WHERE SHOWN AND MAY BE USED AT THE CONTRACTOR'S OPTION WHERE APPLICABLE.
14. **GENERAL**: FACTORY FABRICATED, COMPLYING WITH NFPA 90A FOR CONNECTORS NOT PASSING THROUGH FLOORS OF BUILDINGS. FLEXIBLE DUCTS SHALL NOT PENETRATE ANY FIRE OR SMOKE BARRIER WHICH IS REQUIRED TO HAVE A FIRE RESISTANCE RATING OF ONE HOUR OR MORE. FLEXIBLE DUCT LENGTH SHALL NOT EXCEED 1.5 M (5 FEET). PROVIDE INSULATED ACOUSTICAL AIR DUCT CONNECTORS IN SUPPLY AIR DUCT SYSTEMS AND ELSEWHERE SHOWN.
15. MEAN TEMPERATURE AND PRESSURE DROP: FLEXIBLE DUCTS SHALL NOT PENETRATE ANY FIRE OR SMOKE BARRIER WHICH IS REQUIRED TO HAVE A FIRE RESISTANCE RATING OF ONE HOUR OR MORE. FLEXIBLE DUCT LENGTH SHALL NOT EXCEED 1.5 M (5 FEET). PROVIDE INSULATED ACOUSTICAL AIR DUCT CONNECTORS IN SUPPLY AIR DUCT SYSTEMS AND ELSEWHERE SHOWN.
16. NOT APPLICABLE
17. NOISE CRITERIA
18. NORMALLY CLOSED
19. NATURAL GAS
20. NATURAL GAS FLOW METER
21. NEWTON METER
22. NORMALLY OPEN
23. NATIONAL OCEANIC & ATMSPHERIC ADMINISTRATION
24. NON-STANDARD PART LOAD VALUE
25. NET POSITIVE SUCTION HEAD
26. NET POSITIVE SUCTION HEAD AVAILABLE
27. NET POSITIVE SUCTION HEAD REQUIRED
28. NOT TO SCALE
29. OUTSIDE AIR
30. OUTDOOR AIR DAMPER
31. OUTSIDE AIR GRILLE
32. OUTSIDE AIR INTAKE
33. OUTSIDE DIAMETER
34. OIL FLOWMETER
35. OPERATING ROOM
36. PUMP
37. PASCAL
38. PROPANE CONDENSATE
39. POUNDS PER CUBIC FOOT (FEET)
40. PRESSURE DROP
41. PROPELLER (TYPE) EXHAUST FAN
42. PRE FILTER
43. PRESSURE GAUGE
44. PROPYLENE GLYCOL-WATER (SOLUTION)
45. PREHEAT COIL
46. PARTS PER MILLION
47. PRESSURE REGULATING (VALVE) STATION
48. PRESSURE REGULATING VALVE
49. POUNDS PER SQUARE INCH
50. POUNDS PER SQUARE INCH - ABSOLUTE
51. POUNDS PER SQUARE INCH - GAUGE
52. PRIMARY SECONDARY SYSTEM
53. PRESSURE SAFETY VALVE
54. PACKAGED TERMINAL AIR CONDITIONER
55. RETURN OR EXHAUST
56. RETURN AIR
57. RETURN AIR DAMPER
58. RADIO FREQUENCY
59. ROTARY AIR HEAT EXCHANGER
60. RETURN AIR TEMPERATURE
61. REMOTE CONDENSER CHILLER
62. RECIPROCATING CHILLER UNIT
63. REFRIGERANT DISCHARGE
64. ROOM DATA SHEETS
65. RELIEF AIR
66. RETURN GRILLE
67. RELATIVE HUMIDITY
68. REHEAT COIL
69. REFRIGERANT HOT GAS
70. REFRIGERANT LIQUID LINE
71. RUN LOAD AMPS
72. REVERSE OSMOSIS
73. REVOLUTIONS PER MINUTE
74. RETURN REGISTER
75. REFRIGERANT SUCTION
76. ROOFTOP UNIT
77. RELIEF VALVE
78. SUPPLY AIR
79. SOUND ATTENUATING DEVICE
80. SUPPLY AIR TEMPERATURE
81. SHADING COEFFICIENT
82. STANDARD CUBIC FEET PER MINUTE
83. SPINAL CODE INJURY
84. SILICON CONTROLLED RECTIFIER
85. SMOKE DETECTOR
86. SUPPLY DIFFUSER
87. SCHEMATIC DESIGN (SUBMISSION 1)
88. SCHEMATIC DESIGN (SUBMISSION 2)
89. SMOKE DAMPER
90. SMOKE DAMPER (RETURN)
91. SMOKE DAMPER (SUPPLY)
92. SENSIBLE HEAT
93. SUPPLY FAN
94. SUPPLY AIR GRILLE
95. STEAM HUMIDIFIER
96. STEAM HEATING COIL
97. SQUARE INCHES
98. STATIC PRESSURE
99. SPECIFIC GRAVITY
100. SUPPLY PROCESS AND DISTRIBUTION
101. STEAM PRESSURE REDUCING VALVE
102. STATIC PRESSURE SENSOR
103. SQUARE FEET
104. SUPPLY AIR REGISTER
105. STAINLESS STEEL
106. STEAM TO STEAM HEAT EXCHANGER
107. SOLID SEPARATOR
108. STEAM TRAP
109. STEAM UNIT HEATER
110. STEAM PRESSURE REDUCING VALVE
111. STEAM VENT SILENCER
112. SOFT WATER
113. STEAM TO WATER HEAT EXCHANGER
114. TEMPERATURE AND PRESSURE CONTROL VALVE
115. TESTING, ADJUSTING, BALANCE
116. TEMPERATURE DIFFERENCE
117. TOTAL DYNAMIC HEAD
118. TOTAL DISOLVED SOLIDS
119. TRANSFER GRILLE
120. TRAP
121. TOP REGISTER
122. TOTAL STATIC PRESSURE
123. THERMOSTAT
124. TERMINAL UNIT
125. THRU-WALL UNIT
126. UNDERCUT
127. UNIT COOLER
128. UNIT HEATER
129. UNDERWRITERS LABORATORY
130. UPBLAST UNIT VENTILATOR
131. VALUE
132. VANE-AXIAL FAN
133. VARIABLE AIR VOLUME
134. VOLUME DAMPER (MANUAL, OPPOSED BLADE)
135. VARIABLE FREQUENCY DRIVE
136. VETERANS HEALTH ADMINISTRATION
137. VIBRATION ISOLATOR
138. VACUUM PUMP
139. VARIABLE PRIMARY SYSTEM
140. VACUUM (STEAM CONDENSATE) RETURN
141. VARIABLE SPEED DRIVE
142. VERTICAL UNIT HEATER
143. WATTS
144. WASTE ANESTHESIA GAS
145. WET BULB (TEMPERATURE)
146. WATER COOLED
147. WATER COOLED CHILLER
148. WATER COOLED CONDENSING UNIT
149. WATER COOLED HEAT PUMPS
150. WATER COOLED PACKAGED UNIT
151. WALL EXHAUST FAN
152. WATER FILTER
153. WATER FLOW CONTROL VALVE
154. WATER FLOWMETER
155. WATER FLOW MEASURING DEVICE
156. WATER GAUGE
157. WATER SIDE PRESSURE DROP
158. WATER SOURCE HEAT PUMP
159. YEAR

DUCTWORK SYMBOLS

UP / DN — SUPPLY DUCT

UP / DN — E

BOILER PLANT GENERAL NOTES - COMMON WORK RESULTS FOR BOILER PLANT AND STEAM GENERATION

A. **COMMON WORK RESULTS FOR BOILER PLANT AND STEAM GENERATION**

1. **GENERAL**

A. **SUBMITTALS**

1. SUBMITTALS, INCLUDING NUMBER OF REQUIRED COPIES, SHALL BE SUBMITTED IN ACCORDANCE WITH SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
2. INFORMATION AND MATERIAL SUBMITTED UNDER THIS SECTION SHALL BE MARKED 'SUBMITTED UNDER SECTION 23 05 10, COMMON WORK RESULTS FOR BOILER PLANT AND STEAM GENERATION', WITH APPLICABLE PARAGRAPH IDENTIFICATION.
3. ALL SUBMITTALS IN THESE SECTIONS ARE FOR EQUIPMENT AND MATERIALS THAT ARE INTERDEPENDENT PARTS OF THE ENTIRE SYSTEMS. THEREFORE, THEY SHALL ALL BE SUBMITTED AT THE SAME TIME AND COMPLETE INCLUDING COORDINATIONSHOP DRAWINGS, INSTALLATION INSTRUCTIONS, STRUCTURAL SUPPORT, AND STRUCTURAL PIPING CALCULATIONS SO THAT THEY MAY BE REVIEWED AS A SYSTEM. THE SUBMITTALS FOR EACH SECTION SHALL BE COVERED BY ONE INDIVIDUAL TRANSMITTAL SIGNED BY THE PRIME CONTRACTOR AND CONTAINING A STATEMENT THAT THE CONTRACTOR HAS FULLY REVIEWED ALL DOCUMENTS. DEVIATIONS FROM THE CONTRACT DOCUMENTS, IF ANY, SHALL BE LISTED ON THE TRANSMITTAL.
4. PHASED PROJECTS. SUBMIT COMPLETE SUBMITTALS AND TRANSMITTALS WITH MANPOWER LEVELS PRIOR TO COMMENCING WORK. THE PHASING PLAN SHALL BE DETAILED ENOUGH TO PROVIDE MILESTONES IN THE PROCESS THAT CAN BE VERIFIED.
5. TEST PLANS. SUBMIT SAFETY TEST PLAN FOR TEMPORARY STEAM PLANT WITH TEMPORARY STEAM PLANT SUBMITTALS. SUBMIT ALL OTHER TEST PLANS FOR PLANT AND EQUIPMENT 45 DAYS PRIOR TO START OF TESTING TO ALLOW FOR TEST MODIFICATIONS PRIOR TO START.
6. CONTRACTOR SHALL MAKE ALL NECESSARY FIELD MEASUREMENTS AND INVESTIGATIONS TO ASSURE THAT THE EQUIPMENT AND ASSEMBLIES WILL MEET CONTRACT REQUIREMENTS, AND ALL EQUIPMENT THAT REQUIRES REGULAR MAINTENANCE, CALIBRATION, ETC. ARE ACCESSIBLE FROM THE FLOOR OR PERMANENT WORK PLATFORM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ALL SUBMITTALS MEET THE SPECIFICATIONS AND REQUIREMENTS AND IT IS ASSUMED BY THE VA THAT ALL SUBMITTALS DO MEET THE VA SPECIFICATIONS UNLESS THE CONTRACTOR HAS REQUESTED A VARIANCE IN WRITING AND APPROVED BY COR PRIOR TO THE SUBMITTAL. IF AT ANY TIME DURING THE PROJECT IT IS FOUND THAT ANY ITEM DOES NOT MEET THE VA SPECIFICATIONS AND THERE WAS NO VARIANCE APPROVAL THE CONTRACTOR SHALL CORRECT AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT EVEN IF A SUBMITTAL WAS APPROVED.
7. IF EQUIPMENT IS SUBMITTED WHICH DIFFERS IN ARRANGEMENT FROM THAT SHOWN, PROVIDE DOCUMENTATION PROVING EQUIVALENT PERFORMANCE, DESIGN STANDARDS AND DRAWINGS THAT SHOW THE REARRANGEMENT OF ALL ASSOCIATED SYSTEMS. ADDITIONALLY, ANY IMPACTS ON ANCILLARY EQUIPMENT OR SERVICES SUCH AS FOUNDATIONS, PIPING, AND ELECTRICAL SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DESIGN, SUPPLY AND INSTALL AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT. VA APPROVAL WILL BE GIVEN ONLY IF ALL FEATURES OF THE EQUIPMENT AND ASSOCIATED SYSTEMS, INCLUDING ACCESSIBILITY, ARE EQUIVALENT TO THAT REQUIRED BY THE CONTRACT.

B. **COORDINATION / SHOP DRAWINGS**

1. SUBMIT COMPLETE CONSOLIDATED AND COORDINATED SHOP DRAWINGS FOR ALL NEW SYSTEMS, AND FOR EXISTING SYSTEMS THAT ARE IN THE SAME AREAS.
2. DO NOT INSTALL EQUIPMENT FOUNDATIONS, EQUIPMENT OR PIPING UNTIL COORDINATIONSHOP DRAWINGS HAVE BEEN APPROVED.
3. IN ADDITION, FOR HVAC SYSTEMS, PROVIDE DETAILS OF THE FOLLOWING:
4. MECHANICAL EQUIPMENT ROOMS.
5. HANGERS, INSERTS, SUPPORTS, AND BRACING.

C. **PIPE SLEEVES**

1. DUCT OR EQUIPMENT PENETRATIONS OF FLOORS, WALLS, CEILINGS, OR ROOFS.

D. MANUFACTURER'S LITERATURE AND DATA

1. MANUFACTURER'S LITERATURE AND DATA: INCLUDE FULL ITEM DESCRIPTION AND OPTIONAL FEATURES AND ACCESSORIES. MAINTAINING SAID DEVICES LOCATE AND POSITION THERMOME STATIONS, STANDARD COMPLIANCE, MODEL NUMBERS, SIZE, AND CAPACITY. SUBMIT UNDER THE PERTINENT SECTION RATHER THAN UNDER THIS SECTION.

E. **RIGGING PLAN**

1. RIGGING PLAN: PROVIDE DOCUMENTATION OF THE CAPACITY AND WEIGHT OF THE RIGGING AND EQUIPMENT INTENDED TO BE USED. THE RIGGING PLAN SHALL INCLUDE THE PATH OF TRAVEL OF THE LOAD, THE STAGING AREA AND INTENDED ACCESS, AND QUALIFICATIONS OF THE OPERATOR AND SIGNAL PERSON.

F. **MAINTENANCE DATA AND OPERATING INSTRUCTIONS**

1. COMPLETE OPERATING AND MAINTENANCE MANUALS INCLUDING WIRING DIAGRAMS, TECHNICAL DATA SHEETS, INFORMATION FOR ORDERING REPLACEMENT PARTS, AND TROUBLESHOOTING GUIDE:

G. **BOILER PLANT MAINTENANCE DATA AND OPERATING INSTRUCTIONS**

1. MANUFACTURER'S INSTALLATION, MAINTENANCE, REPAIR, AND OPERATION INSTRUCTIONS FOR EACH DEVICE. INCLUDE ASSEMBLY DRAWINGS AND PARTS LISTS. INCLUDE OPERATING PRECAUTIONS AND REASONS FOR PRECAUTIONS.
2. SCHEMATIC DIAGRAMS AND WIRING DIAGRAMS OF ALL CONTROL SYSTEMS CORRECTED TO INCLUDE ALL FIELD MODIFICATIONS.
3. DESCRIPTION OF BOILER FIRING AND OPERATING SEQUENCE INCLUDING DESCRIPTION OF RELAY AND INTERLOCK POSITIONS AT EACH PART OF THE SEQUENCE.
4. CONTROL SYSTEM PROGRAMMING INFORMATION FOR PARAMETERS. SUCH AS SET POINTS, THAT DO NOT REQUIRE SERVICES OF AN EXPERIENCED TECHNICIAN.
5. STEP-BY-STEP WRITTEN INSTRUCTIONS THAT ARE SPECIFIC FOR THE SYSTEM INSTALLED ON TESTING ALL SAFETY DEVICES. THE INSTRUCTIONS SHOULD BE IN THE SAME FORMAT AND IN COMPLIANCE AND EQUIVALENT TO THE VHA BOILER PLANT SAFETY DEVICES TESTING MANUAL FOR EACH TEST. ALL SAFETY DEVICES LISTED IN THE MANUAL SHALL BE TESTED AND DOCUMENTATION PROVIDED CERTIFYING COMPLETION.

H. **QUALITY ASSURANCE**

1. MECHANICAL, ELECTRICAL AND ASSOCIATED SYSTEMS SHALL BE SAFE, RELIABLE, EFFICIENT, DURABLE, EASILY AND SAFELY OPERABLE AND MAINTAINABLE, EASILY AND SAFELY ACCESSIBLE, AND IN COMPLIANCE WITH APPLICATION OF CODES AS SPECIFIED. ALL VA SAFETY DEVICE REQUIREMENTS SHALL BE COMPLIED WITH REGARDLESS OF THE SIZE, TYPE, OR OPERATING PRESSURE OF BOILER TO INCLUDE CONDENSING BOILERS, HOT WATER BOILERS FOR HEATING SYSTEMS, AS DEFINED IN THE VHA BOILER PLANT SAFETY DEVICES TESTING MANUAL. THE SYSTEMS SHALL BE COMPRISED OF HIGH QUALITY INSTITUTIONAL-CLASS AND INDUSTRIAL-CLASS PRODUCTS OF MANUFACTURERS THAT ARE EXPERIENCED SPECIALISTS IN THE REQUIRED PRODUCT LINES. ALL CONSTRUCTION FIRMS AND PERSONNEL SHALL BE EXPERIENCED AND QUALIFIED SPECIALISTS IN INDUSTRIAL AND INSTITUTIONAL HVAC OR STEAM BOILER PLANT CONSTRUCTION, AS APPLICABLE.

I. **NAMEPLATES:**

1. NAMEPLATE BEARING MANUFACTURER'S NAME OR IDENTIFIABLE TRADEMARK SHALL BE SECURELY AFFIXED IN A CONSPICUOUS PLACE ON EQUIPMENT, OR NAME OR TRADEMARK CAST INTEGRALLY WITH EQUIPMENT. STAMPED OR OTHERWISE PERMANENTLY MARKED ON EACH ITEM OF EQUIPMENT.

J. **BOILER PLANT EQUIPMENT SERVICE PROVIDERS:**

1. SERVICE PROVIDERS SHALL BE AUTHORIZED AND TRAINED BY THE MANUFACTURERS OF THE EQUIPMENT SUPPLIED. THESE PROVIDERS SHALL BE CAPABLE OF RESPONDING ONSITE AND PROVIDE ACCEPTABLE SERVICE TO RESTORE BOILER PLANT OPERATIONS WITHIN //4// // HOURS OF RECEIPT OF NOTIFICATION BY PHONE, E-MAIL OR FAX IN EVENT OF AN EMERGENCY. SUCH AS THE SHUTDOWN OF EQUIPMENT, OR WITHIN //24// // HOURS IN A NON-EMERGENCY. SUBMIT NAMES, MAIL AND E-MAIL ADDRESSES AND PHONE NUMBERS OF SERVICE PERSONNEL AND COMPANIES PROVIDING SERVICE UNDER THESE CONDITIONS FOR (AS APPLICABLE TO THE PROJECT): BURNERS, BURNER CONTROL SYSTEMS, BOILER CONTROL SYSTEMS, PUMPS, CRITICAL INSTRUMENTATION, COMPUTER WORKSTATION AND PROGRAMMING.

K. **EXECUTION (INSTALLATION, CONSTRUCTION) QUALITY:**

1. APPLY AND INSTALL ALL ITEMS IN ACCORDANCE WITH MANUFACTURERS WRITTEN INSTRUCTIONS. REFER CONFLICTS BETWEEN THE MANUFACTURER'S INSTRUCTIONS AND THE CONTRACT DOCUMENTS TO THE COR FOR RESOLUTION. PROVIDE WRITTEN HARD COPIES AND COMPUTER FILES ON CD OR DVD OF MANUFACTURER'S INSTALLATION INSTRUCTIONS TO THE COR WITH SUBMITTALS PRIOR TO COMMENCING INSTALLATION OF ANY ITEM. INSTALLATION OF THE ITEM WILL NOT BE ALLOWED TO PROCEED UNTIL THE RECOMMENDATIONS ARE RECEIVED AND APPROVED BY VA. FAILURE TO FURNISH THESE RECOMMENDATIONS IS A CAUSE FOR REJECTION OF THE MATERIAL.
2. SPEC WRITER NOTE: FOR BOILER PLANT PROJECTS, COPY PARAGRAPH 2 BELOW ONTO THE 'MP' SCHEDULE SHEET CONTRACT DRAWING.
3. ALL ITEMS THAT REQUIRE ACCESS, SUCH AS FOR OPERATING, CLEANING, SERVICING, MAINTENANCE, AND CALIBRATION, SHALL BE EASILY AND SAFELY ACCESSIBLE BY PERSONS STANDING AT FLOOR LEVEL OR STANDING ON PERMANENT PLATFORMS, WITHOUT THE USE OF PORTABLE LADDERS. EXAMPLES OF THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO: ALL TYPES OF VALVES, FILTERS AND STRAINERS, TRANSMITTERS, CONTROL DEVICES. PRIOR TO COMMENCING INSTALLATION WORK, REFER CONFLICTS BETWEEN THIS REQUIREMENT AND CONTRACT DOCUMENTS TO THE COR FOR RESOLUTION. FAILURE OF THE CONTRACTOR TO RESOLVE, OR REPORT OUT ANY ISSUES WILL RESULT IN THE CONTRACTOR CORRECTING AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT.
4. COMPLETE COORDINATIONSHOP DRAWINGS SHALL BE REQUIRED IN ACCORDANCE WITH PARAGRAPH, SUBMITTALS. CONSTRUCTION WORK SHALL NOT START ON ANY SYSTEM UNTIL THE COORDINATIONSHOP DRAWINGS HAVE BEEN APPROVED BY VA.
5. WORKMANSHIP/CRAFTSMANSHIP WILL BE OF THE HIGHEST QUALITY AND STANDARDS. THE VA RESERVES THE RIGHT TO REJECT ANY WORK BASED ON POOR QUALITY OF WORKMANSHIP THIS WORK SHALL BE REMOVED AND DONE OVER AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT.

L. **DELIVERY, STORAGE AND HANDLING**

1. EQUIPMENT AND MATERIAL PLACED ON THE JOB SITE SHALL REMAIN IN THE CUSTODY OF THE CONTRACTOR UNTIL PHASED ACCEPTANCE, WHETHER OR NOT THE GOVERNMENT HAS REIMBURSED THE CONTRACTOR FOR THE EQUIPMENT AND MATERIAL. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE PROTECTION OF SUCH EQUIPMENT AND MATERIAL AGAINST ANY DAMAGE OR THEFT.
2. LARGE EQUIPMENT SUCH AS BOILERS, TANKS, ECONOMIZERS, HEAT EXCHANGERS, AND FANS IF SHIPPED ON OPEN TRAILER TRUCKS SHALL BE COVERED WITH SHRINK ON PLASTICS OR WATER PROOF TARPAULINS THAT PROVIDE PROTECTION FROM EXPOSURE TO RAIN, ROAD SALTS AND OTHER TRANSIT HAZARDS. PROTECTION SHALL BE KEPT IN PLACE UNTIL EQUIPMENT IS MOVED INTO A BUILDING OR INSTALLED AS DESIGNED.
3. EXISTING EQUIPMENT AND PIPING BEING WORKED ON BY THE CONTRACTOR SHALL BE UNDER THE CUSTODY AND RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE PROTECTED AS REQUIRED FOR NEW WORK.
4. PROTECT PLASTIC PIPING AND TANKS FROM ULTRAVIOLET LIGHT (SUNLIGHT).
5. EXERCISE CARE IN STORAGE AND HANDLING OF EQUIPMENT AND PIPING MATERIAL TO BE INCORPORATED IN THE WORK. REMOVE DEBRIS ARISING FROM CUTTING, THREADING AND WELDING OF PIPING.
6. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ALL COSTS, DAMAGE, AND DELAY ARISING FROM FAILURE TO PROVIDE CLEAN SYSTEMS.

M. **AS-BUILT DOCUMENTATION**

1. THE INSTALLING CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS OF EACH COMPLETED PHASE FOR VERIFICATION, AND, SHALL PROVIDE THE COMPLETE SET AT THE TIME OF FINAL SYSTEMS CERTIFICATION TESTING. SHOULD THE INSTALLING CONTRACTOR ENGAGE THE TESTING COMPANY TO PROVIDE AS-BUILT, FOR ANY INFORMATION THEREOF, IT SHALL NOT BE DEEMED A CONFLICT OF INTEREST OR BREACH OF THE 'THIRD PARTY TESTING COMPANY' REQUIREMENT. PROVIDE RECORD DRAWINGS AS FOLLOWS:
2. //RED-LINED. HAND-MARKED DRAWINGS ARE TO BE PROVIDED, WITH ONE PAPER COPY AND A SCANNED PDF VERSION OF THE HAND-MARKED DRAWINGS PROVIDED ON CD //DVD//.
3. //AS-BUILT DRAWINGS ARE TO BE PROVIDED, WITH A COPY OF THEM ON AUTOCAD VERSION // // PROVIDED ON CD //DVD//. THE CAD DRAWINGS SHALL USE MULTIPLE LINE LAYERS WITH A SEPARATE INDIVIDUAL LAYER FOR EACH SYSTEM.//
4. //AS-BUILT DRAWINGS ARE TO BE PROVIDED, WITH A COPY OF THEM IN THREE-DIMENSIONAL BUILDING INFORMATION MODELING (BIM) SOFTWARE VERSION // // PROVIDED ON CD //DVD//.
5. THE AS-BUILT DRAWINGS SHALL INDICATE THE LOCATION AND TYPE OF ALL LOCKOUT/TAGOUT POINTS FOR ALL ENERGY SOURCES FOR ALL EQUIPMENT AND PUMPS TO INCLUDE BREAKER LOCATION AND NUMBERS, VALVE TAG NUMBERS, ETC. COORDINATE LOCKOUT/TAGOUT PROCEDURES AND PRACTICES WITH LOCAL VA REQUIREMENTS.

N. **JOB CONDITIONS – WORK IN EXISTING BOILER PLANT**

1. MAINTENANCE OF STEAM SUPPLY AND CONDENSATE RETURN SERVICE: SCHEDULE ALL WORK TO PERMIT CONTINUOUS STEAM AND CONDENSATE SERVICE AT PRESSURES AND FLOW RATES AS REQUIRED BY THE VAMC. AT ALL TIMES, THERE SHALL BE ONE SPARE BOILER AVAILABLE AND ONE SPARE PUMP FOR EACH SERVICE AVAILABLE. IN ADDITION TO THOSE REQUIRED FOR SERVING THE LOAD DEMAND. THE SPARE BOILER AND PUMPS MUST BE CAPABLE OF HANDLING THE LOADS THAT MAY BE IMPOSED IF THE OPERATING BOILER OR PUMP FAILS.
2. STEAM AND CONDENSATE SERVICE INTERRUPTIONS: LIMITED STEAM AND CONDENSATE SERVICE INTERRUPTIONS, AS REQUIRED FOR INTERCONNECTIONS OF NEW AND EXISTING SYSTEMS, WILL BE PERMITTED BY THE COR DURING PERIODS WHEN THE STEAM DEMANDS ARE NOT CRITICAL TO THE OPERATION OF THE VAMC. THESE NON-CRITICAL PERIODS ARE LIMITED TO BETWEEN 8 PM AND 5 AM DURING THE NON-HEATING SEASON. PROVIDE AT LEAST 10 WORKING DAYS ADVANCE NOTICE TO THE COR. THE REQUEST SHALL INCLUDE A DETAILED PLAN ON THE PROPOSED SHUTDOWN AND THE INTENDED WORK TO BE DONE ALONG WITH MANPOWER LEVELS. ALL EQUIPMENT AND MATERIALS MUST BE ON SITE AND VERIFIED WITH PLAN //5// // // DAYS PRIOR TO THE SHUTDOWN OR IT WILL NEED TO BE RESCHEDULED.
3. PLANT WORKING ENVIRONMENT: MAINTAIN THE ARCHITECTURAL AND STRUCTURAL INTEGRITY OF THE PLANT BUILDING AND THE WORKING ENVIRONMENT AT ALL TIMES. MAINTAIN THE INTERIOR OF PLANT AT 18 DEGREES C (65 DEGREES F) MINIMUM. LIMIT THE OPENING OF DOORS, WINDOWS OR OTHER ACCESS OPENINGS TO BRIEF PERIODS AS NECESSARY FOR RIGGING PURPOSES. STORM WATER OR GROUND WATER LEAKAGE IS PROHIBITED. PROVIDE DAILY CLEAN-UP OF CONSTRUCTION AND DEMOLITION DEBRIS ON ALL FLOOR SURFACES AND ON ALL EQUIPMENT BEING OPERATED BY VA. MAINTAIN ALL EGRESS ROUTES AND SAFETY SYSTEMS/DEVICES.

2. **PRODUCTS**

A. **GENERAL**

1. EQUIPMENT AND COMPONENTS OF EQUIPMENT SHALL BEAR MANUFACTURER'S NAME AND TRADEMARK, MODEL NUMBER, SERIAL NUMBER AND PERFORMANCE DATA ON A NAMEPLATE SECURELY AFFIXED IN A CONSPICUOUS PLACE, OR CAST INTEGRAL WITH, STAMPED OR OTHERWISE PERMANENTLY MARKED UPON THE COMPONENTS OF THE EQUIPMENT.

B. **TEMPORARY BOILER PLANT INSTALLATION**

1. PROVIDE TEMPORARY FACILITIES TO REPLACE ALL FUNCTIONS OF THE EXISTING BOILER PLANT DURING THE CONSTRUCTION PERIOD. TEMPORARY FACILITIES MUST REMAIN IN OPERATION UNTIL ALL NEW FACILITIES ARE ACCEPTED FOR BENEFICIAL USE. TEMPORARY FACILITIES SHALL PROVIDE SAME QUALITY AND CAPACITY OF SERVICE AS EXISTING FACILITIES.
2. REFER TO CONTRACT DOCUMENTS FOR ARRANGEMENT AND LOCATION OF TEMPORARY FACILITIES AND FOR EQUIPMENT FOOTPRINTS REQUIREMENTS.
3. REMOVE ALL TEMPORARY FACILITIES FROM GOVERNMENT PROPERTY AFTER FINAL USE. PROVIDE COR 10 WORKING DAYS ADVANCE NOTICE PRIOR TO REMOVAL.

C. **REPAIRS AND MAINTENANCE:**

1. CONTRACTOR SHALL FURNISH LABOR AND MATERIAL FOR ALL REPAIRS AND SAFETY DEVICE TESTING AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT. MALFUNCTIONS THAT REDUCE THE STEAM SUPPLY TO THE FACILITY SHALL BE REPAIRED WITHIN 4 HOURS OF NOTICE. OTHER REPAIRS SHALL BE ACCOMPLISHED WITHIN 24 HOURS OF NOTICE. PERFORM MAINTENANCE REQUIRING STANDARD TOOLS AND SUPPLIES AND LESS THAN ONE MAN-HOUR PER DAY WILL BE PERFORMED BY THE GOVERNMENT. CLEANING MADE NECESSARY BY GOVERNMENT OPERATION WILL BE PERFORMED BY THE GOVERNMENT.

D. **FIRESTOPPING**

1. SECTION 07 84 00, FIRESTOPPING RECOGNIZES AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FIRE, SMOKE AND GASES WHERE PENETRATIONS OCCUR FOR PIPING AND DUCTWORK. REFER TO SECTION 23 07 11, HVAC AND BOILER PLANT INSULATION, FOR FIRESTOP PIPE AND DUCT INSULATION.

E. **PENETRATIONS**

1. PROVIDE CURBS FOR ROOF MOUNTED PIPING, DUCTWORK AND EQUIPMENT. CURBS SHALL BE 457 MM 18 INCHES) HIGH WITH CONTINUOUSLY WELDED SEAMS, BUILT-IN CANT STRIP, INTERIOR BAFFLE WITH ACOUSTIC INSULATION, CURB BOTTOM, HINGED CURB ADAPTER.
2. PROVIDE FIRESTOPPING FOR OPENINGS THROUGH FIRE AND SMOKE BARRIERS. MAINTAINING MINIMUM REQUIRED RATING OF FLOOR, CEILING OR WALL ASSEMBLY. SEE SECTION 07 84 00, FIRESTOPPING.

3. **EXECUTION**

A. **GENERAL**

1. IF AN INSTALLATION IS UNSATISFACTORY TO THE COR, THE CONTRACTOR SHALL CORRECT THE INSTALLATION AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT.
2. ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING
   LOCATION OF PIPING, SLEEVES, INSERTS, HANGERS, AND EQUIPMENT, ACCESS PROVISIONS SHALL BE COORDINATED WITH THE WORK OF ALL TRADES. THE COORDINATIONSHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW. LOCATE PIPING, SLEEVES, INSERTS, HANGERS, DUCTWORK AND EQUIPMENT CLEAR OF WINDOWS, DOORS, OPENINGS, LIGHT OUTLETS, AND OTHER SERVICES AND UTILITIES. EQUIPMENT COORDINATIONSHOP DRAWINGS SHALL BE PREPARED TO COORDINATE PROPER LOCATION AND PERSONNEL ACCESS OF ALL FACILITIES. THE DRAWINGS SHALL BE SUBMITTED FOR REVIEW. FOLLOW MANUFACTURER'S PUBLISHED RECOMMENDATIONS FOR INSTALLATION METHODS NOT OTHERWISE SPECIFIED.
4. OPERATING PERSONNEL ACCESS AND OBSERVATION PROVISIONS: SELECT AND ARRANGE THE EQUIPMENT AND SYSTEMS TO PROVIDE CLEAR VIEW AND EASY ACCESS, WITHOUT USE OF PORTABLE LADDERS, FOR MAINTENANCE AND OPERATION OF ALL DEVICES INCLUDING, BUT NOT LIMITED TO: ALL EQUIPMENT ITEMS, VALVES, FILTERS, STRAINERS, TRANSMITTERS, SENSORS, CONTROL DEVICES. ALL GAUGES AND INDICATORS SHALL BE CLEARLY VISIBLE BY PERSONNEL STANDING ON THE FLOOR OR ON PERMANENT PLATFORMS. DO NOT REDUCE OR CHANGE MAINTENANCE AND OPERATING SPACE AND ACCESS PROVISIONS THAT ARE SHOWN ON THE CONTRACT DOCUMENTS.
5. BOILER AND ECONOMIZER ACCESS PLATFORMS: ARRANGE PIPING AND EQUIPMENT TO ALLOW ACCESS BY A PERSON STANDING ON THE PLATFORMS TO ALL VALVES LOCATED ABOVE THE BOILERS, TO BOILER MANWAYS LOCATED ON TOP OF THE BOILERS, AND TO ALL ECONOMIZER VALVES AND ACCESS PANELS.
6. BOILER AND ECONOMIZER ACCESS PLATFORMS: ARRANGE PIPING AND EQUIPMENT TO ALLOW ACCESS BY A PERSON STANDING ON THE PLATFORMS TO ALL VALVES LOCATED ABOVE THE BOILERS, TO BOILER MANWAYS LOCATED ON TOP OF THE BOILERS, AND TO ALL ECONOMIZER VALVES AND ACCESS PANELS.
7. EQUIPMENT AND PIPING SUPPORT: COORDINATE STRUCTURAL SYSTEMS NECESSARY FOR PIPE AND EQUIPMENT SUPPORT WITH PIPE AND EQUIPMENT LOCATIONS TO PERMIT PROPER INSTALLATION.
8. LOCATION OF PIPE SLEEVES, TRENCHES AND CHASES SHALL BE ACCURATELY COORDINATED WITH EQUIPMENT AND PIPING LOCATIONS.

B. **CUTTING HOLES:**

1. CUT HOLES THROUGH CONCRETE AND MASONRY BY ROTARY CORE DRILL. PNEUMATIC HAMMER, IMPACT ELECTRIC, AND HAND OR MANUAL HAMMER TYPE DRILL IS PROHIBITED, EXCEPT AS PERMITTED BY COR WHERE WORKING AREA SPACE IS LIMITED.
2. LOCATE HOLES TO AVOID INTERFERENCE WITH STRUCTURAL MEMBERS SUCH AS SLABS, COLUMNS, RIBS, BEAMS OR REINFORCING. HOLES SHALL BE LAID OUT IN ADVANCE AND DRILLING DONE ONLY AFTER APPROVAL BY COR. IF THE CONTRACTOR CONSIDERS IT NECESSARY TO DRILL THROUGH STRUCTURAL MEMBERS, THIS MATTER SHALL BE REFERRED TO COR FOR APPROVAL.
3. DO NOT PENETRATE MEMBRANE WATERPROOFING.

C. **MINOR PIPING:**

1. GENERALLY, SMALL DIAMETER PIPE RUNS FROM DRIPS AND DRAINS, WATER COOLING, AND OTHER SERVICE ARE NOT SHOWN BUT MUST BE PROVIDED.

D. **ELECTRICAL INTERCONNECTION OF INSTRUMENTATION OR CONTROLS**

1. THIS GENERALLY NOT SHOWN BUT MUST BE PROVIDED. THIS INCLUDES INTERCONNECTIONS OF SENSORS, TRANSMITTERS, TRANSDUCERS, CONTROL DEVICES, CONTROL AND INSTRUMENTATION PANELS, INSTRUMENTS AND COMPUTER WORKSTATIONS. DEVICES SHALL BE LOCATED SO THEY ARE EASILY ACCESSIBLE FOR TESTING, MAINTENANCE, CALIBRATION, ETC. THE COR HAS THE FINAL DECISION ON WHAT IS ACCESSIBLE AND WHAT IS NOT. COMPLY WITH NFPA 70.

E. **CONCRETE AND GROUT:**

1. USE CONCRETE AND NON-SHRINK GROUT 3,000 PSIG MINIMUM, SPECIFIED IN SECTION 03 30 00, CAST-IN-PLACE CONCRETE.

F. INSTALL GAUGES, THERMOMETERS, VALVES AND OTHER DEVICES WITH DUE REGARD FOR EASE IN READING OR OPERATING AND MAINTAINING SAID DEVICES. LOCATE AND POSITION THERMOME STATIONS AND GAUGES TO BE EASILY READ BY OPERATOR OR STAFF STANDING ON FLOOR OR WALKWAY PROVIDED. SERVICING SHALL NOT REQUIRE DISMANTLING ADJACENT EQUIPMENT OR PIPE WORK.

G. **WORK IN EXISTING BUILDING:**

1. PERFORM AS SPECIFIED IN PARAGRAPH, OPERATIONS AND STORAGE AREAS, PARAGRAPH, ALTERATIONS, AND PARAGRAPH, RESTORATION OF THE SECTION 01 00 00, GENERAL REQUIREMENTS
2. RELOCATION OF EXISTING EQUIPMENT: ALTERATIONS AND RESTORATION OF EXISTING BUILDING(S)
2. AS SPECIFIED IN SECTION 01 00 00, GENERAL REQUIREMENTS, PARAGRAPH, OPERATIONS AND STORAGE AREAS, MAKE ALTERATIONS TO EXISTING SERVICE PIPING AT TIMES THAT WILL LEAST INTERFERE WITH NORMAL OPERATION OF THE FACILITY.

H. **SWITCHGEAR/ELECTRICAL EQUIPMENT DRIP PROTECTION**

1. EVERY EFFORT SHALL BE MADE TO ELIMINATE THE INSTALLATION OF PIPE ABOVE ELECTRICAL AND DATA/TELEPHONE SWITCHGEAR. IF THIS IS NOT POSSIBLE, ENCASE PIPE IN A SECOND PIPE WITH A MINIMUM OF JOINTS. INSTALLATION OF PIPING, DUCTWORK, LADDER TYPE PROTECTION APPARATUS OR OTHER INSTALLATIONS FOREIGN TO THE ELECTRICAL INSTALLATION SHALL NOT BE LOCATED IN THE SPACE EQUAL TO THE WIDTH AND DEPTH OF THE EQUIPMENT AND EXTENDING FROM TO A HEIGHT OF 1.8 M (6 FEET) ABOVE THE EQUIPMENT OR TO CEILING STRUCTURE, WHICHEVER IS LOWER (NFPA 70).

I. **INACCESSIBLE EQUIPMENT:**

1. WHERE THE GOVERNMENT DETERMINES THAT THE CONTRACTOR HAS INSTALLED EQUIPMENT NOT CONVENIENTLY ACCESSIBLE FOR OPERATION AND MAINTENANCE OR INSPECTIONS, EQUIPMENT SHALL BE RELOCATED TO BE READILY ACCESSIBLE OR REMEDIAL ACTION PERFORMED AS DIRECTED AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT.
2. THE TERM "CONVENIENTLY ACCESSIBLE" IS DEFINED AS CAPABLE OF BEING REACHED WITHOUT THE USE OF LADDERS, OR WITHOUT CLIMBING OR CRAWLING UNDER OR OVER OBSTACLES SUCH AS, BUT NOT LIMITED TO MOTORS, FANS, PUMPS, BELT GUARDS, TRANSFORMERS, HIGH VOLTAGE LINES, CONDUIT AND RACEWAYS, PIPING, HOT SURFACES, AND DUCTWORK. THE COR HAS FINAL DETERMINATION ON WHETHER AN INSTALLATION MEETS THIS REQUIREMENT OR NOT.

J. **TEMPORARY PIPING AND EQUIPMENT**

1. CONTINUITY OF OPERATION OF EXISTING FACILITIES WILL GENERALLY REQUIRE TEMPORARY INSTALLATION OF PIPING AND OTHER EQUIPMENT.
2. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED FACILITIES IN ACCORDANCE WITH THE REQUIREMENTS OF PHASED CONSTRUCTION AND MAINTENANCE OF SERVICE. ALL PIPING AND EQUIPMENT SHALL BE PROPERLY SUPPORTED, SLOPED TO DRAIN, OPERATE WITHOUT EXCESSIVE STRESS, AND SHALL BE INSULATED WHERE INJURY CAN OCCUR TO PERSONNEL BY CONTACT WITH OPERATING FACILITIES. THE REQUIREMENTS OF PARAGRAPH, ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING APPLY.
3. TEMPORARY FACILITIES AND PIPING SHALL BE COMPLETELY REMOVED AND ANY OPENINGS IN STRUCTURES SEALED. PROVIDE NECESSARY BLIND FLANGES AND CAPS TO SEAL OPEN PIPING REMAINING IN SERVICE.

K. **RIGGING**

1. CLOSE ALL OPENINGS IN THE BUILDING WHEN NOT REQUIRED FOR RIGGING OPERATIONS TO MAINTAIN PROPER ENVIRONMENT IN THE FACILITY FOR GOVERNMENT OPERATION AND MAINTENANCE OF SERVICE.
2. CONTRACTOR SHALL PROVIDE ALL FACILITIES REQUIRED TO DELIVER SPECIFIED EQUIPMENT AND PLACE ON FOUNDATIONS. ATTACHMENTS TO STRUCTURES FOR RIGGING PURPOSES AND SUPPORT OF EQUIPMENT ON STRUCTURES SHALL BE CONTRACTOR'S FULL RESPONSIBILITY. UPON REQUEST, THE GOVERNMENT WILL CHECK STRUCTURE ADEQUACY AND ADVISE CONTRACTOR OF RECOMMENDED RESTRICTIONS.
3. CONTRACTOR SHALL CHECK ALL CLEARANCES, WEIGHT LIMITATIONS AND SHALL OFFER A RIGGING PLAN DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER. ALL MODIFICATIONS TO STRUCTURES, INCLUDING REINFORCEMENT THEREOF, SHALL BE AT CONTRACTOR'S COST, TIME AND RESPONSIBILITY.
4. RESTORE BUILDING TO ORIGINAL CONDITION UPON COMPLETION OF RIGGING WORK.

L. **PIPE AND EQUIPMENT SUPPORTS**

1. WHERE HANGER SPACING DOES NOT CORRESPOND WITH JOIST OR RIB SPACING, USE STRUCTURAL STEEL CHANNELS DESIGNED BY A STRUCTURAL ENGINEER, SECURED DIRECTLY TO JOIST AND RIB STRUCTURE THAT WILL CORRESPOND TO THE REQUIRED HANGER SPACING, AND THEN SUSPEND THE ADJUSTMENT AND PIPING FROM THE CHANNELS. DRILL OR BURN HOLES IN STRUCTURAL STEEL ONLY WITH THE PRIOR APPROVAL OF THE COR.
2. USE OF CHAIN PIPE SUPPORTS, WIRE OR STRAP HANGERS, WOOD FOR BLOCKING, STAYS AND BRACING, OR, HANGERS SUSPENDED FROM PIPING ABOVE ARE PROHIBITED. REPLACE OR THOROUGHLY CLEAN RUSTY PRODUCTS AND PAINT WITH ZINC PRIMER.
3. HANGER RODS SHALL BE USED THAT ARE STRAIGHT AND VERTICAL. TURNBUCKLES FO

BOILER PLANT GENERAL NOTES - BOILER PLANT MECHANICAL EQUIPMENT

B. BOILER PLANT MECHANICAL EQUIPMENT

1. **GENERAL**

A. **SUBMITTALS**

B. **FEEDWATER DEAERATOR WITH STORAGE TANK AND ACCESSORIES:**

1. DRAWINGS SHOWING ARRANGEMENT AND OVERALL DIMENSIONS OF FEEDWATER DEARATOR INCLUDING STORAGE TANK. SHOW LOCATIONS OF TANK-MOUNTED DEVICES. SHOW LOCATIONS AND SIZES OF PIPE CONNECTIONS AND ACCESS OPENINGS. SHOW DESIGN OF ALL SHELL, HEAD AND NOZZLE WELDS. ACCESS PLATFORMS AS REQUIRED FOR ALL MAINTENANCE AND INSPECTION POINTS.
2. CATALOG DATA, DRAWINGS AND SPECIFICATION SHEETS SHOWING DESIGN AND CONSTRUCTION OF FEEDWATER DEARATOR, STORAGE TANK, RECYCLE PUMPS, WATER FLOW CONTROL VALVES, SAFETY VALVE, OVERFLOW CONTROL VALVE, WATER LEVEL AND OVERFLOW CONTROLS SYSTEMS, VENT ORIFICE, VACUUM BREAKER, ALARM SWITCHES AND ALL ACCESSORIES.
3. DESIGN FLOW CAPACITY, OXYGEN REMOVAL RATE, AND OTHER PERFORMANCE DATA AND PRESSURE AND TEMPERATURE LIMITATIONS OF FEEDWATER DEAERATOR, RECYCLE PUMPS, WATER FLOWLEVEL CONTROL VALVE AND CONTROL

C. **CONDENSATE STORAGE TANK AND ACCESSORIES:**

1. DRAWINGS SHOWING ARRANGEMENT AND OVERALL DIMENSIONS OF TANK AND SUPPORTS. SHOW LOCATIONS AND SIZES OF ALL PIPE CONNECTIONS AND ACCESS OPENINGS. ACCESS PLATFORMS AS REQUIRED FOR MAINTENANCE AND INSPECTIONS AND OPERATION OF THE EQUIPMENT OR PARTS THEREOF.
2. DESIGN AND CONSTRUCTION (INCLUDING PRESSURE AND TEMPERATURE LIMITATIONS) OF TANK, CONTINUOUS BLOWDOWN HEAT EXCHANGER (IF PROVIDED), CONTROL VALVES, WATER LEVEL CONTROL SYSTEM, LEVEL ALARM SWITCHES AND ALL ACCESSORIES, TO INCLUDE LOCKOUT/TAGOUT POINTS.
3. PERFORMANCE DATA ON CONTROL VALVES AND CONTINUOUS BLOWDOWN HEAT EXCHANGER (IF PROVIDED). REFER TO DRAWINGS (SCHEDULES) FOR REQUIREMENTS.
4. INTERIOR COATING: MATERIAL SPECIFICATION, SERVICE LIMITATIONS, INSTRUCTIONS FOR APPLICATION, EXPERIENCE RECORD UNDER THE REQUIRED SERVICE CONDITIONS.

D. **BLOWOFF TANK AND ACCESSORIES: FLASH TANK:**

1. DRAWING SHOWING OUTLINE DIMENSIONS, ARRANGEMENT AND WEIGHT OF TANK AND ACCESSORIES. LOCATIONS AND SIZES OF ALL PIPE CONNECTIONS AND ACCESS OPENINGS.
2. DESIGN AND CONSTRUCTION OF TANK, SUPPORTS AND ACCESSORIES.
3. DESIGN AND PERFORMANCE OF BLOWOFF TANK TEMPERATURE CONTROL VALVE.

E. **BOILER FEED AND CONDENSATE TRANSFER PUMPS:**

1. DRAWINGS WITH DIMENSIONS OF ASSEMBLIES OF PUMPS AND DRIVERS.
2. CATALOG DATA AND SPECIFICATION SHEETS ON DESIGN AND CONSTRUCTION OF PUMPS, DRIVERS AND COUPLINGS (FLEXIBLE-COUPLED UNITS).
3. MOTOR EFFICIENCY AND POWER FACTOR AT FULL LOAD.
4. PERFORMANCE CURVES SHOWING DISCHARGE HEAD, REQUIRED FLOW PLUS RECIRCULATION, NET POSITIVE SUCTION HEAD REQUIRED, EFFICIENCY, DRIVER POWER, IMPELLER DIAMETER TO BE FURNISHED. REFER TO DRAWINGS FOR REQUIREMENTS.
5. PRESSURE AND TEMPERATURE LIMITATIONS OF PUMP UNIT AND ACCESSORIES.
6. SIZE AND CAPACITY OR RECIRCULATION ORIFICE.
7. DATA ON VARIABLE FREQUENCY DRIVE (VFD) UNITS AND PRESSURE CONTROLLERS (IF VFD SPECIFIED).
8. CONDENSATE RETURN PUMPS (ELECTRICAL AND/OR MECHANICAL TYPES) AND VACUUM HEATING PUMP UNITS:
9. DRAWINGS WITH DIMENSIONS OF ENTIRE UNIT. DRAWING SHALL INCLUDE LOCATIONS AND SIZES OF ALL PIPE CONNECTIONS.
10. CATALOG DATA AND SPECIFICATION SHEETS ON DESIGN AND CONSTRUCTION OF PUMPS, RECEIVER AND ACCESSORIES.
11. CATALOG CUTS AND SCHEMATIC DIAGRAM OF CONTROLS
12. ELECTRIC PUMP PERFORMANCE CURVES SHOWING DISCHARGE HEAD, FLOW, NET POSITIVE SUCTION HEAD REQUIRED, EFFICIENCY, MOTOR POWER AND IMPELLER DIAMETER TO BE FURNISHED. MECHANICAL PUMP PERFORMAN PRESSURE SHOWING DISCHARGE THAN 207 KPA (30 PSIG). PROVIDE 34 KPA (5 PSIG) DIFFERENCE IN PRESSURE. REFER TO DRAWINGS FOR REQUIREMENTS.
13. PRESSURE AND TEMPERATURE LIMITATIONS OF PUMP UNIT.

2. **PRODUCTS**

A. **GENERAL**

1. ELECTRIC MOTOR CONTROL CABINETS/ENCLOSURES INCLUDING VFDS IN THE BOILER PLANT SHALL BE MINIMUM NEMA 4, STAINLESS STEEL. THE DESIGN AE SHALL DETERMINE AT THE DESIGN STAGE BASED ON THE ENVIRONMENTAL CONDITION AND LOCATION. THIS SHALL ALSO BE INDICATED ON THE DRAWINGS.
2. FEEDWATER DEARATOR WITH STORAGE TANK AND ACCESSORIES
3. PRESSURIZED 2 TO 5 PSIG UNIT DESIGNED TO HEAT AND DEAERATE BOILER FEEDWATER BY DIRECT CONTACT WITH LOW PRESSURE STEAM. /TRAY OR PACKED COLUMN// /SPRAY// TYPE DEARATING SECTION, HORIZONTAL STORAGE TANK. PROVIDE RECYCLE SPRAY WATER PUMPS ON SPRAY-TYPE UNITS IF NECESSARY TO OBTAIN REQUIRED PERFORMANCE. PROVIDE ACCESSORIES INCLUDING VACUUM BREAKER, SAFETY VALVE, WATER INLET AND FLOW CONTROLS AND CONTROL VALVES, WATER LEVEL INDICATORS AND ALARMS AND OTHER DEVICES AS SPECIFIED AND SHOWN.

B. **CONDENSATE STORAGE TANK AND ACCESSORIES**

1. HORIZONTAL CYLINDRICAL WELDED STEEL TANK, INCLUDING ACCESSORY EQUIPMENT, SUITABLE FOR RIGGING INTO THE AVAILABLE SPACE. COMPLY WITH OVERALL DIMENSIONS AND ARRANGEMENT OF THE TANK AND ACCESSTORIES OR CAPACITANCE DEVICES MAY BE PROVIDED. ACCESSORIES INCLUDE MAKE-UP WATER CONTROLS AND CONTROL VALVES, THERMOMETER, WATER LEVEL GAUGE, AND OTHER DEVICES AS SPECIFIED.
2. SERVICE: RECEIVING AND STORING STEAM CONDENSATE AND MAKE-UP WATER. VENT THE TANK TO THE ATMOSPHERE. CONTENTS OF TANK MAY VARY IN TEMPERATURE FROM 4 TO 100 DEGREES C (40 TO 212 DEGREES F).

C. **BOILER BLOWOFF TANK AND ACCESSORIES**

1. TYPE: CYLINDRICAL WELDED STEEL TANK MOUNTED VERTICALLY. TANK SHALL INCLUDE ACCESSORY EQUIPMENT AND SHALL BE SUITABLE FOR RIGGING INTO THE AVAILABLE SPACE. OVERALL DIMENSIONS AND ARRANGEMENT OF THE TANK AND ACCESSORIES SHALL CONFORM TO THE DRAWINGS. TANK VOLUME SHALL BE TWICE THE VOLUME OF A 100 MM (4 INCH) BLOWOFF (REDUCTION IN BOILER WATER LEVEL) THAN THE LARGEST BOILER CONNECTED TO THE TANK.
2. SERVICE: SUITABLE FOR RECEIVING, VENTING, STORING, COOLING AND DISCHARGING INTO THE DRAIN THE EFFLUENT FROM THE BOILERS RESULTING FROM THE INTERMITTENT OPERATION OF THE BOILER BOTTOM BLOWOFFS, BOILER ACCESSORY DRAINS, AND THE USE OF CONTINUOUS BLOWDOWNS.
3. CENTRIFUGAL MULTI-STAGE BOILER FEEDWATER PUMP/CONDENSATE TRANSFER PUMPS
4. TYPE: TWO OR MORE STAGES, CENTRIFUGAL DIFFUSER TYPE, DIRECT-COUPLED, VERTICAL SHAFT, IN-LINE, BASE-MOUNTED, MOTOR-DRIVEN, ARRANGED AS SHOWN.
5. SERVICE: DESIGN PUMPS AND ACCESSORIES FOR CONTINUOUS SERVICE, 115 DEGREES C (240 DEGREES F) WATER, WITH FLOW RATES RANGING FROM MAXIMUM SCHEDULED ON THE DRAWINGS (PLUS MANUFACTURER'S RECOMMENDED RECIRCULATION) TO 10 PERCENT OF MAXIMUM (PLUS MANUFACTURER'S RECOMMENDED RECIRCULATION). PUMPS SHALL BE SUITABLE FOR PARALLEL OPERATION WITHOUT SURGING OR HUNTING.
6. PERFORMANCE: REFER TO SCHEDULES ON DRAWINGS. PUMP HEAD-FLOW PERFORMANCE CURVE SHALL SLOPE CONTINUOUSLY UPWARD TO SHUT-OFF.
7. CONTROL – BOILER FEED: FLOW RATES WILL BE CONTROLLED BY AUTOMATIC MODULATING FEEDWATER VALVES ON EACH BOILER. PUMPS SHALL BE STARTED AND STOPPED MANUALLY. PUMPS //SHALL BE CONSTANT SPEED// /SHALL HAVE VARIABLE FREQUENCY DRIVES/ CONTROLLED BY BOILER FEED HEADER PRESSURE ELECTRONIC CONTROL SYSTEM WHICH MUST BE PROVIDED. CONTROL THE HEADER PRESSURE AT // /KPA // // PSIG). /FOR FURTHER INFORMATION AND REQUIREMENTS REFER TO SECTION 26 29 11, MOTOR CONTROLLERS.//
8. CONTROL – CONDENSATE: /CONSTANT SPEED OPERATION. FLOW RATE WILL BE CONTROLLED BY AUTOMATIC MODULATING WATER LEVEL CONTROL VALVE ON CONDENSATE TRANSFER INLET TO DEAERATOR.
9. CONDENSATE TRANSFER PUMPS, FLEXIBLE-COUPLED, END SUCTION, CENTRIFUGAL
10. TYPE: SINGLE STAGE, END SUCTION, CENTRIFUGAL WITH VOLUTE CASING, HORIZONTAL SHAFT , FRAME-MOUNTED, FLEXIBLE COUPLED, DRIVEN BY CONSTANT SPEED MOTOR, ARRANGED AS SHOWN. PUMP FRAMES AND MOTORS SHALL BE BASE-MOUNTED.
11. SERVICE: DESIGN PUMPS AND ACCESSORIES FOR CONTINUOUS CONDENSATE TRANSFER SERVICE, 93 DEGREES C (199 DEGREES F) WATER, WITH FLOW RATES RANGING FROM MAXIMUM SHOWN ON DRAWINGS (PLUS MANUFACTURER'S RECOMMENDED RECIRCULATION) TO 10 PERCENT OF MAXIMUM. (PLUS MANUFACTURER'S RECOMMENDED RECIRCULATION). PUMPS SHALL BE SUITABLE FOR PARALLEL OPERATION WITHOUT SURGING OR HUNTING.

D. **FLASH TANK**

1. TYPE: CYLINDRICAL WELDED STEEL TANK WITH ACCESSORIES AS SHOWN. REFER TO DETAIL ON DRAWINGS.
2. SERVICE: SUITABLE FOR RECEIVING, VENTING, STORING AND DISCHARGING TO CONDENSATE RETURN PUMP THE EFFLUENT DISCHARGED FROM STEAM TRAPS ON HIGH AND MEDIUM PRESSURE STEAM SYSTEMS.

3. **EXECUTION**

A. **INSTALLATION**

1. FEEDWATER DEAERATOR WITH STORAGE TANK AND ACCESSORIES, CONDENSATE STORAGE TANK, BLOWOFF TANK, FLASH TANK.
2. COORDINATE LOCATION WITH STRUCTURAL REQUIREMENTS OF THE BUILDING.
3. LOCATION SHALL PERMIT ACCESS TO AND REMOVAL OF ALL INTERNAL AND EXTERNAL FEATURES WITHOUT REMOVING OTHER ITEMS OF EQUIPMENT OR PIPING.
4. BOLT TO BUILDING AS RECOMMENDED BY MANUFACTURER OR AS SHOWN. //COMPLY WITH SEISMIC REQUIREMENTS IN SECTION 13 05 41. SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.// ARRANGE ANCHORAGE TO ALLOW THERMAL EXPANSION OF UNIT.
5. CLEAN INTERIOR OF EQUIPMENT BEFORE PLACING IN SERVICE.
6. DEARATOR VENT PIPES MUST EXTEND VERTICALLY THROUGH ROOF. HORIZONTAL RUNS ARE PROHIBITED.
7. ALL CONTROLS, SAFETIES, SET POINTS, ETC. MUST CONFORM TO THE VHA BOILER PLANT SAFETY DEVICES TESTING MANUAL.

B. BOILER FEED AND CONDENSATE TRANSFER PUMPS:

a. FOR BASE-MOUNTED HORIZONTAL SHAFT PUMPS, CONNECT BASE DRAIN TO 20 MM (3/4 INCH) PIPE. EXTEND PIPE TO NEAREST OPEN SIGHT OR FLOOR DRAIN.

b. ALIGN PUMPS AND DRIVERS ON COMMON SHAFT. AT JOB SITE, A MILLWRIGHT SHALL LEVEL, SHIM, BOLT, AND GROUT THE BASE PLATES OR BASE FRAMES ONTO THE CONCRETE PADS, AND SHALL ALSO CHECK THE ALIGNMENTS OF FLEXIBLE-COUPLED PUMPS AND DRIVERS AND MAKE CORRECTIONS NECESSARY. CHECK ALIGNMENT WHEN BOTH PUMP AND DRIVER ARE AT NORMAL OPERATING TEMPERATURE.

c. WHERE PACKAGED DEARATOR-FEED PUMP UNIT IS REQUIRED, BOILER FEED PUMP BASE PLATES SHALL BE WELDED OR BOLTED TO DEARATOR SUPPORT FRAME.

d. IF WATER-COOLED BEARINGS OR QUENCHED OR FLUSHED OR WATER-COOLED STUFFING BOXES ARE PROVIDED ON PUMPS, CONTRACTOR SHALL INSTALL ON EACH PUMP VALVED 15 MM (1/2 INCH) PIPING CONNECTIONS TO COLD WATER SUPPLY, AND 15 MM (1/2 INCH) DRAINS TO NEAREST OPEN SIGHT DRAIN. PROVIDE UNIONS AT ALL CONNECTIONS TO PUMPS.

B. TESTING AND BALANCING FEEDWATER DEARATOR WITH STORAGE TANK AND ACCESSORIES

10. DEMONSTRATE THE ABILITY OF THE DEARATOR TO PERFORM AS SPECIFIED IN REGARD TO OXYGEN REMOVAL AND OUTLET TEMPERATURE, OVER THE REQUIRED OUTPUT FLOW RANGE AND INPUT TEMPERATURE RANGE OF UNIT. TEST PERFORMANCE AT 5 PERCENT AND 100 PERCENT OF CAPACITY, AND AT TWO INTERMEDIATE POINTS TO BE SELECTED BY THE COR. REPEAT TEST TWO TIMES AT EACH LOAD POINT

11. ALL PERMANENT WORK PLATFORMS SHALL BE IN PLACE BEFORE TESTING. THE USE OF OR NEED FOR STEP LADDERS TO PERFORM ANY INSPECTION, TEST, OR MAINTENANCE SHALL BE CONSIDERED A FAILURE TO INSTALL THE EQUIPMENT IN ACCORDANCE WITH SPECIFICATIONS THAT REQUIRE ACCESS TO EQUIPMENT. THE CONTRACTOR SHALL CORRECT AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT BEFORE BENEFICIAL USE CAN START.

B. **STARTUP AND TESTING**

1. PERFORM TESTS AS RECOMMENDED BY PRODUCT MANUFACTURER AND LISTED STANDARDS AND UNDER ACTUAL OR SIMULATED OPERATING CONDITIONS AND PROVE FULL COMPLIANCE WITH DESIGN AND SPECIFIED REQUIREMENTS. TESTS OF THE VARIOUS ITEMS OF EQUIPMENT SHALL BE PERFORMED SIMULTANEOUSLY WITH THE SYSTEM OF WHICH EACH ITEM IS AN INTEGRAL PART.

C. **COMMISSIONING**

1. RE: SPECIFICATIONS

D. **DEMONSTRATION AND TRAINING**

1. RE: SPECIFICATIONS

BOILER PLANT GENERAL NOTES - BOILER PLANT MECHANICAL EQUIPMENT

C. FIRE-TUBE BOILERS

1. **GENERAL**

A. FACTORY ASSEMBLED, PACKAGED SCOTCH MARINE, HORIZONTAL, WETBACK, FIRE TUBE BOILERS WITH A MINIMUM HEATING SURFACE AREA OF 5 SQUARE FEET PER BOILER HORSEPOWER.

A. **DESCRIPTION**

1. PACKAGED FIRE TUBE BOILER WITH TRIM (ACCESSORIES), DUAL FUEL (NATURAL GAS AND NO. 2 OIL) BURNER, FUEL VALVE AND PIPING TRAINS AND OTHER ACCESSORIES.

B. **SUBMITTALS**

1. MANUFACTURER'S LITERATURE AND DATA INCLUDING: FULL ITEM DESCRIPTION AND OPTIONAL COMPONENTS.// ARRANGE ANCHORAGE TO ALLOW THERMAL EXPANSION OF UNIT.
2. COMPLIANCE. MODEL NUMBERS, SIZE, AND CAPACITY.

C. **BOILER:**

1. COMPLETE CATALOG INFORMATION AND OUTLINE DRAWINGS OF BOILER, BURNER, AND ACCESSORIES WITH DIMENSIONS INCLUDING TUBE REMOVAL SPACE AND ACCESS DOOR OPENING SPACE.
2. BOILER TRIM: INCLUDES BOTTOM BLOWOFF VALVES, WATER LEVEL ALARM AND CUTOFF DEVICES, WATER LEVEL GAUGE, LOW WATER CUTOFFS, PIPING, ALL VALVES AND FITTINGS FURNISHED BY BOILER MANUFACTURER, FEEDWATER CONTROL SYSTEM, STEAM SAFETY VALVES, STEAM PRESSURE GAUGE, STACK THERMOMETER, DRAFT GAUGE, AND STEAM PRESSURE SWITCHES.
3. BURNER AND FUEL VALVE AND PIPING TRAINS:
4. CATALOG DATA AND DRAWINGS SHOWING BURNER ASSEMBLY AND FUEL TRAIN ARRANGEMENT.
5. OUTLINE DRAWINGS OF FLUE GAS RECIRCULATION (FGR) DUCTWORK (IF APPLICABLE).
6. BURNER MANAGEMENT (FLAME SAFEGUARD CONTROL) SYSTEM. REFER TO SECTION 23 09 11, INSTRUMENTATION AND CONTROL FOR BOILER PLANT.

2. **PRODUCTS**

A. **BOILER**

1. TYPE: FACTORY ASSEMBLED PACKAGED SCOTCH MARINE HORIZONTAL FIRE TUBE HIGH PRESSURE INDUSTRIAL STEAM BOILER. THREE OR FOUR PASS WETBACK DESIGN WITH INTERNAL FURNACE LOCATED BELOW CENTER OF BOILER SHELL. DESIGNED FOR NATURAL GAS AND NO. 2 FUEL OIL FIRING.
2. SERVICE: CONTINUOUS LONG-TERM GENERATION OF STEAM THROUGHOUT THE BURNER FIRING RANGE IN COMPLIANCE TO THE SPECIFIED PERFORMANCE REQUIREMENTS WITH FEEDWATER SUPPLY AT 100 DEGREES C (212 DEGREES F).

3. **PERFORMANCE:**

a. STEAM OUTPUT QUANTITY AND PRESSURE: REFER TO SCHEDULES ON DRAWINGS.

b. STEAM OUTPUT QUALITY: 99 PERCENT MINIMUM AT ALL STEAM FLOW RATES. BASED ON WATER QUALITY IN BOILER OF 2200 PPM MAXIMUM TOTAL SOLIDS, 15 PPM MAXIMUM SUSPENDED SOLIDS, 440 PPM MAXIMUM ALKALINITY.

c. MINIMUM EFFICIENCY AT REQUIRED MAXIMUM OUTPUT:

d. NATURAL GAS FUEL (37.3 MJ/CUBIC METER) (1000 BTU/CUBIC FOOT): 82 PERCENT AT 15 PERCENT EXCESS AIR.

e. FUEL OIL (ASTM D396, GRADE 2): 85 PERCENT AT 15 PERCENT EXCESS AIR.

f. DESIGN PRESSURE: SHALL EQUAL THE ASME-STAMPED MAXIMUM ALLOWABLE WORKING PRESSURE OF 138 KPA (200 PSIG). PURPOSE OF HIGH DESIGN PRESSURE IS TO PROVIDE ADDITIONAL CORROSION ALLOWANCE AND ADDITIONAL SAFETY MARGIN TO PERFORM SAFETY DEVICE TESTING.

4. **BOILER TRIM (ACCESSORIES):**

- CONFORM TO ASME BPVC SECTION I.
- STEAM SAFETY VALVES:

5. CAPACITIES CERTIFIED BY NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS (NBBI).
6. TYPE: BRONZE OR CAST-STEEL BODIES, SIDE OUTLET. FLANGED OR THREADED INLET AND OUTLET, LIFTING LEVER. DUAL CONTROL RINGS, STAINLESS STEEL TRIM, O-RING EPDM SEATS ON BRONZE VALVES.
7. SETTINGS AND ADJUSTMENTS: FACTORY SET, SEALED, AND STAMPED ON NAMEPLATE. SET PRESSURES AS SHOWN. SET PRESSURE OF LOWEST PRESSURE VALVE SHALL NOT EXCEED NORMAL BOILER PLANT OPERATING PRESSURE BY MORE THAN 207 KPA (30 PSIG). PROVIDE 34 KPA (5 PSIG) DIFFERENCE IN SETTING BETWEEN EACH OF THE VALVES.

8. **STEAM PRESSURE GAUGE:**

9. CASE: TURRET-STYLE, BOTTOM CONNECTION, THREADED RING, BLOWOUT DISC IN REAR.
10. DIAL: 200 MM (8 INCH) MINIMUM DIAMETER, NON-CORROSIVE, BLACK MARKINGS ON WHITE BACKGROUND.
11. MEASURING ELEMENT: BOURDON TUBE DESIGNED FOR STEAM SERVICE.
12. MOVEMENT: STAINLESS STEEL, ROTARY.
13. POINTER: MICROMETER ADJUSTABLE, BLACK COLOR.
14. WINDOW: LAMINATED SAFETY GLASS, OR PLASTIC.
15. ACCURACY: ONE HALF PERCENT OF THE FULL SPAN.
16. RANGE: /0 - 2070 KPA/ /0 - 300 PSIG/ GAUGE.

B. INSTALLATION: STOP VALVE, STEEL PIPING, VALVED BLOWDOWN, SIPHON, UNION AT GAUGE, AND VALVED CONNECTION FOR INSPECTOR'S GAUGE. REFER TO DETAIL. FIRE TUBE BOILER.

C. **WATER LEVEL SAFETY AND OPERATING CONTROLS AND INDICATORS:**

1. PROVIDE HIGH AND LOW WATER WARNING ALARMS. PRIMARY AND AUXILIARY LOW WATER BURNER CUTOFFS. AUTOMATIC ELECTRONIC MODULATING FEEDWATER LEVEL CONTROL SYSTEM. GAUGE GLASS.
2. FLOAT-TYPE ELECTRIC OR ELECTRONIC MODULATING WATER LEVEL CONTROL DEVICE AND PRIMARY LOW WATER CUTOFF. AS AN OPTION TO THE FLOAT TYPE DEVICE, ELECTRONIC SELF-CHECKING MAGNETOSTRICTIVE OR CAPACITANCE DEVICES MAY BE PROVIDED.
3. CONTROL SYSTEM SHALL AUTOMATICALLY MODULATE AN ELECTRIC FEEDWATER FLOW CONTROL VALVE. FEEDWATER PUMP WILL OPERATE CONTINUOUSLY.
4. AUXILIARY WATER COLUMN WITH WATER LEVEL SENSORS FOR HIGH AND LOW-LEVEL ALARMS AND AUXILIARY LOW WATER CUTOFF.
5. CONDUCTIVITY PROBE TYPE HIGH AND LOW-LEVEL ALARM SENSORS AND AUXILIARY LOW WATER CUTOFF SENSOR.
6. WATER COLUMNS SHALL BE RATED FOR 1380 KPA (200 PSIG) MINIMUM SATURATED STEAM AND HAVE CONNECTIONS FOR BOTTOM BLOWOFF.
7. WATER COLUMN PIPING TO BOILER AND TO DRAINS: ASTM A106/A106M, GRADE B, SEAMLESS OR ERW PIPING, SCHEDULE 80 THREADED. FITTINGS SHALL BE 300 LB. MALLEABLE IRON OR FORGED STEEL. ALL CHANGES IN DIRECTION SHALL BE WITH CROSSES, NO ELLS. PROVIDE VALVED DRAIN PIPING CONNECTED TO THE LOWEST PART OF EACH OF THE WATER COLUMNS.

D. **ELECTRICAL:**

1. PROVIDE CIRCUIT BREAKERS, TRANSFORMERS, ALL DEVICES FOR COMPLETE CONTROL SYSTEM. ALL CONTROL ELECTRONIC BOARD RELAYS SHALL BE IN WATERPROOF NEMA 4 PANELS.

E. **MODULATING FEEDWATER CONTROL VALVE:**

1. CHARACTERIZED ROTARY OR SLIDING GATE VALVE. OPERATED BY ELECTRIC DRIVE UNIT ACTUATOR WITH TOP MOUNT INTEGRATED DIGITAL POSITIONER. EQUAL-PERCENT VALVE FLOW CHARACTERISTICS. MODIFIED LINEAR VALVE FLOW CHARACTERISTICS SHALL BE UTILIZED WHEN DIGITAL POSITIONER IS FURNISHED.

F. **HIGH STEAM PRESSURE BURNER CUTOUTS:**

1. PROVIDE TWO U.L. LISTED, FM APPROVED UNITS WITH DIFFERENT SET POINTS. UNIT WITH LOWEST SET POINT SHALL BE THE HIGH PRESSURE LIMIT SWITCH (MANUAL RESET); UNIT WITH HIGHEST SET POINT SHALL BE THE HIGH-HIGH PRESSURE LIMIT SWITCH (MANUAL RESET).
2. BELLOWS OR BOURDON TUBE ACTUATED SEALED SNAP-ACTING SWITCH WITH ADJUSTABLE SET POINT AND SWITCH POSITION INDICATOR.
3. THE HIGH PRESSURE LIMIT SWITCH (MANUAL RESET) UNIT SHALL HAVE AN ADJUSTABLE DIFFERENTIAL PRESSURE OR DEAD BAND SO THE RESET PRESSURE IS AN ADJUSTABLE SET POINT AND SWITCH POSITION INDICATOR.
4. RATED FOR 200 PSIG MINIMUM EMERGENCY PRESSURE.
5. SET PRESSURE RANGE: TO 150 PERCENT OF REQUIRED SET PRESSURE.
6. PROVIDE INDICATORS WITH GRADUATED SCALES FOR SET POINT AND DIFFERENTIAL PRESSURE.
7. MOUNTING: CONNECT TO WATER COLUMN PIPING. THERE SHALL BE NO VALVES BETWEEN CUTOFF AND BOILER SHELL. PROVIDE SIPHONS AT EACH SWITCH TO PROTECT BELLOWS FROM HIGH TEMPERATURE.

G. **SET POINTS:**

1. HIGH PRESSURE LIMIT SWITCH (MANUAL RESET) UNIT- REFER TO BOILER SCHEDULE SHOWN ON THE DRAWINGS. IF NOT SHOWN, SET AT 34 KPA (5 PSIG) BELOW THE SET PRESSURE OF THE HIGH-HIGH (MANUAL RESET) UNIT.
2. HIGH PRESSURE LIMIT SWITCH (MANUAL RESET) UNIT- RESET SET POINT(THE POINT AT WHICH A MANUAL RESET CAN BE ACCOMPLISHED) SHALL BE 90 PERCENT OF THE NORMAL OPERATING PRESSURE OF THE BOILER.(THIS IS THE PRESSURE THAT WOULD ALLOW THE BOILER TO RESTART)
3. HIGH-HIGH PRESSURE LIMIT SWITCH (MANUAL RESET) UNIT- 34 KPA (5 PSIG) BELOW LOWEST SAFETY VALVE SET PRESSURE. SUBTRACTIVE DIFFERENTIAL NOT TO EXCEED 69 KPA (10 PSIG).
4. REFER TO SECTION 23 09 11, INSTRUMENTATION AND CONTROL FOR BOILER PLANT FOR THE OPERATION OF THE CUTOUTS

H. **BURNER AND FUEL TRAINS**

BURNER TYPE: INTEGRAL COMBINATION NATURAL GAS AND FUEL OIL. PACKAGED, FORCED DRAFT, MODULATING FIRING//, AND VARIABLE SPEED FORCED DRAFT FAN//. /DESIGN FOR LOW NOX EMISSIONS.// /BURNER SHALL BE MANUFACTURED AND TESTED BY THE BOILER MANUFACTURER ON THE BOILER SPECIFIED HEREIN.

2. GAS BURNER: RING TYPE WITH MULTIPLE PORTS OR SPUDS.
3. OIL BURNER: GUN TYPE, INSIDE MIX, LOW PRESSURE AIR ATOMIZING.
4. IGNITER (PILOT): INTERRUPTED, ELECTRICALLY IGNITED. NATURAL GAS AND PROPANE.
5. CHANGE OF FUELS WILL NOT REQUIRE ANY DISASSEMBLY AND REASSEMBLY OF THE FUEL TRAIN ON BURNER FUEL NOZZLES.

I. **SERVICE:**

1. CONTINUOUS OPERATION AT ALL FIRING RATES ON EACH FUEL LISTED UNDER PARAGRAPH. PROJECT CONDITIONS OF THIS SECTION. DESIGN THE ENTIRE BURNER AND FUEL TRAIN SYSTEM FOR APPLICATION TO THE SPECIFIC BOILER FURNISHED AND FOR SERVICE AT THE AVAILABLE FUEL PRESSURES.
2. IGNITER (PILOT) FUELS: NORMAL FUEL WILL BE NATURAL GAS. PROPANE WILL BE USED IF THERE IS AN INTERRUPTION IN NATURAL GAS SERVICE.

J. **FLUE GAS EMISSIONS LIMITS:**

1. CARBON MONOXIDE: SHALL NOT EXCEED 200 PPM.
2. SMOKE: ON NATURAL GAS AND NO. 2 OIL SHALL NOT BE VISIBLE AND SHALL NOT EXCEED NO. 1 ON THE BACHARACH SMOKE SCALE.
3. NOX: // // PPM MAXIMUM, CORRECTED TO 3 PERCENT OXYGEN, DRY BASIS ON NATURAL GAS //AND // // // PPM, MAXIMUM LOW NITROGEN NO. 2 FUEL OIL//.
4. COMBUSTION AIR SYSTEM AND FLUE GAS RECIRCULATION (FGR) SYSTEM (IF PROVIDED).
5. AIR FLOW RATES CONTROLLED BY FORCED DRAFT FAN INLET OR OUTLET DAMPERS// AND VARIABLE SPEED DRIVE//.

K. **ELECTRICAL CONDUIT:**

1. PROVIDE LIQUID-TIGHT FLEXIBLE METAL CONDUIT WITH SEALING FITTINGS FOR ALL POWER AND CONTROL SERVICES TO FUEL TRAINS AND BURNERS. FLEXIBLE METAL CONDUIT MUST BE LIMITED TO 900 MM (3 FEET) IN LENGTH. UNLESS ADDITIONAL LENGTH IS REQUIRED FOR DOOR OR BURNER SWING. REFER TO SECTION 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.

L. **NATURAL GAS MAIN FUEL TRAIN:**

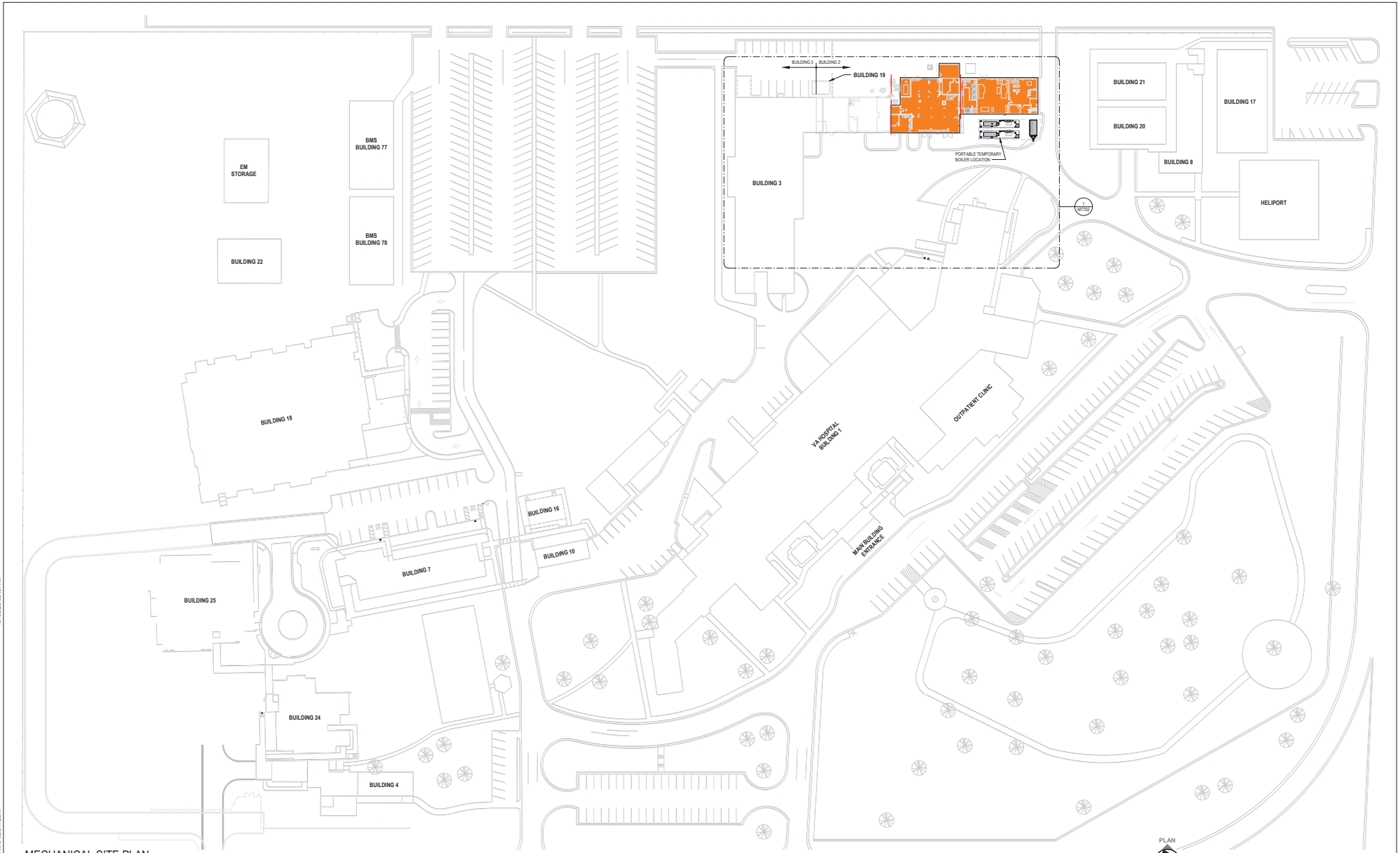
1. ARRANGEMENT: COMPLY WITH TYPICAL ARRANGEMENT IN NFPA 85, ANNEX A, AS MODIFIED BY THE FOLLOWING DESCRIPTION. STARTING AT THE ENTRANCE TO THE TRAIN, THE DEVICES ARE, IN SEQUENCE: PLUG VALVE, FILTER, PRESSURE GAUGE, PRESSURE REGULATOR, VALVED CONNECTION TO PILOT BURNER FUEL TRAIN, FLOW METER (IF REQUIRED), PRESSURE GAUGE, LOW PRESSURE SWITCH, TWO AUTOMATIC SAFETY SHUT OFF VALVES, VALVED LEAK TEST, HIGH PRESSURE SWITCH, FUEL FLOW CONTROL VALVE, PLUG VALVE, PRESSURE GAUGE, BURNER. PROVIDE TEE CONNECTION OR VENT BETWEEN THE AUTOMATIC SAFETY SHUT OFF VALVES. VENT LINE SHALL INCLUDE VALVED LEAK TEST CONNECTION, AUTOMATIC VENT VALVE, VALVED LEAK TEST CONNECTION, LOCKABLE PLUG VALVE, VENT THRU ROOF. HIGH AND LOW PRESSURE SWITCHES SHALL BE LOCATED TO SENSE THE CONSTANT PRESSURE CONTROLLED BY THE BURNER PRESSURE REGULATOR AND NOT THE VARIABLE BURNER PRESSURE.
2. AUTOMATIC SAFETY SHUT-OFF VALVES.
3. TYPE: MOTORIZED-OPENING, SPRING CLOSING, CONTROLLED BY BURNER CONTROL SYSTEM. TWO VALVES REQUIRED.
4. SERVICE: PROVIDE OPEN-SHUT CONTROL OF FUEL FLOW TO BURNER. VALVES SHALL SHUT BUBBLE TIGHT AND BE SUITABLE FOR OPERATION WITH UPSTREAM PRESSURE OF TWO TIMES THE HIGHEST PRESSURE AT ENTRANCE TO BOILER-MOUNTED REGULATORS.

M. **AUTOMATIC VENT VALVE:**

1. TYPE: MOTORIZED OR SOLENOID CLOSING, SPRING OPENING, FULL PORT, CONTROLLED BY BURNER CONTROL SYSTEM.
2. SERVICE: PROVIDE OPEN-SHUT CONTROL OF VENT LINE THAT IS CONNECTED BETWEEN THE TWO SAFETY SHUT-OFF VALVES. VALVES SHALL SHUT BUBBLE-TIGHT AND BE SUITABLE FOR OPERATION WITH UPSTREAM PRESSURE OF TWO TIMES THE HIGHEST PRESSURE AT ENTRANCE TO BOILER-MOUNTED REGULATORS. VALVE SHALL BE OPEN WHENEVER SAFETY SHUT-OFF VALVES ARE CLOSED.
3. APPROVAL: UL LISTED FOR BURNER SERVICE.

N. **FUEL OIL TRAIN**

1. ARRANGEMENT: COMPLY WITH TYPICAL ARRANGEMENT IN NFPA 85, ANNEX A, AS MODIFIED BY THE FOLLOWING DESCRIPTION. STARTING AT THE ENTRANCE TO THE TRAIN, THE DEVICES ARE, IN ORDER: MANUAL SHUT OFF VALVE, FILTER, PRESSURE GAUGE, PRESSURE REGULATOR (IF REQUIRED BY BURNER FURNISHED), LOW PRESSURE SWITCH, HIGH PRESSURE SWITCH, FLOW METER (IF SPECIFIED), OIL FLOW CONTROL VALVE, VALVED GAUGE, AUTOMATIC SAFETY SHUT OFF VALVE, VALVED LEAK TEST, AUTOMATIC SAFETY SHUT OFF VALVE, VALVED LEAK TEST, MANUAL SHUT OFF VALVE, PRESSURE GAUGE, BURNER. PROVIDE RETRACTABLE NOZZLE WITH FLEXIBLE HOSES.
2. AUTOMATIC SAFETY SHUT-OFF VALVES.
3. TYPE: MOTORIZED-OPENING, SPRING CLOSING, CONTROLLED BY BURNER CONTROL SYSTEM. TWO VALVES REQUIRED.
4. SERVICE: PROVIDE OPEN-SHUT CONTROL OF FUEL FLOW TO BURNER. VALVES SHALL SHUT BUBBLE-TIGHT AND BE SUITABLE FO



1 MECHANICAL SITE PLAN

SCALE: 1" = 40'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MECH SITE PLAN

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: MT701

Autodesk Docs://0489001/0131/ABS Boiler Replacement/0489001-0131-MECHR25.rvt

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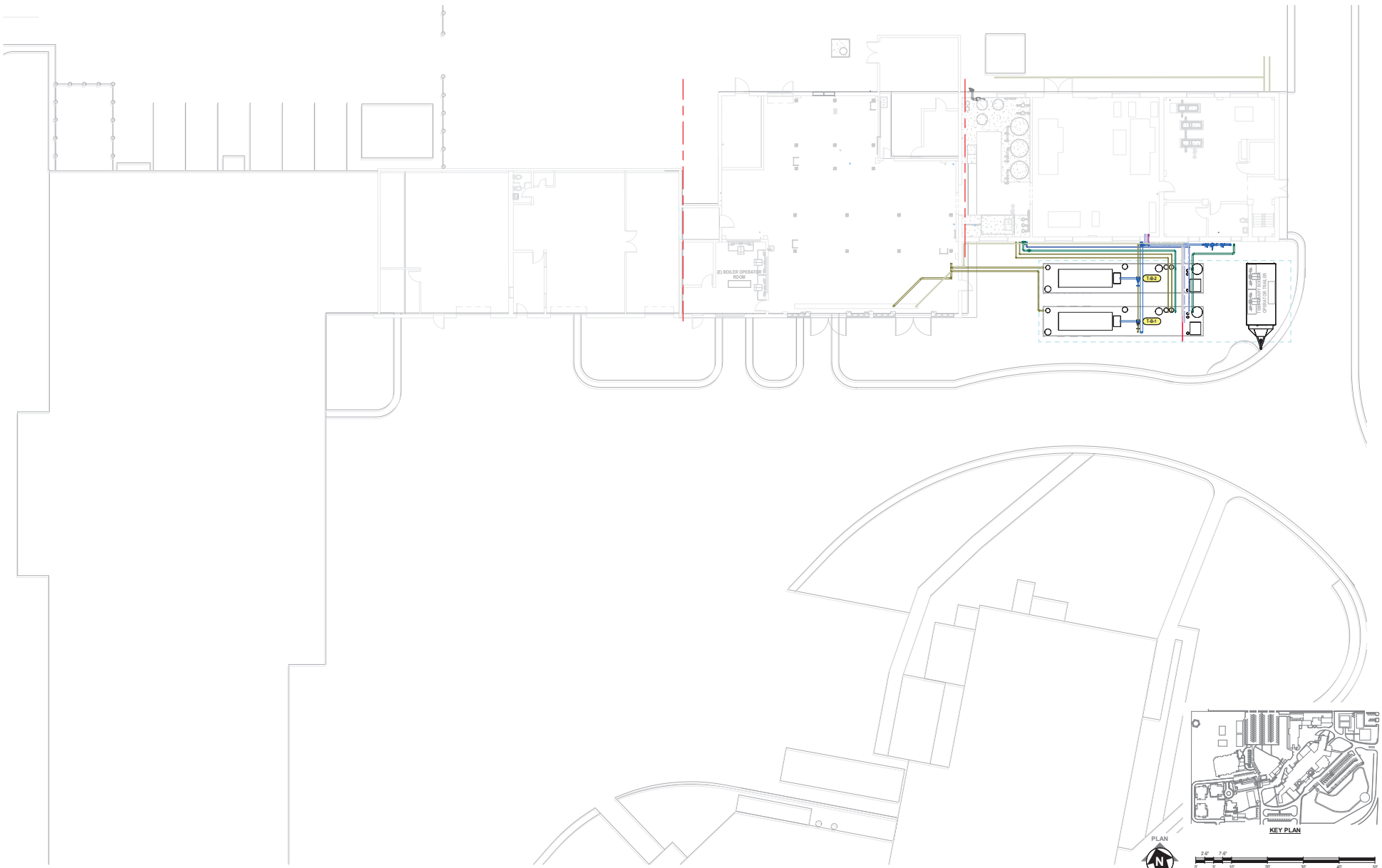

1 ENLARGED TEMPORARY MECHANICAL PIPING SITE PLAN - BOILER PLANT FLOOR

SCALE: 1" = 10'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MECH PIPING ENLARGED SITE PLAN

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: MT702

VA FORM 08 - 6231

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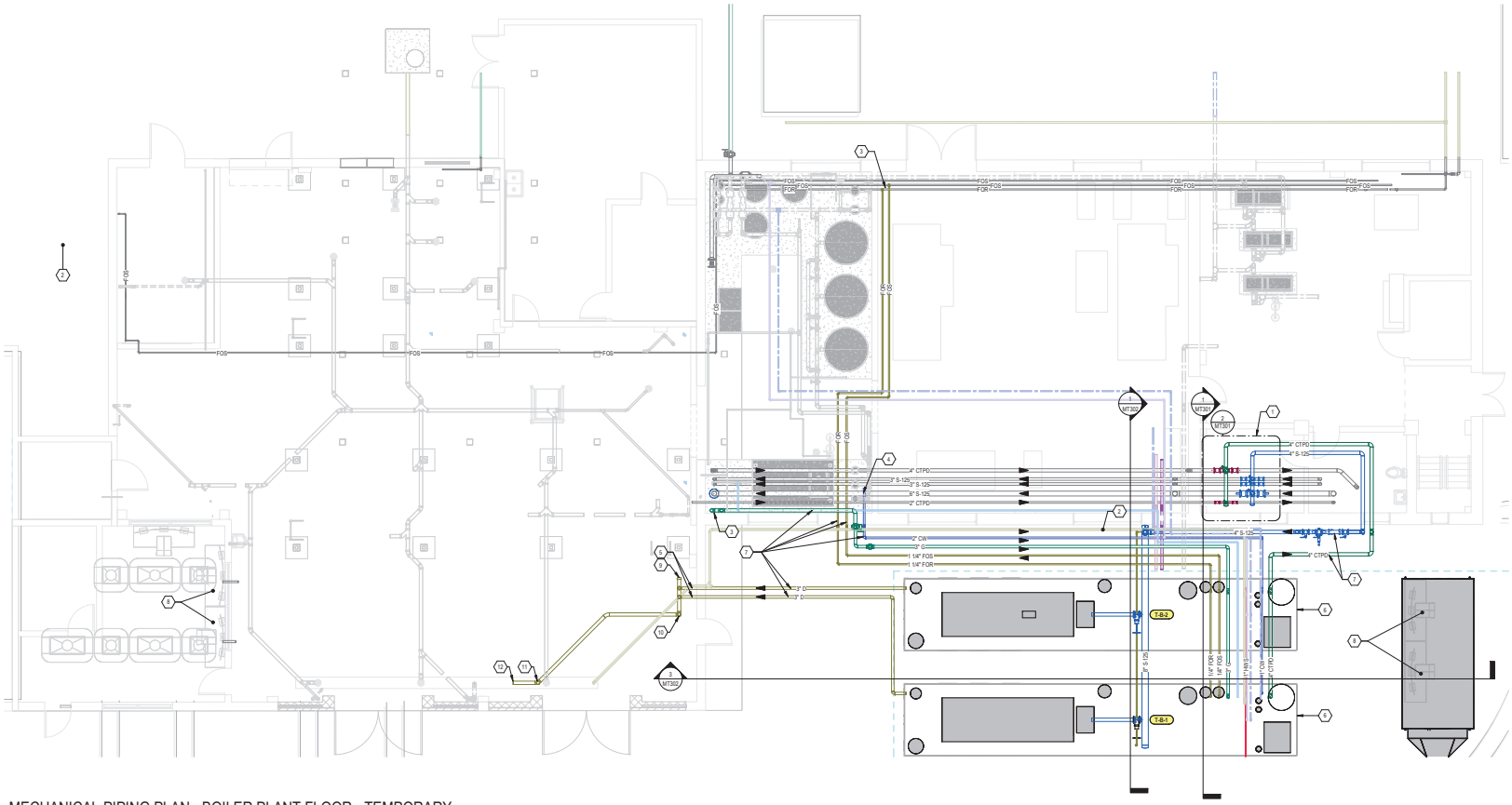
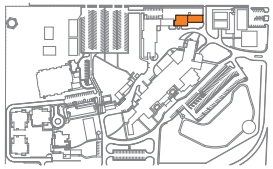


1 MECHANICAL PIPING PLAN - BOILER PLANT FLOOR - TEMPORARY

SCALE: 3/16" = 1'-0"

KEY NOTES

No.	DESCRIPTION
1	INSTALL STEAM / CONDENSATE PIPE TIE-IN CONNECTIONS. VALVE AND CAP FOR TEMP CONNECTIONS.
2	COORDINATE WITH ELECTRICAL FOR POWER SERVICE REQUIREMENTS. IDENTIFY AND PREP ELECTRICAL SERVICE FOR CONNECTION TO TEMPORARY BOILERS. INSTALL RACEWAY AND WIRE. RE: ELECTRICAL DRAWINGS.
3	INSTALL NG, FOS, FOR TIE-IN CONNECTIONS. VALVE AND CAP FOR FUTURE CONNECTION.
4	INSTALL RO, SW, MAKE-UP WATER TIE-IN CONNECTIONS. VALVE AND CAP FOR FUTURE CONNECTION.
5	INSTALL TIE-IN BOILER SYSTEM BLOWDOWN PIPING TIE-IN CONNECTIONS. VALVE AND CAP FOR FUTURE CONNECTION. TEMPORARY BD PIPING. ROUTE TO T-B-1, 2.
6	SET TEMPORARY BOILERS
7	ROUTE TEMPORARY PIPING. CONNECT TO (E) PIPE TIE-IN CONNECTIONS.
8	CONNECT BOILER CONTROLS AND FLAME SAFEGUARD CONTROLS TO BOILER OPERATING AND MONITORING STATIONS.
9	BD TEMPORARY BRANCH MAIN. CONNECT TO BOILER BD PIPING AS INDICATED. FIELD COORDINATE LOCATION, PIPE INVERT.
10	ROUTE TEMPORARY BD ABOVE FLOOR TO TRENCH DRAIN AS INDICATED. OFFSET AS REQUIRED. FIELD COORDINATE ROUTING.
11	ROUTE TEMPORARY BD DN IN TRENCH. FIELD COORDINATE LOCATION.
12	TERMINATE TEMPORARY BD PIPE AT DRAIN IN TRENCH. FIELD VERIFY LOCATION.



KEY PLAN

PLAN

TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL MECH TEMP PLAN - BOILER PLANT FLOOR	Phase: 100% CONSTRUCTION DOCUMENTS	Project Title: A/E REPLACE BOILERS	Project Number: 519-20-200
			Building Number: 2
APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN	FULLY SPRINKLERED	Location: BOILER PLANT	Drawing Number: MT101
		Issue Date: 10/07/2025 · Checked: LRL · Drawn: DMB	

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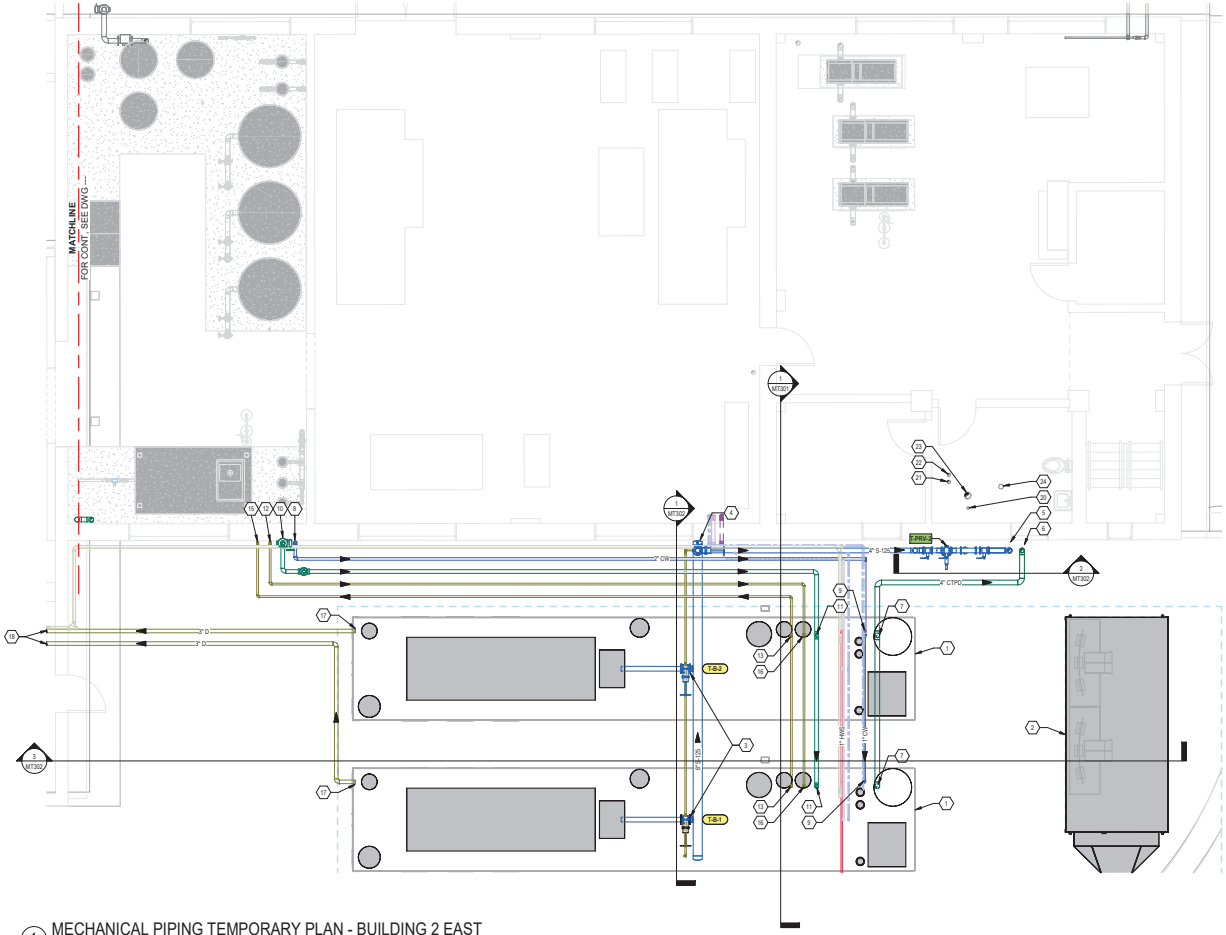
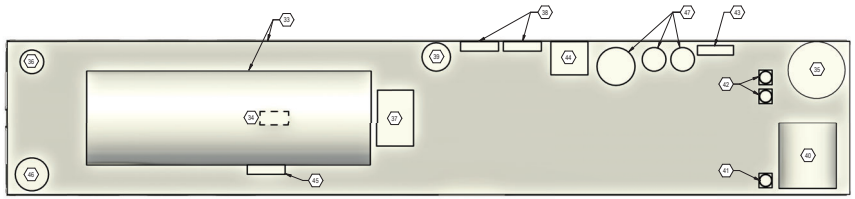


1 MECHANICAL PIPING TEMPORARY PLAN - BUILDING 2 EAST

SCALE: 1/4" = 1'-0"



2 TEMPORARY BOILER PLANT SCHEMATIC EQUIPMENT PLAN

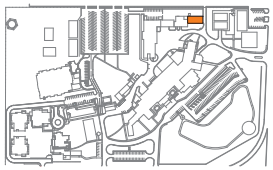
SCALE: NONE

GENERAL NOTES

1. MOBILE STEAM BOILER, SCOTCH MARINE TYPE FIRE TUBE, 200 BHP, 200 PSIG DESIGN, 6,900 LB/HR. IC DUAL FUEL BURNER. FUEL CONSUMPTION IN NATURAL GAS 8,400 MBTU/HR, #2 OIL 600PH WITH PROPANE PILOT. PROVIDE RENTAL UNIT HEAT TRACED, INSULATED, PIPED & WIRED. (APPROX DIMENSIONS 576"L X 102"W X 162"H, SHIPPING WEIGHT 23,000 LBS.
2. INTERIOR SYSTEMS PIPING BY MANUFACTURER. CONNECT TO TIE-LOCATIONS INTERNAL / EXTERNAL TO TRAILER.
3. STANDALONE FLAME SAFEGUARD AND BOILER CONTROL SYSTEMS BY MANUFACTURER / SUPPLIER. CONNECT BOILER CONTROLS AND MONITORING SYSTEMS TO OPERATOR WORKSTATIONS LOCATED IN TEMPORARY BOILER CONTROL ROOM AND BOILER PLANT BOILER CONTROL AS INDICATED.

KEY NOTES

No.	DESCRIPTION
1	T-B-1, T-B-2 TRAILER MOUNTED TEMPORARY BOILER PLANT.
2	TEMPORARY BOILER OPERATOR ROOM
3	ROUTE HPS FROM T-B-1,2 STEAM OUTLET TO TEMP STEAM HEADER. FIELD VERIFY PENETRATION LOCATION THRU DECK FLOOR. FIELD COORDINATE ROUTING.
4	TEMPORARY STEAM HEADER. FIELD COORDINATE LOCATION, MOUTING HEIGHT.
5	ROUTE HPS UP ALONG EXTERIOR WALL. PROVIDE TEMPORARY PIPE SUPPORT. FIELD COORDINATE ROUTING.
6	ROUTE PCR UP ALONG EXTERIOR WALL. PROVIDE TEMPORARY PIPE SUPPORT. FIELD COORDINATE ROUTING.
7	PCR UP THRU TRAILER DECK. ROUTE TO PCR CONNECTION. FIELD COORDINATE LOCATION, ROUTING.
8	ROUTE CW MAKE-UP WATER UP ALONG EXTERIOR WALL ROUTE UP TO TEMPORARY CONNECTION. PROVIDE TEMPORARY PIPE SUPPORT. FIELD COORDINATE ROUTING.
9	ROUTE CW MAKE-UP WATER THRU TRAILER DECK TO CW MAKE-UP WATER PIPE CONNECTION. FIELD COORDINATE LOCATION, ROUTING.
10	ROUTE NG UP ALONG EXTERIOR WALL ROUTE UP TO TEMPORARY CONNECTION. PROVIDE TEMPORARY PIPE.
11	11 ROUTE NG THRU TRAILER DECK TO NG PIPE CONNECTION. FIELD COORDINATE LOCATION, ROUTING.
12	ROUTE FOS UP ALONG EXTERIOR WALL ROUTE UP TO TEMPORARY CONNECTION. PROVIDE TEMPORARY PIPE.
13	ROUTE FOS THRU TRAILER DECK TO FOR PIPE CONNECTION. FIELD COORDINATE LOCATION, ROUTING.
15	ROUTE FOR UP ALONG EXTERIOR WALL ROUTE UP TO TEMPORARY CONNECTION. PROVIDE TEMPORARY PIPE.
16	ROUTE FOR THRU TRAILER DECK TO FOR PIPE CONNECTION. FIELD COORDINATE LOCATION, ROUTING.
17	TEMPORARY BD DRAIN PIPING. CONNECT TO BD DRAIN PIPING IN TRAILER AND ROUTE THRU DECK TO BOILER PLANT AS INDICATED. FIELD COORDINATE ROUTE FOR TEMP INSTALLATION AND REMOVAL.
18	TEMP BD PIPING TO TEMP BD PIPING HEADER. SEE SHEET MT101A FOR CONT.
20	CTPO PIPE DN THRU FLOOR TO PIPE TUNNELS.
21	HPS PIPE DN THRU FLOOR TO PIPE TUNNELS.
22	HPS PIPE DN THRU FLOOR TO PIPE TUNNELS.
23	HPS PIPE DN THRU FLOOR TO PIPE TUNNELS.
24	CTPO PIPE DN THRU FLOOR TO PIPE TUNNELS.
33	STEAM BOILER, 200HP, 200psig, 6,900 lbs/hr
34	MAIN STEAM OUTLET, 4" FLANGE AND (2) 2" NPT
35	FEEDWATER TANK, 36"Dx60" HIGH (APPROX 264 GAL)
36	BLOW DOWN SEPARATOR: 3" OUTLET
37	BURNER MODEL DLG-150P WITH HONEYWELL CONTROLS PANEL
38	MAIN DISCONNECT: BREAKER PANELS
39	PILOT PROPANE TANK
40	FUEL STORAGE TANK, 63"x61"x38" (APPROX 559 GAL)
41	FUEL OIL PUMP MOTOR: MARATHON MODEL FPM48C17FSEP
42	FEEDWATER PUMPS: (2) GRUNDFOS MODEL CR-5-14
43	PUMP CONTROL PANEL: 120V/480V
44	TRANSFORMER: GENERAL ELECTRIC PN 9T91B4204
45	LWCO PANEL WARRICK 2MMBASP, MCDONNELL MILLER 194
46	50 GAL CHEMICAL FEED MIXING TANK
47	WATER SOFTENER MARLO DUPLEX MAT S 60M-1



KEY PLAN

PLAN

TRUE

SCALE: 1/4" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: PARTIAL MECH PIPING PLAN - TEMP BOILER PLANT

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: MT101B

VA FORM 08 - 6231

Autodesk Docs://0489001/0131/ABB Boiler Replacement/0489001-01-01 MECH R25.rvt

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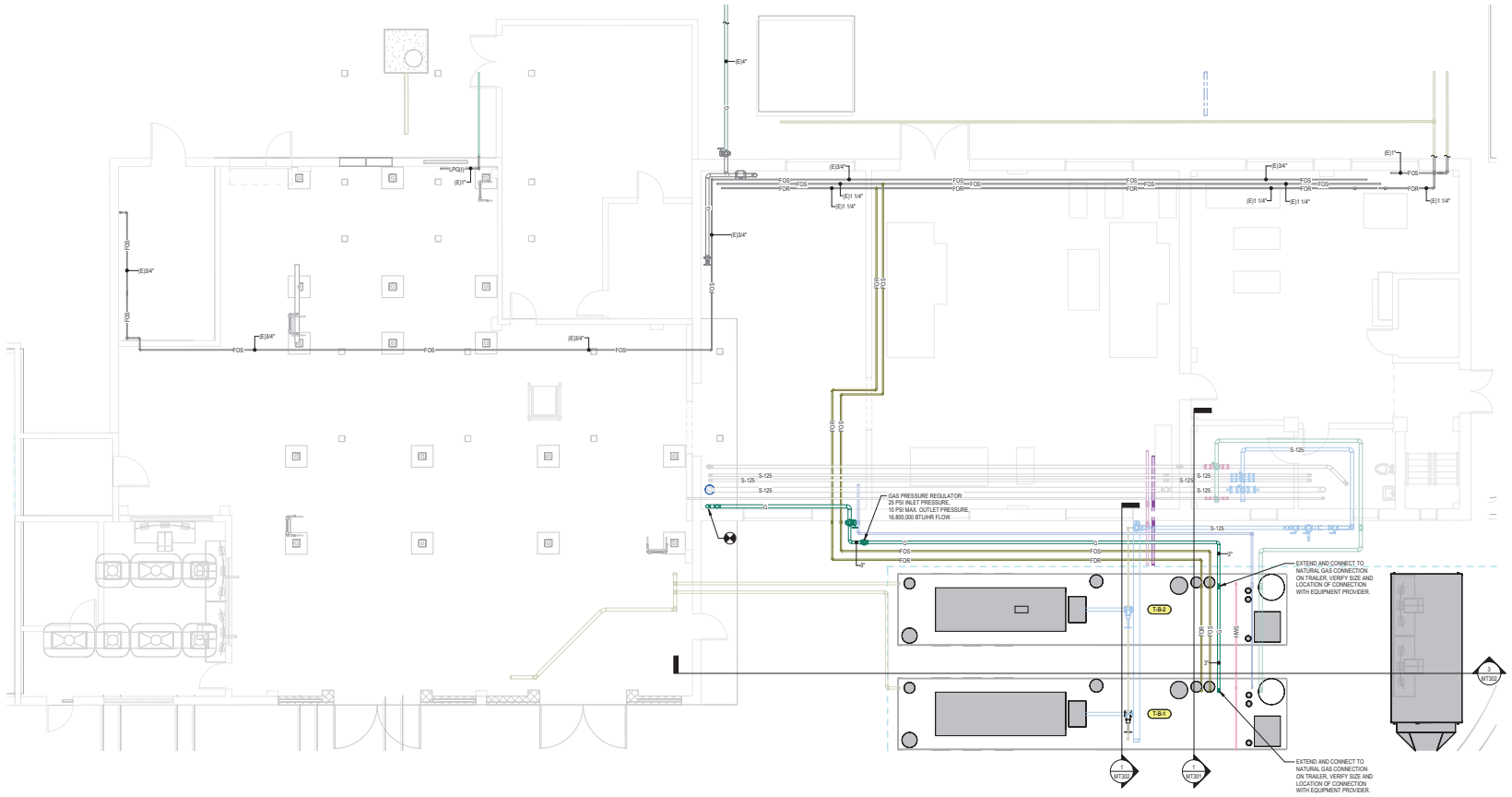
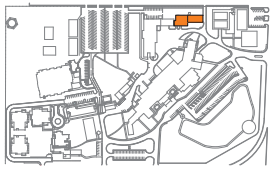


1 MECHANICAL PIPING PLAN - BOILER PLANT FLOOR - TEMPORARY
SCALE: 3/16" = 1'-0"



KEY PLAN

PLAN
TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL MECH PIPING TEMP FLOOR PLAN - FUEL OIL AND GAS

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025 | Checked: LRL | Drawn: MJS

Drawing Number: MT101C

VA FORM 08 - 6231

Autodesk Docs://0489001/0131/VBS Boiler Replacement/0489001-01-MECHR25.rvt

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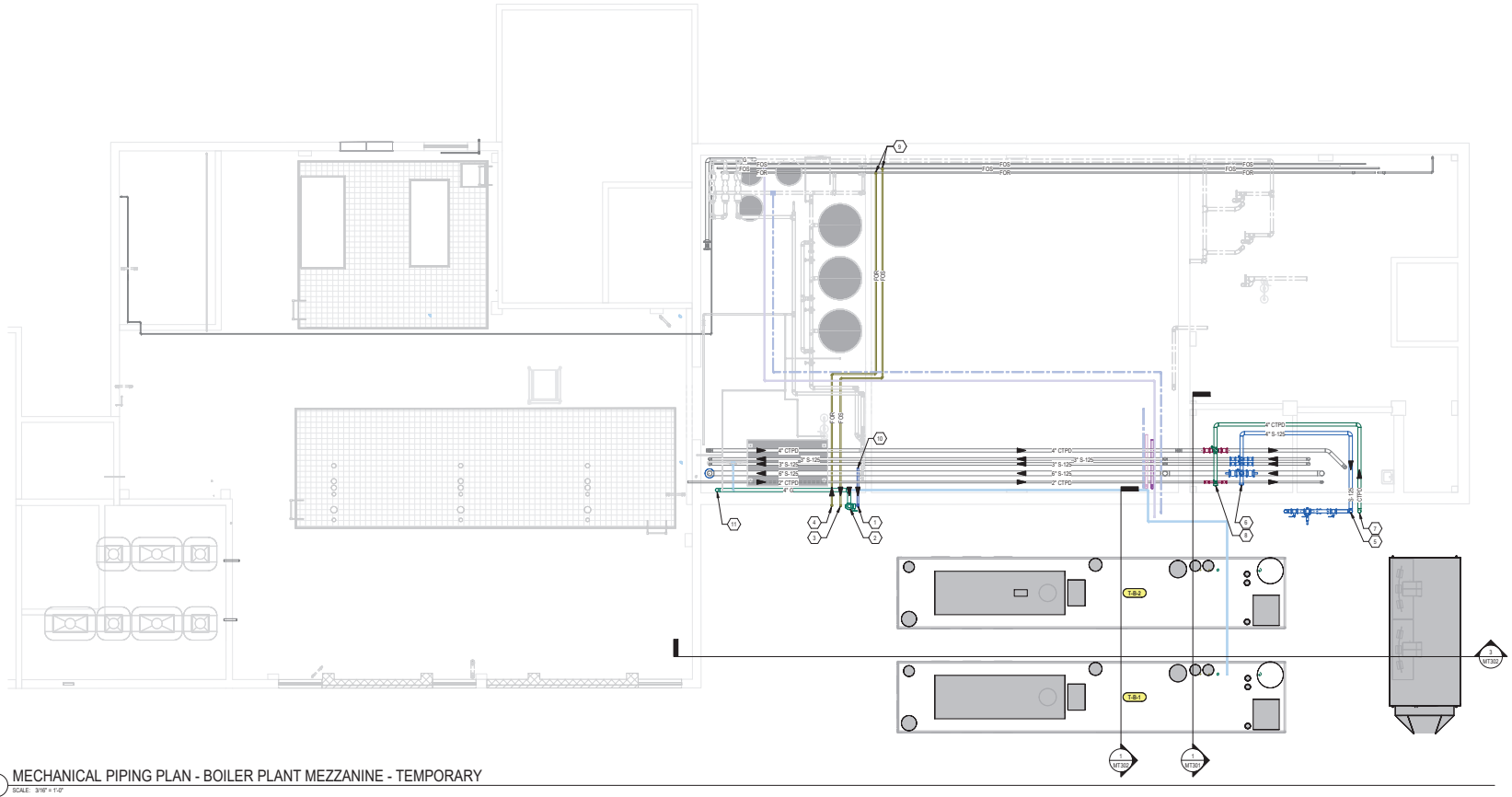
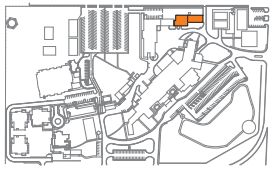


1 MECHANICAL PIPING PLAN - BOILER PLANT MEZZANINE - TEMPORARY
SCALE: 3/16" = 1'-0"

KEY NOTES

No.	DESCRIPTION
1	CONNECT CW MAKE-UP WATER TO TEMP CONNECTION AND ROUTE DN ALONG EXTERIOR WALL AS INDICATED. FIELD COORDINATE CONNECTION AND ROUTING. SEE SHEET MT101B FOR CONT.
2	CONNECT NG TO TEMP CONNECTION AND ROUTE DN ALONG EXTERIOR WALL AS INDICATED. FIELD COORDINATE CONNECTION AND ROUTING. SEE SHEET MT101B FOR CONT.
3	CONNECT FOS TO TEMP CONNECTION AND ROUTE DN ALONG EXTERIOR WALL AS INDICATED. FIELD COORDINATE CONNECTION AND ROUTING. SEE SHEET MT101B FOR CONT.
4	CONNECT FOR TO TEMP CONNECTION AND ROUTE DN ALONG EXTERIOR WALL AS INDICATED. FIELD COORDINATE CONNECTION AND ROUTING. SEE SHEET MT101B FOR CONT.
5	ROUTE HPS UP THRU EXTERIOR WALL AS INDICATED. CONNECT TO (E) BRANCH STEAM MAINS AS INDICATED. PROVIDE ISOLATION SHUT VALVE ASSEMBLY. SEE SHEET MT401.
6	TEMP HPS BRANCH MAIN.
7	ROUTE PCR UP THRU EXTERIOR WALL AS INDICATED. CONNECT TO (E) BRANCH PCR MAINS AS INDICATED. PROVIDE ISOLATION SHUT VALVE ASSEMBLY. SEE SHEET MT401.
8	TEMP PCR BRANCH MAIN.
9	TEMP FOS / FOR CONNECTION. FIELD VERIFY LOCATION. ROUTE THRU EXTERIOR WALL AS INDICATED. FIELD COORDINATE ROUTING.
10	TEMP CW MAKE UP WATER CONNECTION. FIELD VERIFY LOCATION. ROUTE THRU EXTERIOR WALL AS INDICATED. FIELD COORDINATE ROUTING.
11	TEMP NG CONNECTION. FIELD VERIFY LOCATION. ROUTE THRU EXTERIOR WALL AS INDICATED. FIELD COORDINATE ROUTING.



KEY PLAN

PLAN
TRUE

SCALE: 3/16" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: OVERALL MECH TEMP PLAN - BOILER PLANT MEZZANINE

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: MT102

Autodesk Docs://0489001/0131/ABB Boiler Replacement/0489001-01-MECHPR25.rvt

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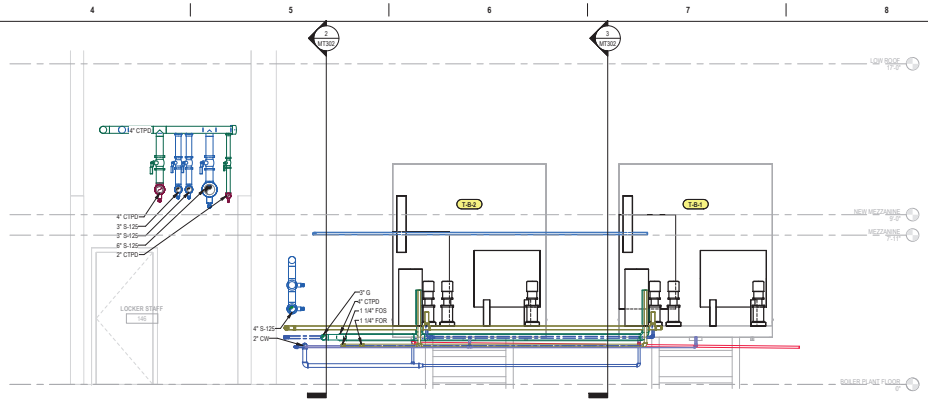
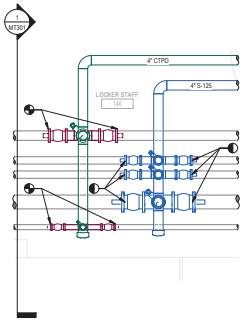
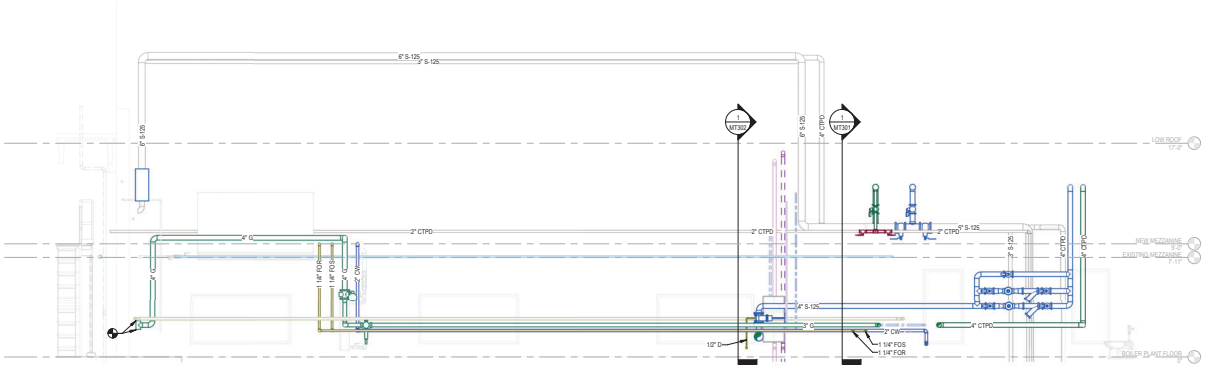
VA FORM 08 - 6231



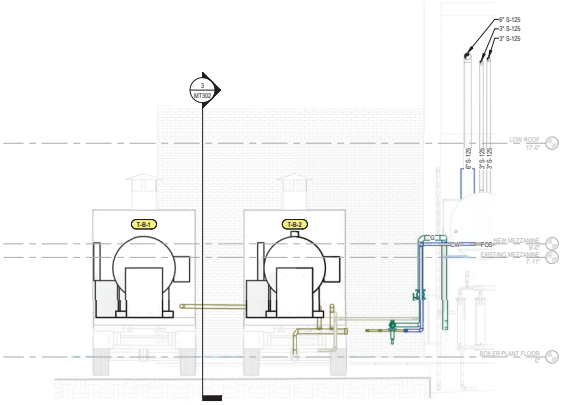
1 TEMPORARY BOILER AND PIPING SECTION
SCALE: 3/8" = 1'-0"



2 TEMPORARY PIPING TIE-IN ENLARGED PLAN
SCALE: 1/2" = 1'-0"



3 TEMPORARY PIPING SECTION
SCALE: 1/4" = 1'-0"



4 TEMPORARY BOILER AND PIPING SECTION
SCALE: 1/4" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
Revisions:	Date:

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VA U.S. Department of Veterans Affairs

Drawing Title: MECH TEMPORARY SECTIONS

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: MT301

VA FORM 08 - 6231

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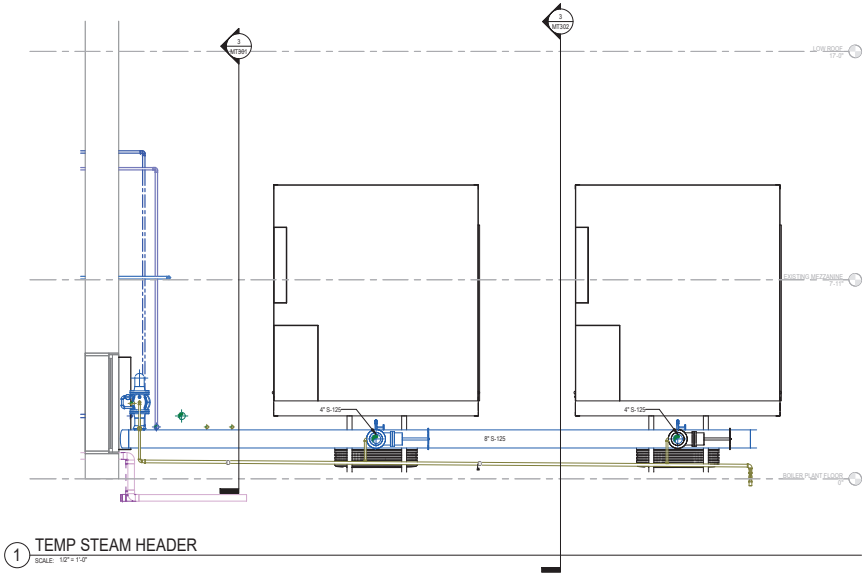
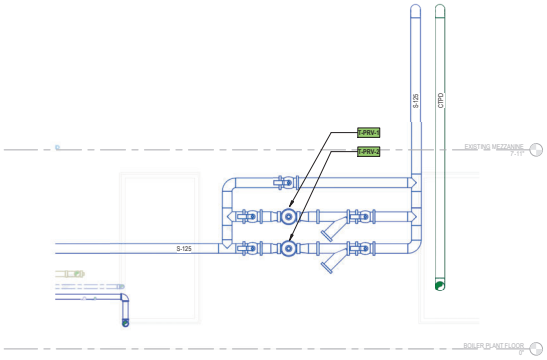
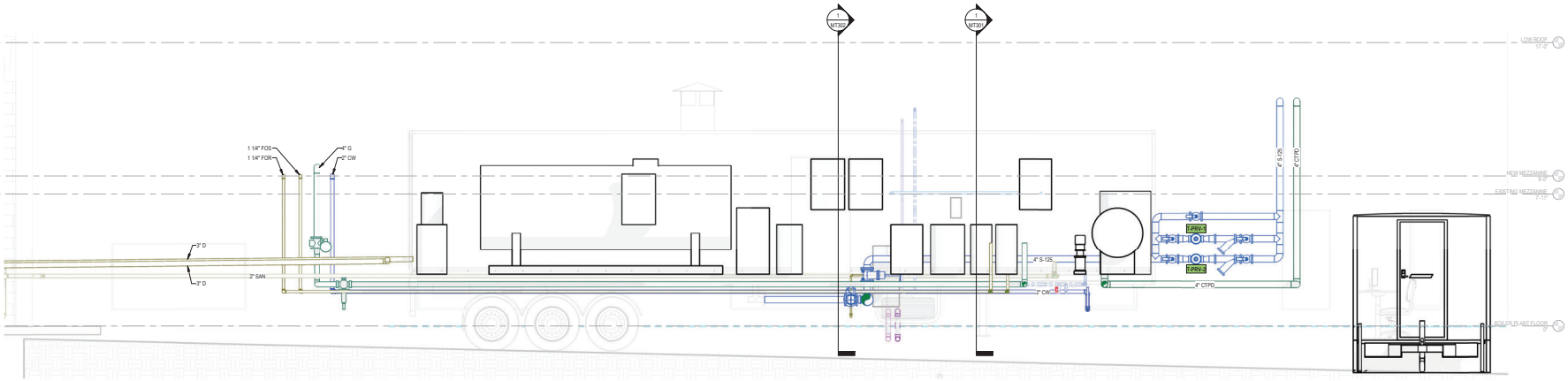


1 TEMP STEAM HEADER
SCALE: 1/2" = 1'-0"



2 TEMP PRV
SCALE: 1/2" = 1'-0"



3 TEMPORARY BOILER AND PIPING SECTION
SCALE: 3/8" = 1'-0"

SCALE: 3/8" = 1'-0"

SCALE: 1/2" = 1'-0"

100% CONSTRUCTION DOCUMENTS	10/07/2025
95% CONSTRUCTION DOCUMENTS	07/25/2025
65% DESIGN DEVELOPMENT	11/21/2024
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VA U.S. Department of Veterans Affairs

Drawing Title: MECH TEMPORARY SECTIONS

Phase: 100% CONSTRUCTION DOCUMENTS

Project Title: A/E REPLACE BOILERS

Project Number: 519-20-200

Building Number: 2

APPROVING OFFICIAL: COR, Mr. JOSHUA JUNKIN

FULLY SPRINKLERED

Location: BOILER PLANT

Issue Date: 10/07/2025

Checked: LRL

Drawn: DMB

Drawing Number: MT302

Autodesk Docs://0489001/0131/ABS Boiler Replacement/0489001-01-MECHFR25.rvt

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