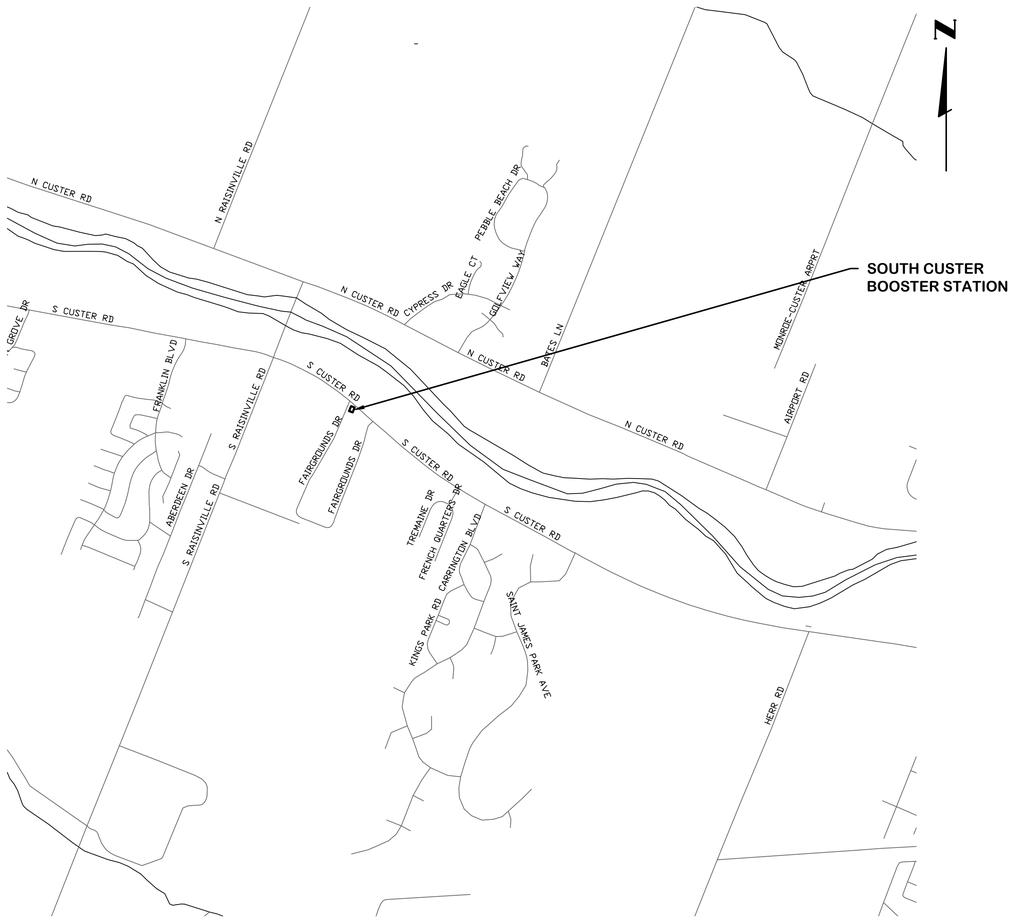

LOCATION MAP

0 500 1000 2000

SCALE IN FEET

CITY OF MONROE, MICHIGAN

SOUTH CUSTER BOOSTER PUMP STATION EXPANSION

2023

ROBERT E. CLARK - MAYOR

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STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

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STATUS: ISSUED FOR BID
DATE: MAY 2023

TOL-7766001\COVER-COVER
5/26/2023 12:54 PM CLENDER

STRUCTURAL LEGEND

- EXISTING STRUCTURE
- EXISTING STRUCTURE TO BE REMOVED
- NEW CONCRETE STRUCTURE
- NEW BLOCK WALL
- NEW BRICK WALL

PIPING AND EQUIPMENT LEGEND

- EXISTING PIPING
- EXISTING PIPING OR EQUIPMENT TO BE REMOVED (IF YARD PIPING, ABANDON AND REMOVE AS REQUIRED)
- EXISTING PIPING OR EQUIPMENT TO BE RELOCATED
- NEW PIPING

8 / 12 = NUMBER OF SECTION / SHEET NUMBER ON WHICH SECTION IS SHOWN

SECTION 3 / 4 = NUMBER OF SECTION / SHEET NUMBER ON WHICH SECTION IS CUT

DELINEATION OF SECTIONS

(SECTIONS LETTERED ARE SHOWN ON SAME SHEET)

A = ELEVATION VIEW

5 / 7 = NUMBER OF DETAIL IN SECTION / SHEET NUMBER ON WHICH DETAIL IS SHOWN

6 / 7 = NUMBER OF DETAIL IN PLAN / SHEET NUMBER ON WHICH DETAIL IS SHOWN

DETAIL 5 / 9 = NUMBER OF DETAIL / SHEET NUMBER ON WHICH DETAIL IS TAKEN

DELINEATION OF BLOW - UP DETAILS

(DETAILS LETTERED ARE SHOWN ON SAME SHEET)

VALVE SYMBOL LEGEND

- GATE, KNIFE GATE, BUTTERFLY OR GLOBE VALVES
- PLUG VALVE
- BALL VALVE
- PINCH VALVE
- CHECK VALVE

NOTE:
FOR SYMBOLS USED FOR PIPING ISOMETRIC DIAGRAMS, SEE SHEET NO. _

STANDARD ABBREVIATIONS

ALUM.	ALUMINUM	MAX.	MAXIMUM
AVE.	AVENUE	MH	MANHOLE
BM	BENCH MARK	MJ	MECHANICAL JOINT
BF	BLIND FLANGE	MIN.	MINIMUM
BLDG.	BUILDING	N	NORTH
C/C	CENTER TO CENTER	NTS	NOT TO SCALE
CK'D PL.	CHECKERED PLATE	OC	ON CENTER
CONC.	CONCRETE	OD	OUTSIDE DIAMETER
DIA.	DIAMETER	PE	PLAIN END
DWG.	DRAWING	R	RADIUS
EW	EACH WAY	RR	RAILROAD
EF	EACH FACE	S	SOUTH
ECC.	ECCENTRIC	SCH.	SCHEDULE
EL.	ELEVATION	SH.	SHEET
E	EAST	SS	STAINLESS STEEL
EXIST.	EXISTING	ST.	STREET
F	FLANGE	STA.	STATION
' OR FT.	FEET OR FOOT	T&B	TOP AND BOTTOM
GAL.	GALLON	TYP.	TYPICAL
GR.	GRADE	VERT.	VERTICAL
HOR.	HORIZONTAL	W	WEST
" OR IN.	INCH	W/	WITH
ID	INSIDE DIAMETER		
INV. EL.	INVERT ELEVATION		

PIPING ABBREVIATIONS

MATERIAL

ABS	ABS ACRYLONITRILE-BUTADIENE-STYRENE
ABSC	ABS COMPOSITE SEWER PIPE (TRUSS PIPE)
BSP	BLACK STEEL PIPE
CIP	CAST IRON PIPE
CISP	CAST IRON SOIL PIPE
CMP	CORRUGATED METAL PIPE
CPP	CONCRETE PRESSURE PIPE
CPT	CORRUGATED POLYETHYLENE TUBING
CPVC	CHLORINATED POLYVINYL CHLORIDE PIPE
CU	COPPER TUBING OR PIPING
DIP	DUCTILE IRON PIPE
FRP	FIBERGLASS REINFORCED PIPE
GLDIP	GLASS-LINED DUCTILE IRON PIPE
GSP	GALVANIZED STEEL PIPE
HDPE	HIGH DENSITY POLYETHYLENE
PCP	PLAIN CONCRETE PIPE
PE	POLYETHYLENE
PP	POLYPROPYLENE
PPVC	PERFORATED POLYVINYL CHLORIDE PIPE
PVC	POLYVINYL CHLORIDE PIPE
PVCP	PERFORATED VITRIFIED CLAY PIPE
PVDF	POLYVINYLIDENE FLUORIDE (KYNAR)
RCP	REINFORCED CONCRETE PIPE
SP	STEEL PIPE
SSP	STAINLESS STEEL PIPE
SWS	SPIRAL WELDED STEEL
UPVC	UNPLASTICIZED POLYVINYL CHLORIDE PIPE
VCP	VITRIFIED CLAY PIPE

SERVICE

PS	PRIMARY SLUDGE
RAS	RETURN ACTIVATED SLUDGE
WAS	WASTE ACTIVATED SLUDGE
DS	DIGESTED SLUDGE
SC	SCUM
SP	SUPERNATANT
DG	DIGESTER GAS
NG	NATURAL GAS
CW	CITY WATER
HW	HOT CITY WATER
EW	EFFLUENT WATER
PW	PROTECTED WATER
CA	COMPRESSED AIR
TD	TANK DRAIN
SS	SANITARY SEWER

TOPOGRAPHY LEGEND

TOPOGRAPHY LINES:

- CENTER LINE
- X — X — X — FENCE LINE
- PROPERTY LINE
- PERMANENT EASEMENT
- CONSTRUCTION EASEMENT
- SILT FENCE

UTILITY LINES:

C	CABLE (UNDERGROUND)*
CO15	COMBINED SEWER
E	ELECTRICAL (UNDERGROUND)*
G4	GAS LINE
SA10	SANITARY SEWER
S	SIGNAL (UNDERGROUND)*
ST18	STORM SEWER
T	TELEPHONE (UNDERGROUND)*
W8	WATER LINE
ST54	LARGE DIAMETER LINES (ANY TYPE)
/ / /	UTILITY LINE TO BE REMOVED
X X X	UTILITY LINE TO BE ABANDONED
8" Sanitary Sewer	NEW UTILITY LINE
54" Sanitary Sewer	LARGE DIAMETER NEW UTILITY LINE

ALPHA DESIGNATION REFERS TO UTILITY TYPE, NUMERICAL DESIGNATION REFERS TO PIPE NOMINAL DIAMETER. LINES WITH NO NUMERICAL DESIGNATION ARE OF UNKNOWN SIZE.

* AERIAL LINES, IF SHOWN, ARE DESIGNATED WITH LOWER CASE LETTERS

SYMBOLS:

SA	MANHOLE (ALPHA DESIGNATION REFERS TO UTILITY TYPE, "U" IS "UNKNOWN" TYPE)
PP	POWER POLE OR TELEPHONE POLE
LP	LIGHT POLE
FH, YH	FIRE HYDRANT OR YARD HYDRANT
	VALVE
CO	CLEAN OUT
IP	IRON PIN (OR LABELED POST, MARKER ETC.)
	CATCH BASINS
BORING B-2	SOIL BORING

YARD PIPING LEGEND

UTILITY LINES:

AA	AERATION AIR
AL	ALUM
C	CABLE (UNDERGROUND)*
CA	COMPRESSED AIR
CL	CHLORINE SOLUTION
CO	COMBINED SEWER
CW	COLD CITY WATER
CLG	CHLORINE GAS
DG	DIGESTER GAS
DS	DIGESTED SLUDGE
DW	DILUTION WATER
EW	EFFLUENT WATER
E	ELECTRICAL (UNDERGROUND)*
FC	FERRIC/FERROUS CHLORIDE
FD	FOUNDATION DRAIN
FE	FINAL EFFLUENT
FO	FIBER OPTIC
FU	FUEL OIL
G	GAS LINE (OFF SITE)
GR	GREASE
IC	IRON CHLORIDE
HW	HOT CITY WATER
ML	MIXED LIQUOR
NG	NATURAL GAS
P	POLYMER
PE	PRIMARY EFFLUENT
PS	PRIMARY SLUDGE
PW	PLANT WATER
RAS	RETURN ACTIVATED SLUDGE
RD	ROOF DRAIN
RS	RAW SEWAGE
SA	SANITARY SEWER
SB	SECONDARY BYPASS
SC	SCUM
SE	SECONDARY EFFLUENT
S	SIGNAL (UNDERGROUND)*
SPA	SPARE
ST	STORM SEWER
SM	STEAM
SP	DIGESTER SUPERNATANT
TD	TANK DRAIN
T	TELEPHONE (UNDERGROUND)*
TE	THICKENER EFFLUENT
TS	THICKENED SLUDGE
WAS	WASTE ACTIVATED SLUDGE
ST54	LARGE DIAMETER LINES (ANY TYPE)
/ / /	UTILITY LINE TO BE REMOVED
X X X	UTILITY LINE TO BE ABANDONED
SA8	NEW UTILITY LINE
54" Sanitary Sewer	LARGE DIAMETER NEW UTILITY LINE

NOTE: ACCURACY OF EXISTING ELEVATIONS AND DIMENSIONS IS NOT GUARANTEED. FIELD VERIFY BEFORE CONSTRUCTION.

1. ACCESS FOR EMERGENCY VEHICLES MUST BE PROVIDED AT ALL TIMES
2. IF DURING THE COURSE OF CONSTRUCTION, EVIDENCE OF DEPOSITS OF HISTORICAL AND/OR ARCHAEOLOGICAL INTEREST IS FOUND, THE OPERATOR WILL CEASE OPERATIONS AND NOTIFY THE OWNER. THE OWNER WILL THEN NOTIFY THE STATE HISTORICAL PRESERVATION OFFICE. NO FURTHER DISTURBANCE OF THE DEPOSITS WILL OCCUR UNTIL AN OFFICIAL FROM THE STATE OFFICE HAS SURVEYED THE FIND, MADE A DETERMINATION OF THE VALUE OF THE FIND AND EFFECT OF CONTINUED CONSTRUCTION DISTURBANCES, AND SUBMITTED THE RESULTS OF THE DETERMINATION TO THE OWNER.
3. ANY SITE PREPARATION THAT WILL INVOLVE EARTH MOVING (SUCH AS CLEARING AND GRUBBING) WILL NOT BEGIN MORE THAN TWO WEEKS IN ADVANCE OF THE START OF EXCAVATION. THE PURPOSE OF THIS RESTRICTION IS TO PREVENT THE EXISTENCE OF LARGE AREAS OF EXPOSED SOILS FOR AN EXTENDED PERIOD OF TIME WHEN CONSTRUCTION IN NOT PROCEEDING.
4. ALL DISTURBED VEGETATION IS TO BE RESEEDED AS PART OF RESTORATION, UNLESS THE AREA WILL BE PAVED OR OCCUPIED BY NEW COLLECTION OR TREATMENT FACILITIES.
5. ALL MOTORIZED CONSTRUCTION EQUIPMENT WILL BE EQUIPPED WITH PROPER EMISSION CONTROL EQUIPMENT, MUFFLERS, AND INTAKE SILENCERS, AS APPROPRIATE TO MINIMIZE NOISE POLLUTION.
6. ALL CONSTRUCTION WILL TAKE PLACE DURING NORMAL WEEKDAY, DAYLIGHT WORKING HOURS, NOT ON WEEKEND OR HOLIDAYS, UNLESS NECESSARY TO RESOLVE AN EMERGENCY SITUATION.
7. NO MANHOLE OR SEWER EXCAVATION WILL BE LEFT OPEN AWAITING CONNECTION OR REMOVAL AT A LATER DATE BY THE CONTRACTOR'S FORCES, OR OTHERS, BUT SHALL BE TEMPORARILY BACKFILLED AND RESURFACED, IF APPLICABLE, WITH A TEMPORARY PAVEMENT PASSABLE TO TRAFFIC.
8. WHEN TEMPORARY DIVERSION OF WASTEWATER FLOWS IS NECESSARY TO COMPLETE CONSTRUCTION, FLOW DIVERSION DEVICES WILL BE WATERTIGHT. DISCHARGE OF FLOWS DIRECTLY INTO THE ENVIRONMENT, RATHER THAN INTO AN APPROPRIATE TREATMENT OR COLLECTION FACILITY, IS PROHIBITED.
9. ONLY WATER OR CALCIUM CHLORIDE WILL BE USED AS DUST PALLIATIVE.
10. STOCKPILED TOPSOIL AND FILL MATERIAL SHALL BE PROTECTED WITH EROSION CONTROL BARRIERS OR TEMPORARY SEEDING.
11. NO FILL, TOPSOIL, OR HEAVY EQUIPMENT SHALL BE STORED WITHIN 200 FEET OF A STREAM BANK OR WITHIN THE DRIPLINE OF A TREED AREA.
12. IF, DUE TO WEATHER, FINAL GRADING CANNOT BE ACCOMPLISHED IMMEDIATELY, MULCHING AND TEMPORARY SEEDING, IF FEASIBLE, OR SOME TYPE OF TEMPORARY EROSION CONTROL MEASURES, MUST BE USED WITHIN 30 DAYS UNTIL LONG-TERM RESTORATION CAN OCCUR.
13. EXCESS SOIL THAT IS STOCKPILED MUST BE EITHER REMOVED OR REGRADED WITHIN 15 DAYS OF THE COMPLETION OF CONSTRUCTION.

STATE OF MICHIGAN Troy McCallin Brehmer LICENSED PROFESSIONAL ENGINEER License No. 6201309851
Troy 5/26/2023

LEGEND AND INDEX

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

REVISIONS AFTER ISSUED FOR BID — NO. DATE BY

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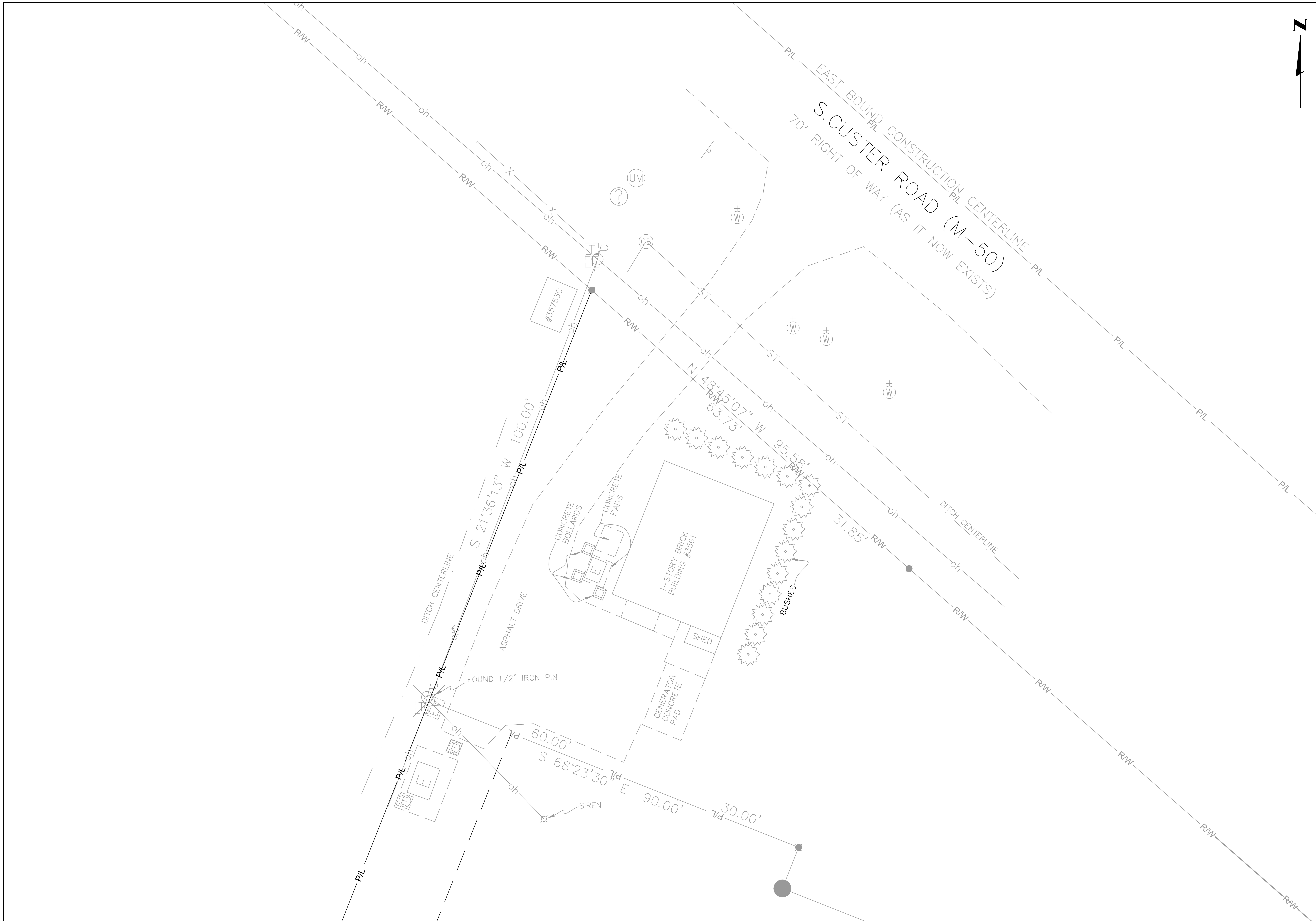
JOB NO.	538-7766.001
SCALE	NONE

THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
BCW	RHN	TMB

STATUS: ISSUED FOR BID
DATE: MAY 2023



EXISTING SITE PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

STATE OF MICHIGAN
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SCALE	1"=10'

THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
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SHEET NO. G-2
2 of 35

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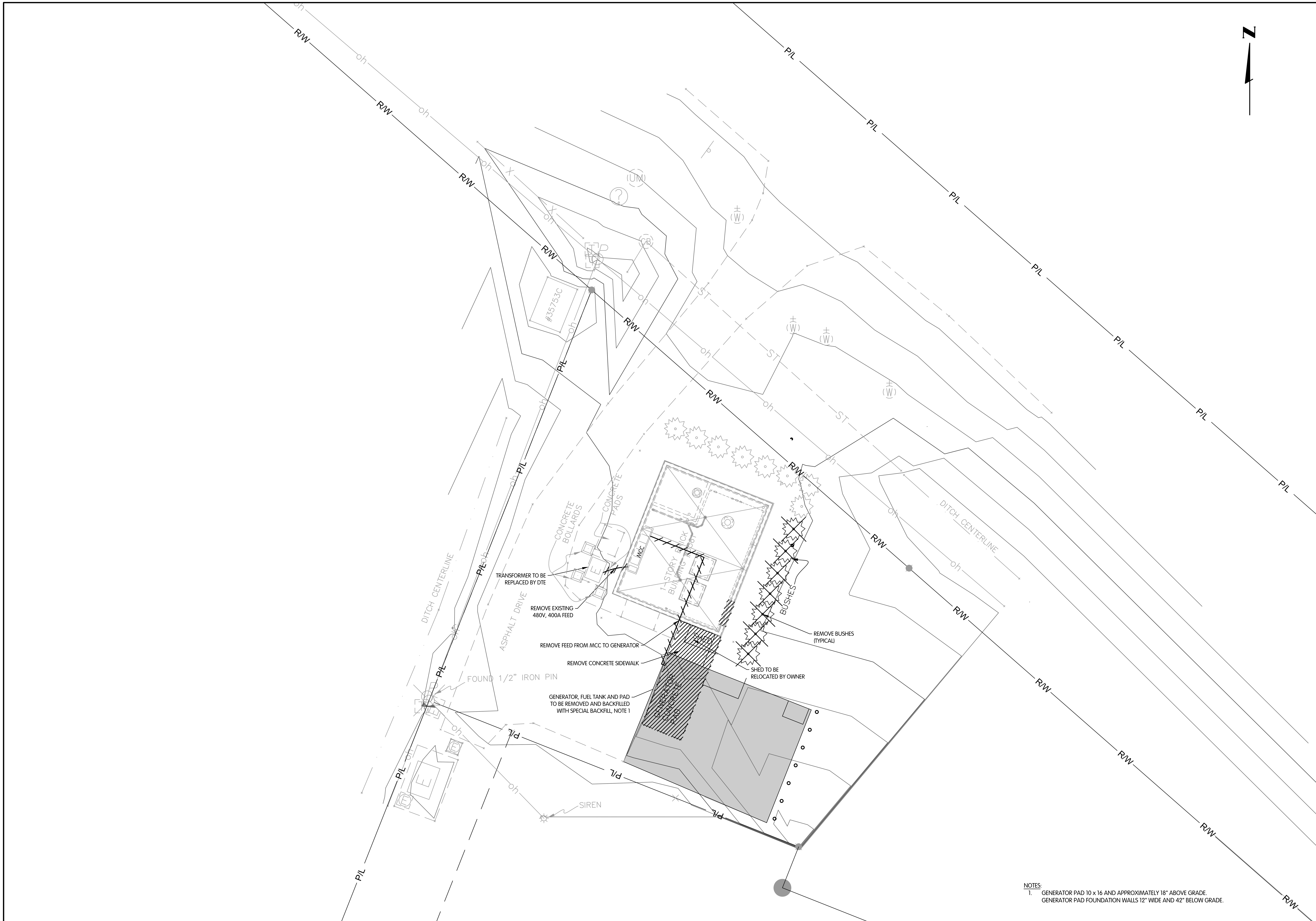

NOTES:

1. GENERATOR PAD 10 x 16 AND APPROXIMATELY 18" ABOVE GRADE. GENERATOR PAD FOUNDATION WALLS 12" WIDE AND 42" BELOW GRADE.

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SOUTH CUSTER BOOSTER STATION REMOVALS SITE PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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1			
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JOB NO.	538-7766.001
SCALE	1"=10'

THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
BCW	RHN	TMB

STATUS: ISSUED FOR BID
DATE: MAY 2023

SHEET NO.
R-1
3 of 35

TOL-7766001R03-REMOVAL SITE PLAN
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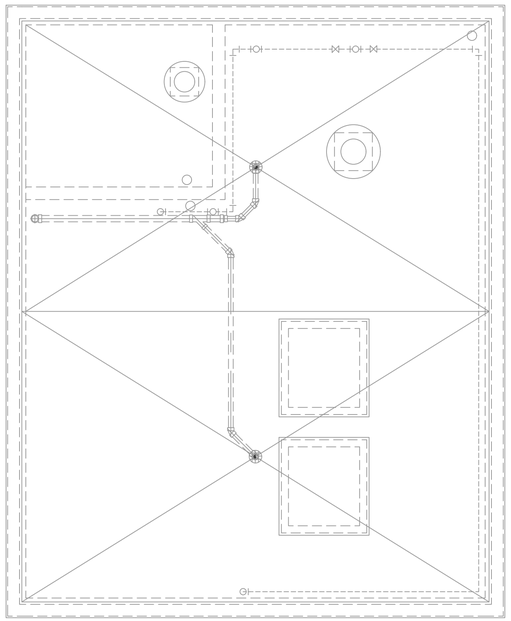
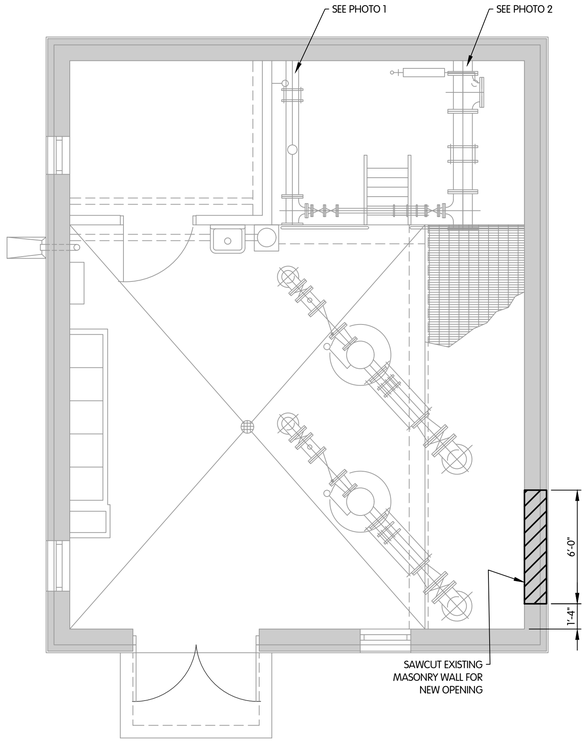
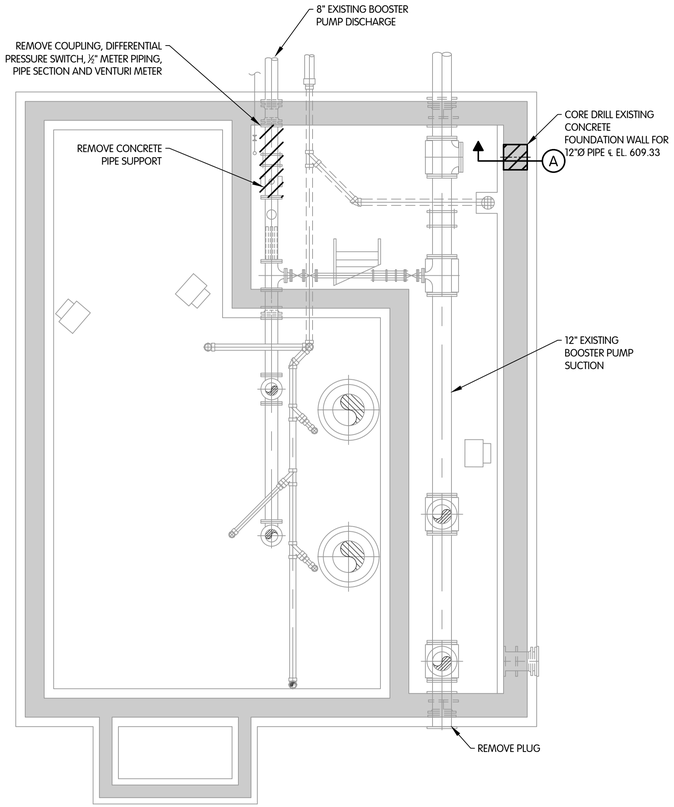


ROOF - PLAN
¼"=1'-0"



UPPER PLAN
¼"=1'-0"



LOWER PLAN
¼"=1'-0"

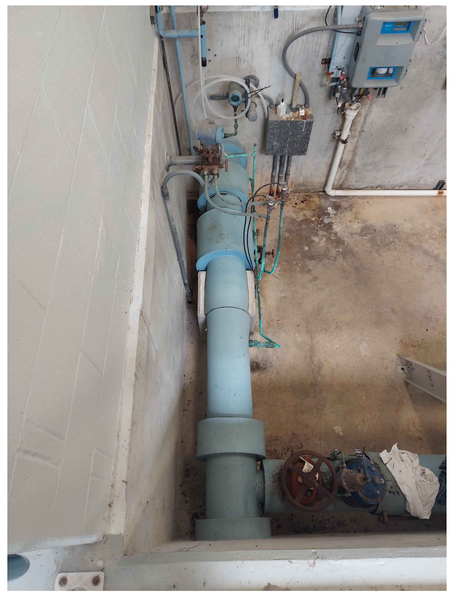
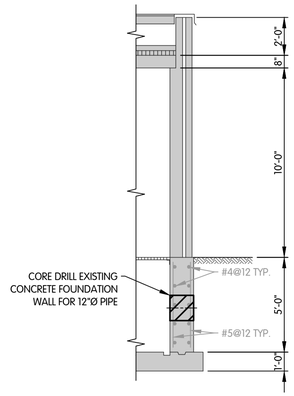


PHOTO 1

PHOTO 2



DETAL A
¼"=1'-0"

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5/26/2023

SOUTH CUSTER BOOSTER STATION REMOVALS PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
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SCALE	1/4"=1'-0"
	THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE
DESIGNED	BCW
DRAWN	RHN
CHECKED	TMB
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DATE	MAY 2023
SHEET NO.	R-2
	4 OF 35

T:\DL-7766\001\R\1-REMOVAL EXISTING BUILDING
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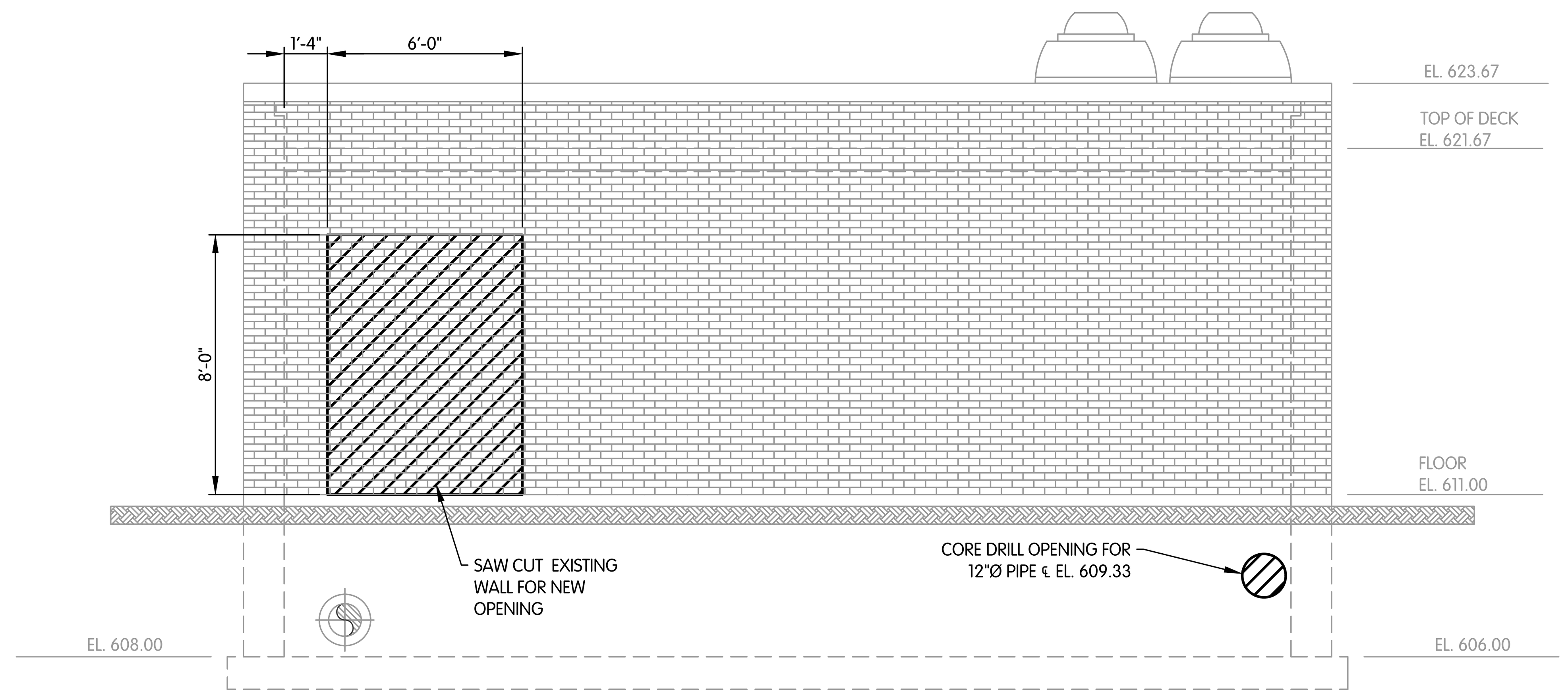
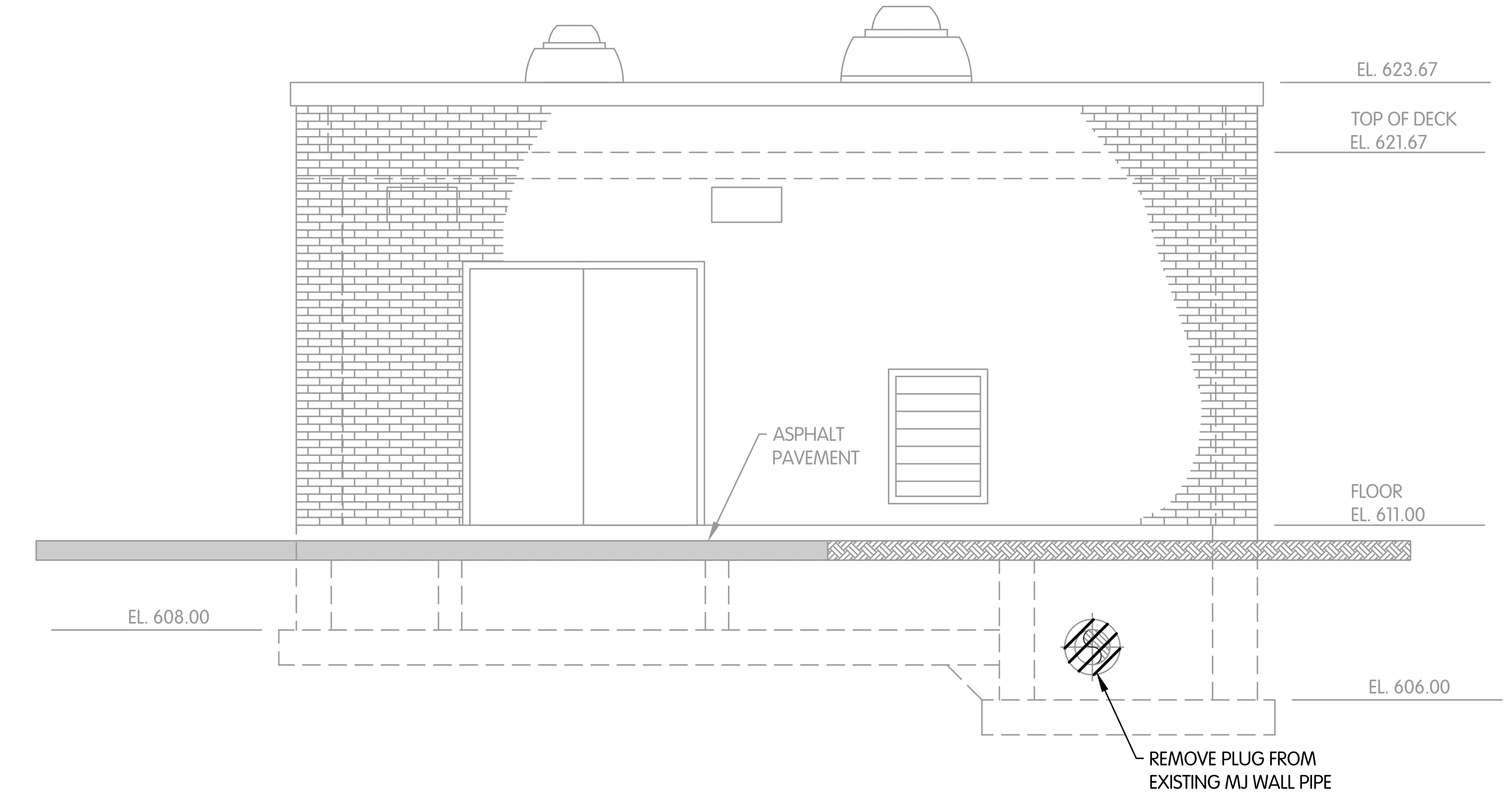
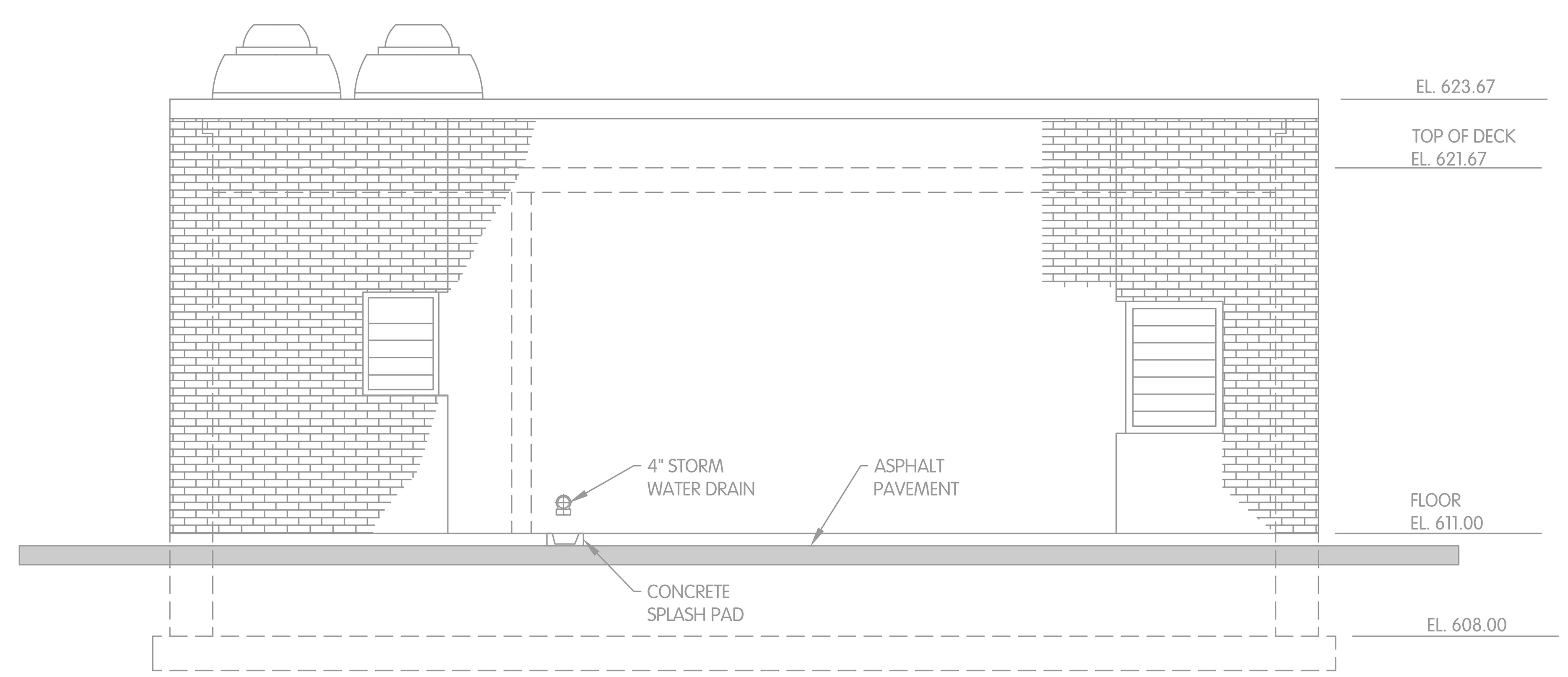


EAST ELEVATION
¼"=1'-0"



SOUTH ELEVATION
¼"=1'-0"



WEST ELEVATION
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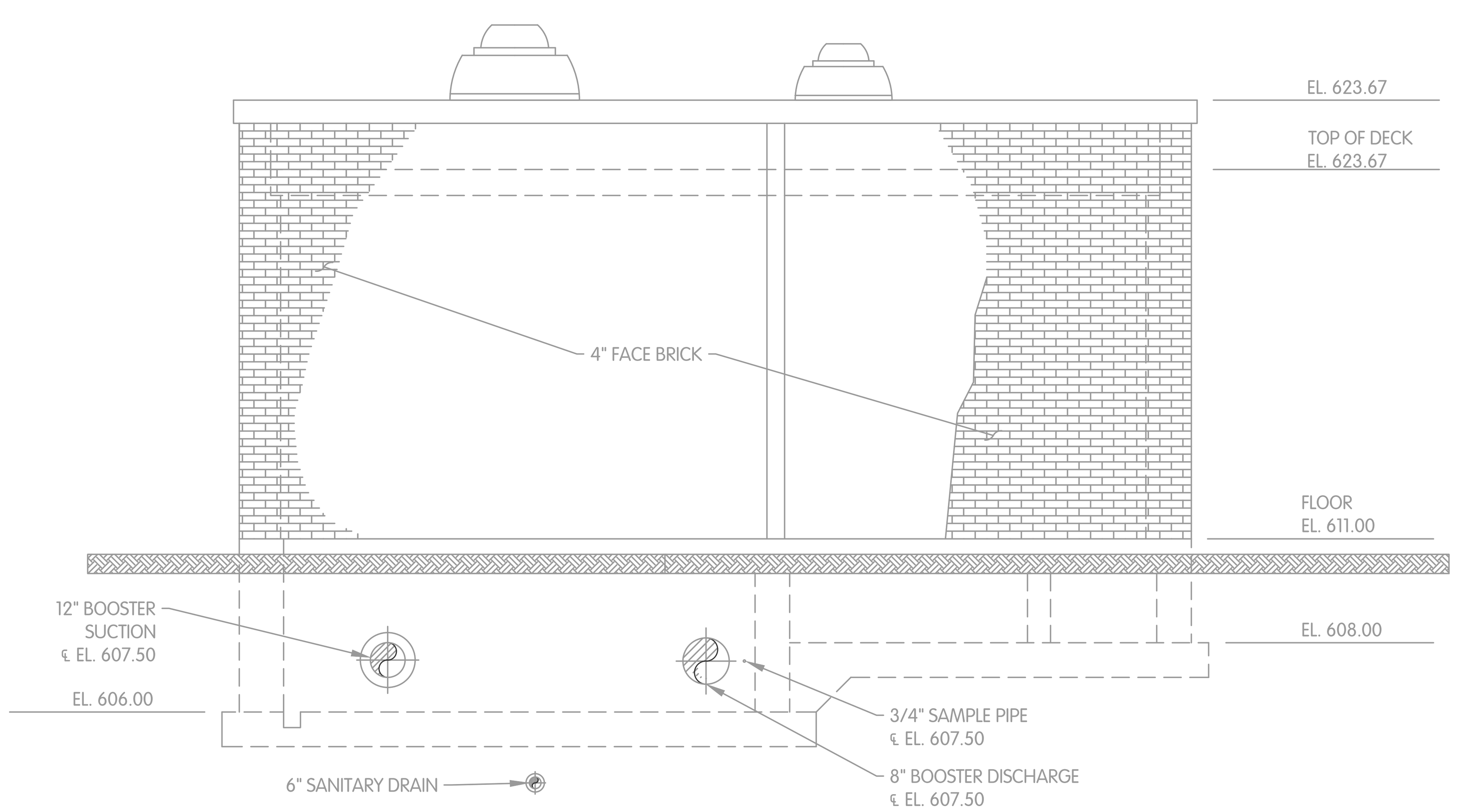

NORTH ELEVATION
¼"=1'-0"

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SOUTH CUSTER BOOSTER STATION
REMOVALS
ELEVATIONS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

REVISIONS AFTER ISSUED FOR BID

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4			
5			

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SCALE 1/4"=1'-0"
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

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STATUS: ISSUED FOR BID
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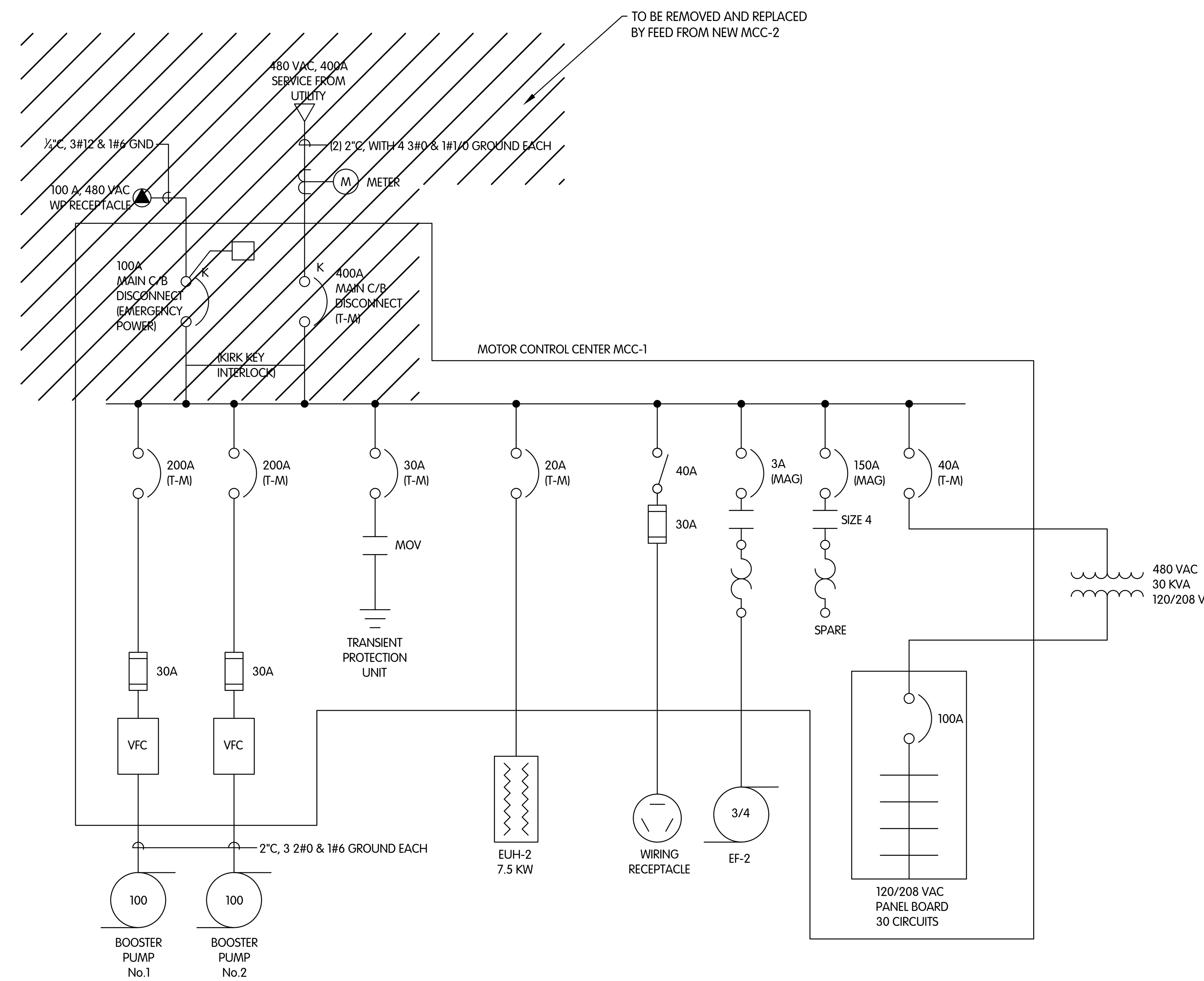
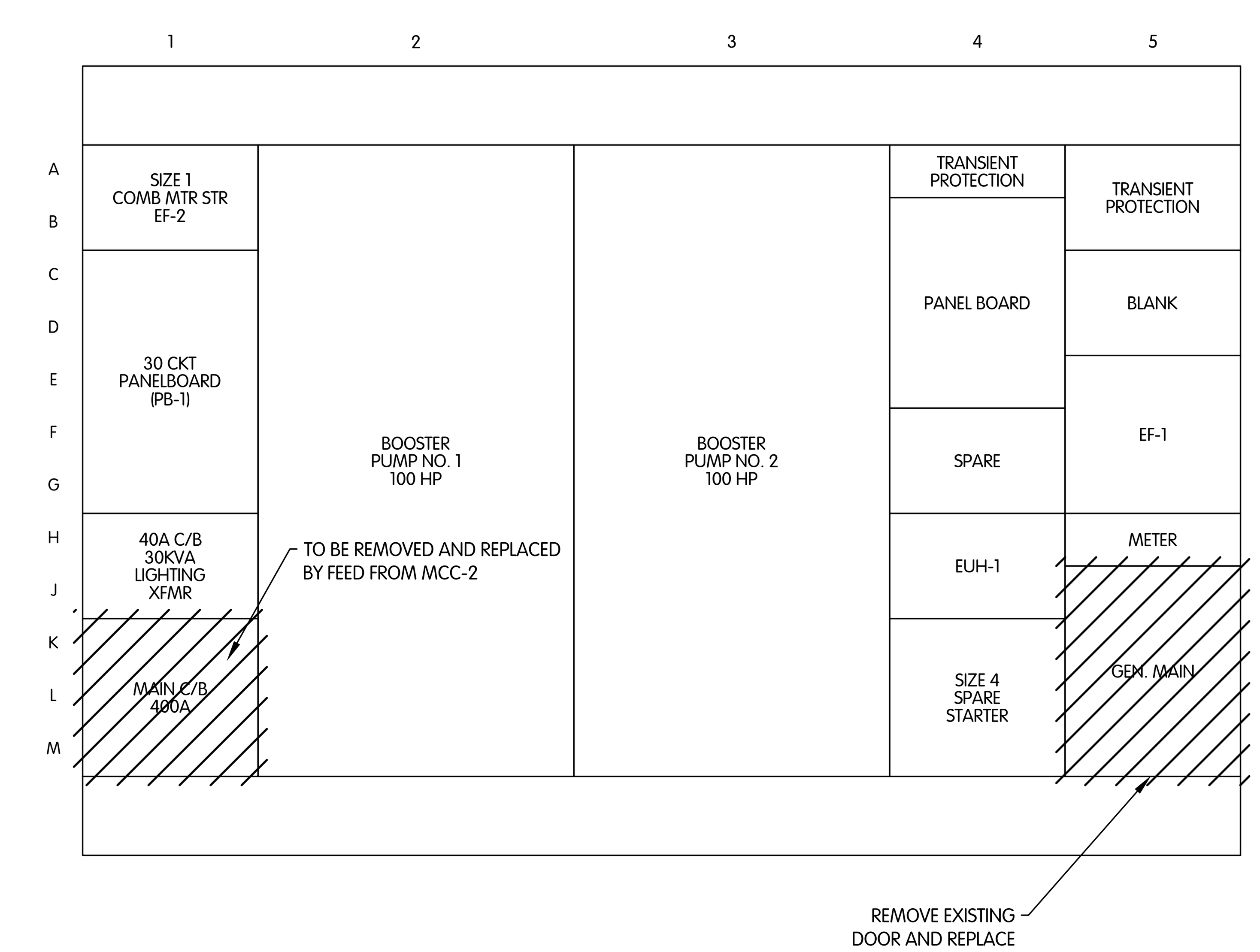
R-3
5 of 35

TOL-7766001R02-REMOVAL EXISTING SECTIONS
5/26/2023 12:39 PM - CLENDER
5/26/2023 12:54 PM



MOTOR CONTROL CENTER MCC-1
ONE-LINE DIAGRAM



MOTOR CONTROL CENTER MCC-1 LAYOUT

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SOUTH CUSTER BOOSTER STATION
REMOVALS
ELECTRICAL

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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3			
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1			

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JOB NO. 538-7766.001
SCALE NONE
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

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PEM	RHN	TMB

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R-4
6 of 35

TOL-776600IR06-6 R-4 - ELECTRICAL
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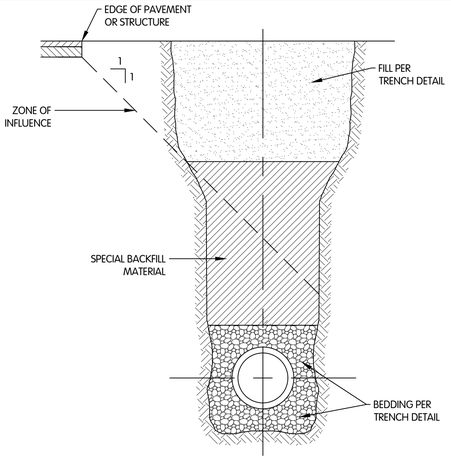
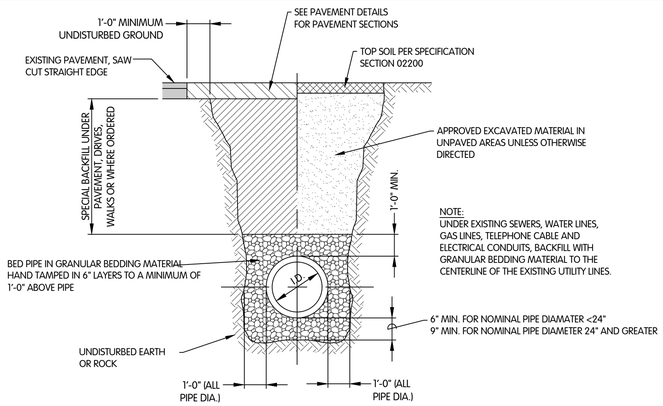
5/26/2023 12:54 PM

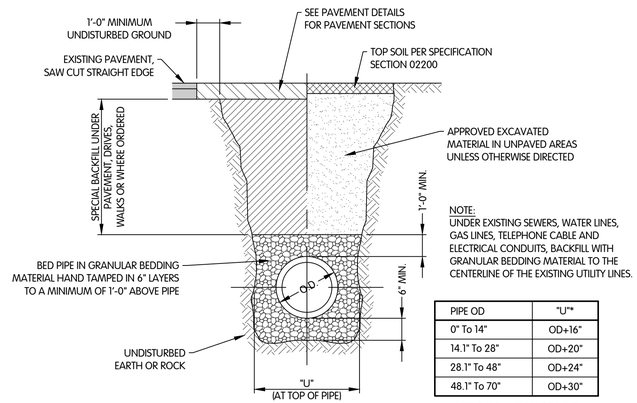


PARALLEL ZONE OF INFLUENCE
NTS

TRANSVERSE ZONE OF INFLUENCE
NTS



TRENCH DETAIL FOR RIGID PIPE (DIP)
NTS

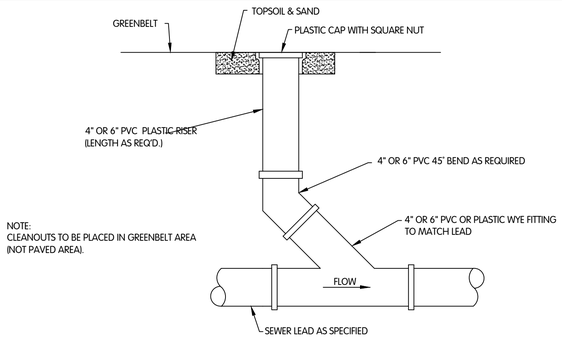


PIPE OD	"U"*
0" To 14"	OD+16"
14.1" To 28"	OD+20"
28.1" To 48"	OD+24"
48.1" To 70"	OD+30"

TRENCH SCHEDULE

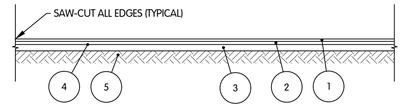
* NOTE:
"U" IS THE MINIMUM WIDTH FOR FLEXIBLE PIPES IN ACCORDANCE WITH ASTM D-2321 AND D-2774.

TRENCH DETAIL FOR FLEXIBLE PIPE
NTS

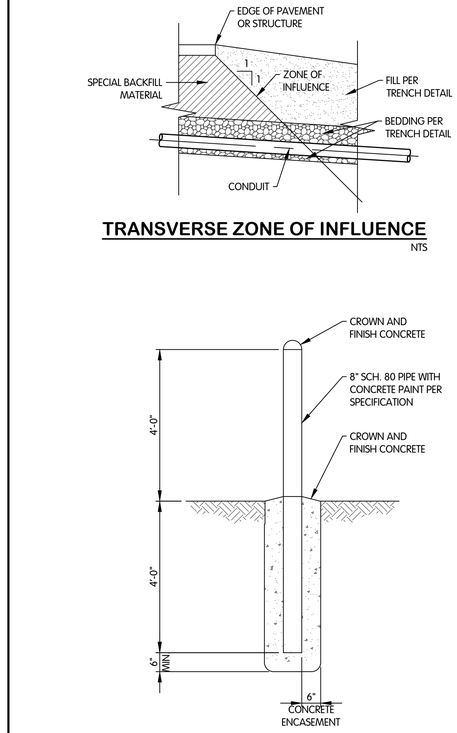


SANITARY SEWER LEAD CLEANOUT
NTS

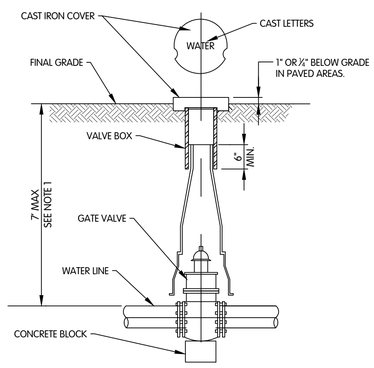
1. MDOT ITEM 501 HMA 5, LVSP 1½" ASPHALT CONCRETE SURFACE COURSE
2. MDOT ITEM 501 HMA 3, LVSP 2½" ASPHALT CONCRETE LEVELING COURSE
3. MDOT ITEM 302, 8" AGGREGATE BASE
4. PRIME COAT 0.40 GAL/SQ.YD.
5. COMPACTED SUBGRADE



ASPHALT PAVEMENT DETAIL
NTS

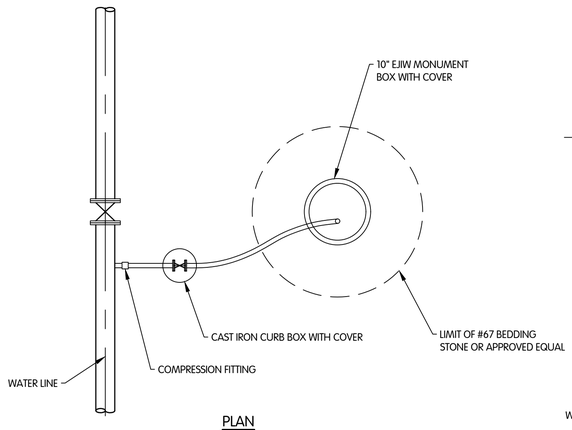


BOLLARD DETAIL
1/2" = 1'-0"

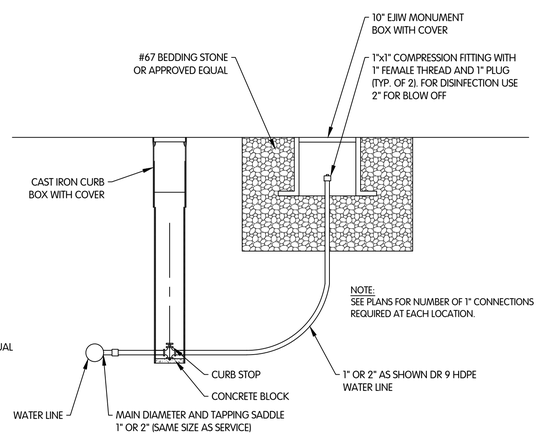


GATE VALVE DETAIL FOR 12" AND SMALLER WATER MAINS
NTS

NOTES:
1. VALVES WITH THE OPERATING NUT GREATER THAN 5-FEET BELOW GRADE SHALL BE PROVIDED WITH A VALVE EXTENSION.



PLAN



SECTION

WATER BLOW-OFF ASSEMBLY AND DISINFECTION APPLICATION POINT ASSEMBLY
NTS

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER PUMP STATION
CIVIL
DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	BY
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SCALE AS SHOWN
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BCW	RHN	TMB

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C-0.1
7 OF 35

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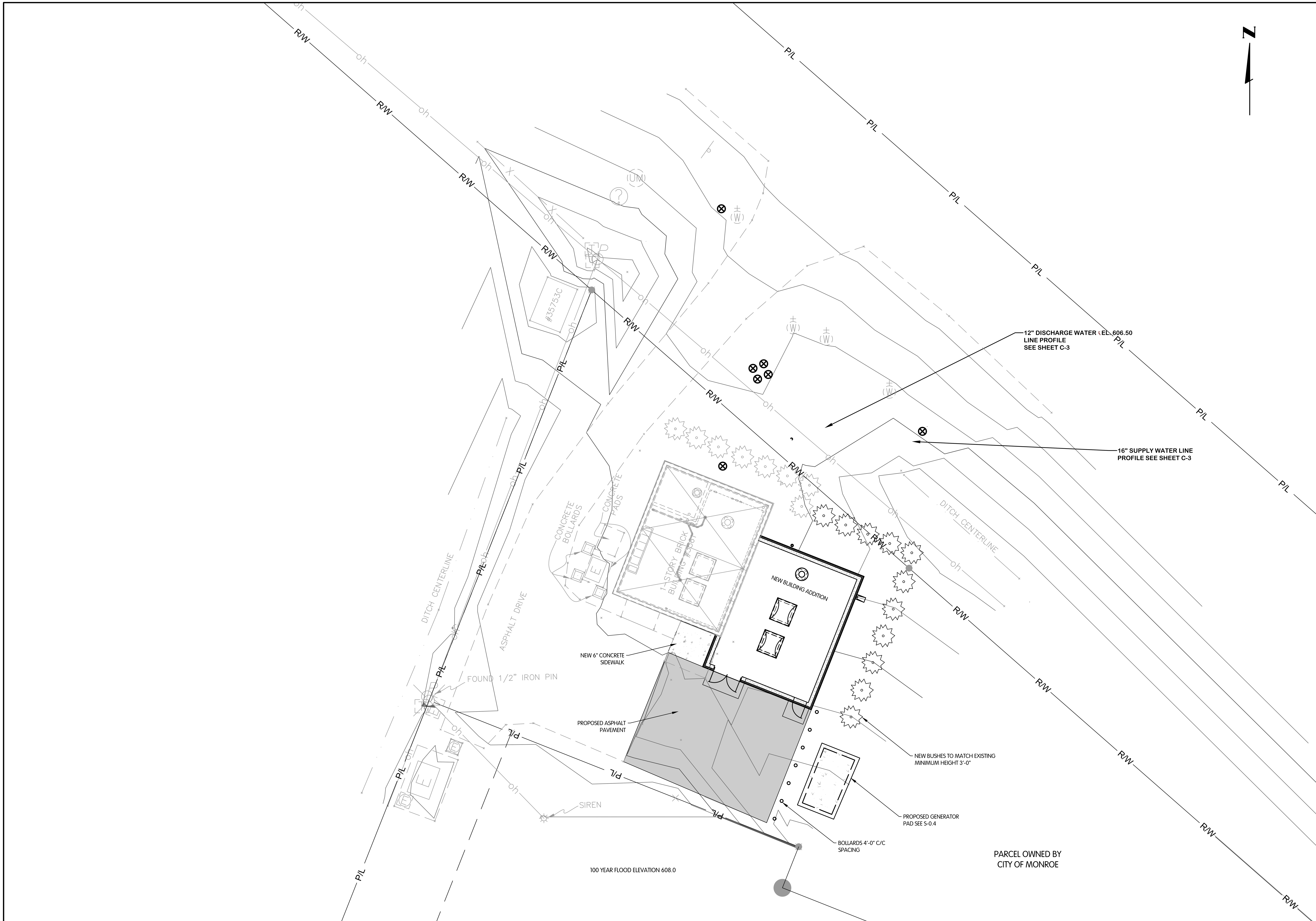

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
CIVIL
SITE PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
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SCALE 1'=10'

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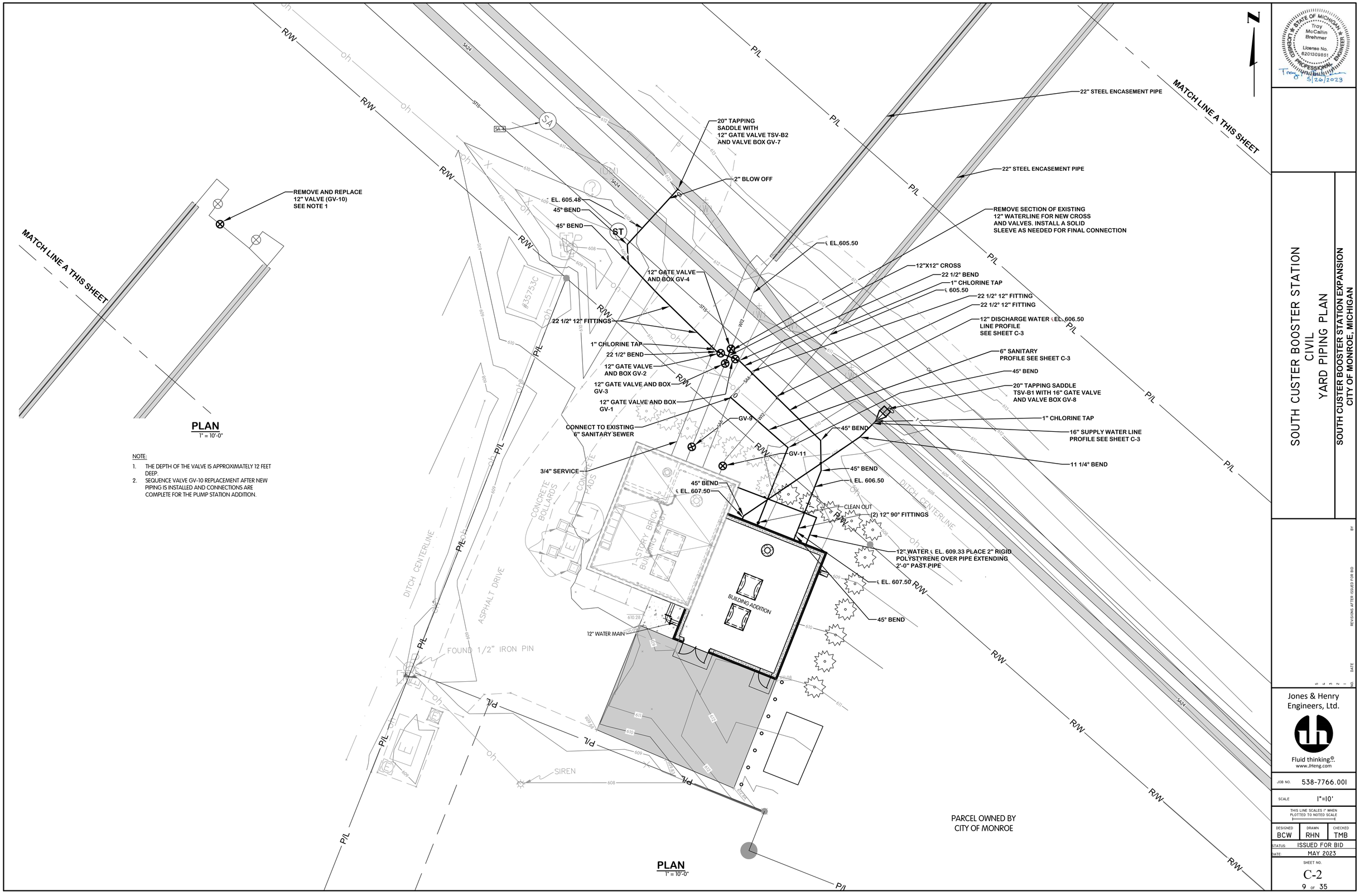

TOL-7766000\C01-NEW SITE YARD PIPING
5/26/2023 12:44 PM C. CLENDER
5/26/2023 12:55 PM

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PROFESSIONAL ENGINEER
STATE OF MICHIGAN
5/26/2023

SOUTH CUSTER BOOSTER STATION
CIVIL
YARD PIPING PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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SCALE 1"=10'
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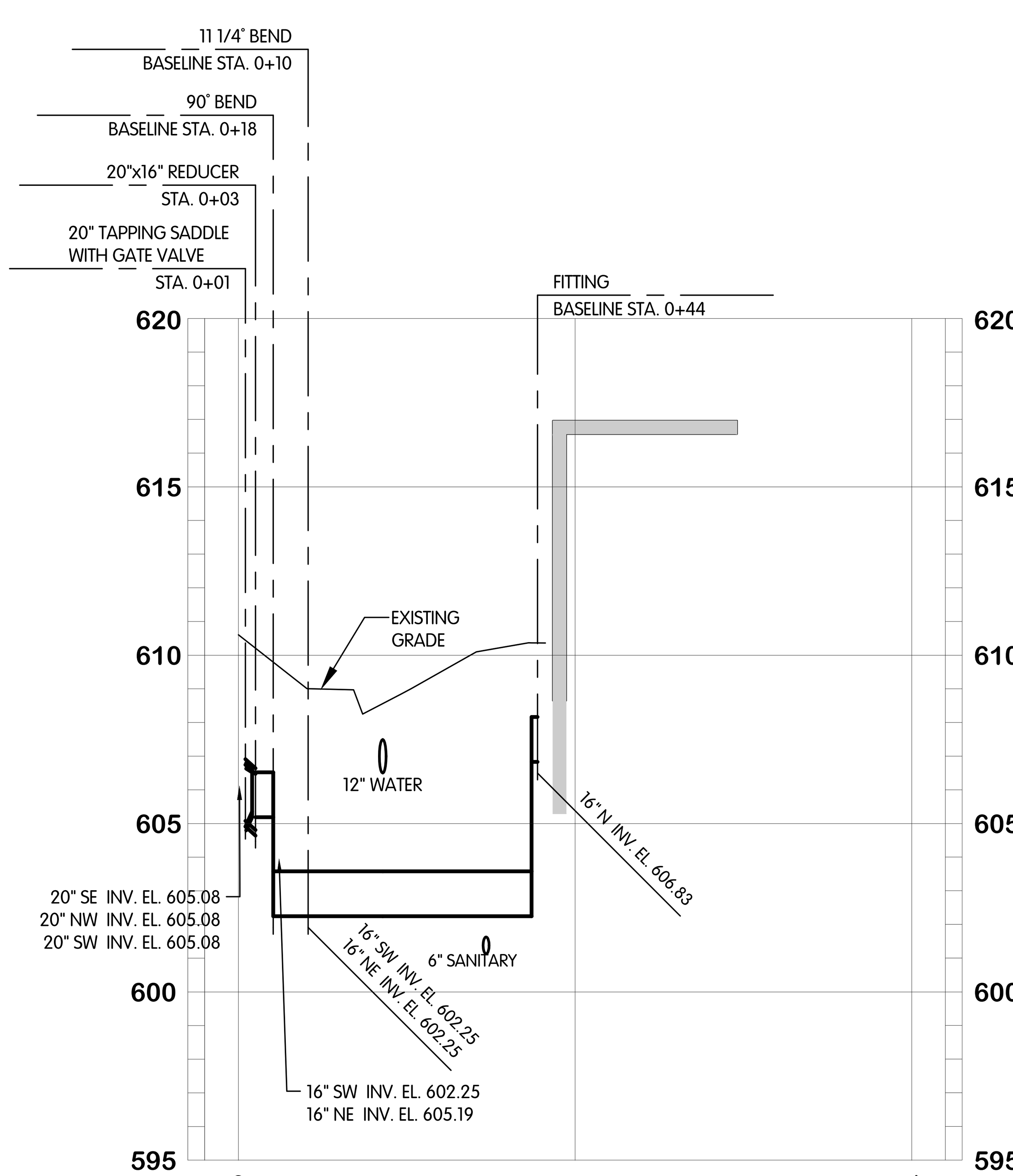
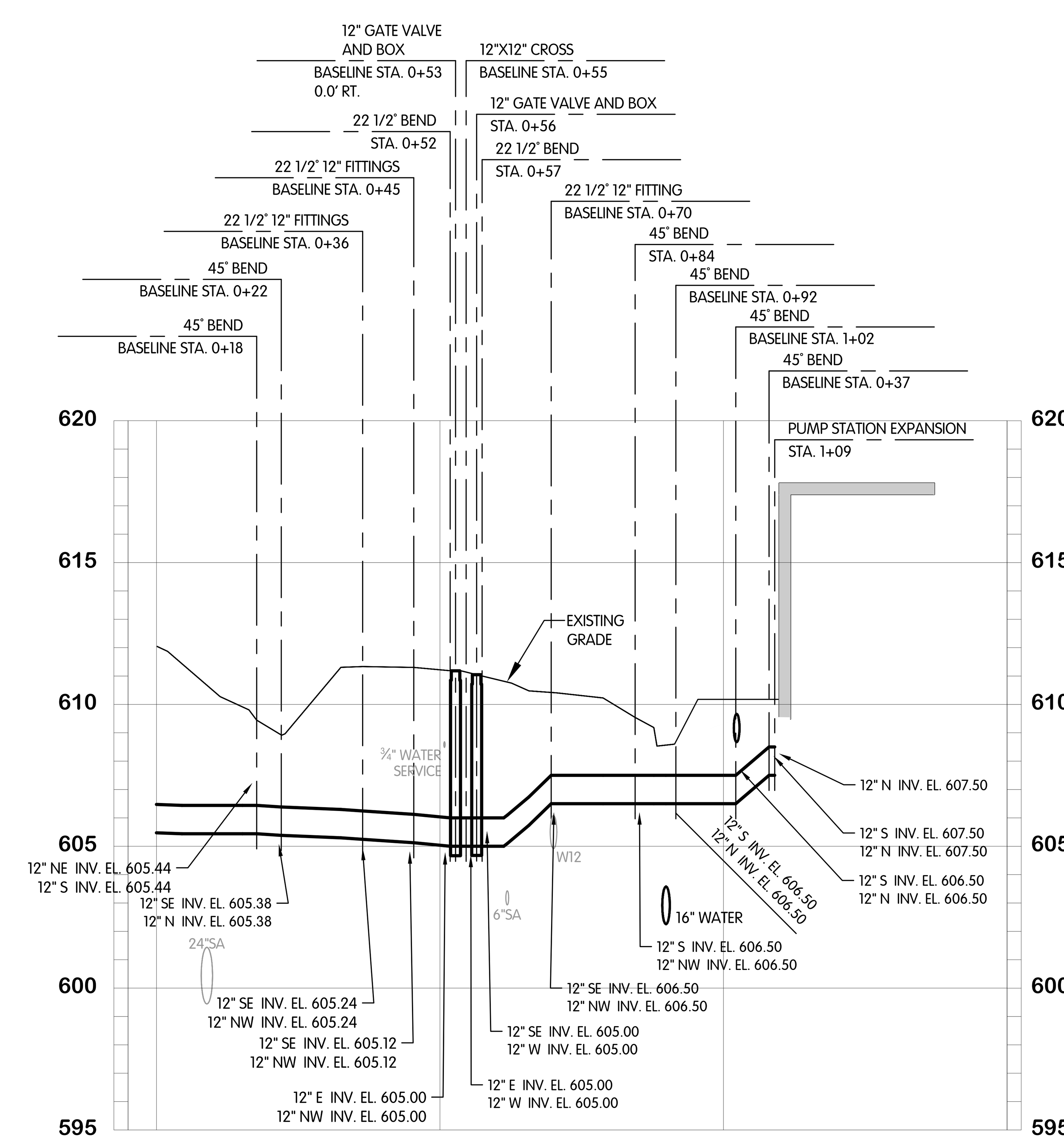
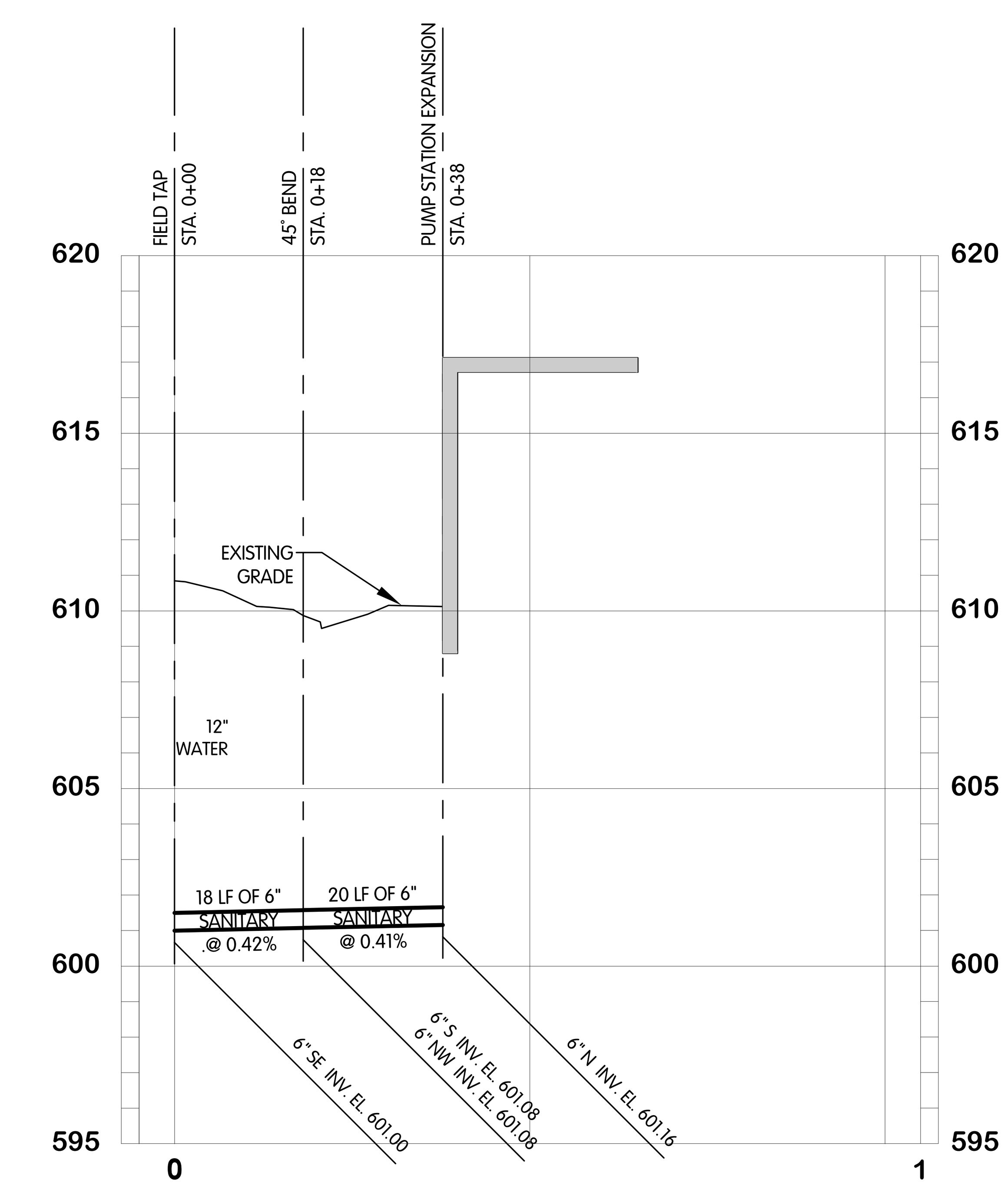


16" WATER SUPPLY LINE



12" WATER DISCHARGE



6" SANITARY LINE

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5/26/2023

SOUTH CUSTER BOOSTER STATION
CIVIL
PROFILES

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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SCALE	1"=20' HOR 1"=4' VIRT

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10 of 35

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EROSION AND SEDIMENTATION CONTROL

1. EROSION AND SEDIMENTATION CONTROL PRACTICES SHALL BE INSTALLED TO NATURAL RESOURCES CONSERVATION SERVICE OR EQUIVALENT STANDARDS AND SPECIFICATIONS FOR PARTICULAR TECHNIQUES. THE PRACTICES ARE TO BE MAINTAINED IN EFFECTIVE WORKING CONDITION DURING CONSTRUCTION AND UNTIL ALL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
2. CLEARING AND GRUBBING SHALL NOT COMMENCE UNTIL THE CONTRACTOR IS PREPARED TO START CONSTRUCTION.
3. SEDIMENT BASINS AND DIVERSION DIKES SHALL BE CONSTRUCTED BEFORE DISTURBING THE LAND THAT DRAINS INTO THEM.
4. DIVERSION CHANNELS SHALL BE CONSTRUCTED AROUND THE CONSTRUCTION SITE TO COLLECT RUNOFF AND PREVENT SILT AND OTHER ERODED MATERIALS FROM ENTERING LOCAL DRAINAGE COURSES. DIVERSION CHANNELS SHALL BE STABILIZED BY SEEDING OR RIP-RAP OR LINED WITH PLASTIC, AND FLOW TO TEMPORARY SILT BASINS.
5. EXISTING TOPSOIL THAT IS TO BE REUSED SHALL BE STOCKPILED AND REPLACED UPON FINAL GRADING. STOCKPILED TOPSOIL SHALL BE PROTECTED WITH SILT BARRIERS AND TEMPORARY SEEDING OR A COVERING SUCH AS ANCHORED STRAW MULCH.
6. EXCESS SOIL THAT IS STOCKPILED SHALL BE EITHER REMOVED OR PERMANENTLY STABILIZED WITHIN 15 DAYS OF THE COMPLETION OF CONSTRUCTION.
7. EXCAVATED MATERIALS SHALL BE STOCKPILED ON THE UPHILL SIDE OF TRENCHES.
8. ONLY THOSE TREES, SHRUBS, AND GRASSES THAT MUST BE REMOVED FOR CONSTRUCTION MAY BE REMOVED; PROTECT THE REST TO PRESERVE THEIR AESTHETIC, HABITAT, AND EROSION CONTROL VALUES.
9. DISTURBED LAND EXPOSED LONGER THAN 15 DAYS SHALL BE TEMPORARILY STABILIZED BY SEEDING AND MULCHING OR MULCHING ALONE.
10. AS CONSTRUCTION IS COMPLETED, PERMANENTLY STABILIZE EACH DISTURBED AREA WITH PERENNIAL VEGETATION. IF FINAL GRADING AND SEEDING WILL NOT OCCUR WITHIN 30 DAYS, ALL DISTURBED AREAS SHALL BE TEMPORARILY SEEDED AND/OR MULCHED IMMEDIATELY.
11. FINAL GRADING SHALL BE CONSISTENT WITH PRE-CONSTRUCTION TOPOGRAPHY TO MAINTAIN DRAINAGE AND AESTHETICS.
12. NO MORE THAN 200 FEET OF TRENCH SHALL BE OPEN AT ANY TIME. MINIMIZE THE AREA DISTURBED FOR TRENCH OPENING, LAYING OF PIPE, AND BACKFILLING.
13. TRENCHES SHALL BE BACKFILLED IMMEDIATELY; COMPACT AND SEED AND/OR MULCH TRENCHES IN UNPAVED AREAS WITHIN 15 DAYS AFTER THEY HAVE BEEN OPENED.
14. LARGE-SCALE CONSTRUCTION SHALL BE RESEEDED IN STAGES TO PREVENT EROSION WHEN SEASONAL CONDITIONS PERMIT. WITHIN 15 DAYS AFTER A SPAN HAS BEEN COMPLETED, THE CONTRACTOR SHALL PLACE ALL TOPSOIL, FINE GRADE, SEED, FERTILIZE, AND MULCH ALL AREAS DISTURBED BY ACTIVITIES ASSOCIATED WITH THE CONSTRUCTION OF THAT SECTION OF PIPE.
15. SLOPES EXCEEDING 15 PERCENT OR TENDING TO BE UNSTABLE SHALL BE STABILIZED WITH WATER DIVERSION BERMS, SODDING, OR THE USE OF JUTE OR EXCELSIOR BLANKETS.
16. WHEN BORROW MATERIAL IS OBTAINED FROM OTHER THAN COMMERCIAL SOURCES, CONTROL EROSION OF THE BORROW SITE DURING AND AFTER THE WORK TO PREVENT SEDIMENT FROM ENTERING STREAMS OR OTHER WATER BODIES. WASTE OR DISPOSAL AREAS AND CONSTRUCTION ROADS SHALL BE LOCATED AND CONSTRUCTED IN A MANNER THAT SHALL KEEP SEDIMENT FROM ENTERING STREAMS.
17. UNPAVED AREAS SHALL BE WET DOWN AS NECESSARY USING WATER OR OTHER ENVIRONMENTALLY BENIGN SUBSTANCE DURING CONSTRUCTION TO MINIMIZE DUST.
18. IF WORK IS SUSPENDED FOR ANY REASON, THE CONTRACTOR SHALL MAINTAIN THE SOIL EROSION AND SEDIMENTATION CONTROLS IN GOOD OPERATING CONDITION DURING THE SUSPENSION OF THE WORK. ALSO, WHEN SEASONAL CONDITIONS PERMIT AND THE SUSPENSION OF WORK IS EXPECTED TO EXCEED A PERIOD OF ONE MONTH, THE CONTRACTOR SHALL PLACE TOPSOIL, FINE GRADE, SEED, FERTILIZE, AND MULCH ALL DISTURBED AREAS LEFT EXPOSED WHEN WORK IS STOPPED.
19. WHEN WORKING ADJACENT TO A WATERWAY, THE CONTRACTOR SHALL MAINTAIN A BUFFER ZONE OF UNDISTURBED VEGETATION BETWEEN THE WORK AREA AND THE WATERWAY. IF A BUFFER ZONE OF VEGETATION CANNOT PREVENT SILTATION OF THE WATERWAY, SILT BARRIERS SHALL ALSO BE INSTALLED BY THE CONTRACTOR IN THESE AREAS TO PREVENT SEDIMENT-LADEN RUNOFF FROM ENTERING THE WATERWAY.
20. MATERIAL EXCAVATED FROM BORING PITS (FOR JACK AND BORE LOCATIONS) SHALL BE SURROUNDED WITH SILT BARRIERS AT SUFFICIENT DISTANCE TO ENSURE THEIR INTEGRITY AND EFFECTIVENESS.
21. CONTRACTOR SHALL REMOVE DAILY ALL MUD, SOIL, AND DEBRIS THAT MAY BE TRACKED ONTO EXISTING STREETS, DRIVES, OR WALKS BY HIS EQUIPMENT OR THAT OF SUBCONTRACTORS OR SUPPLIERS.
22. ALL MATERIALS TO BE DISPOSED OF OFF-SITE MUST BE DISPOSED OF IN AN ENVIRONMENTALLY SOUND MANNER IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS. NO EXCESS MATERIALS ARE TO BE DISPOSED OF IN ANY WETLAND, FLOOD PLAIN, OR OTHER ENVIRONMENTALLY SENSITIVE AREAS. EROSION CONTROL MEASURES AT THE DISPOSAL SITE MUST BE INSTALLED AND MAINTAINED UNTIL DISPOSAL IS COMPLETE AND THE DISPOSAL SITE IS PERMANENTLY STABILIZED.

FLOODPLAINS / WETLANDS

1. WHEN PIPELINE CONSTRUCTION TAKES PLACE IN FLOODPLAINS AND WETLANDS, THE CONTRACTOR SHALL PLACE BULKHEADS OF CLAY SOIL ACROSS THE TRENCH AT 100 FOOT INTERVALS TO RESIST THE MOVEMENT OF GROUNDWATER THROUGH GRANULAR MATERIAL. SUCH BULKHEADS SHALL BE CAREFULLY COMPACTED AND SHALL EXTEND APPROXIMATELY 3 FEET IN A DIRECTION PARALLEL TO THE PIPE AND SHALL EXTEND FROM THE BOTTOM OF THE TRENCH TO A HEIGHT OF 6 INCHES ABOVE THE GROUNDWATER TABLE OR THE TOP OF THE GRANULAR FILL MATERIAL, WHICHEVER IS HIGHER.

TRAFFIC CONTROL

1. AT LEAST ONE LANE OF TRAFFIC SHALL BE MAINTAINED ALONG THE TRAVEL ROUTE TO THE CONSTRUCTION SITE.
2. ACCESS SHALL BE MAINTAINED FOR EMERGENCY VEHICLES AT ALL TIMES.
3. NO TRENCH SHALL BE LEFT OPEN AT THE END OF THE WORK DAY.
4. ANY CONSTRUCTION EQUIPMENT OR EXCAVATIONS NEAR ROADS SHALL BE MARKED WITH LIGHTS OR REFLECTORS.
5. THE CONTRACTOR SHALL PROVIDE, ERECT, AND MAINTAIN ALL NECESSARY BARRICADES, WARNING SIGNS, DANGER SIGNALS, FLAGGERS, WATCHERS, AND ALL OTHER APPROPRIATE PRECAUTIONS NECESSARY TO THE PROTECTION OF THE WORK AND FOR SAFETY.
6. PRIOR TO CLOSING OFF CLEAR ACCESS TO ANY PUBLIC ALLEY, STREET, ROAD, AVENUE, OR BOULEVARD, THE CONTRACTOR SHALL HAVE CONSENT FROM LOCAL OFFICIALS AND THE ENGINEER.

AIR POLLUTION / NOISE CONTROL

1. CONSTRUCTION SHALL BE LIMITED TO DAYTIME HOURS.
2. CONSTRUCTION EQUIPMENT SHALL BE PROVIDED WITH INTAKE SILENCERS AND MUFFLERS, AS REQUIRED BY SAFETY STANDARDS.
3. ALL CONSTRUCTION VEHICLES SHALL BE EQUIPPED WITH PROPER EMISSIONS CONTROL EQUIPMENT.
4. ALL EQUIPMENT AND MACHINERY SHALL BE MAINTAINED TO MINIMIZE EXHAUST EMISSIONS AND NOISE.

TREES / VEGETATION PROTECTION

1. TREE REMOVAL SHALL BE LIMITED TO THAT NECESSARY FOR CONSTRUCTION AND SHALL BE LIMITED TO THE PERMANENT EASEMENT UNLESS EXPLICITLY PERMITTED BY THE ENGINEER.
2. NO TREE REMOVAL SHALL BE PERMITTED OUTSIDE THE TEMPORARY EASEMENT WITHOUT PERMISSION OF THE ENGINEER.
3. TREES WHICH ARE NOT TO BE REMOVED SHALL BE PROTECTED FROM INJURY BY TREES BEING FELLED.
4. PRIOR TO CLEARING, THE CONTRACTOR AND ENGINEER SHALL WALK THE ACQUIRED EASEMENTS AND DESIGNATE THE TREES THAT ARE TO BE SAVED. TREES TO BE SAVED SHALL BE CLEARLY MARKED BY PAINT WITH THE LETTER "S". TREES TO BE PROTECTED BY AN APPROPRIATE BARRIER SHALL BE MARKED WITH A "S" ENCLOSED ON A CIRCLE.
5. SOIL AND OTHER MATERIAL SHALL NOT BE STORED NEXT TO OR WITHIN THE DRIP-LINE OF TREES.
6. PRESERVATION OF LANDSCAPING SHOULD TAKE PRECEDENCE OVER REMOVAL. IF REMOVAL OR DAMAGE IS UNAVOIDABLE, EXISTING VEGETATION SHALL BE REPAIRED OR REPLACED "IN-KIND" UNLESS THE LAND OWNER SPECIFIES OTHERWISE.
7. IF TREES/SHRUBS CANNOT BE REPLACED IN THE SAME LOCATION DUE TO INSTALLATION OF THE WATER OR SEWER LINES, RELOCATION OF THE TREES/SHRUBS SHALL BE CONSIDERED.
8. THE CONTRACTOR SHALL REPAIR ALL INJURIES TO BARK, TRUNKS, LIMBS, AND ROOTS OF REMAINING VEGETATION BY PROPERLY DRESSING, CUTTING, AND BRACING, USING ONLY APPROVED TREE SURGERY METHODS, TOOLS, AND MATERIALS. WHEN ROOTS ARE DAMAGED DURING EXCAVATION, THE ABOVE-GROUND PORTION OF THE TREE SHALL BE PRUNED TO COMPENSATE.
9. SELECTIVE PRUNING OF TREE LIMBS PRIOR TO CONSTRUCTION SHALL ONLY BE DONE WITHIN ESTABLISHED EASEMENTS WHERE REMOVAL IS NECESSARY FOR OPERATION OF EQUIPMENT.
10. LIMIT THE USE OF RIP-RAP TO AREAS WHERE STREAM FLOW CONDITIONS PRECLUDE VEGETATIVE STABILIZATION.

DEWATERING

1. ALL DEWATERING FLOWS SHALL BE SETTLED IN SILTATION BASINS OR DIRECTED THROUGH FILTERING DEVICES BEFORE DISCHARGE TO STABILIZED SITES, SUCH AS STREAMS OR STORM SEWERS, NOT ONTO EXPOSED SOILS, STREAM BANKS, OR ANY OTHER SITE WHERE THE FLOW COULD CAUSE EROSION.
2. SILT FROM CONSTRUCTION SITES SHALL NOT BE PERMITTED TO ENTER STORM SEWERS. WHEN CONSTRUCTION OCCURS NEAR STORM SEWER INLETS, EROSION CONTROL MEASURES SUCH AS INLET FILTERS SHALL BE USED TO PREVENT SILT FROM ENTERING THE STORM SEWERS.
3. ALL WATER SHALL BE CONVEYED FROM THE CONSTRUCTION SITE IN A CLOSED CONDUIT. DO NOT USE TRENCH EXCAVATIONS AS TEMPORARY DRAINAGE DITCHES.

STREAM CROSSINGS

1. WHEN CLEARING VEGETATION PRIOR TO INITIATING STREAM CROSSING WORK, STREAMBANK TREES, SHRUBS, AND OTHER VEGETATION SHOULD BE LEFT IN PLACE TO HELP CONTROL EROSION; WHERE EQUIPMENT OPERATION REQUIRES TREE REMOVAL, STUMPS AND ROOTS ARE TO REMAIN IN PLACE TO HELP ANCHOR THE STREAMBANK.
2. PRIOR TO STARTING ANY STREAM CROSSING, SILT BARRIERS SHALL BE PLACED ALONG THE BANKS WHERE VEGETATION REMOVAL HAS OCCURRED OR IS ANTICIPATED, OR EXPOSED SOIL EXISTS. SPOILS OR OTHER FILL MATERIALS ARE NOT TO BE STOCKPILED WITHIN 50 FEET OF THE STREAM.
3. CONSTRUCTION WITHIN A STREAM SHALL BE CONTINUED UNTIL COMPLETED. A STREAM CROSSING SHALL NOT BE STARTED UNLESS THE CONTRACTOR IS PREPARED TO FINISH THE WORK IMMEDIATELY. WORK SHALL NOT START UNLESS TIME AND WEATHER CONSTRAINTS HAVE BEEN PROVIDED FOR. STREAM CROSSING WORK SHALL BE RESTRICTED TO PERIODS OF DRY WEATHER AND LOW-FLOW OR NO-FLOW CONDITIONS.
4. RESTORATION SHALL INCLUDE THE RE-ESTABLISHMENT OF CHANNEL CONTOURS AND BANK STABILIZATION AND SHALL START IMMEDIATELY AFTER THE CROSSING IS COMPLETED.
5. WHEN USING OPEN CUT METHODS FOR LAYING SEWER PIPE ACROSS INTERMITTENT OR VERY SMALL STREAMS, THE STREAM CROSSING AND ASSOCIATED RESTORATION SHALL BE PERFORMED WITHIN A 48 HOUR PERIOD. THE STREAM CROSSING AND ASSOCIATED RESTORATION SHALL BE PERFORMED WITHIN A ONE WEEK (SEVEN DAYS) PERIOD IF THE CROSSING INVOLVES TEMPORARY DIVERSION OF A SMALL TO MODERATE SIZE STREAM AND ENCASEMENT OF THE PIPE IN CONCRETE.
6. ACCEPTABLE FLOW DIVERSION PROCEDURES SUCH AS BYPASS PUMPING, TEMPORARY PARALLEL STREAM CHANNELS, COFFERDAMS, OR TEMPORARY DIKES SHALL BE USED. THE DIVERSION PROCEDURE SHALL BE CONDUCTED IN SUCH A FASHION TO PREVENT THE DISCHARGE OF ANY AND ALL SPOILS, SILTS, CONSTRUCTION DEBRIS, OR EXCAVATED MATERIALS INTO THE STREAM WATER. THE COMPLETE CROSSING SHALL NOT IMPEDE THE FLOW OF WATER OR CREATE AN IMPOUNDMENT OF WATER UPSTREAM OF THE CROSSING.
7. THE WIDTH OF THE EASEMENT FOR THE STREAM CROSSING SHALL BE RESTRICTED TO ONLY THAT NECESSARY TO PERFORM THE WORK.
8. MATERIAL EXCAVATED FROM BORING PITS (FOR JACK AND BORE CROSSINGS) SHALL BE SURROUNDED WITH PROPERLY INSTALLED AND MAINTAINED SILT FENCES.
9. CONSTRUCTION EQUIPMENT SHALL BE KEPT OUT OF THE STREAM CHANNEL EXCEPT DURING ACTUAL PIPE INSTALLATION.

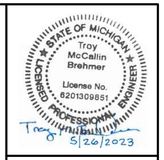
ARCHAEOLOGICAL / HISTORICAL RESOURCES

1. CONTRACTORS AND SUBCONTRACTORS ARE REQUIRED UNDER OHIO REVISED CODE SECTION 149.53 TO NOTIFY THE OHIO HISTORICAL SOCIETY AND THE OHIO HISTORIC SITE PRESERVATION BOARD OF ARCHAEOLOGICAL DISCOVERIES IN THE PROJECT AREA, AND TO COOPERATE WITH THOSE ENTITIES IN ARCHAEOLOGICAL AND HISTORIC SURVEYS AND SALVAGE EFFORTS.

CONTACT: OHIO HISTORIC PRESERVATION OFFICE
PHONE: 614-297-2470

PROHIBITED CONSTRUCTION ACTIVITIES

1. DISPOSING OF EXCESS OR UNSUITABLE EXCAVATED MATERIAL OR TREES, BRUSH, AND OTHER DEBRIS IN ANY STREAM CORRIDOR, ANY WETLANDS, ANY SURFACE WATERS, OR AT UNSPECIFIED LOCATIONS.
2. STOCKPILING MATERIALS OR STORING CONSTRUCTION EQUIPMENT AND VEHICLES ON PROPERTY NOT SPECIFIED ON THE PLANS BY THE ENGINEER FOR SUCH PURPOSES.
3. INDISCRIMINATE, ARBITRARY, OR CAPRICIOUS OPERATION OF EQUIPMENT IN ANY STREAM CORRIDORS, ANY WETLANDS, ANY SURFACE WATERS, OR OUTSIDE THE EASEMENT LIMITS.
4. PUMPING OF SEDIMENT-LADEN WATER FROM TRENCHES OR OTHER EXCAVATIONS DIRECTLY INTO ANY SURFACE WATERS, ANY STREAM CORRIDORS, ANY WETLANDS, OR STORM SEWERS; ALL SUCH WATER SHALL BE PROPERLY FILTERED OR SETTLED TO REMOVE SILT PRIOR TO RELEASE.
5. DISCHARGING POLLUTANTS SUCH AS CHEMICALS, FUELS, LUBRICANTS, BITUMINOUS MATERIALS, RAW SEWAGE, OR OTHER HARMFUL WASTE INTO OR ALONGSIDE OF RIVERS, STREAMS, IMPOUNDMENTS, OR INTO ANY NATURAL OR MAN-MADE CHANNELS.
6. PERMANENT OR UNSPECIFIED ALTERATION OF THE FLOW LINE OF ANY STREAM.
7. DAMAGING VEGETATION OUTSIDE OF THE CONSTRUCTION AREA.
8. OPEN BURNING OF PROJECT DEBRIS WITHOUT A PERMIT.
9. DISCHARGING INJURIOUS SILICA DUST CONCENTRATIONS INTO THE ATMOSPHERE RESULTING FROM BREAKING, CUTTING, CHIPPING, DRILLING, BUFFING, GRINDING, POLISHING, SHAPING OR SURFACING CLOSER THAN 200 FEET TO PLACES OF RESIDENCES OR COMMERCIAL, PROFESSIONAL, QUASI-PUBLIC, OR PUBLIC PLACES OF HUMAN OCCUPATION.
10. RUNNING WELL POINT OR PUMP DISCHARGE LINES THROUGH PRIVATE PROPERTY OR PUBLIC PROPERTY AND RIGHTS-OF-WAY WITHOUT THE WRITTEN PERMISSION OF THE PROPERTY OWNER AND THE CONSENT OF THE ENGINEER.
11. OPERATIONS ENTAILING THE USE OF VIBRATORY HAMMERS OR COMPACTORS OUTSIDE THE HOURS OF 8:00 A.M. AND 5:00 P.M. OR OUTSIDE THE HOURS ALLOWED FOR CONSTRUCTION BY LOCAL ORDINANCES OR REGULATIONS.
12. CLOSING OFF CLEAR ACCESS TO ANY PUBLIC ALLEY, STREET, ROAD, AVENUE, OR BOULEVARD WITHOUT THE PRIOR CONSENT OF MUNICIPAL OFFICIALS AND THE ENGINEER, AND CLOSING CLEAR ACCESS:
    - BY FIRE PROTECTION EQUIPMENT AND EMERGENCY VEHICLES;
    - BY THE PUBLIC TO ANY COMMERCIAL OR PROFESSIONAL PLACE OF BUSINESS, QUASI-PUBLIC OR PUBLIC ESTABLISHMENT, OR RESIDENCE; OR
    - BY VEHICLES TO DRIVEWAYS WITHOUT PROVIDING ALTERNATE ACCESS.



ENVIRONMENTAL PROTECTION MEASURES NOTES

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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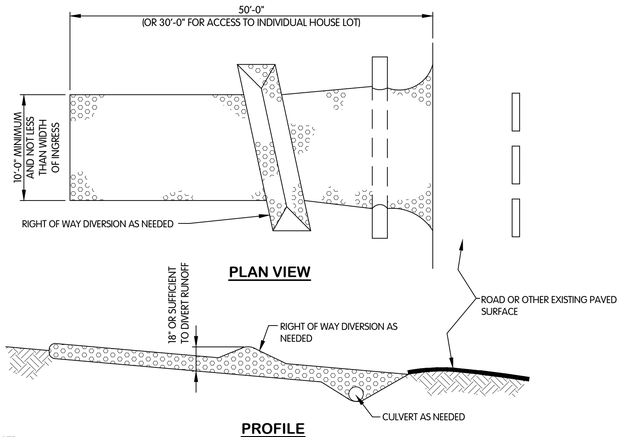
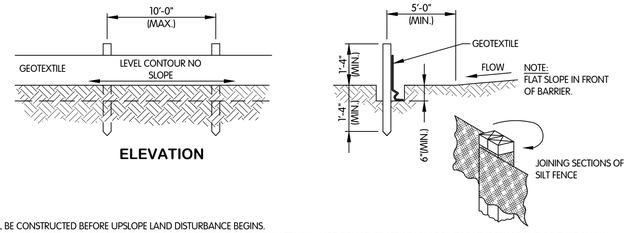


NOTE:
1. STONE SIZE - 2" STONE SHALL BE USED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - THE CONSTRUCTION ENTRANCE SHALL BE AS LONG AS REQUIRED TO STABILIZE HIGH TRAFFIC AREAS BUT NOT LESS THAN 50'-0" (EXCEPT ON SINGLE RESIDENCE LOT WHERE A 30 FT. MINIMUM LENGTH APPLIES.
3. THICKNESS - THE STONE LAYER SHALL BE AT LEAST 6" THICK.
4. WIDTH - THE ENTRANCE SHALL BE AT LEAST 10'-0" WIDE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. BEDDING - A GEOTEXTILE SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE. IT SHALL HAVE A GRAB TENSILE STRENGTH OF AT LEAST 200 LB. AND A MULLEN BURST STRENGTH OF AT LEAST 190 LB.
6. CULVERT - A PIPE OR CULVERT SHALL BE CONSTRUCTED UNDER THE ENTRANCE IF NEEDED TO PREVENT SURFACE WATER FLOWING ACROSS THE ENTRANCE FROM BEING DIRECTED OUT ONTO PAVED SURFACES.
7. WATER BAR - A WATER BAR SHALL BE CONSTRUCTED AS PART OF THE CONSTRUCTION ENTRANCE IF NEEDED TO PREVENT SURFACE RUNOFF FROM FLOWING THE LENGTH OF THE CONSTRUCTION ENTRANCE AND OUT ONTO PAVED SURFACES.
8. MAINTENANCE - TOP DRESSING OF ADDITIONAL STONE WILL SHALL BE APPLIED AS CONDITIONS DEMAND. MUD SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADS, OR ANY SURFACE WHERE RUNOFF IS NOT CHECKED BY SEDIMENT CONTROLS, SHALL BE REMOVED IMMEDIATELY. REMOVAL SHALL BE ACCOMPLISHED BY SCRAPING OR SWEEPING.
9. CONSTRUCTION ENTRANCES SHALL NOT BE RELIED UPON TO REMOVE MUD FROM VEHICLES AND PREVENT OFF SITE TRACKING.VEHICLES THAT ENTER AND LEAVE THE CONSTRUCTION SITE SHALL BE RESTRICTED FROM MUDDY AREAS.

CONSTRUCTION ENTRANCE
(RCE) NTS



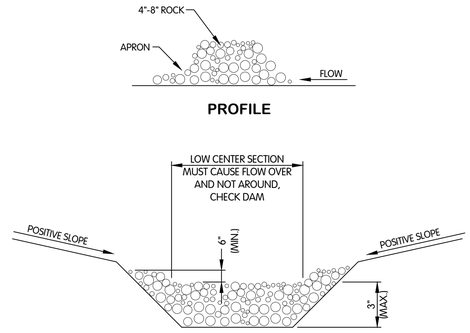
NOTES:
1. SILT FENCE SHALL BE CONSTRUCTED BEFORE UPSLOPE LAND DISTURBANCE BEGINS.
2. ALL SILT FENCE SHALL BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE SO THAT WATER WILL NOT CONCENTRATE AT LOW POINTS IN THE FENCE AND SO THAT SMALL SWALES OR DEPRESSIONS WHICH MAY CARRY SMALL CONCENTRATED FLOWS TO THE SILT FENCE ARE DISSIPATED ALONG ITS LENGTH.
3. TO PREVENT WATER PONDED BY THE SILT FENCE FROM FLOWING AROUND THE ENDS, EACH END SHALL BE CONSTRUCTED UPSLOPE SO THAT THE ENDS ARE AT A HIGHER ELEVATION.
4. WHERE POSSIBLE, SILT FENCE SHALL BE PLACED ON THE FLATTEST AREA AVAILABLE.
5. WHERE POSSIBLE, VEGETATION SHALL BE PRESERVED FOR 5'-0" (OR AS MUCH AS POSSIBLE) UPSLOPE FROM THE SILT FENCE. IF VEGETATION IS REMOVED, IT SHALL BE REESTABLISHED WITHIN 7 DAYS FROM THE INSTALLATION OF THE FENCE.
6. SOIL STOCKPILES OR OTHER SOURCES OF SEDIMENT SHALL HAVE SILT FENCE PROTECTION.
7. THE SILT FENCE SHALL BE PLACED IN A TRENCH CUT A MINIMUM OF 6" DEEP. THE TRENCH SHALL BE CUT WITH A TRENCHER, CABLE LAYING MACHINE, OR OTHER SUITABLE DEVICE WHICH WILL ENSURE AN ADEQUATELY UNIFORM TRENCH DEPTH.
8. THE SILT FENCE SHALL BE PLACED WITH THE STAKES ON THE DOWN SLOPE SIDE OF THE GEOTEXTILE AND SO THAT 8" OF CLOTH ARE BELOW THE GROUND SURFACE. EXCESS MATERIAL SHALL LAY ON THE BOTTOM OF THE 6" DEEP TRENCH. THE TRENCH SHALL BE BACK FILLED AND COMPACTED.
9. SEAMS BETWEEN SECTIONS OF SILT FENCE SHALL BE OVERLAPPED WITH THE END STAKES OF EACH SECTION WRAPPED TOGETHER BEFORE DRIVING INTO THE GROUND.
10. MAINTENANCE-- SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. IF RUNOFF OVER TOPS THE SILT FENCE, FLOWS UNDER OR AROUND THE ENDS, OR IN ANY OTHER WAY BECOMES A CONCENTRATED FLOW, ONE OF THE FOLLOWING SHALL BE PERFORMED, AS APPROPRIATE:
    A. THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED.
    B. ACCUMULATED SEDIMENT SHALL BE REMOVED.
    C. OTHER PRACTICES SHALL BE INSTALLED.

CRITERIA FOR SILT FENCE MATERIALS:

1. FENCE POSTS - THE LENGTH SHALL BE A MINIMUM OF 32" LONG. WOOD POST WILL BE 2" X 2" HARDWOOD OF SOUND QUALITY. THE MAXIMUM SPACING BETWEEN POSTS SHALL BE 10'-0".
2. SILT FENCE FABRIC (SEE CHART BELOW):

FABRIC PROPERTIES	VALUES	TEST METHOD
GRAB TENSILE STRENGTH	90 LB. MINIMUM	ASTM D 1682
MULLEN BURST STRENGTH	190 P.S.I. MINIMUM	ASTM D 3786
SLURRY FLOW RATE	0.3 GAL./MIN./FT.² MAX.	
EQUIVALENT OPENING SIZE	40-80	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY	90% MINIMUM	ASTM-G-26

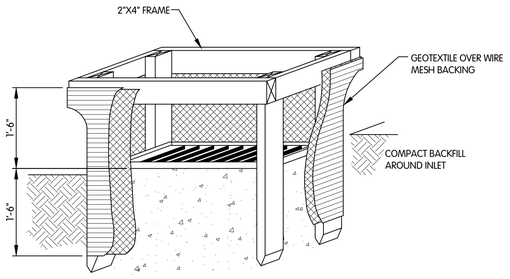
SILT FENCE
(SF) NTS



NOTES:
1. THE CHECK DAM SHALL BE CONSTRUCTED OF 4" TO 8" DIAMETER STONE, PLACED SO THAT IT COMPLETELY COVERS THE WIDTH OF THE CHANNEL.
2. THE TOP OF THE CHECK DAM SHALL BE CONSTRUCTED SO THAT THE CENTER IS APPROXIMATELY 6 IN. LOWER THAN THE OUTER EDGES, SO WATER WILL FLOW ACROSS THE CENTER AND NOT AROUND THE ENDS.
3. THE MAXIMUM HEIGHT OF THE CHECK DAM AT THE CENTER OF THE WEIR SHALL NOT EXCEED 3'-0".
4. SPACING BETWEEN DAMS SHALL BE AS SHOWN IN THE PLANS OR BY THE FOLLOWING TABLE:

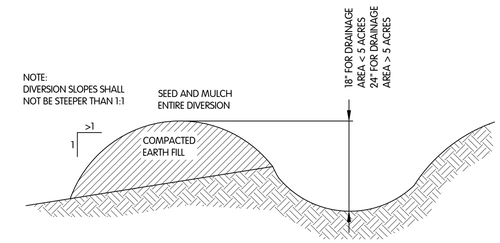
CHECK DAM SPACING				
DAM HEIGHT (FT.)	CHANNEL SLOPE			
	< 5%	5-10%	10-15%	15-20%
1	65 FT.	30 FT.	20 FT.	15 FT.
2	130 FT.	65 FT.	40 FT.	30 FT.
3	200 FT.	100 FT.	65 FT.	50 FT.

CHECK DAM



NOTES:
1. INLET PROTECTION SHALL BE CONSTRUCTED EITHER BEFORE UPSLOPE LAND DISTURBANCE BEGINS OR BEFORE THE STORM DRAIN BECOMES OPERATIONAL.
2. THE EARTH AROUND THE INLET SHALL BE EXCAVATED COMPLETELY TO A DEPTH AT LEAST 18 INCHES.
3. THE WOODEN FRAME SHALL BE CONSTRUCTED OF 2 X 4 CONSTRUCTION GRADE LUMBER. THE 2 X 4 POSTS SHALL BE DRIVEN 18" INTO THE GROUND AT FOUR CORNERS OF THE INLET AND THE TOP PORTION OF 2 X 4 FRAME ASSEMBLED USING THE OVERLAP JOINT SHOWN. THE TOP OF THE FRAME SHALL BE AT LEAST 6" BELOW ADJACENT ROADS IF PONDED WATER WOULD POSE A SAFETY HAZARD TO TRAFFIC.
4. WIRE MESH SHALL BE OF SUFFICIENT STRENGTH TO SUPPORT FABRIC WITH WATER FULLY IMPOUNDED AGAINST IT. IT SHALL BE STRETCHED TIGHTLY AROUND THE FRAME AND FASTENED SECURELY TO THE FRAME.
5. GEOTEXTILE SHALL HAVE AN EQUIVALENT OPENING SIZE OF 20 - 40 SIEVE AND BE RESISTANT TO SUNLIGHT. IT SHALL BE STRETCHED TIGHTLY AROUND THE FRAME AND FASTENED SECURELY. IT SHALL EXTEND FROM THE TOP OF THE FRAME TO 18" BELOW THE INLET NOTCH ELEVATION. THE GEOTEXTILE SHALL OVERLAP ACROSS ONE SIDE OF THE INLET SO THE ENDS OF THE CLOTH ARE NOT FASTENED TO THE SAME POST.
6. BACKFILL SHALL BE PLACED AROUND THE INLET IN COMPACTED 6" LAYERS UNTIL THE EARTH IS EVEN WITH NOTCH ELEVATION ON ENDS AND TOP ELEVATION ON SIDES.
7. A COMPACTED EARTH DIKE OR A CHECK DAM SHALL BE CONSTRUCTED IN THE DITCH LINE BELOW THE INLET IF THE INLET IS NOT IN A DEPRESSION AND IF RUNOFF BYPASSING THE INLET WILL NOT FLOW TO A SETTLING POND. THE TOP OF EARTH DIKES SHALL BE AT LEAST 6" HIGHER THAN THE TOP OF THE FRAME.

INLET PROTECTION IN SWALES, DITCH LINES OR YARD INLETS
(IP) NTS

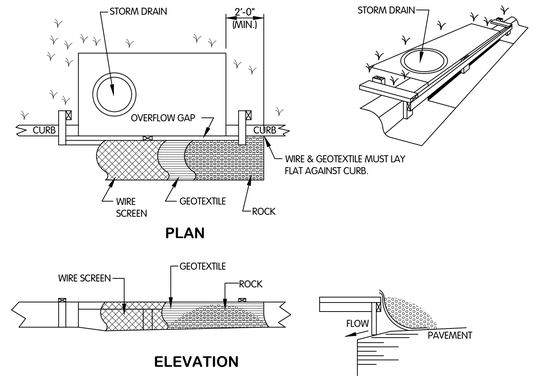


NOTES:
1. DIVERSION SHALL BE COMPACTED BY TRAVERSING WITH TRACKED EARTH MOVING EQUIPMENT.
2. DIVERSIONS SHALL NOT BE BREACHED OR LOWERED TO ALLOW CONSTRUCTION TRAFFIC TO CROSS; INSTEAD THE TOP WIDTH MAY BE MADE WIDER AND SIDE SLOPES MADE FLATTER THAN SPECIFIED ABOVE.
3. DIVERSIONS SHALL BE STABILIZED WITH VEGETATION AND CHECK DAMS OR THE FOLLOWING TREATMENTS.

TEMPORARY DIVERSION STABILIZATION TREATMENT			
DIVERSION SLOPE	< 2 ACRES	2-5 ACRES	5-10 ACRES
0-3%	SEED AND STRAW	SEED AND STRAW	SEED AND STRAW
3-5%	SEED AND STRAW	SEED AND STRAW	MATTING
5-8%	SEED AND STRAW	MATTING	MATTING
8-20%	SEED AND STRAW	MATTING	ENGINEERED

NOTE:
DIVERSIONS WITH STEEPER SLOPES OR GREATER DRAINAGE AREAS ARE BEYOND THE SCOPE OF THIS STANDARD AND MUST BE DESIGNED FOR STABILITY. SEED, STRAW AND MATTING USED SHALL MEET THE SPECIFICATIONS FOR TEMPORARY SEEDING, MULCHING AND MATTING.

TEMPORARY DIVERSION
(TD) NTS



NOTES:
1. INLET PROTECTION SHALL BE CONSTRUCTED EITHER BEFORE UPSLOPE LAND DISTURBANCE BEGINS OR BEFORE THE STORM DRAIN BECOMES OPERATIONAL.
2. THE WOODEN FRAME IS TO BE CONSTRUCTED OF 2X4 CONSTRUCTION GRADE LUMBER. THE END SPACERS SHALL BE A MINIMUM OF 12" BEYOND BOTH ENDS OF THE THROAT OPENING. THE ANCHORS SHALL BE NAILED TO 2X4 STAKES DRIVEN ON THE OPPOSITE SIDE OF THE CURB.
3. THE WIRE MESH SHALL BE OF SUFFICIENT STRENGTH TO SUPPORT FABRIC AND STONE. IT SHALL BE A CONTINUOUS PIECE WITH A MINIMUM WIDTH OF 30" AND 4'-0". LONGER THAN THE THROAT LENGTH OF THE INLET, 2'-0" ON EACH SIDE.
4. GEOTEXTILE CLOTH SHALL HAVE AN EQUIVALENT OPENING SIZE (EOS) OF 20-40 SIEVE AND BE RESISTANT TO SUNLIGHT. IT SHALL BE AT LEAST THE SAME SIZE AS THE WIRE MESH.
5. THE WIRE MESH AND GEOTEXTILE CLOTH SHALL BE FORMED TO THE CONCRETE GUTTER AND AGAINST THE FACE OF THE CURB ON BOTH SIDES OF THE INLET AND SECURELY FASTENED TO THE 2X4 FRAME.
6. 2" STONE SHALL BE PLACED OVER THE WIRE MESH AND GEOTEXTILE IN SUCH A MANNER AS TO PREVENT WATER FROM ENTERING THE INLET UNDER OR AROUND THE GEOTEXTILE CLOTH.

CURB INLET PROTECTION
NTS

DESIGN K. STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
Troy McCallin Brehmer
5/26/2023

ENVIRONMENTAL PROTECTION MEASURES DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
5			
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JOB NO. 538-7766.001
SCALE NONE
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE
DESIGNED BCW | DRAWN RGW | CHECKED TMB
STATUS: ISSUED FOR BID
DATE: MAY 2023
SHEET NO. C-5
12 OF 35

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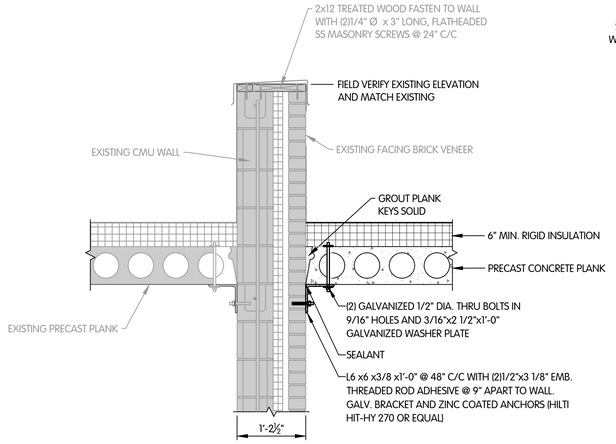
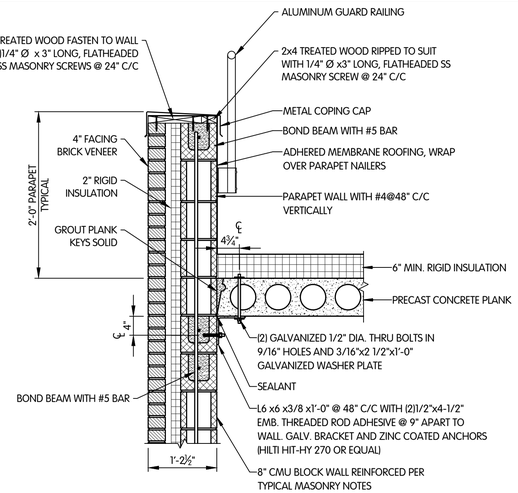
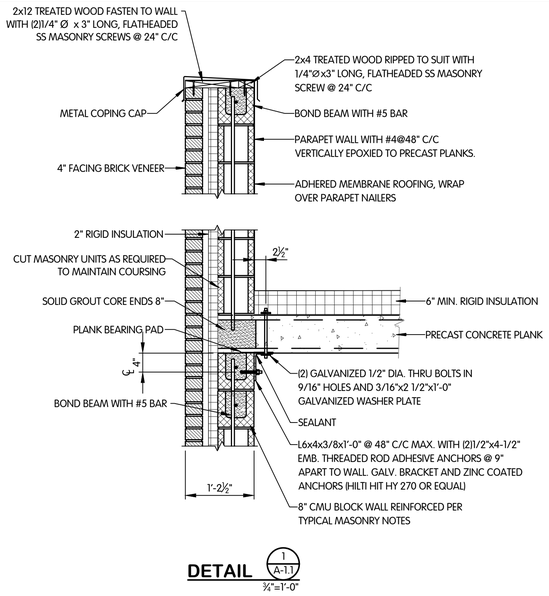
LAST SAVED BY: CLENDER
5/26/2023 12:55 PM



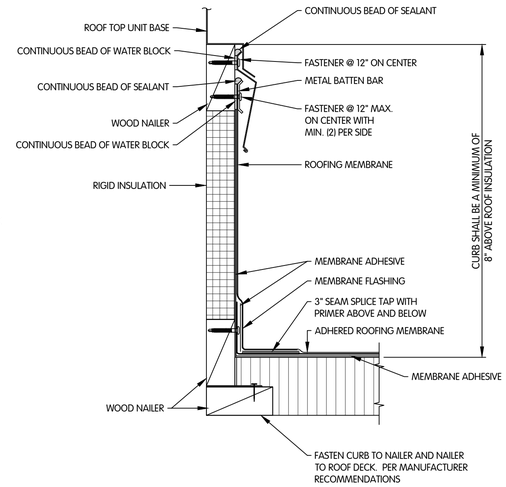
DETAIL 3 / A-1.1
¾"=1'-0"



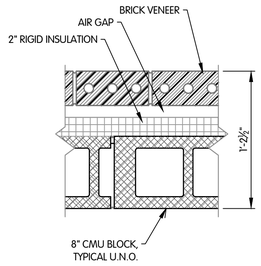
DETAIL 2 / A-1.1
¾"=1'-0"



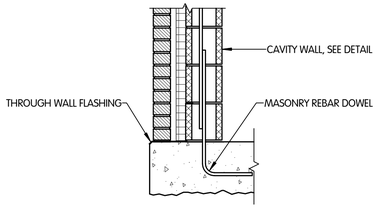
DETAIL 1 / A-1.1
¾"=1'-0"



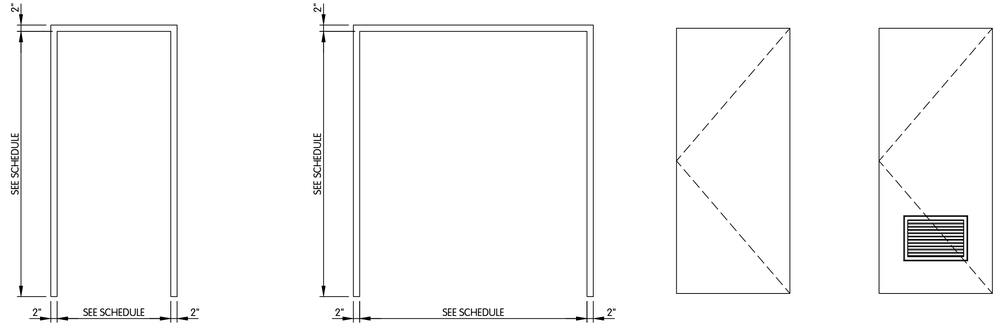
MECHANICAL CURB DETAIL
3" = 1'-0"



CAVITY WALL DETAIL
½"=1'-0"



TYPICAL CAVITY WALL BASE DETAIL
¾"=1'-0"



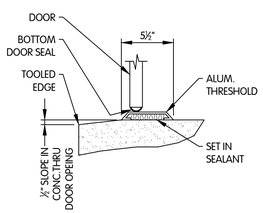
FRAME TYPES
NTS

DOOR TYPES
NTS

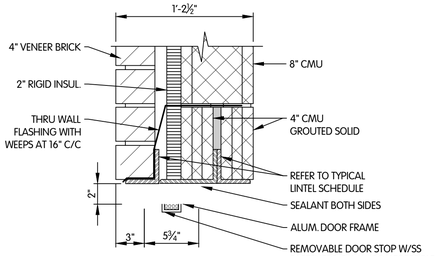
DOOR SCHEDULE

DOOR NO.	SIZE	DOOR		FRAME			THRESH.	UL LABEL	REMARKS
		MAT.	TYPE	MAT.	JAMB	HEAD			
1	3'-0"x7'-2"	ALUMINUM	D	ALUMINUM	J-1	H-1	NONE		
2	6'-0"x7'-2"	ALUMINUM	C	ALUMINUM	J-1	H-1	T-1		
3	3'-0"x7'-2"	ALUMINUM	C	ALUMINUM	J-1	H-1	T-1		

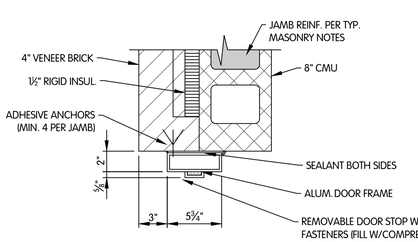
NOTE:
1. UL LABEL DOORS SHALL HAVE SAME UL LABEL FRAMES.



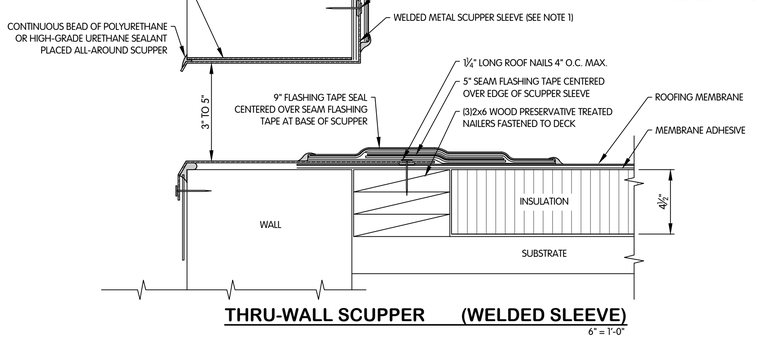
THRESHOLD T-1
½"=1'-0"



HEAD H-1
½"=1'-0"



JAMB J-1
½"=1'-0"



THRU-WALL SCUPPER (WELDED SLEEVE)
6" = 1'-0"

NOTES:
1. SCUPPER MUST BE WELDED METAL SLEEVE. ROUND ALL SHEET METAL FLANGE CORNERS.
2. APPLY LAP SEALANT AROUND ENTIRE PERIMETER OF FLASHING.
3. FASTENERS SHALL BE EITHER HOT DIPPED GALVANIZED OR STAINLESS STEEL AND SHALL BE COMPARABLE WITH THE SCUPPER MATERIAL.
4. METAL FLANGE OR SCUPPER MUST BE FULLY SUPPORTED BY WOOD AND TERMINATED AT LEAST 1/2" IN FROM EDGE OF WOOD.
5. SCUPPER SHALL BE 8" WIDE AND HAVE A MINIMUM OF 3" CLEAR HEIGHT, UNLESS NOTED OTHERWISE.
6. FOLLOW ALL MEMBRANE ROOFING MANUFACTURER'S INSTALLATION RECOMMENDATIONS AND USE ADHESIVES, SEALANTS, PRIMERS AND FASTENERS THAT ARE COMPARABLE WITH THE FURNISHED SYSTEM.

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION ARCHITECTURAL DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
1			
2			
3			
4			
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JOB NO.	538-7766.001
SCALE	AS SHOWN
	THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE
DESIGNED	BCW
DRAWN	RHN
CHECKED	TMB
STATUS:	ISSUED FOR BID
DATE	MAY 2023
SHEET NO.	A-0.1
	13 OF 35

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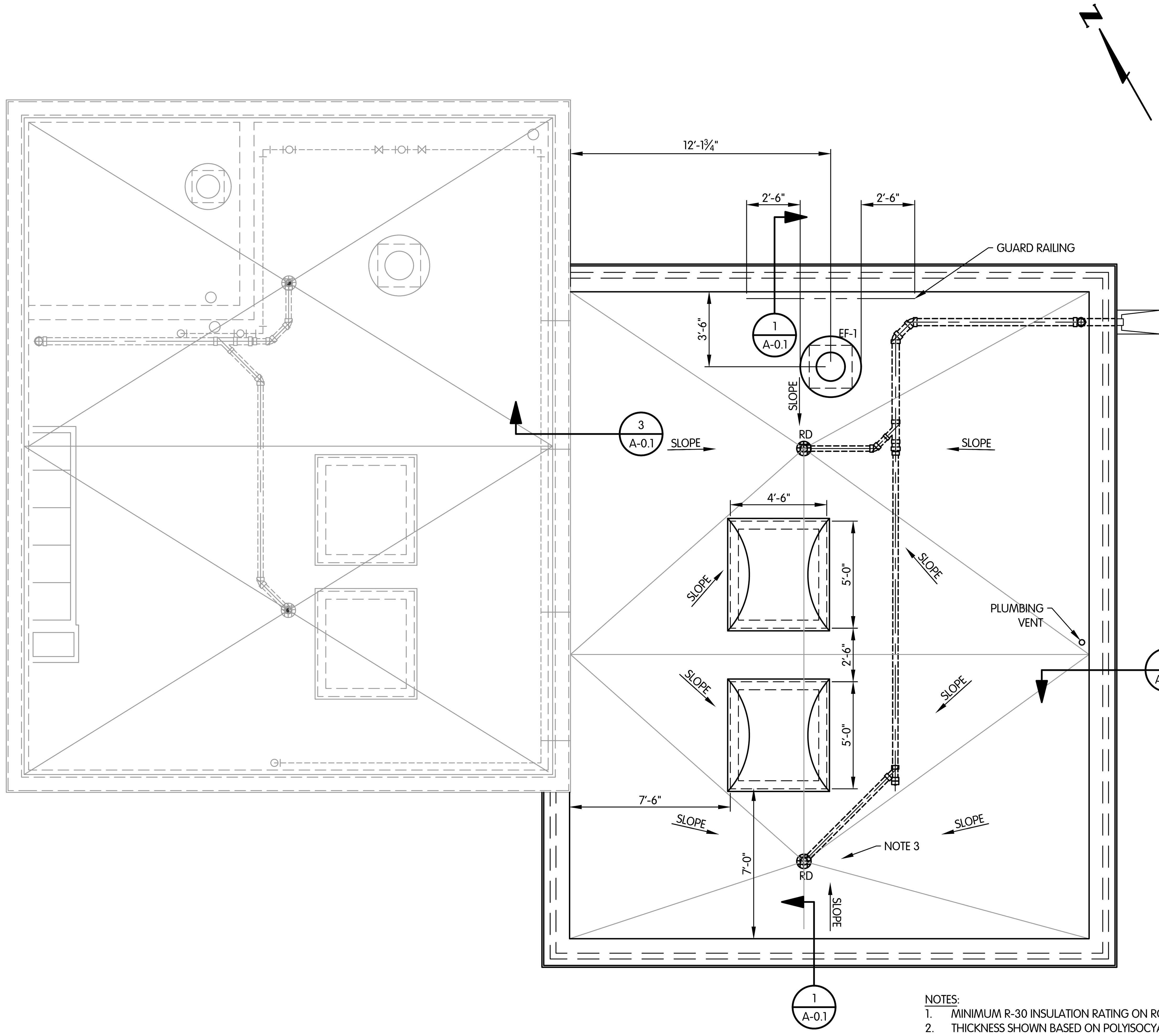
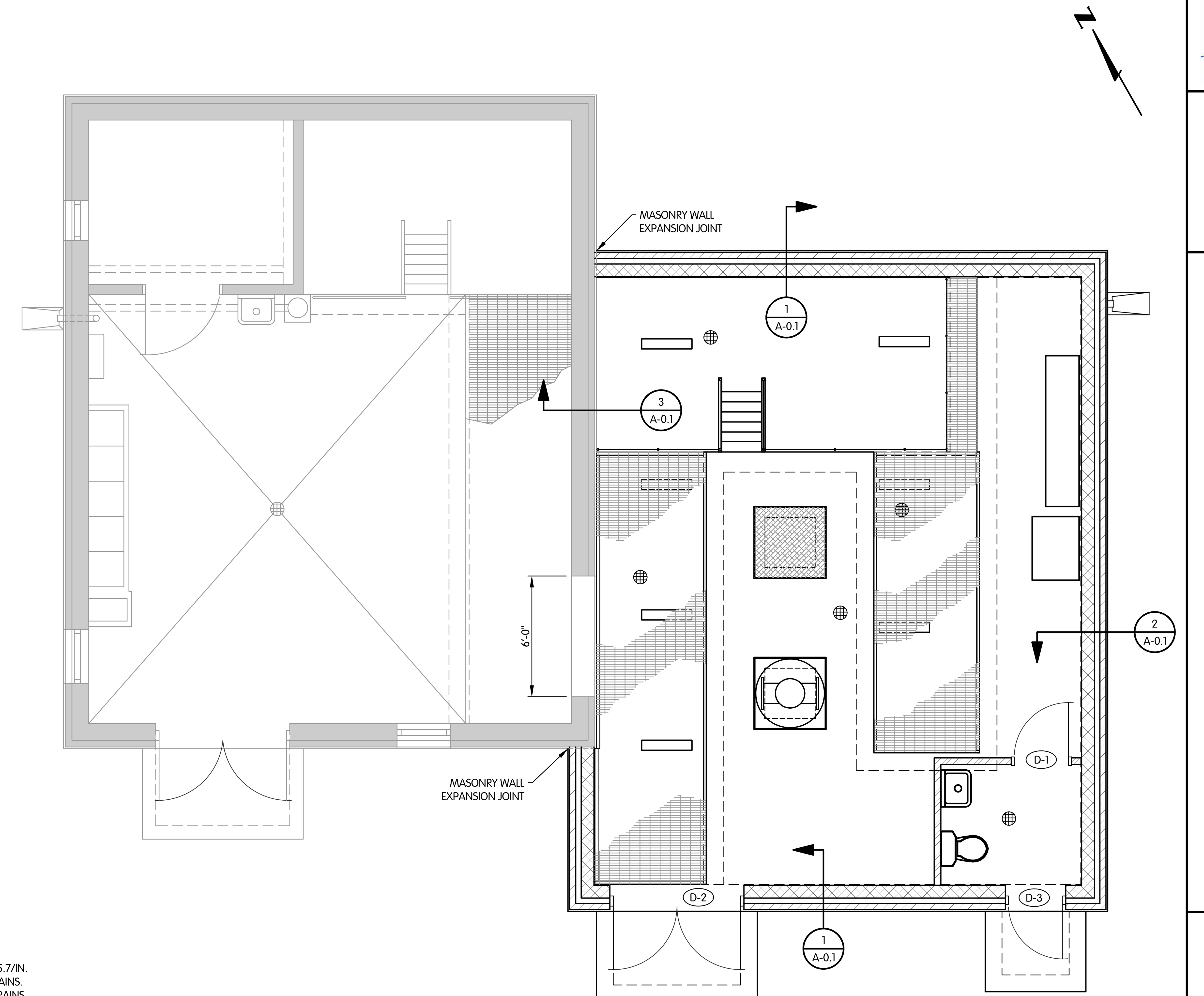


NOTES:
1. MINIMUM R-30 INSULATION RATING ON ROOF.
2. THICKNESS SHOWN BASED ON POLYISOCYANURATE R-5.7/IN.
3. MINIMUM 5" INSULATION THICKNESS, AT THE ROOF DRAINS.
4. SLOPE INSULATION AT A 1/4" PER FOOT TO THE ROOF DRAINS MINIMUM INSULATION THICKNESS AT ROOF DRAIN SHALL BE 5"
5. DIMENSION SHOWN FOR SKYLIGHTS ARE MINIMUM DIMENSIONS. COORDINATE OPENING DIMENSIONS WITH PUMP DIMENSIONS.

ROOF PLAN
¼"=1'-0"



LOWER PLAN
¼"=1'-0"

STATE OF MICHIGAN
Troy McCallin Brehmer
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SOUTH CUSTER BOOSTER STATION ARCHITECTURAL PLANS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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JOB NO.	538-7766.001
SCALE	1/4"=1'-0"

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BCW	RHN	TMB

STATUS: ISSUED FOR BID
DATE: MAY 2023
SHEET NO.
A-1.1
14 of 35

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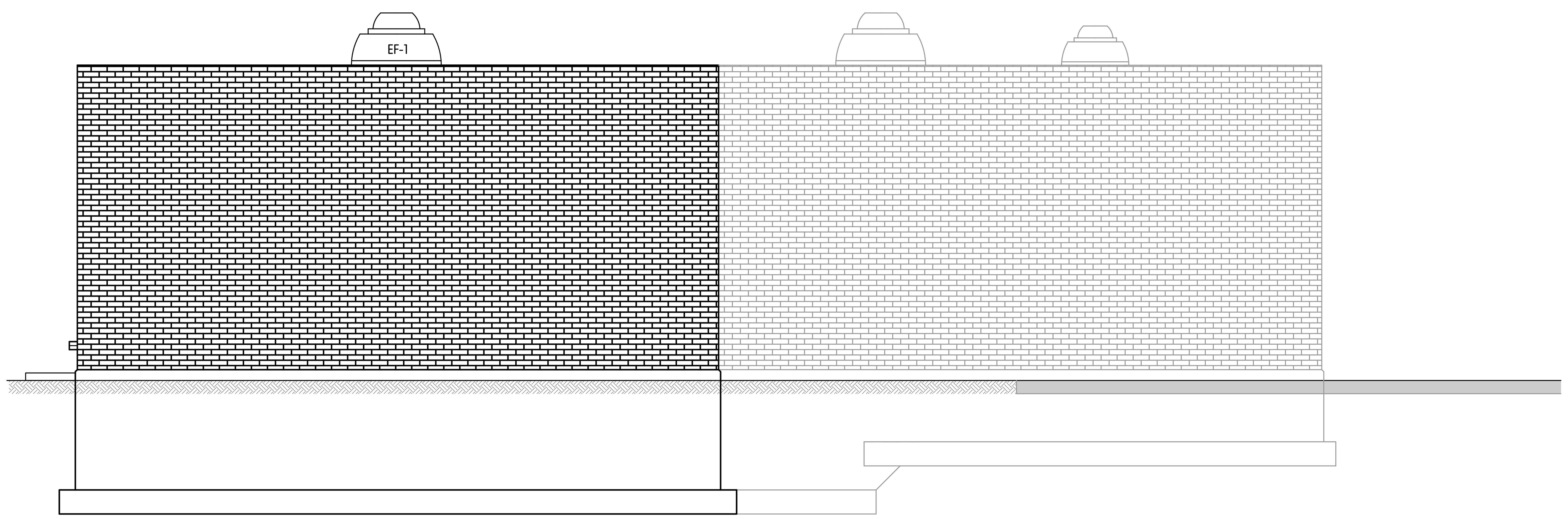
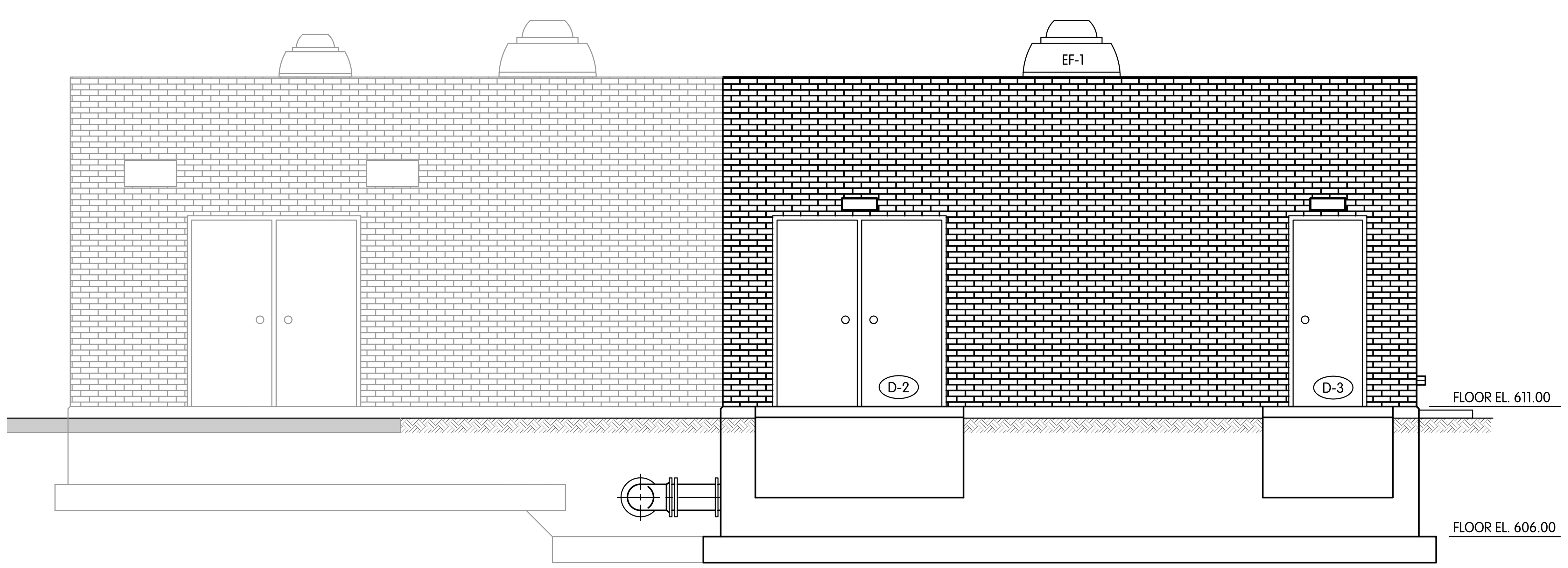


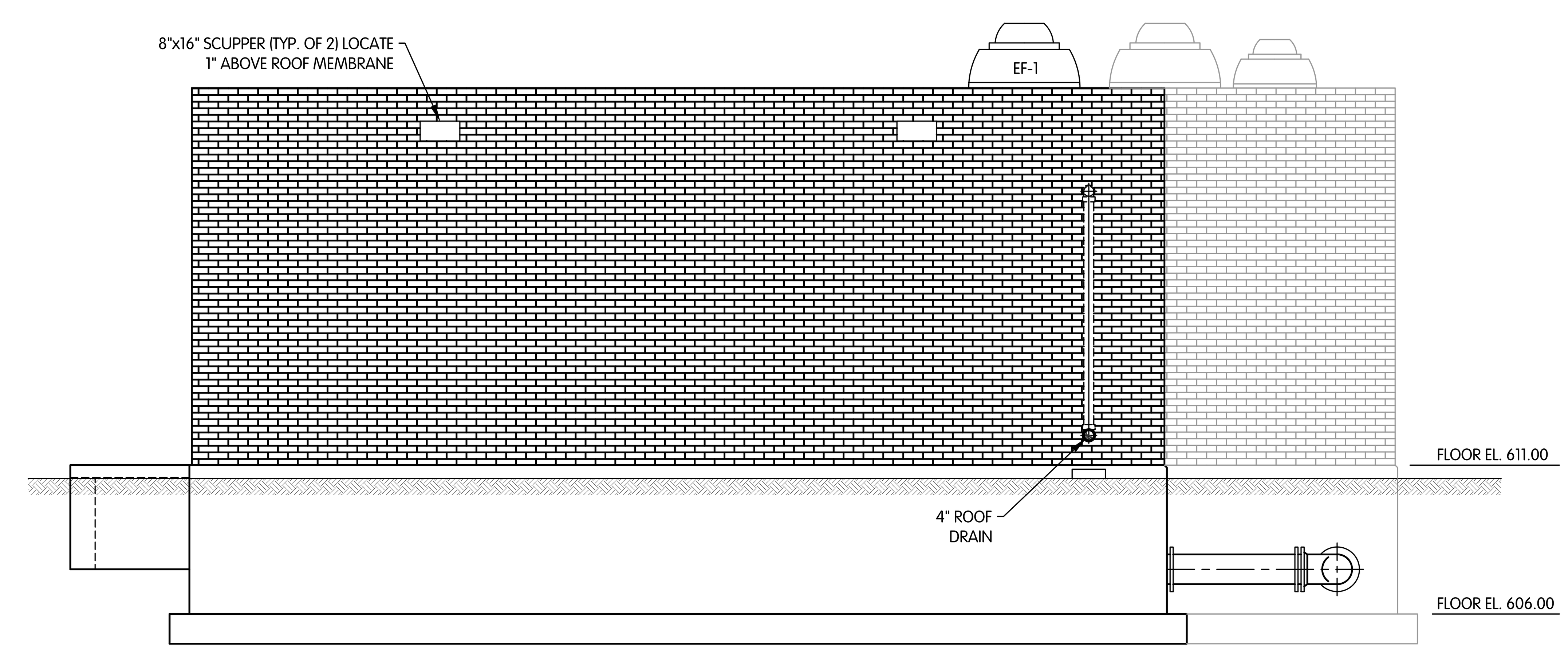
NORTH ELEVATION

¼"=1'-0"



SOUTH ELEVATION

¼"=1'-0"



EAST ELEVATION

¼"=1'-0"

STATE OF MICHIGAN
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5/26/2023

SOUTH CUSTER BOOSTER STATION ARCHITECTURAL ELEVATIONS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

REVISIONS AFTER ISSUED FOR BID

NO	DATE	REVISIONS AFTER ISSUED FOR BID	BY
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4			
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SCALE 1/4"=1'-0"

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DESIGNED	DRAWN	CHECKED
BCW	RHN	TMB

STATUS: ISSUED FOR BID

DATE: MAY 2023

SHEET NO.
A-1.2
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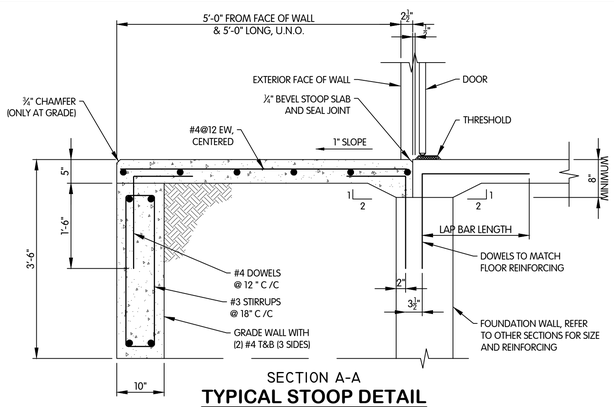
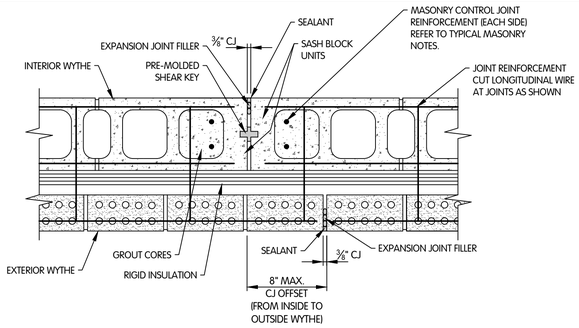


SECTION A-A

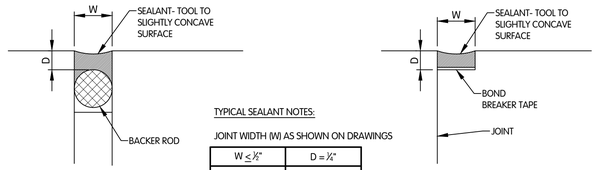
TYPICAL STOOP DETAIL

¾" = 1'-0"



TYPICAL WALL CONTROL JOINT (CJ)

CAVITY WALL CONSTRUCTION — ½" = 1'-0"



STANDARD — SHALLOW

TYPICAL SEALANT NOTES:

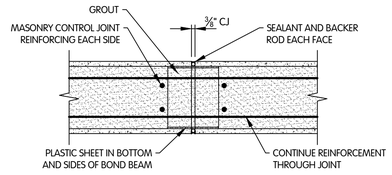
JOINT WIDTH (W) AS SHOWN ON DRAWINGS

W ≤ ½"	D = ¼"
W = ¾"	D = ⅜"
W ≥ 1"	D = ½"

1. BLUNT SHARP EDGES OF CONCRETE JOINTS WITH GRINDER BEFORE SEALING.

TYPICAL SEALANT DETAILS

NTS



NOTE:
THIS DETAIL ONLY APPLIES TO BOND BEAMS AT ROOF BEARING ELEVATIONS. REFER TO OTHER TYPICAL WALL CONTROL JOINT DETAILS FOR BOND BEAMS AT OTHER ELEVATIONS.

TYPICAL BOND BEAM CONTROL JOINT DETAIL

½" = 1'-0"

TYPICAL MASONRY LINTEL SCHEDULE FOR 4", 8" & 12" UNITS

MASONRY OPENING	ANGLE SIZE	BEARING EACH END
LESS THAN 4'-0"	L 3½"x 3½"x ⅜"	4"
4'-0" TO 6'-6"	L 5"x 3½"x ⅜"	6"
6'-6" TO 8'-6"	L 6"x 3½"x ⅜"	8"

NOTES:
1. USE THIS SCHEDULE FOR MASONRY OPENING LINTELS, UNLESS NOTED OTHERWISE
2. LINTELS SHALL HAVE AN ANGLE FOR EACH FOUR INCHES OF WALL THICKNESS. PLACE EVERY TWO ANGLES BACK TO BACK AND WELD TOGETHER.
3. ALL EXTERIOR WALL LINTELS SHALL BE GALVANIZED, PRIMED AND PAINTED. ALL INTERIOR WALL LINTELS SHALL BE PRIMED AND PAINTED.

STRUCTURAL DESIGN DATA

BUILDING CODE		2015 MICHIGAN BUILDING CODE
OCCUPANCY CATEGORY		= III
USE GROUP		= F-2
CONSTRUCTION TYPE		= 2-B
FLOOR	LIVE LOAD, UNLESS NOTED OTHERWISE	= 200 PSF
FLAT ROOF	LIVE LOAD	= 20 PSF (MIN.)
	MECHANICAL & ELECTRICAL	= 10 PSF
SNOW	GROUND SNOW LOAD	= P_G = 25 PSF
	FLAT ROOF	= P_f = 22 PSF
	SNOW EXPOSURE FACTOR	= C_e = 1.0
	SNOW LOAD IMPORTANCE FACTOR	= I_s = 1.1
	THERMAL FACTOR	= C_t = 1.0
WIND	BASIC WIND SPEED	= 120 MPH
	WIND EXPOSURE	= C
SEISMIC	SEISMIC IMPORTANCE FACTOR	= IE = 1.25
	SITE CLASS	= D
	SEISMIC DESIGN CATEGORY	= B
	DESIGN SPECTRAL RESPONSE ACCELERATIONS	= S_{DS} = 0.157 S_{D1} = 0.078
	ANALYSIS PROCEDURE	= EQUIVALENT LATERAL FORCE
STAIRS	LIVE LOAD, UNLESS NOTED OTHERWISE	= 100 PSF
GRATING	LIVE LOAD, UNLESS NOTED OTHERWISE	= 100 PSF
SOILS	DESIGN GROSS BEARING CAPACITY	= 1500 PSF
CONCRETE	DESIGN STRENGTH AT 28 DAY	= 4500 PSI
FLOOD	100 YEAR ELEVATION	= 609.80

TYPICAL MASONRY NOTES:

1. MASONRY BLOCK WALLS SHALL BE VERTICALLY REINFORCED AS FOLLOWS, UNLESS NOTED OTHERWISE: 8" WALLS REINFORCED WITH #5@48" C/C, 10" WALLS REINFORCED WITH #5@40" C/C AND 12" WALLS REINFORCED WITH #5@32" C/C. FOR SINGLE REINFORCED WALLS CENTER VERTICAL REINFORCING IN WALL, FOR DOUBLE REINFORCED WALLS PLACE BARS AT EACH FACE.
2. ALL WALL CORNERS, ENDS, CONTROL JOINTS AND JAMBS OF OPENINGS GREATER THAN 2'-10" SHALL BE REINFORCED VERTICALLY FOR FULL HEIGHT OF FLOOR AS FOLLOWS: 8" WALLS SHALL BE REINFORCED WITH (1) #5, 10" AND 12" WALLS SHALL BE REINFORCED WITH (2) #5. PLACE JAMB REINFORCING SO THAT IT DOES NOT GET INTERRUPTED BY STEEL LINTEL BEARING, MAXIMUM 12" FROM OPENING.
3. ALL VERTICAL WALL REINFORCEMENT SHALL SPAN FROM FOOTING TO PARAPET IN SOLID GROUTED CELLS INCLUDING PILASTERS, WITH 48 BAR DIAMETER LAPS. DOWEL WALLS TO FOOTING WITH MATCHING REINFORCEMENT, UNLESS NOTED OTHERWISE. STRAIGHT DOWELS SHALL BE EMBEDDED 36 BAR DIAMETERS AND HOOKED DOWELS SHALL BE EMBEDDED 12 BAR DIAMETERS.
4. MASONRY BLOCK WALLS SHALL BE HORIZONTALLY REINFORCED IN BOND BEAM UNITS AS SHOWN BY SECTIONS AND WITH 9 GAGE, LADDER TYPE, JOINT REINFORCING AT 16" C/C. PROVIDE CORNER BARS AT REINFORCED BOND BEAMS WITH 48 BAR DIA. LAPS. RUN TOP OF WALL BOND BEAM REINFORCING THROUGH MASONRY CONTROL JOINTS, UNLESS NOTED OTHERWISE.
5. ALL MASONRY WALL OPENINGS GREATER THAN 12" REQUIRE A STEEL LINTEL. PROVIDE LINTELS PER TYPICAL MASONRY LINTEL SCHEDULE, UNLESS NOTED OTHERWISE. REFER TO MECHANICAL DRAWINGS FOR MECHANICAL OPENINGS. REFER TO ARCHITECTURAL DRAWINGS FOR DOOR AND WINDOW LINTEL LOCATIONS.
6. FILL CORES IN HOLLOW CONCRETE MASONRY UNITS UNDER BEARING PLATES, BEAMS, LINTELS, POSTS AND SIMILAR ITEMS. UNLESS SHOWN OTHERWISE, GROUT SHALL EXTEND A MINIMUM 24-INCH DEEP AND 12-INCH ON EACH SIDE OF BEARING AREA.
7. VERTICAL MASONRY CONTROL JOINTS SHALL BE SPACED @ 20'-0" ON CENTER, MAXIMUM. THE JOINT SPACING SHALL INCLUDE THE DISTANCE MEASURED AROUND BUILDING CORNERS TO THE NEXT JOINT.

GENERAL STRUCTURAL NOTES:

1. ALL CONSTRUCTION JOINTS IN WALLS AND BASE SLABS OF STRUCTURES THAT CONTAIN OR CONVEY LIQUIDS, OR CONTAIN EQUIPMENT OR OCCUPANTS, THAT ARE BELOW GRADE OR 100 YEAR FLOOD, SHALL HAVE CONTINUOUS WATERSTOPS TO MAKE THE STRUCTURE WATERTIGHT. JOIN THE WATERSTOPS AT ALL INTERSECTIONS SO THAT A CONTINUOUS SEAL IS PROVIDED. WATERSTOPS SHALL BE SECURED RIGIDLY IN THEIR DESIGN LOCATIONS DURING CONCRETE PLACEMENT. VIBRATE CONCRETE TO CONSOLIDATE IT AROUND THE WATERSTOPS.
2. LAP SPLICES, CONSTRUCTION JOINT DETAILS, WALL CORNER REINFORCEMENT DETAILS, JOINT SEALING DETAILS, SHEAR KEY DETAILS, ETC., UNLESS OTHERWISE SHOWN ON THE DRAWINGS, SHALL ADHERE TO STANDARD STRUCTURAL DETAIL DRAWINGS.
3. THE CONTRACTOR SHALL MAINTAIN ADEQUATE SUPERVISION AND CONTROL OF DEWATERING OPERATIONS TO ENSURE THAT STABILITY OF EXCAVATED AND CONSTRUCTED SLOPES ARE NOT ADVERSELY AFFECTED BY INFLOW OF GROUNDWATER AND TO PERMIT PLACEMENT AND CURING OF CONCRETE UNDER CONTROLLED ENVIRONMENTS.
4. CONCRETE MAT AND WALL CONSTRUCTION JOINTS SHALL NOT BE SPACED MORE THAN 60 FEET APART, UNLESS NOTED OTHERWISE. WHEN CONSTRUCTION JOINT SPACING EXCEEDS 25 FEET THE PLACEMENT OF CONCRETE SECTIONS SHALL BE ALTERNATED TO ALLOW ADJACENT SECTIONS TO BE PLACED AT LEAST 48 HOURS APART. THIS ALLOWS FOR SHRINKAGE TO OCCUR IN A SECTION PRIOR TO THE PLACEMENT OF ITS ADJACENT SECTIONS. HORIZONTAL REINFORCEMENT SPLICES SHALL BE LOCATED IN THE ADJACENT SECTION THAT WILL BE PLACED AT LEAST 48 HOURS LATER TO ALLOW FOR UNRESTRAINED SHRINKAGE TO OCCUR BETWEEN PLACED SECTIONS. JOINT TYPES AND LOCATION PLANS SHALL BE SUBMITTED WITH REBAR SHOP DRAWINGS FOR ENGINEER'S REVIEW.
5. THE BACKFILL UNDERNEATH BASE SLABS AND FOOTINGS SHALL BE SPECIAL BACKFILL, UNLESS OTHERWISE APPROVED, IN ACCORDANCE WITH THE SPECIFICATIONS AND SHALL BE WELL COMPACTED TO NOT LESS THAN 100% MAXIMUM DRY DENSITY IN ACCORDANCE WITH THE STANDARD PROCTOR TEST ASTM D-698 AND SPECIFICATION 02200.
6. WHEREVER REINFORCEMENT REQUIREMENTS FOR STRUCTURAL COMPONENTS (BEAMS, SLABS, WALLS, ETC.) DON'T AGREE AMONG DIFFERENT SECTIONS, THE MOST CONSERVATIVE REQUIREMENT AMONG THEM WILL GOVERN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
7. IF NOT OTHERWISE SHOWN OR SPECIFIED ALL WALL VERTICAL REINFORCING SHALL BE DOWELED INTO BASE MATS, ALL WALL HORIZONTAL REINFORCING SHALL BE DOWELED OR HAVE CORNER BARS TO ADJACENT WALLS, AND ALL SLAB HORIZONTAL REINFORCING SHALL BE DOWELED INTO ADJACENT WALLS, WITH REINFORCING THAT MATCHES THE GIVEN REINFORCEMENT. IF NOT OTHERWISE SHOWN OR SPECIFIED, CONCRETE SECTIONS SHALL BE HORIZONTALLY AND VERTICALLY REINFORCED WITH #5 BARS AT 12" C/C, EACH WAY AND EACH FACE.
8. WHENEVER THICKNESSES OF STRUCTURAL COMPONENTS (WALLS, SLABS, BEAMS, ETC.) DON'T AGREE AMONG DIFFERENT SECTIONS, THE THICKEST SECTION AMONG THEM THEN SHALL GOVERN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
9. VERIFY ALL EXISTING DIMENSIONS, ELEVATIONS AND CONDITIONS AT INTERFACE BETWEEN EXISTING & NEW CONSTRUCTION BEFORE STARTING TO FABRICATE STRUCTURAL STEEL OR DETAILING REBARS. NOTIFY THE ENGINEER OF ANY DISCREPANCIES FOR RESOLUTION.
10. DURING CONSTRUCTION OF NEW STRUCTURES OR STRUCTURAL ELEMENTS, PREVENT UNDERMINING THE FOUNDATIONS OF NEARBY EXISTING STRUCTURES BY SHEET PILING OR BY UNDERPINNING AS REQUIRED. TAKE ALL NECESSARY PROTECTIVE MEASURES TO PREVENT DAMAGE TO THE EXISTING STRUCTURES. CAREFULLY MONITOR THE SETTLEMENT OF EXISTING STRUCTURES DURING SHEET PILING OR UNDERPINNING OPERATIONS. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF SHEET PILING OR UNDERPINNING OPERATIONS & SHALL SUBMIT THIS PROCEDURE TO THE ENGINEER FOR REVIEW.
11. THE CONTRACTOR SHALL ENSURE THAT FOUNDATIONS REST ON FIRM MATERIAL OVER THEIR ENTIRE AREA. THE TESTING LAB SHALL VERIFY THAT A SOIL BEARING CAPACITY OF THAT LISTED BY THE "STRUCTURAL DESIGN DATA" TABLE IS OBTAINED. THE BEARING CAPACITY VERIFICATION IS REQUIRED AT REGULAR INTERVALS IN EACH DIRECTION. NOTIFY THE ENGINEER OF ANY UNSUITABLE SOIL ENCOUNTERED. SUCH SOIL SHALL BE REMOVED AND REPLACED WITH COMPACTED SPECIAL BACKFILL AS DIRECTED BY THE ENGINEER.
12. ALL TREATED WOOD SHALL BE SECURED WITH STAINLESS STEEL OR HOT DIP GALVANIZED FASTENERS.
13. WHERE SAW CUTTING CONCRETE LEAVES SURFACE EXPOSED IN OR ABOVE LIQUID CONTAINING OR CONVEYING STRUCTURES, OR WHERE SPECIFICALLY CALLED FOR ELSEWHERE, APPLY " SIKA ARMATEC 110 EPOCEM" TO EXPOSED REINFORCING. THEN APPLY "SIKATOP 121 PLUS" OR " SIKATOP 122 PLUS" TO LEVEL THE SURFACE. THEN APPLY TWO COATS OF "SIKA GUARD 62" (20 MILS EACH) PROTECTIVE COATING. APPLICATIONS SHALL BE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. USE THESE PRODUCTS OR ENGINEER APPROVED EQUAL.
14. ALL RAILING SYSTEMS SHALL BE ALUMINUM, UNLESS NOTED OTHERWISE.
15. CHAMFER STRIPS SHALL BE PLACED IN CORNERS OF FORMS AND AT ALL EXPOSED EDGES TO PRODUCE A BEVELED EDGE ON PERMANENTLY EXPOSED SURFACES. CHAMFERS SHALL BE ¾ - INCH OR AS NOTED ON DRAWINGS. CHAMFER STRIPS SHALL BE WOOD, METAL, PVC, OR RUBBER AND SHALL BE FABRICATED AND INSTALLED TO PRODUCE UNIFORMLY SMOOTH AND STRAIGHT LINES. CHAMFER STRIPS SHALL BE MITERED AT CHANGES IN DIRECTION.
16. PATCH ALL VISIBLE CONCRETE THAT GETS DAMAGED, CREATES LARGE DEPRESSIONS OR UNEVEN SURFACES FROM THE REMOVAL OF EXISTING BUILDING ELEMENTS, EQUIPMENT, EQUIPMENT BASES OR UTILITIES PER THE CONCRETE RESTORATION SPECIFICATIONS 03710, UNLESS NOTED OTHERWISE. PATCH SMALL ANCHOR HOLES FROM REMOVED EQUIPMENT OR UTILITIES WITH NON-SHRINK GROUT, UNLESS NOTED OTHERWISE.
17. CONTRACTOR SHALL ADD CONCRETE REINFORCEMENT DOWEL BAR REPLACEMENTS (DBR'S) WHERE REQUIRED TO FACILITATE CONSTRUCTION. LOCATION OF DBR'S REQUIRE ENGINEER'S APPROVAL.
18. BACKFILL AROUND TANK WALLS AND LOWER LEVEL BUILDING AREA WALLS SHALL BE SPECIAL BACKFILL FROM BOTTOM OF MAT TO 24" BELOW SURROUNDED GRADE, CAP SPECIAL BACKFILL WITH CLAYEY SELECT BACKFILL

COLD-FORM METAL AND GYPSUM BOARD NOTES:

1. ALL STRUCTURAL LIGHT GAGE FRAMING SHALL BE 18 GAGE METAL (MINIMUM)CONFORMING TO ASTM A653 GRADE 33, WITH A YIELD STRENGTH OF 33,000 PSI, MINIMUM. THIS INCLUDES STUDS, JOISTS, TRACKS AND BRIDGING, UNLESS NOTED OTHERWISE.
2. STUDS SHALL BE INSTALLED PLUMB, ALIGNED AND SECURELY ATTACHED TO BOTH FLANGES OF THE UPPER AND LOWER TRACKS.
3. JOISTS SHALL BE DIRECTLY OVER BEARING STUDS OR HEADER MEMBERS. PROVIDE WEB STIFFENERS AT ALL BEARING LOCATIONS. INSTALL WEB STIFFENERS PER MANUFACTURES RECOMMENDATIONS. WIDTH OF WEB STIFFENER(S) SHALL MATCH BEARING WIDTH. JOIST ENDS SHALL BE ATTACHED TO TRACKS AT EACH END
4. METAL TRACK GAGE SHALL MATCH THE STUD OR JOISTS THAT IT IS CONNECTED TO, UNLESS NOTED OTHERWISE. SECURELY ANCHOR TRACKS TO THE SUPPORTING STRUCTURE WITH (2) SCREWS AT 16" C/C MAXIMUM. WHERE TRACKS ARE ATTACHED TO CONCRETE OR MASONRY USE (2) ¾" DIAMETER CONCRETE SCREWS AT 16" C/C UNLESS NOTED OTHERWISE.
5. ALL FRAMING COMPONENTS SHALL BE CUT SQUARELY FOR ATTACHMENT TO PERPENDICULAR MEMBERS, OR AS REQUIRED FOR AN ANGULAR FIT AGAINST ABUTTING MEMBER.
6. PROVIDE V-BAR BRIDGING AT 4'-0" C/C (MAXIMUM SPACING) ON BOTH SIDES OF EXTERIOR AND BEARING STUD WALLS.
7. PROVIDE BRIDGING FOR JOISTS IN ACCORDANCE WITH THE MANUFACTURE'S RECOMMENDATIONS. PLACE BRIDGING AT 5'-0" CENTERS MAXIMUM.
8. INSTALL HEADER PER MANUFACTURE'S RECOMMENDATIONS AND DOUBLE UP WALL STUDS AT EACH END OF HEADER, UNLESS NOTED OTHERWISE.
9. USE HILTI KWIK-PRO SELF TAPPING SCREWS OR EQUAL FOR LIGHT GAGE SCREWED CONNECTIONS. SCREWS SHALL BE GALVANIZED OR ZINC PLATED.
10. GYPSUM BOARD SHALL BE 5/8" PLAIN GYPSUM WALLBOARD COMPLYING WITH ASTM C36 AND FS SS-6-30D, TYPE 111, GRADE R, CLASS I WITH A PAPER-FACE SURFACE SUITABLE TO RECEIVE DECORATIVE FINISH. EDGES SHALL BE TAPERED TO RECEIVE MANUFACTURER'S STANDARD JOINT TREATMENT, UNLESS OTHERWISE SHOWN.

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
STRUCTURAL
DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
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2			
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SCALE 1/4"=1'-0"

THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
DRC	RHN	TMB

STATUS: ISSUED FOR BID

DATE: MAY 2023

SHEET NO.

S-0.1

16 OF 35

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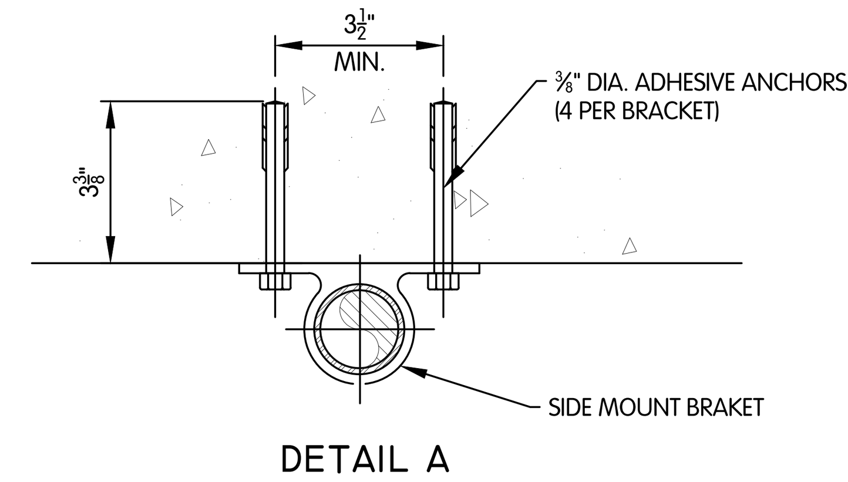
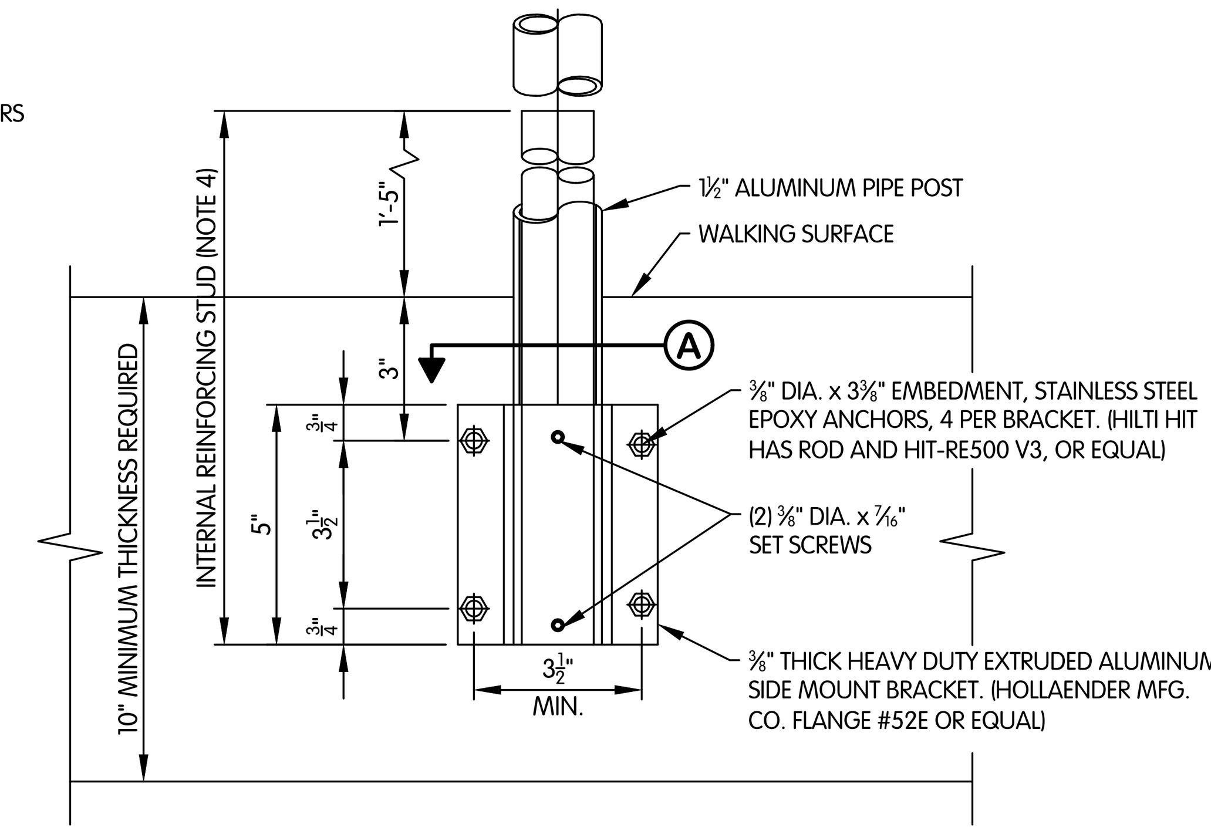
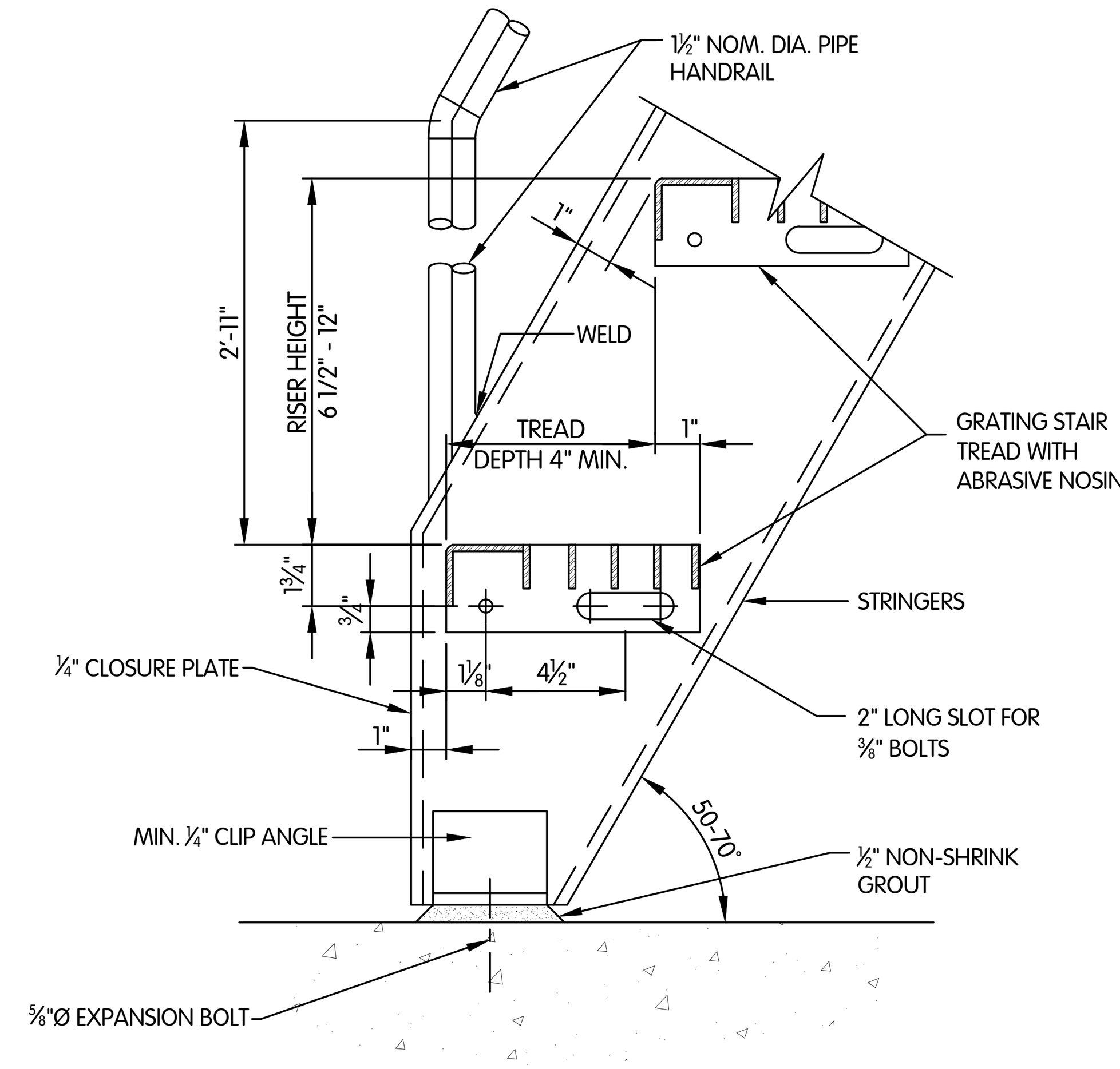


DETAIL A

NOTE:
RAILING POSTS AT CORNERS TO BE LOCATED 6" MIN. FROM CENTER OF POST TO EDGE OF CONCRETE



TYPE A ALUMINUM RAILING POST
3" = 1'-0"



SHIPS LADDER
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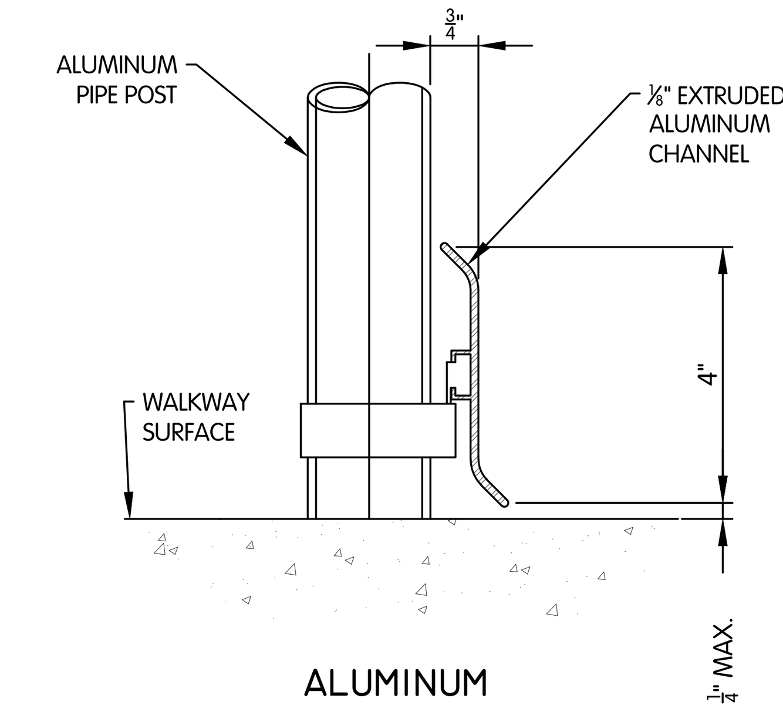
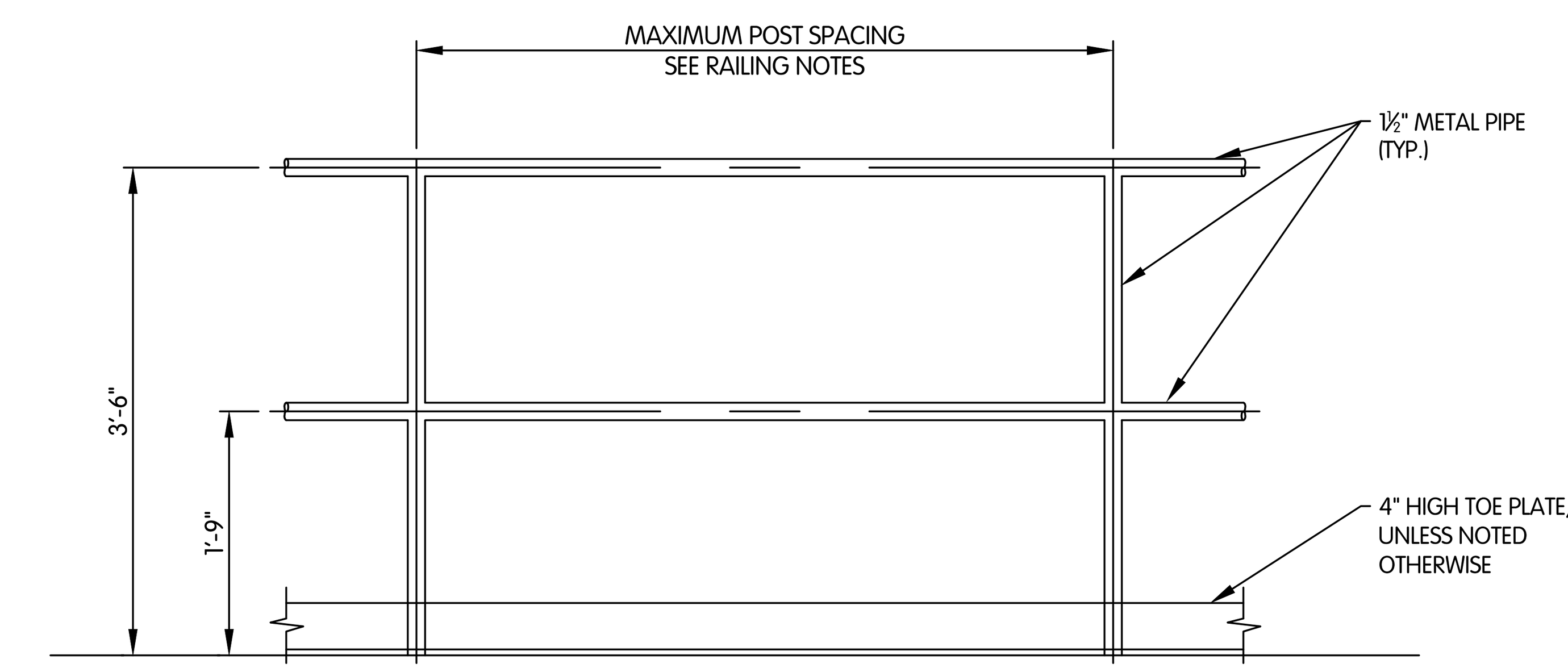


ALUMINUM
TOE PLATE DETAIL
4" = 1'-0"



GUARD RAILING, STANDARD
¾" = 1'-0"

RAILING NOTES:

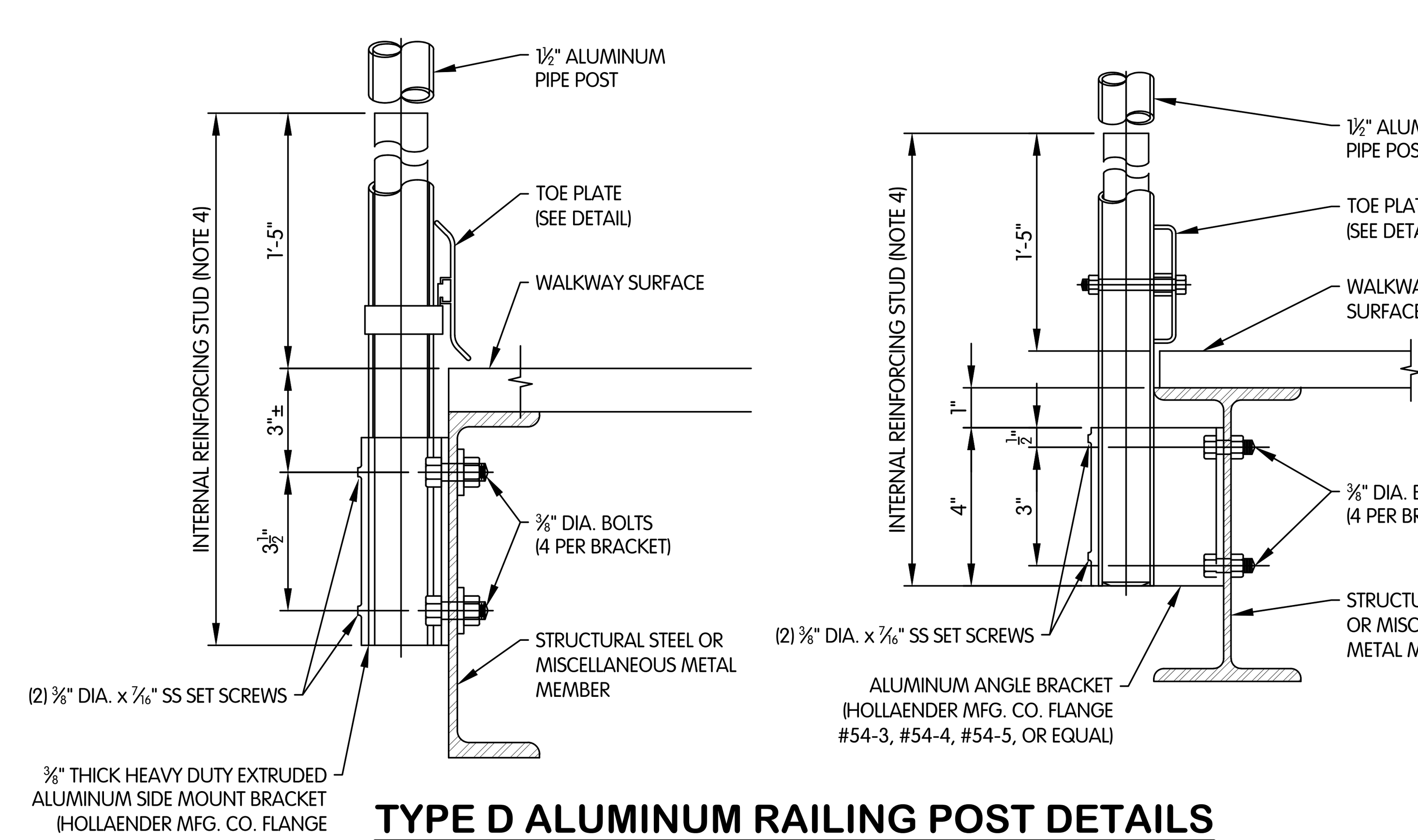
1. GUARD RAILING SHALL BE STANDARD AND STAIR AND RAMP RAILING SHALL BE TYPE I , UNLESS NOTED OTHERWISE ON DRAWINGS.
2. MAXIMUM RAILING POST SPACING SHALL BE 5'-0"
3. REFER TO POST BASE CONNECTION DETAILS FOR ADDITIONAL POST SPACING RESTRAINTS AND STUD INSERT REQUIREMENTS.

RAILING BASE CONNECTION NOTES:

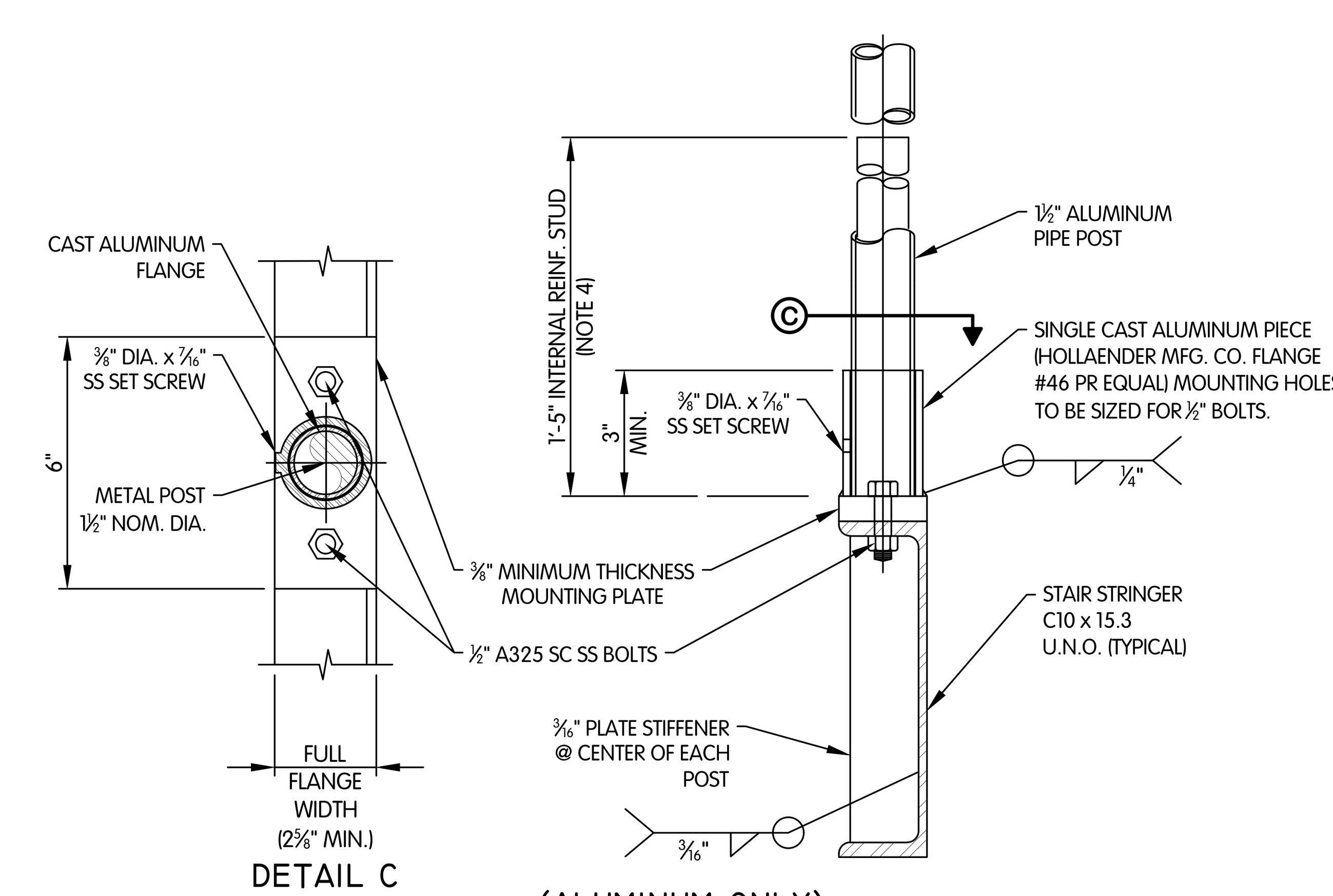
1. PROVIDE COAL TAR PAINT OR NEOPRENE GASKET BETWEEN ALUMINUM SURFACES IN CONTACT WITH CONCRETE, MASONRY, OR DISSIMILAR METALS.
2. ANCHORS FASTENERS:

RAILING MATERIAL	FASTENER
CARBON STEEL	ZINC PLATED CARBON STEEL
ALUMINUM	STAINLESS STEEL
STAINLESS STEEL	STAINLESS STEEL

3. POST BRACKET MATERIAL SHALL MATCH POST MATERIAL, UNLESS NOTED OTHERWISE.
4. POST SHALL BE REINFORCED WITH INTERNAL METAL STUD WHEN REQUIRED BY ENGINEERED DESIGN. STUD SHALL BE WELDED TO POST TO ACT AS ONE MEMBER.



TYPE D ALUMINUM RAILING POST DETAILS
3" = 1'-0"



(ALUMINUM ONLY)

TYPE C METAL STAIR RAILING POST DETAILS
3" = 1'-0"

SOUTH CUSTER BOOSTER STATION
STRUCTURAL
DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

REVISIONS AFTER ISSUED FOR BID

NO	DATE		BY
1			
2			
3			
4			
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DATE: MAY 2023
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S-0.2
17 of 35

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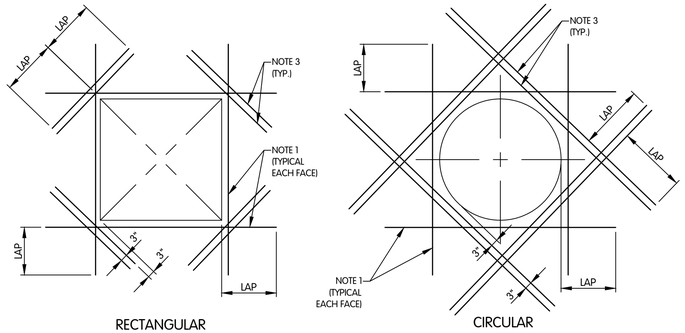

REINFORCEMENT AT OPENING NOTES:
1. ADDITIONAL REINFORCEMENT EQUAL IN AREA TO REINFORCEMENT CUT BY OPENING.
2. PROVIDE LAP LENGTH FOR TOP BARS.
3. PROVIDE TWO DIAGONAL BARS AT EACH FACE AND AT EACH CORNER OR QUADRANT. BARS SHALL BE #5 FOR SECTIONS 18" OR LESS IN THICKNESS AND #6 FOR SECTIONS THICKER THAN 18".
4. DIAGONAL BARS NOT REQUIRED FOR OPENINGS WITH LARGEST DIMENSION LESS THAN 12".
5. ONLY DIAGONAL BARS ARE REQUIRED AT DOOR, WINDOW, OR HATCHED OPENING.

TYPICAL ADDITIONAL REINFORCEMENT FOR OPENINGS BETWEEN 8" AND 48"

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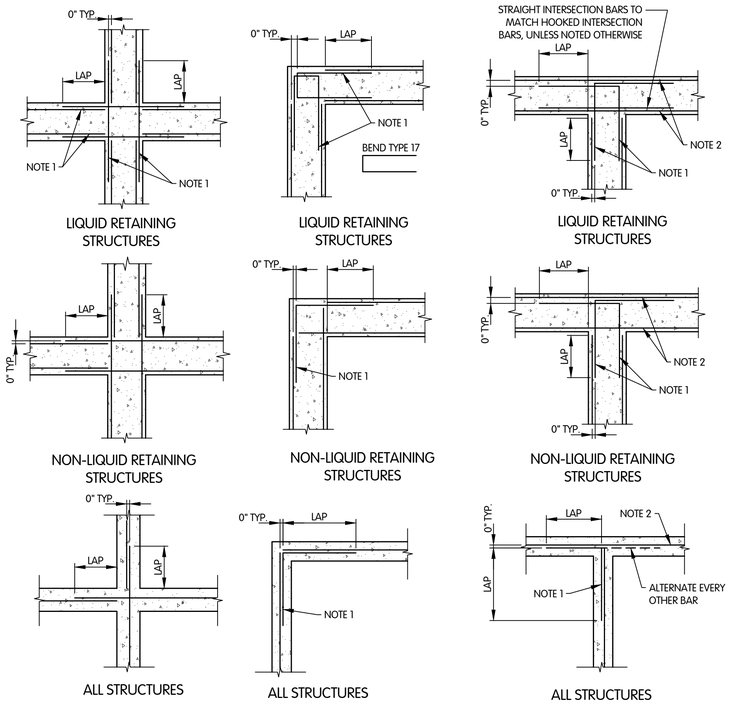
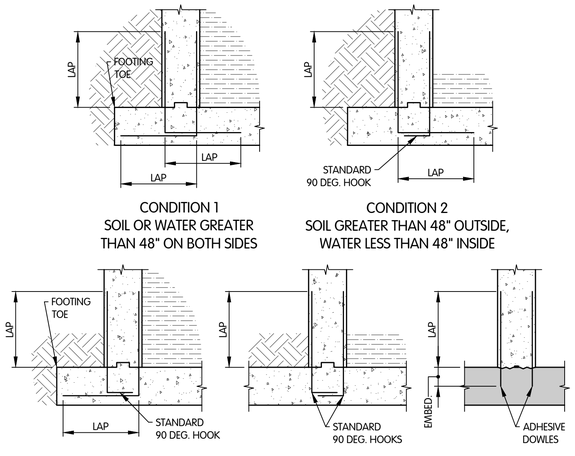


NOTES:
1. ALL WALL CORNERS AND INTERSECTIONS SHALL HAVE DOWEL REINFORCEMENT THAT MATCHES THE SIZE AND SPACING OF THE WALL'S HORIZONTAL REINFORCEMENT, UNLESS NOTED OTHERWISE.
2. CONTINUE HORIZONTAL BARS ACROSS WALL INTERSECTION. LAP ON EITHER SIDE OF WALL INTERSECTION PASSED THE DOWEL BAR LAPS.

STANDARD CONCRETE WALL CORNER AND INTERSECTION HORIZONTAL REINFORCEMENT DETAILS

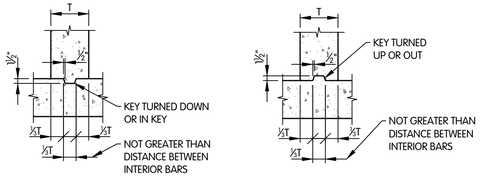
NTS



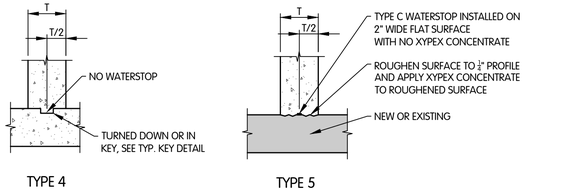
NOTES:
1. WHERE LAP LENGTH HOOK IS INDICATED AND SLAB TOE LENGTH IS NOT LONG ENOUGH FOR LAP HOOK, REDUCE HOOK LENGTH TO TOE LENGTH MINUS 2" COVER.
2. WHERE ADHESIVE DOWELS ARE TO BE INSTALLED USE REBAR FINDER EQUIPMENT TO LOCATE EXISTING BARS AND PLACE ADHESIVE DOWELS TO MISS EXISTING BARS.

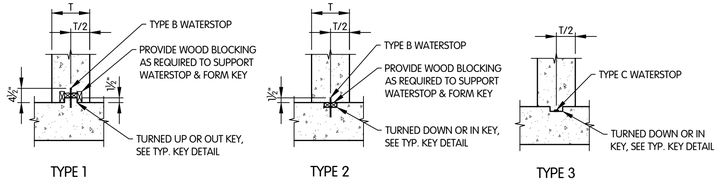
STANDARD CONCRETE WALL REINFORCEMENT DOWELS TO BASE SLAB DETAILS

NTS



STANDARD SHEAR KEY DETAILS





NOTES:
1. PLACE 2" DEEP BED OF BONDING GROUT ON HORIZONTAL JOINTS AND BONDING ADHESIVE ON VERTICAL JOINTS.
2. ALL EXTERIOR WALLS OF LIQUID CONTAINING STRUCTURES AND INTERIOR WALLS SEPARATING SOIL OR LIQUID CONTAINING STRUCTURES FROM OCCUPIED SPACES OR DRY EQUIPMENT AREAS SHALL HAVE A TYPE 1 CONSTRUCTION JOINT AT THE BASE OF THE WALL , UNLESS NOTED OTHERWISE.
3. WATERSTOPS SHALL BE 1.5" CLEAR OF REINFORCING. MOVE WATERSTOP OFF CENTER FOR SINGLE REINFORCEMENT WALLS TO MAINTAIN 1.5" CLEAR TO REINFORCEMENT.

STANDARD CONCRETE WALL CONSTRUCTION JOINT DETAILS

NTS

STANDARD LAP LENGTH (IN.)

BAR SIZE	CLEAR COVER 2" OR MORE		CLEAR COVER LESS THAN 2"	
	TOP AND HORIZONTAL REINFORCEMENT	BOTTOM AND VERTICAL REINFORCEMENT	TOP AND HORIZONTAL REINFORCEMENT	BOTTOM AND VERTICAL REINFORCEMENT
#3	18	16	18	16
#4	24	20	24	19
#5	30	24	30	23
#6	36	30	40	31
#7	54	42	54	42
#8	62	48	71	55

NOTES:
1. REINFORCING SHALL BE LAPPED WITH THE LENGTHS FROM THIS SCHEDULE, WHERE THE WORD "LAP" IS GIVEN ON THE DRAWINGS IT REFERS TO THE LENGTHS IN THIS SCHEDULE, UNLESS NOTED OTHERWISE.
2. TOP REINFORCEMENT IS LOCATED AT THE TOP FACE AND BOTTOM REINFORCEMENT IS LOCATED AT THE BOTTOM FACE OF HORIZONTAL SECTIONS LIKE SLABS AND BEAMS. VERTICAL REINFORCEMENT IS ORIENTED VERTICALLY IN VERTICAL SECTIONS LIKE WALLS AND COLUMNS. HORIZONTAL REINFORCEMENT IS ORIENTED HORIZONTALLY IN VERTICAL SECTIONS LIKE WALLS.

STANDARD CONCRETE COVER

CONCRETE CAST AGAINST EXPOSED EARTH	3"
SURFACE EXPOSED TO EARTH OR WEATHER	2"
SURFACE EXPOSED TO OR OVER WATER, SEWAGE, OR OTHER LIQUIDS	
SLABS, WALLS, JOISTS:	2"
BEAMS, COLUMNS	
PRIMARY REINFORCEMENT:	2½"
STIRRUPS AND TIES:	2"
OTHER SURFACES	
SLABS, WALLS, JOISTS:	1"
BEAMS, COLUMNS	
PRIMARY REINFORCEMENT:	2"
STIRRUPS AND TIES:	1½"

DESIGNED IN THE STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
Troy M. Brehmer
5/26/2023

SOUTH CUSTER BOOSTER STATION STRUCTURAL CONCRETE DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
5			
4			
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2			
1			

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JOB NO. 538-7766.001

SCALE AS NOTED

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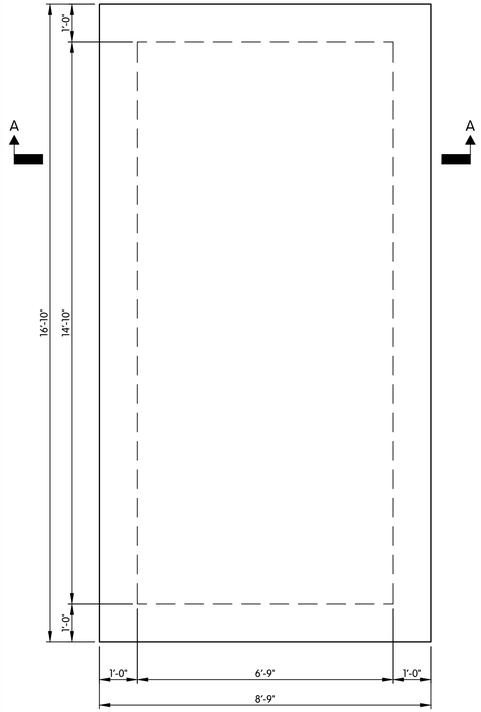
DESIGNED	DRAWN	CHECKED
DRC	CAL	TMB

STATUS: ISSUED FOR BID

DATE: MAY 2023

SHEET NO.
S-0.3
18 OF 35

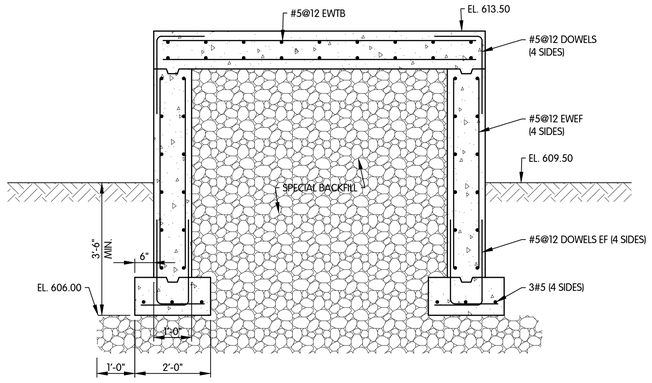
TOL-7766001502-18 S-0.3 - CONCRETE STRUCTURAL DETAILS
5/26/2023 12:54 PM - CLENDER
5/26/2023 12:55 PM



GENERATOR PAD PLAN

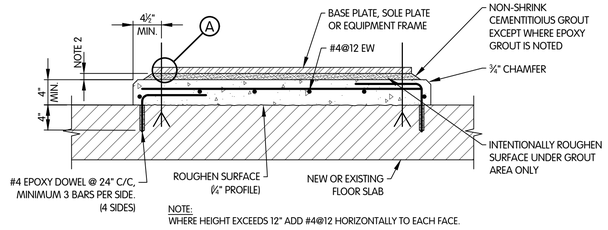
½"=1'-0"

NOTES:
1. PAD DIMENSIONS ARE MINIMUM AND MUST BE VERIFIED WITH EQUIPMENT SUPPLIED PRIOR TO CONSTRUCTION. PAD SHALL BE MINIMUM 6" LARGER THAN EQUIPMENT BASE ON ALL SIDES.



SECTION A-A

¼"=1'-0"

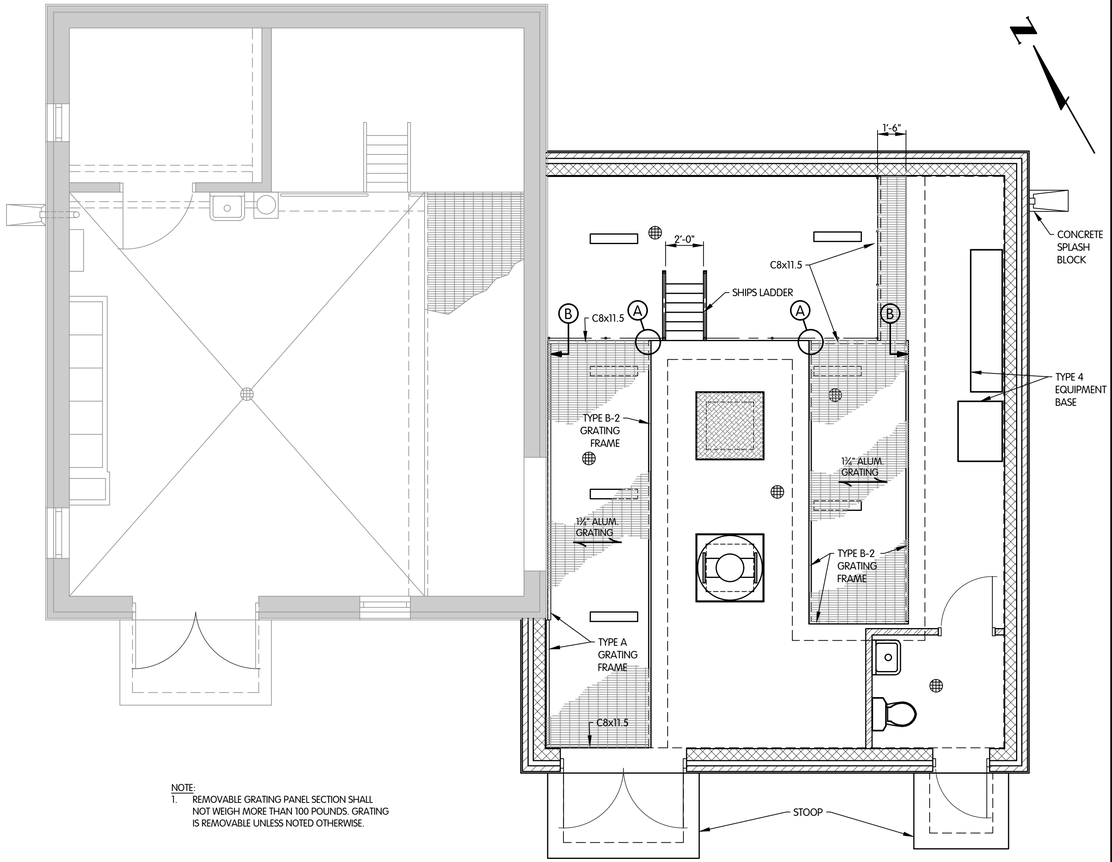


NOTE:
WHERE HEIGHT EXCEEDS 12" ADD #4@12 HORIZONTALLY TO EACH FACE.

TYPE 2
(WITH CONCRETE BASE PAD)

TYPICAL EQUIPMENT BASE DETAIL

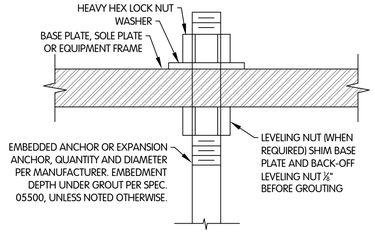
1"=1'-0"



NOTE:
1. REMOVABLE GRATING PANEL SECTION SHALL NOT WEIGH MORE THAN 100 POUNDS. GRATING IS REMOVABLE UNLESS NOTED OTHERWISE.

GRATING PLAN

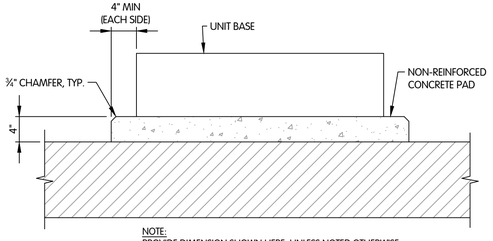
¼"=1'-0"



DETAIL A

(TYPICAL) 6"=1'-0"

EQUIPMENT BASE NOTES:
1. CONCRETE BASE PAD DIMENSIONS SHALL BE 4" LARGER THAN FURNISHED EQUIPMENT BASE ON ALL SIDES, UNLESS NOTED OTHERWISE.
2. GROUT THICKNESS UNDER EQUIPMENT BASES SHALL BE AS FOLLOWS:
   A.) 3" MAXIMUM UNLESS NOTED OTHERWISE
   B.) 1" MINIMUM FOR NON-SHRINK CEMENTITIOUS GROUT, U.N.O.
   C.) 2" MINIMUM FOR EPOXY GROUT, U.N.O.
3. WHEN BASE IS ON ELEVATED SLAB THE SLAB BARS SHALL NOT BE CUT. USE REBAR FINDER EQUIPMENT TO LOCATE BARS AND ADJUST ANCHORAGE LOCATIONS TO MISS FLOOR BARS.

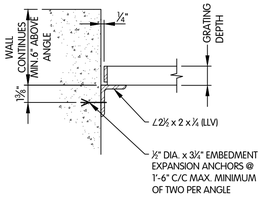


NOTE:
PROVIDE DIMENSION SHOWN HERE, UNLESS NOTED OTHERWISE

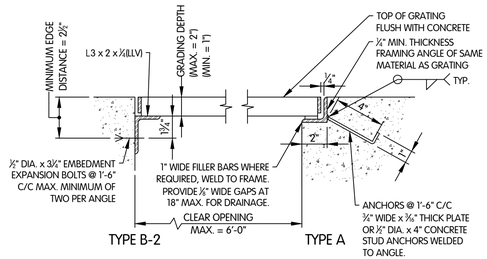
TYPE 4

TYPICAL EQUIPMENT BASE DETAILS

1"=1'-0"



TYPE B-1

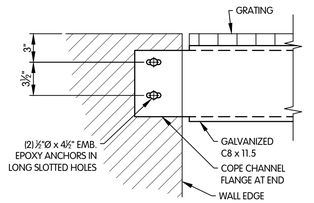


TYPE B-2 TYPE A

GRATING FRAME DETAILS

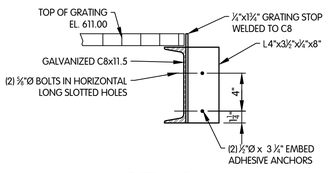
2"=1'-0"

GRATING NOTES:
1. APPLY BITUMINOUS PAINT TO ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE.
2. ANCHORS FOR ALUMINUM AND STAINLESS STEEL TO BE STAINLESS STEEL. ANCHORS FOR GALVANIZED CARBON STEEL TO BE ZINC-PLATED.
3. PROVIDE GALVANIZED STEEL ANGLE FRAMES WITH GALVANIZED STEEL GRATING. FOR ALUMINUM GRATING, PROVIDE ALUMINUM TYPE A FRAME OR STAINLESS STEEL TYPE B-1 OR B-2 FRAMES.
4. FOR B-2 FRAMES USE POWER WRENCH TORQUE REDUCER AS REQUIRED BY ANCHOR MANUFACTURER.



DETAIL A

1½"=1'-0"



DETAIL B

1½"=1'-0"

NOTES:
1. USE L4"x3 1/2"x1/4"x8" ANGLE TO CONNECT C8S, USE DETAIL B.

GRATING FRAME DETAILS

DESIGN OF THE STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION STRUCTURAL DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	BY
5		
4		
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2		
1		

REVISIONS AFTER ISSUED FOR BID

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SCALE AS SHOWN

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DRC	RHN	TMB

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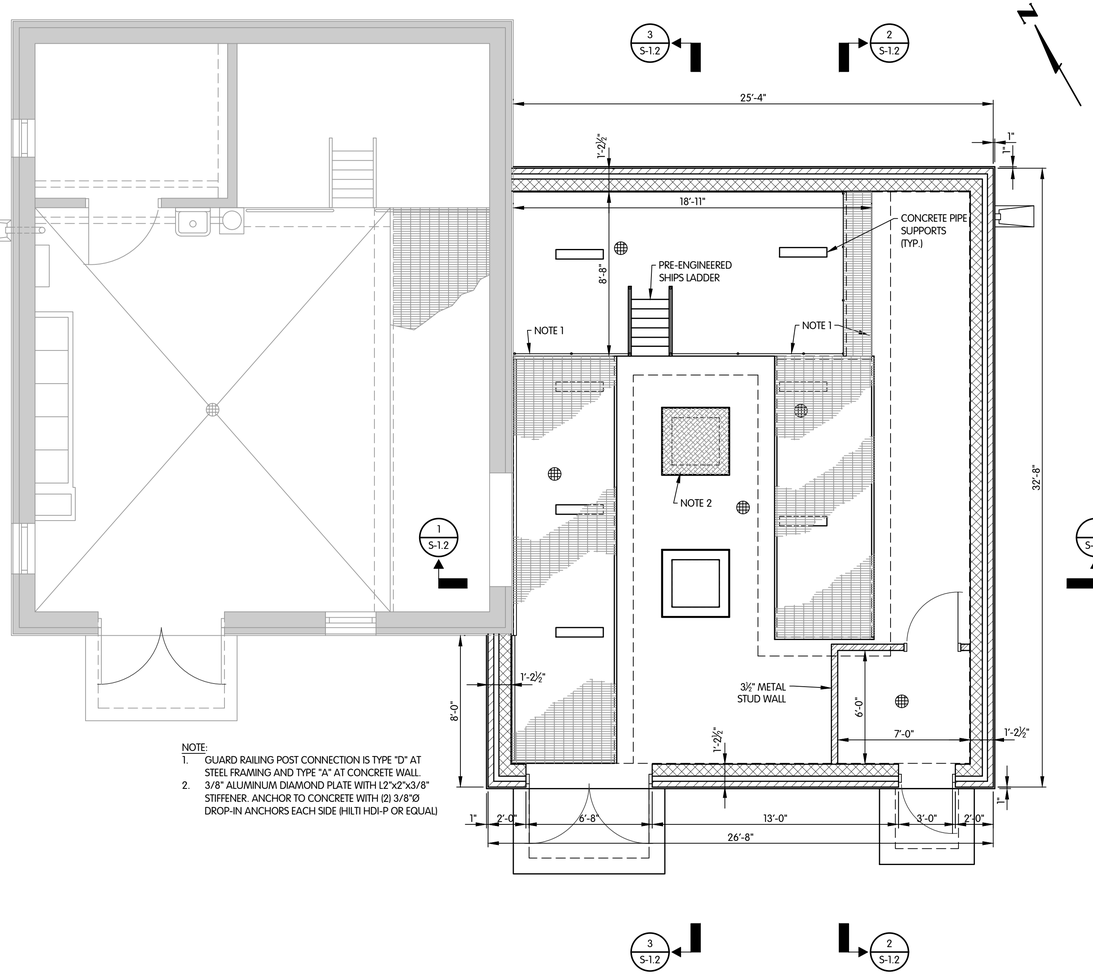
SHEET NO.

S-0.4

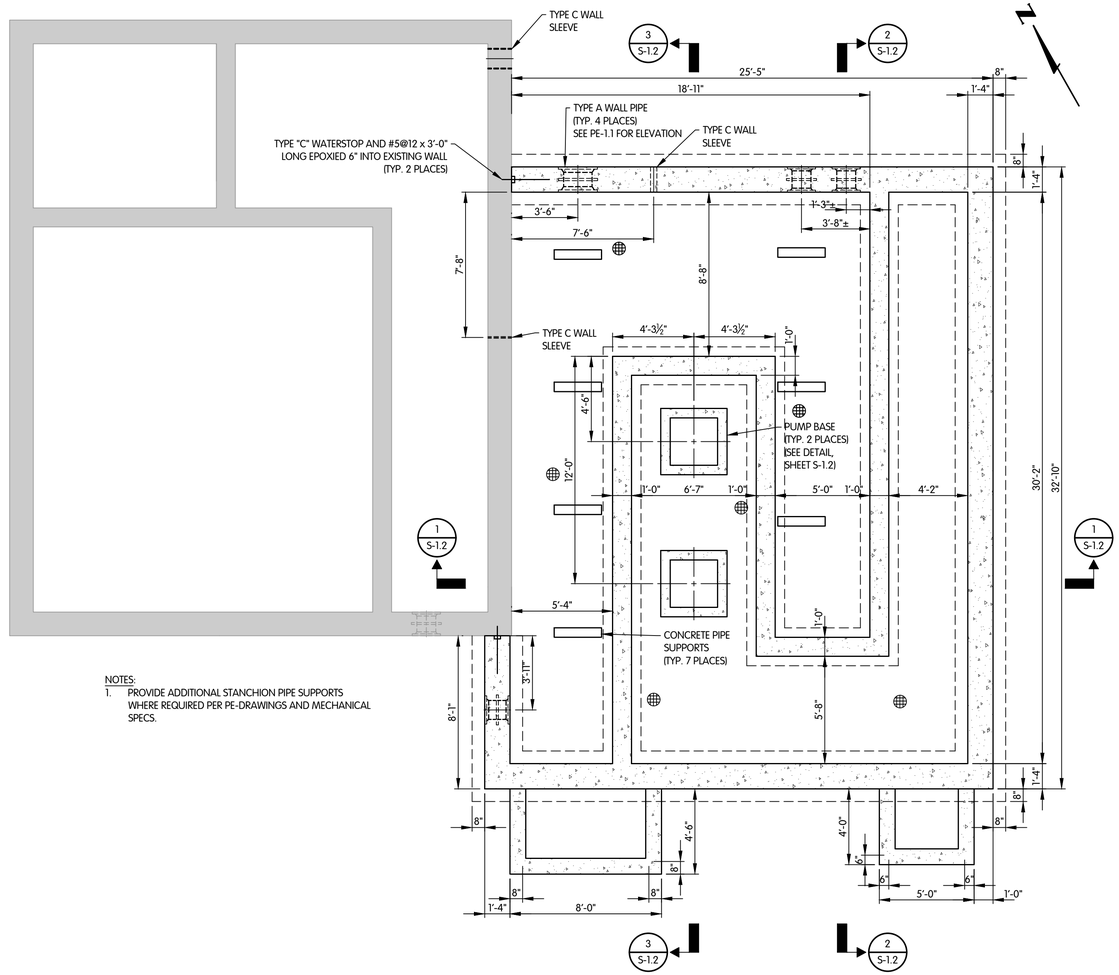
19 OF 35



NOTE:
1. GUARD RAILING POST CONNECTION IS TYPE "D" AT STEEL FRAMING AND TYPE "A" AT CONCRETE WALL.
2. 3/8" ALUMINUM DIAMOND PLATE WITH L2"x2"x3/8" STIFFENER. ANCHOR TO CONCRETE WITH (2) 3/8"Ø DROP-IN ANCHORS EACH SIDE (HILTI HDI-P OR EQUAL)

PLAN @ EL. 611.50

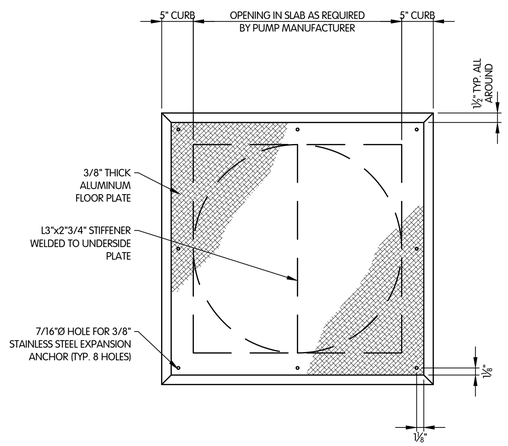
¼"=1'-0"



NOTES:
1. PROVIDE ADDITIONAL STANCHION PIPE SUPPORTS WHERE REQUIRED PER PE-DRAWINGS AND MECHANICAL SPECS.

PLAN @ EL. 610.00

¼"=1'-0"



COVER PLATE DETAIL FOR FUTURE TRANSFER PUMP OPENINGS

1" = 1'-0"

TOL-7766\01\03-20 S-1.1 - PLANS
5/26/2023 12:55 PM - CLENDER
5/26/2023 12:55 PM

DESIGNED IN THE STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION STRUCTURAL PLANS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	BY
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JOB NO.	538-7766.001
SCALE	3/16"=1'-0"

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DRC	RHN	TMB

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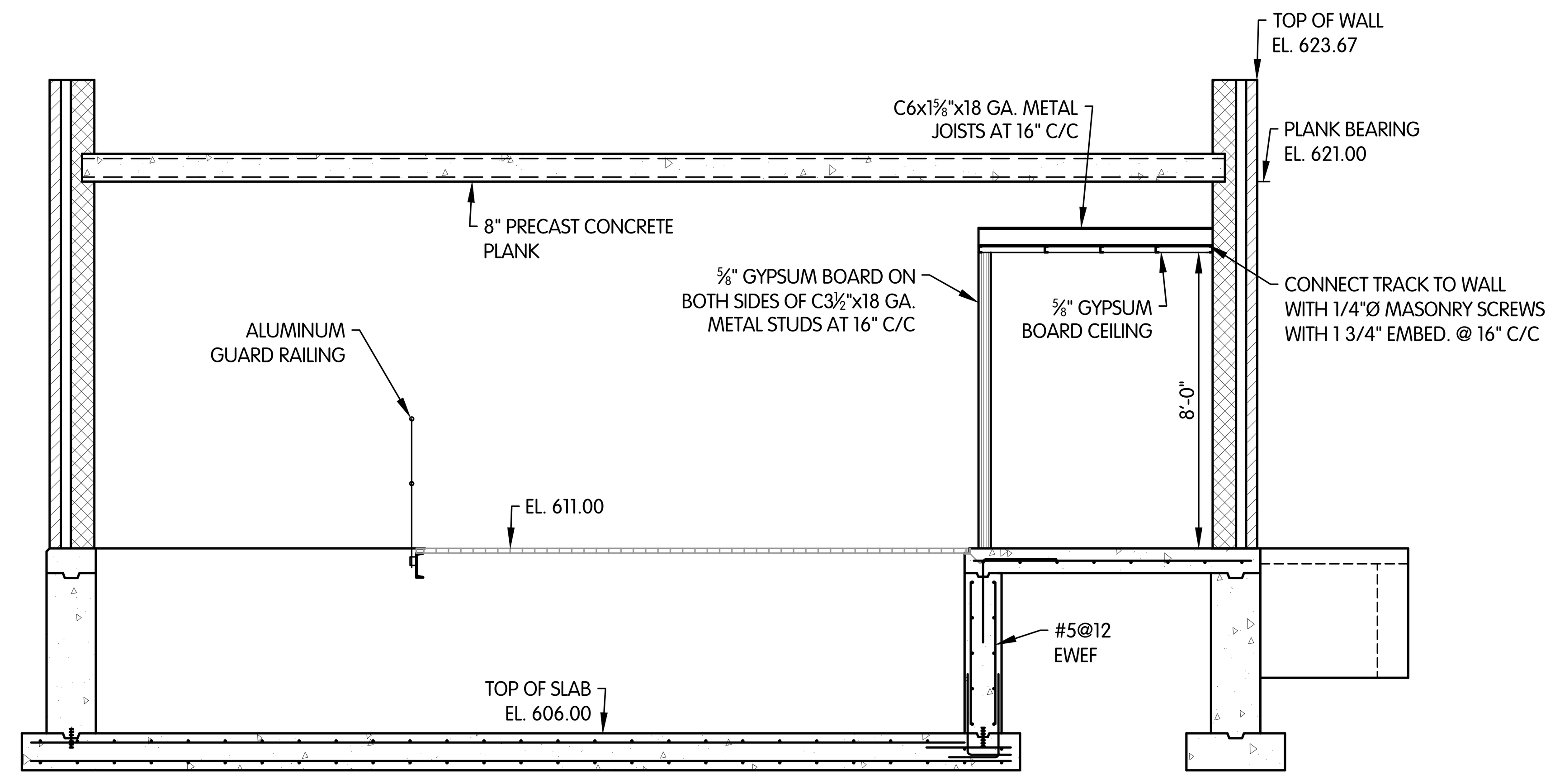
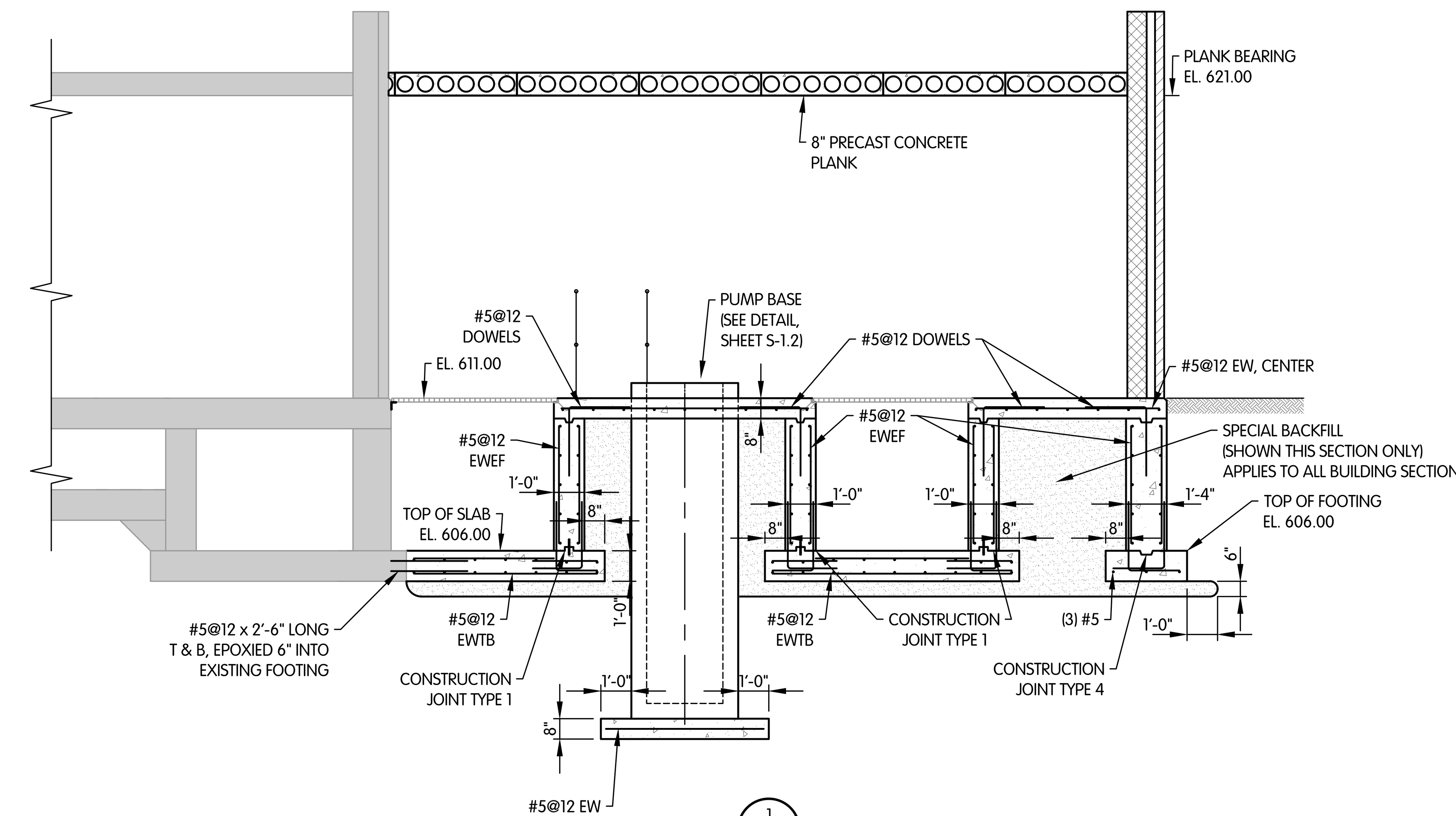
DATE: MAY 2023

SHEET NO.
S-1.1
20 OF 35

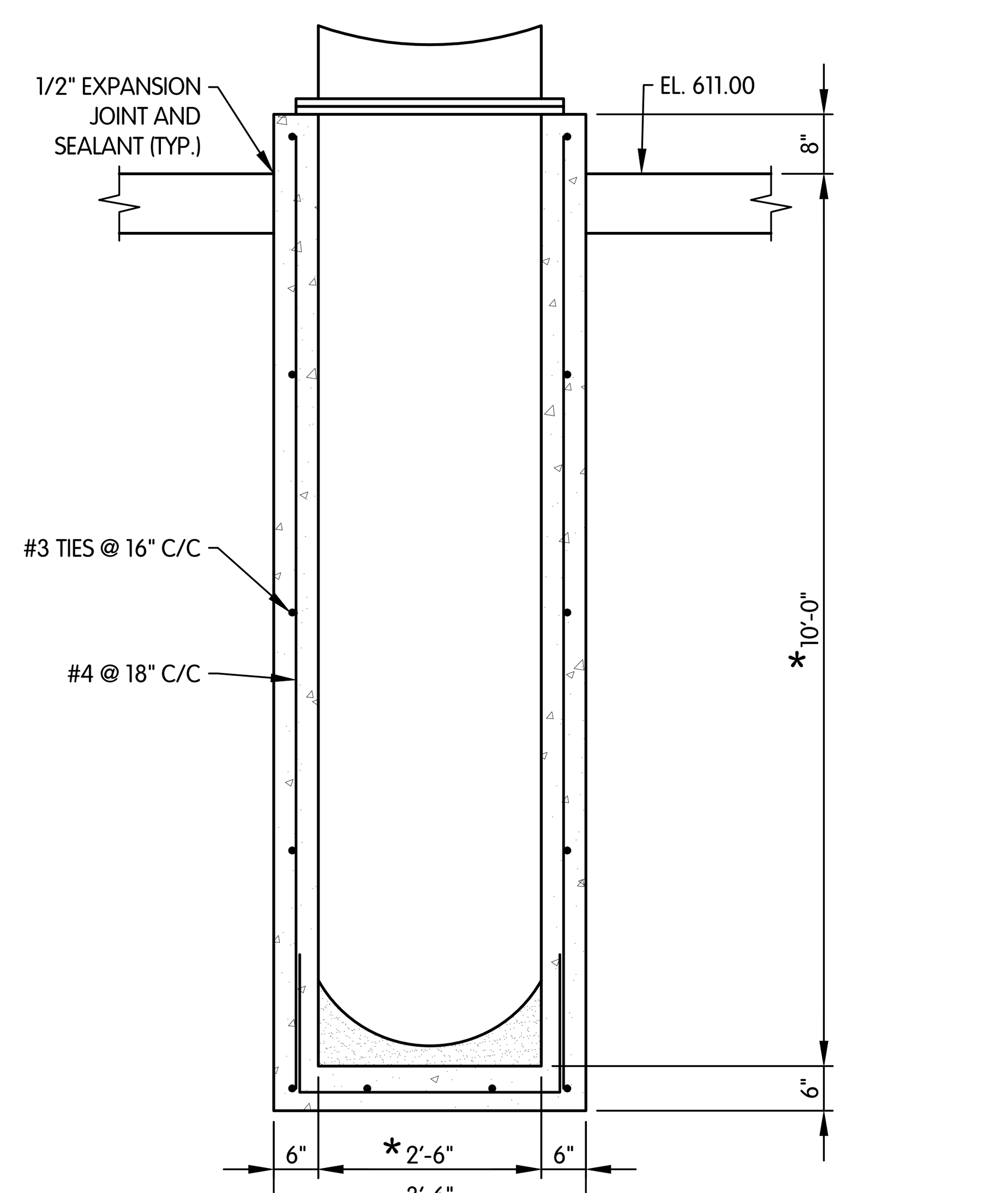


NOTE:
1. SEE SECTION 3 FOR OTHER REINFORCING

SECTION 2 / S-1.1
¼"=1'-0"



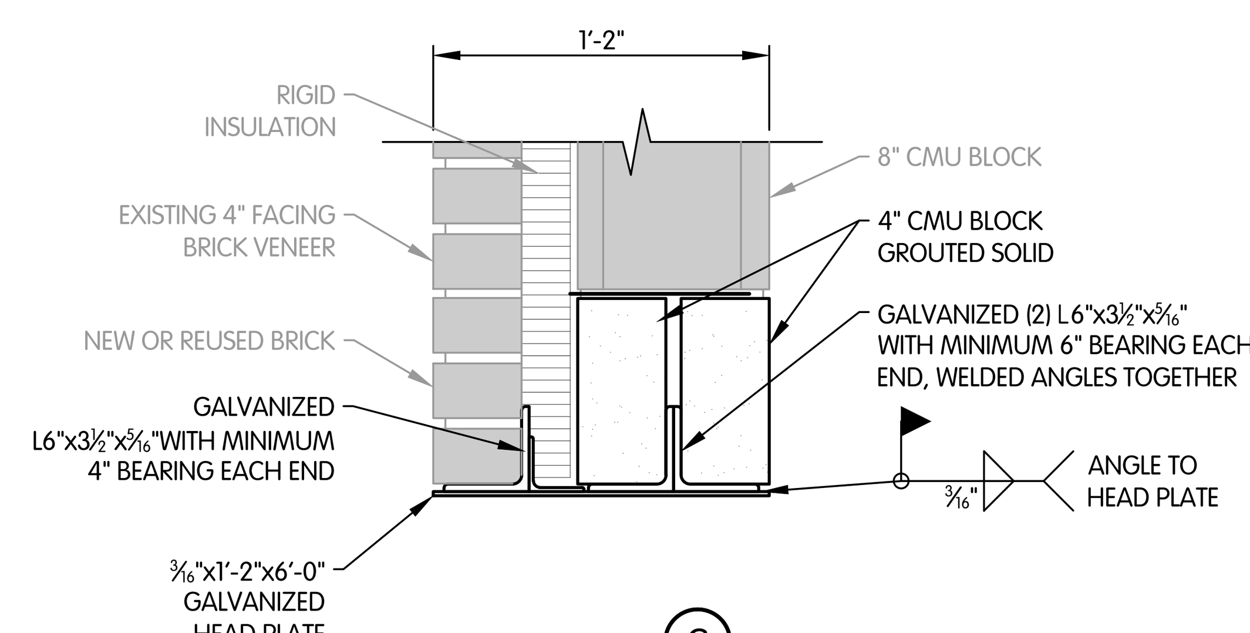
SECTION 1 / S-1.1
¼"=1'-0"



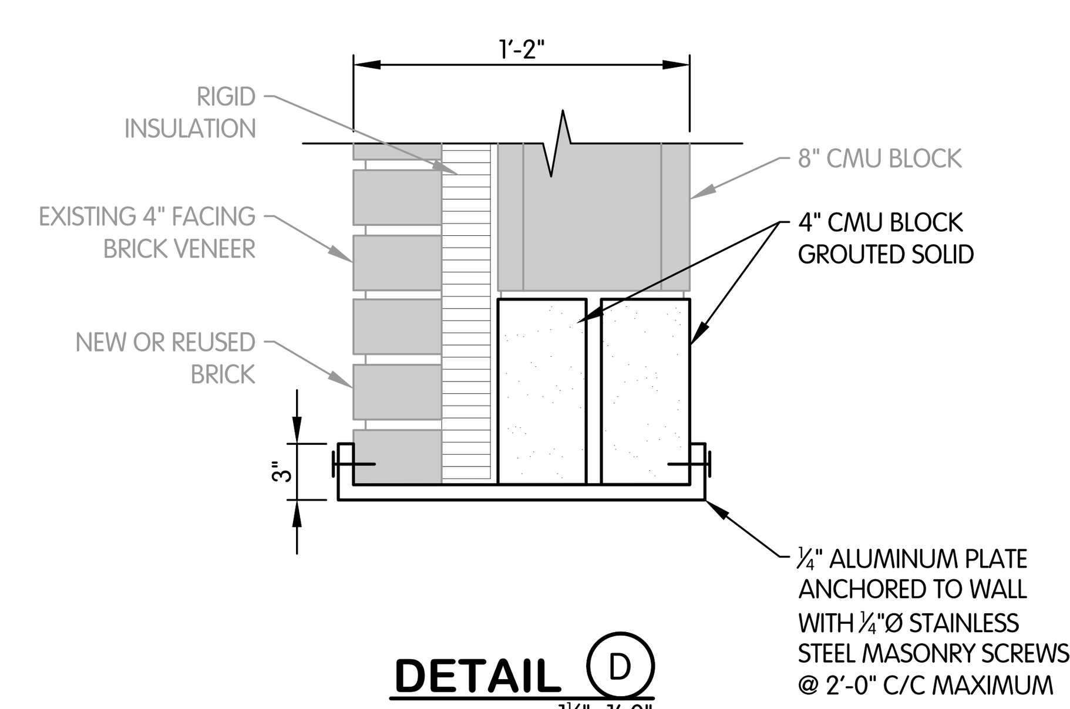
SECTION

* MAY VARY WITH APPROVED EQUIPMENT DRAWINGS.

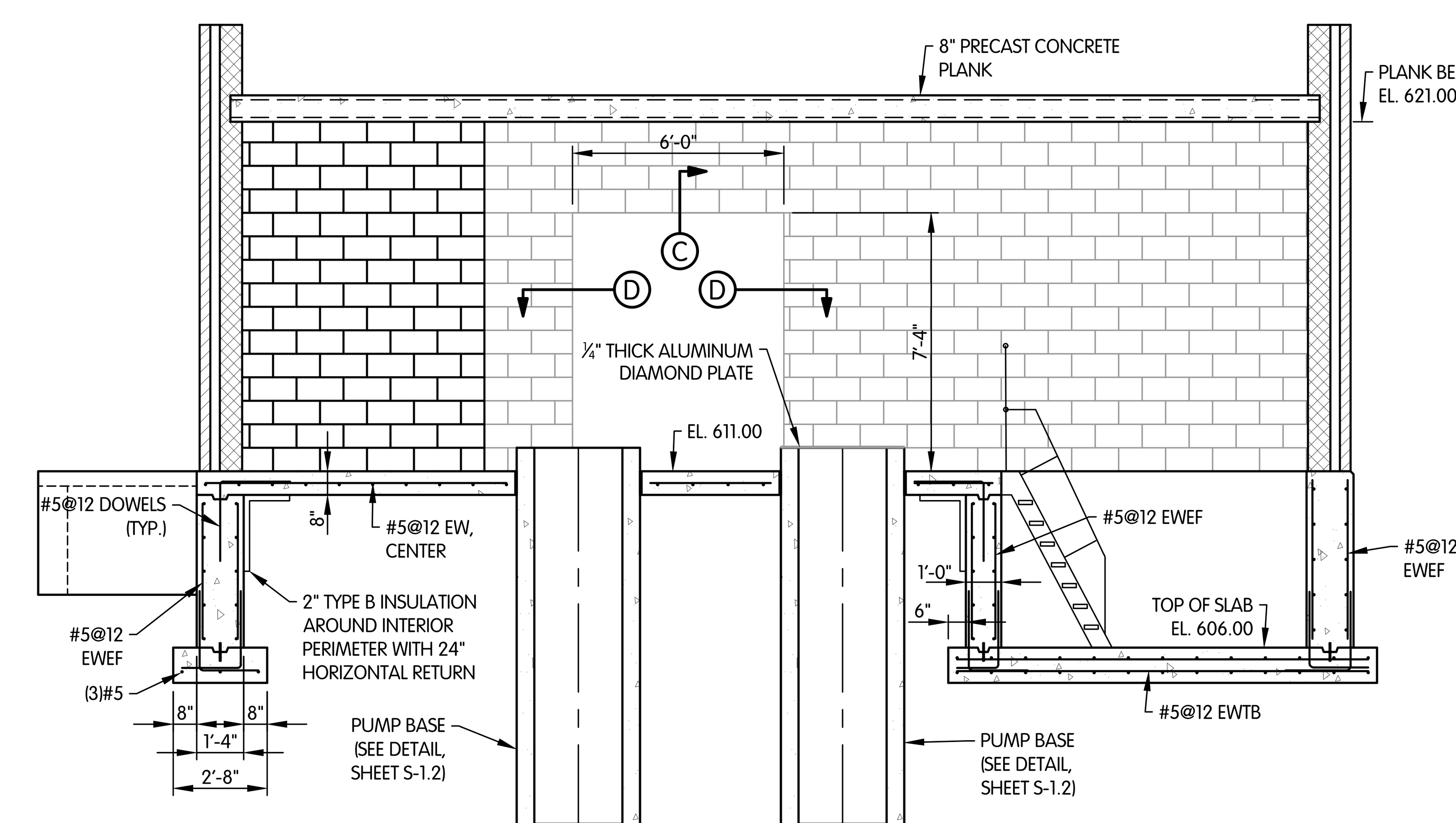
PUMP BASE DETAIL
(2 REQUIRED) ½"=1'-0"



DETAIL C
1½"=1'-0"



DETAIL D
1½"=1'-0"



SECTION 3 / S-1.1
¼"=1'-0"

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
STRUCTURAL
SECTIONS AND DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

REVISIONS AFTER ISSUED FOR BID

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JOB NO.	538-7766.001
SCALE	1/4"=1'-0"

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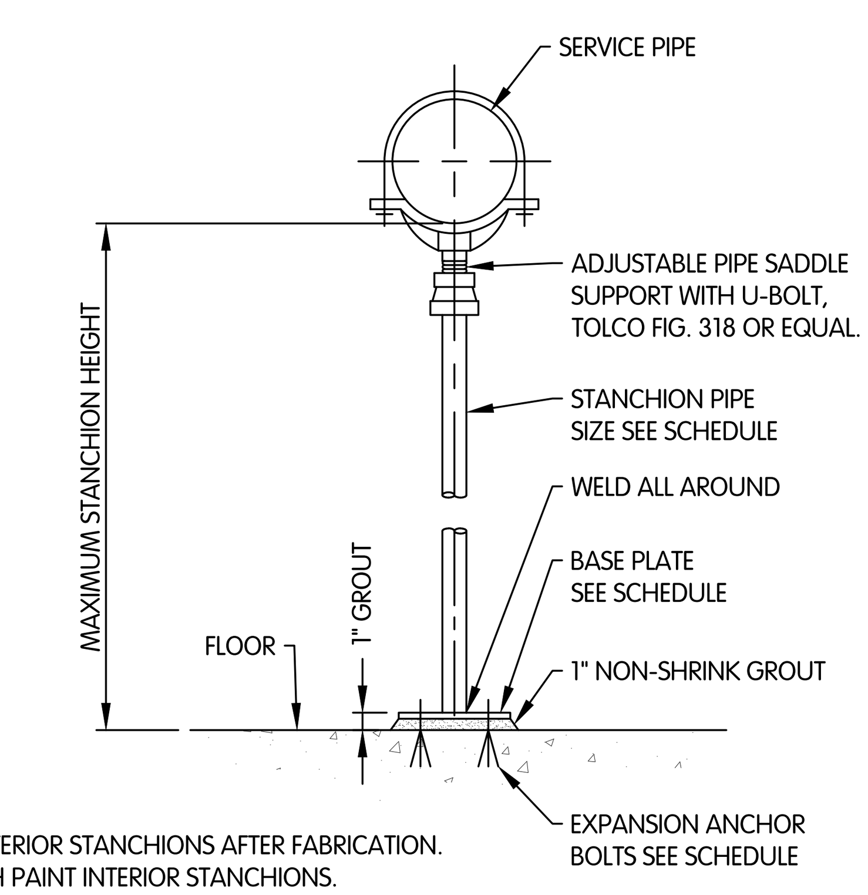
S-1.2
21 of 35

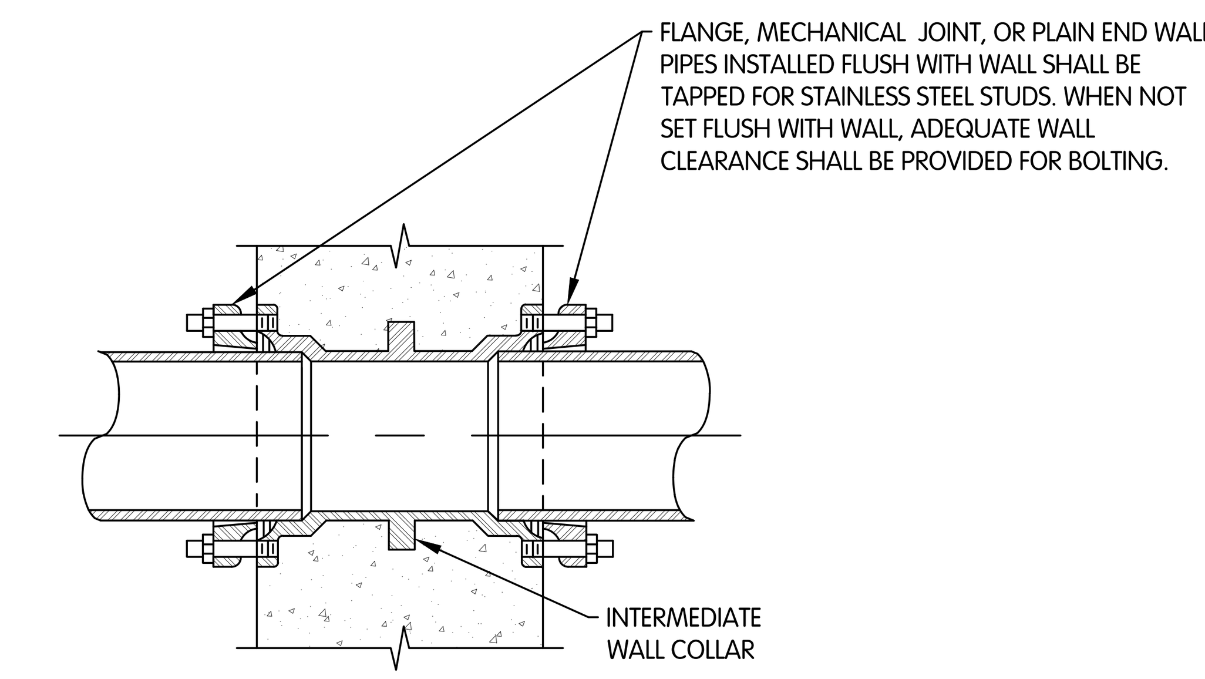
TOL-7766001S04-2) S-1.2 - SECTIONS & DETAILS
5/26/2023 12:44 PM - CLENDER
5/26/2023 12:55 PM



NOTES:
1. HOT DIP GALVANIZE EXTERIOR STANCHIONS AFTER FABRICATION. PRIME PAINT AND FINISH PAINT INTERIOR STANCHIONS.
2. FOR STANCHION PIPES AT BASE ELBOWS, SUBSTITUTE A MOUNTING PLATE FOR THE SADDLE SUPPORT WITH U-BOLT THAT IS SHOWN IN THE ABOVE DETAIL. MOUNTING PLATE SHALL BE DRILLED TO MATCH BOLT HOLE PATTERN PROVIDED IN BASE ELBOW. MOUNTING PLATE SHALL BE A MINIMUM OF ½" THICK.
3. REFER TO SPECIFICATION SECTION 15010 FOR MAXIMUM ALLOWABLE DISTANCE BETWEEN PIPE SUPPORTS. MAXIMUM STANCHION SPACING NOT TO EXCEED 12'-0"

SERVICE PIPE SIZE	STANCHION PIPE SIZE	MAXIMUM DISTANCE BETWEEN STANCHIONS	MAXIMUM STANCHION HEIGHT	BASE PLATE SIZE	ANCHOR BOLT SIZE
2½" To 3½"	HSS 2.875"x0.203"	12'	7'-6"	9"x⅜"x9"	⅝" Dia. w/ 4" Emb.
4" To 12"	HSS 3.500"x0.216"	12'	8'-0"	10"x⅝"x10"	⅝" Dia. w/ 4" Emb.
14" To 16"	HSS 4.500"x0.237"	12'	8'-0"	12"x⅝"x12"	¾" Dia. w/4¾" Emb.
18" To 36"	HSS 6.625"x0.280"	12'	8'-0"	12"x¾"x12"	¾" Dia. w/ 8" Emb.

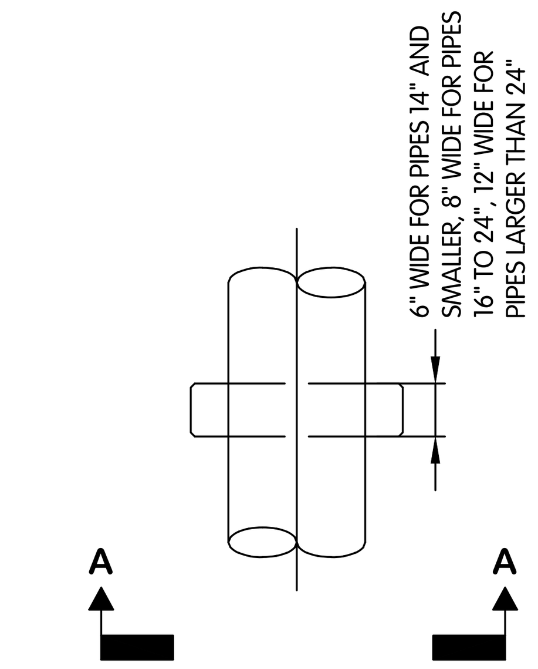
STANCHION PIPE SUPPORT DETAIL
NTS



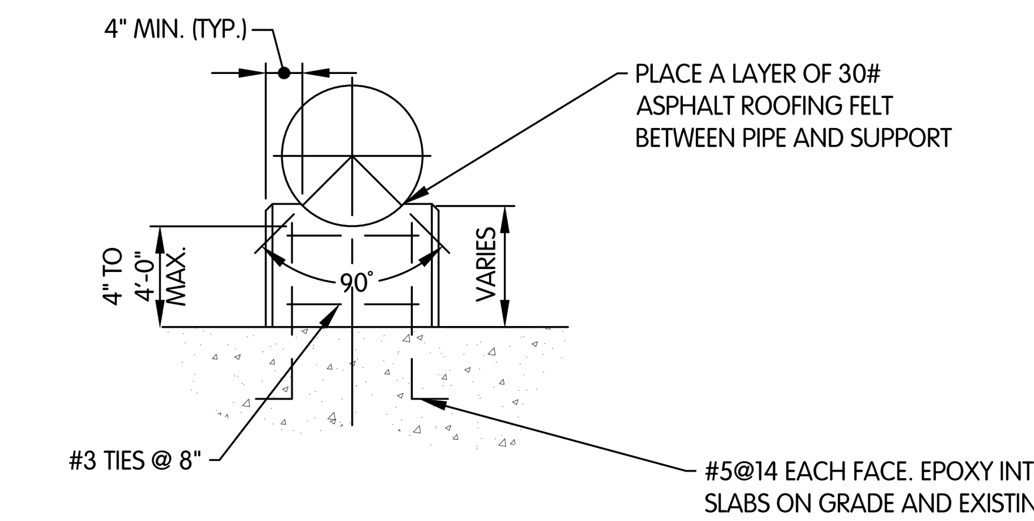
TYPE A

NOTE:
UNLESS SHOWN OTHERWISE, CAST IRON OR DUCTILE IRON WALL PIPES SHALL BE USED FOR 4" DIAMETER AND LARGER PIPING.

WALL PIPE
NTS



PLAN

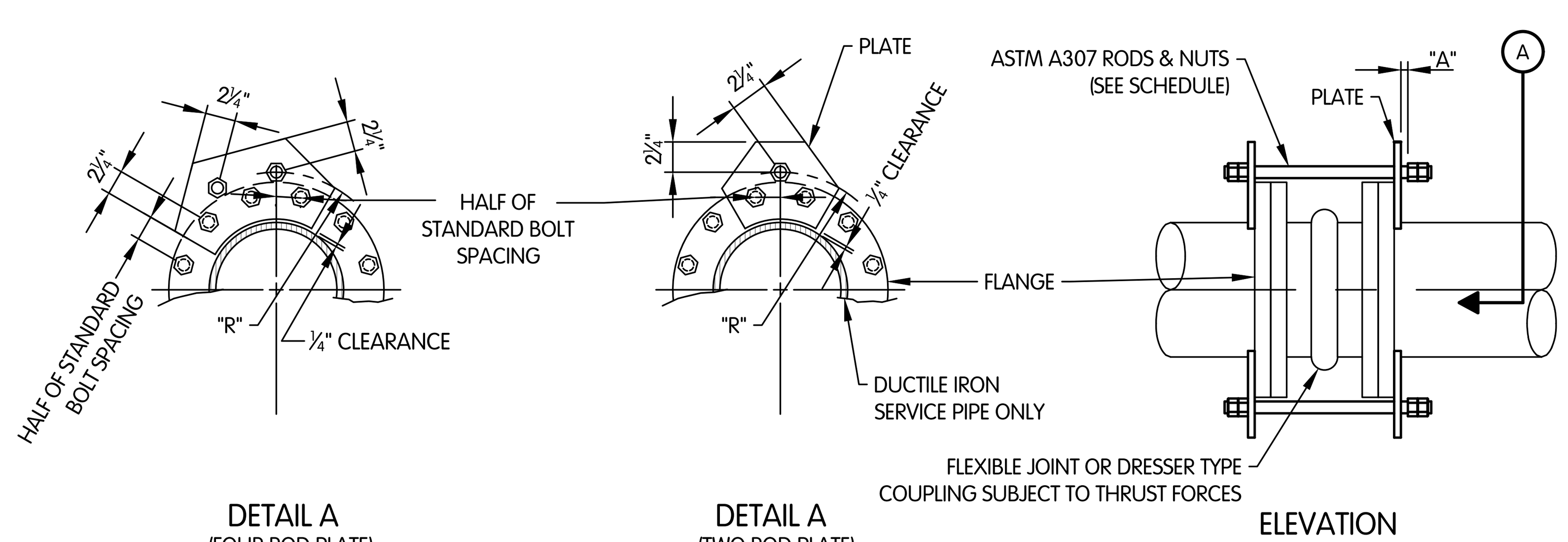


SECTION A-A

NOTE:
1. CONCRETE SUPPORTS SHALL BE SPACED NOT MORE THAN 12'-0" ON CENTER. SUPPORT PIPING NEAR EACH SIDE OF VALVES, RATE CONTROLLERS, AND COUPLINGS.
2. FOR EXISTING ELEVATED SLABS, LOCATE EXISTING BARS WITH REBAR FINDER. LOCATE SUPPORTS SO DOWELS MISS EXISTING BARS.

TYPE 1

CONCRETE SADDLE SUPPORT
NTS



DETAIL A (FOUR ROD PLATE)

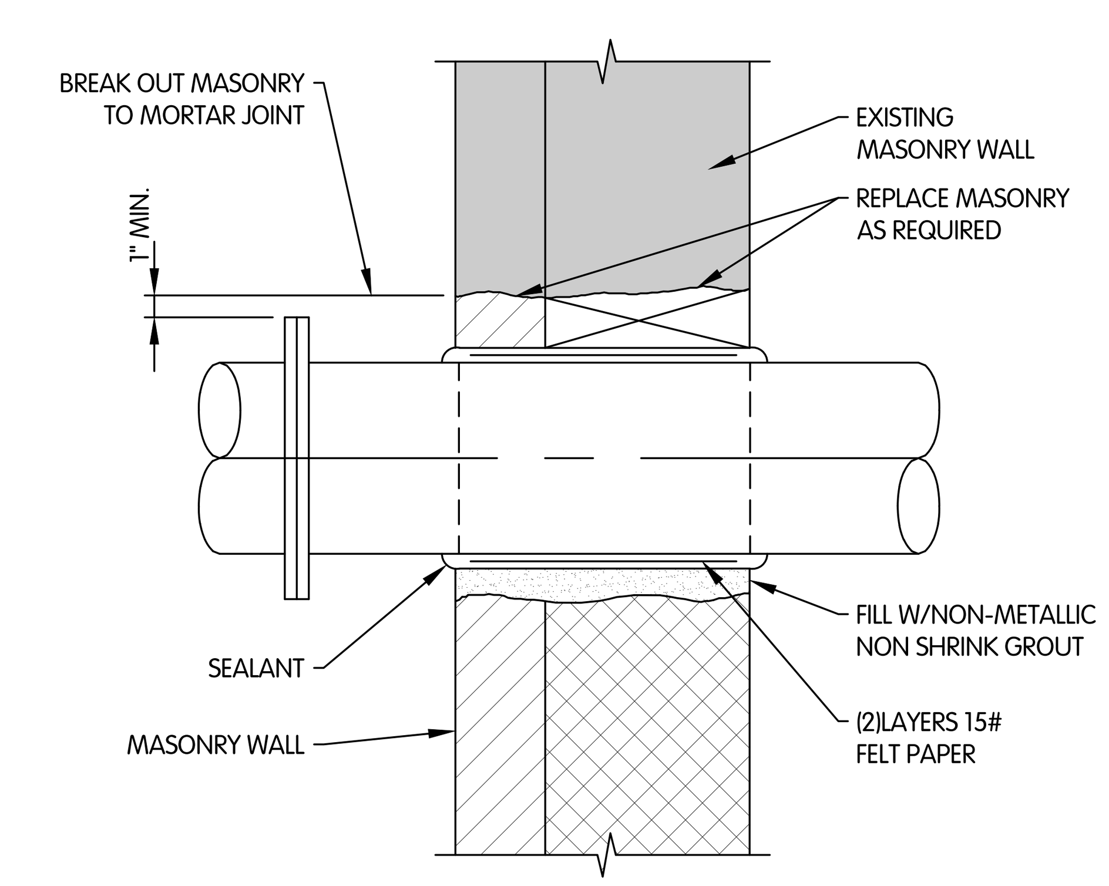
DETAIL A (TWO ROD PLATE)

ELEVATION

HARNESS JOINT DETAIL
NTS

PIPE SIZE	ROD SIZE	"R" SIZE	NO. OF RODS	PLATE THICKNESS	"A" DIM.
4"	½"	5¼"	2	½"	¼"
6"	⅝"	6¼"	2	½"	¼"
8"	¾"	7½"	2	¾"	⅜"
10"	⅞"	8¾"	4	¾"	⅜"
12"	⅞"	10¼"	4	1"	⅜"
14"	1"	11½"	4	1"	⅜"
16"	1⅛"	12¾"	4	1"	⅜"
18"	1¼"	13½"	4	1"	⅜"
20"	1⅜"	15"	4	1⅛"	⅜"
24"	1⅜"	17¼"	6	1⅛"	½"

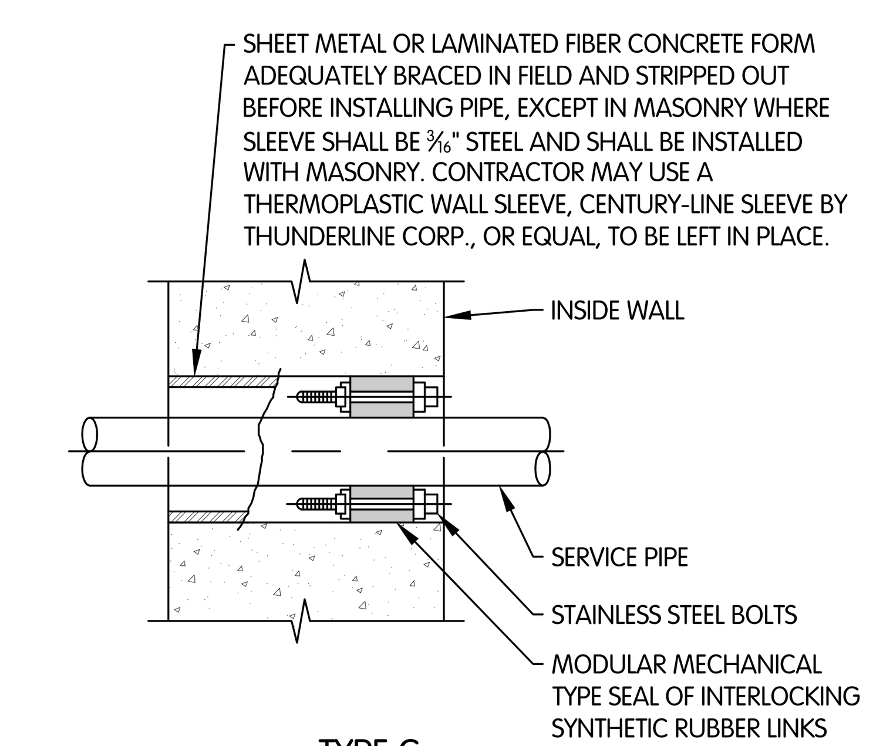
HARNESS SCHEDULE



TYPE F

NOTE:
FOR EXTERIOR WALLS, FACE COURSES TO BE MASONRY AND MIDDLE COURSE TO BE FILLED WITH FIBERGLASS INSULATION.

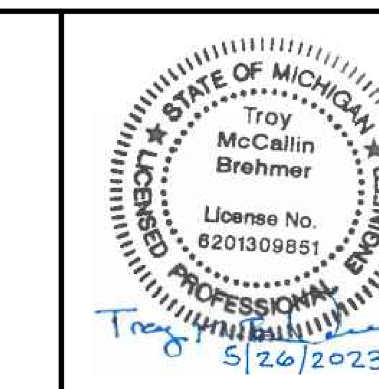
PIPE SLEEVE THRU EXISTING OR MASONRY WALL
NTS



TYPE C

NOTES:
1. EXISTING WALLS SHALL BE CORE DRILLED.
2. CONCRETE SHALL BE WORKED IN AND VIBRATED TO ELIMINATE ALL VOIDS IN CONCRETE - IF VOIDS DO REMAIN, FILL WITH GROUT BEFORE INSTALLING PIPE AND RUBBER SEALS.
3. UNLESS OTHERWISE SHOWN ON THE DRAWINGS ALL INTERIOR WALL PENETRATIONS SHALL USE TYPE C PIPE SLEEVE.

PIPE SLEEVE
NTS



SOUTH CUSTER BOOSTER STATION PIPING AND EQUIPMENT DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO	DATE	REVISIONS AFTER ISSUED FOR BID	BY
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DESIGNED	DRAWN	CHECKED
BCW	RHN	TMB

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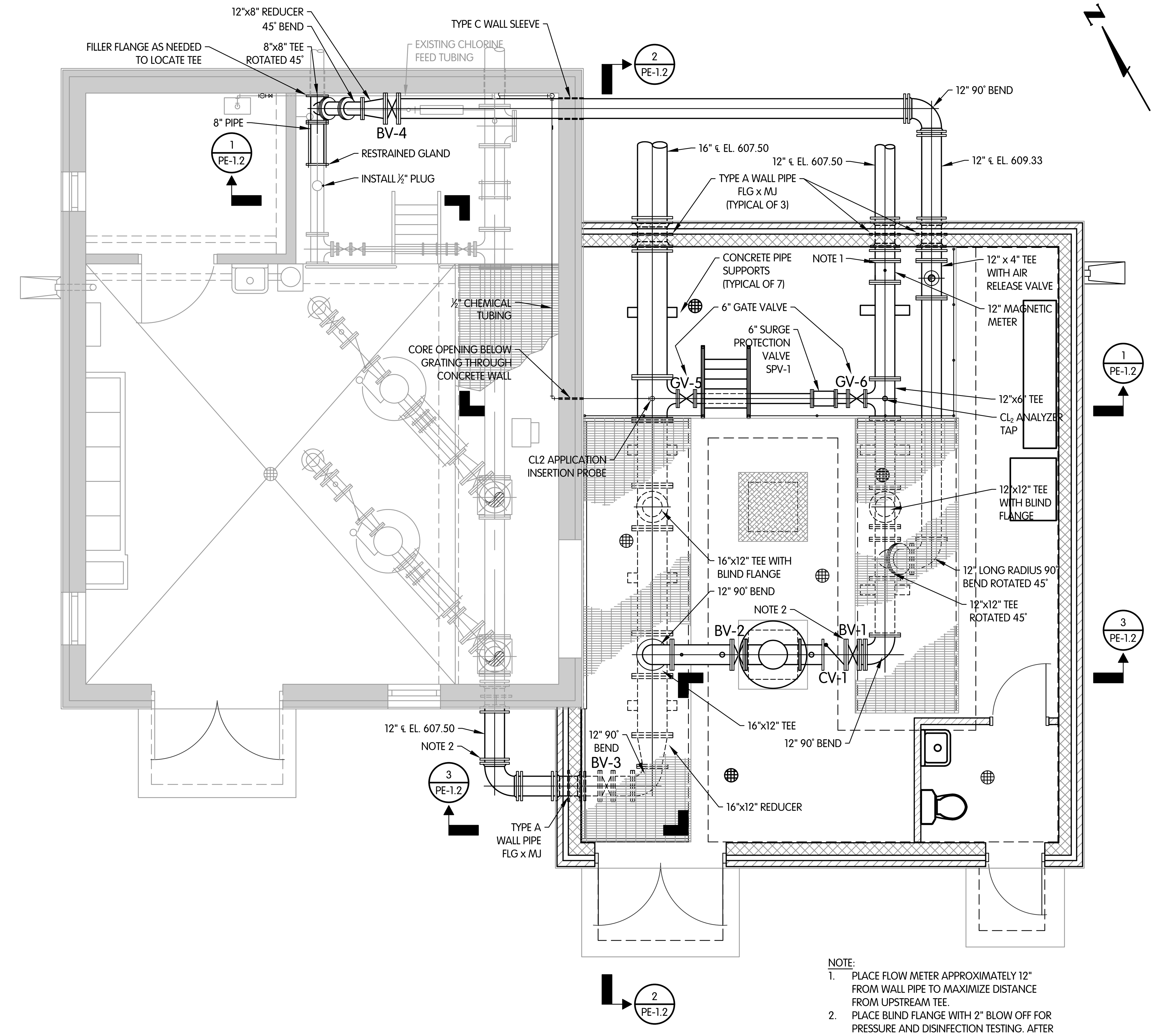
SHEET NO.
PE-0.1
22 of 35

TOL-7766001PE01-22 PE-0.1 - DETAILS
5/26/2023 12:44 PM - CLENDER
5/26/2023 12:55 PM



NOTE:
1. PLACE FLOW METER APPROXIMATELY 12" FROM WALL PIPE TO MAXIMIZE DISTANCE FROM UPSTREAM TEE.
2. PLACE BLIND FLANGE WITH 2" BLOW OFF FOR PRESSURE AND DISINFECTION TESTING. AFTER TESTING REMOVE BLIND FLANGE AND COMPLETE PIPING.

SECTIONAL PLAN

¼"=1'-0"

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION PIPING AND EQUIPMENT PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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JOB NO. 538-7766.001
SCALE AS NOTED
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

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STATUS: ISSUED FOR BID
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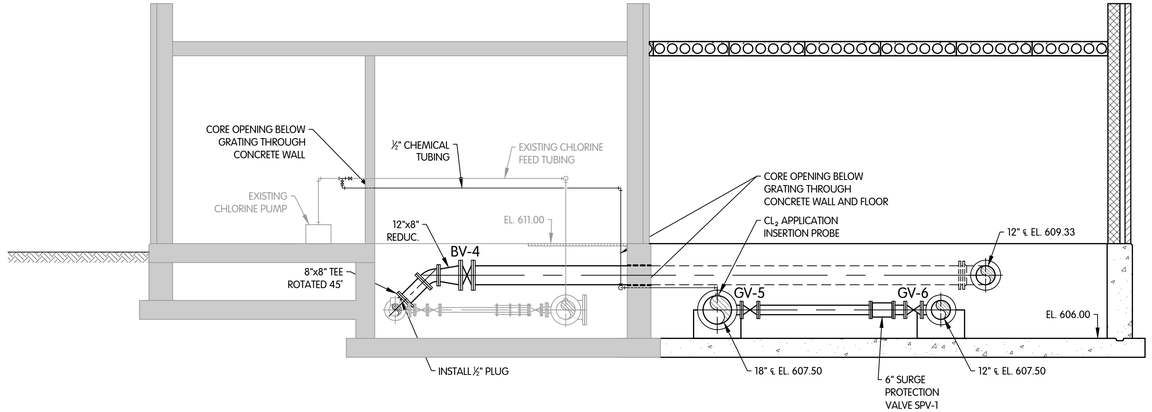
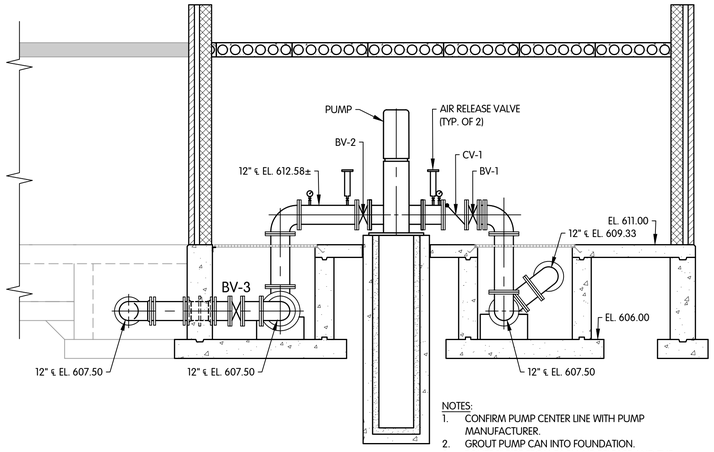
SHEET NO.
PE-1.1
23 of 35

TOL-7766001PE02-23 PE-1.1 - PLAN
5/26/2023 12:44 PM - CLENDER
5/26/2023 12:55 PM

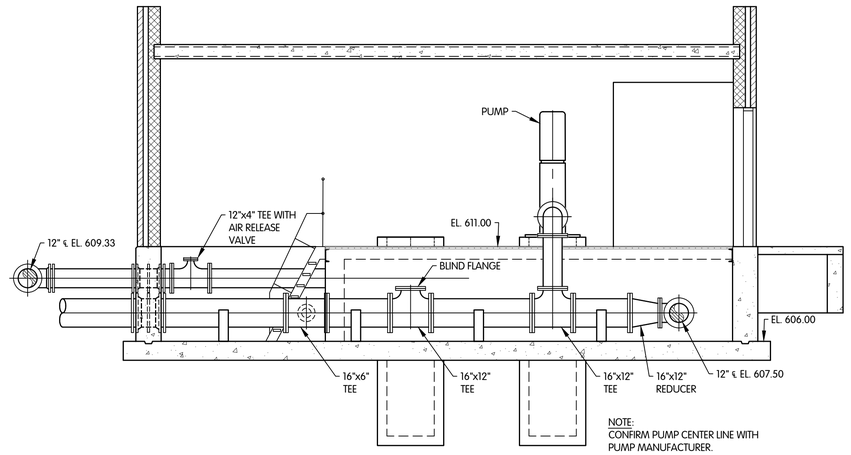


SECTION 1 / PE-1.1
½"=1'-0"



NOTES:
1. CONFIRM PUMP CENTER LINE WITH PUMP MANUFACTURER.
2. GROUT PUMP CAN INTO FOUNDATION.
3. ROUTE 1" PIPE FROM EACH AIR RELEASE AND THE PUMP SEAL CAVITY DRAIN TO THE EQUIPMENT DRAIN.

SECTION 3 / PE-1.1
¼"=1'-0"



NOTE:
CONFIRM PUMP CENTER LINE WITH PUMP MANUFACTURER.

SECTION 2 / PE-1.1
¼"=1'-0"

SOUTH CUSTER BOOSTER STATION
PIPING AND EQUIPMENT SECTIONS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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SCALE 1/4"=1'-0"
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DESIGNED	DRAWN	CHECKED
BCW	RHN	TMB

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SHEET NO.
PE-1.2
24 OF 35

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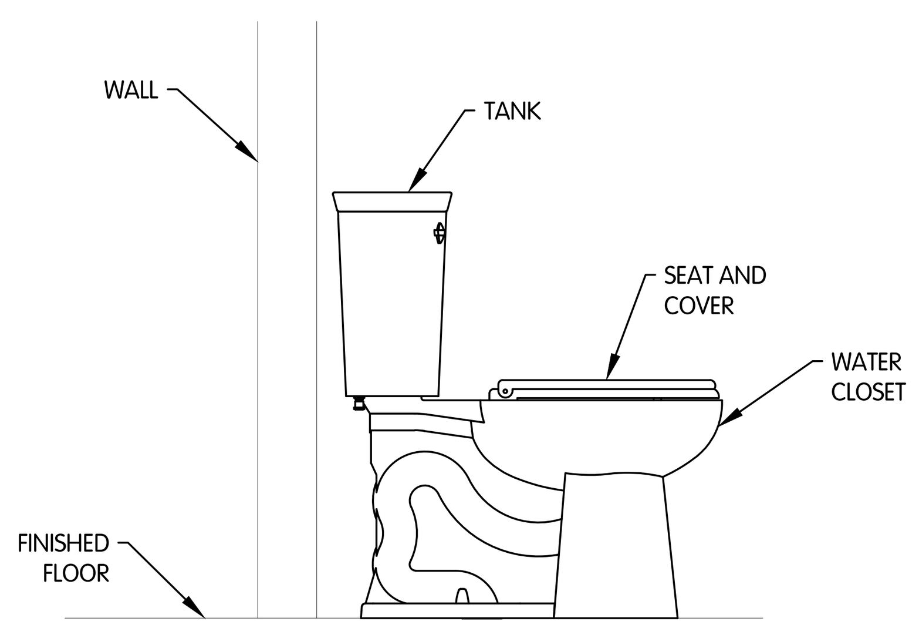
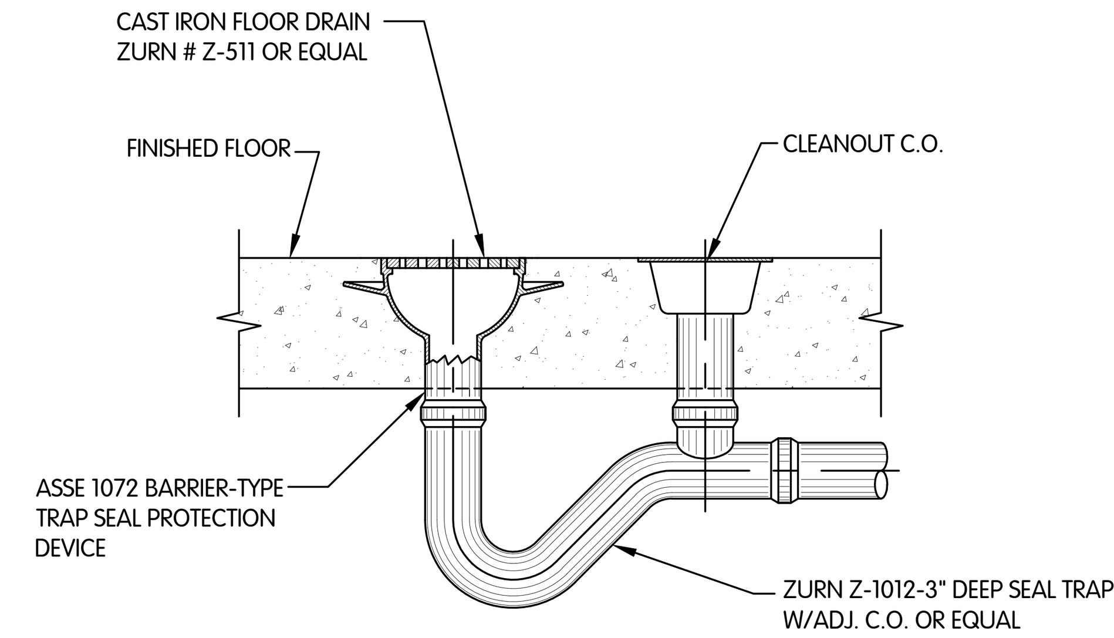
5/26/2023 12:56 PM

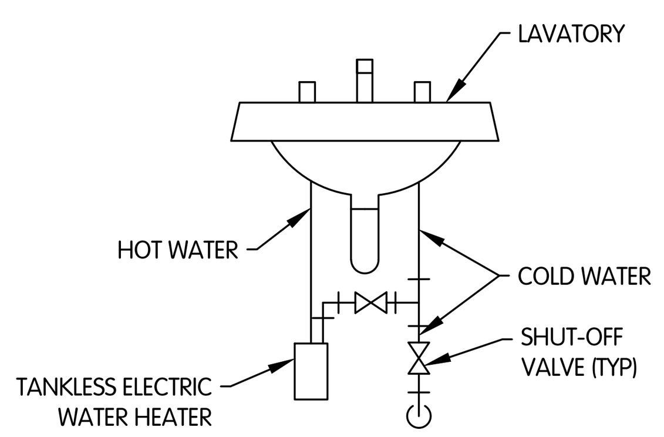


NOTE:
MAXIMUM RIM HEIGHT INSTALLATION FOR NON ADA IS 15". MAXIMUM RIM HEIGHT INSTALLATION FOR ADA IS 16-1/2".

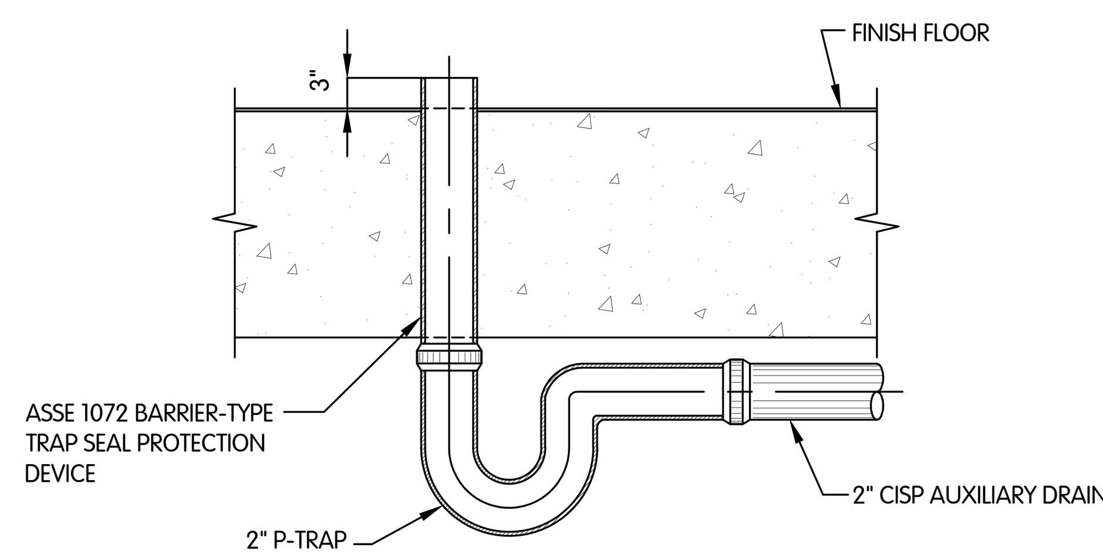
WATER CLOSET TANK TYPE DETAIL
NTS



TYPE B FLOOR DRAIN DETAIL
NTS



LAVATORY WITH TANKLESS ELECTRIC WATER HEATER DETAIL
NTS



EQUIPMENT DRAIN DETAIL
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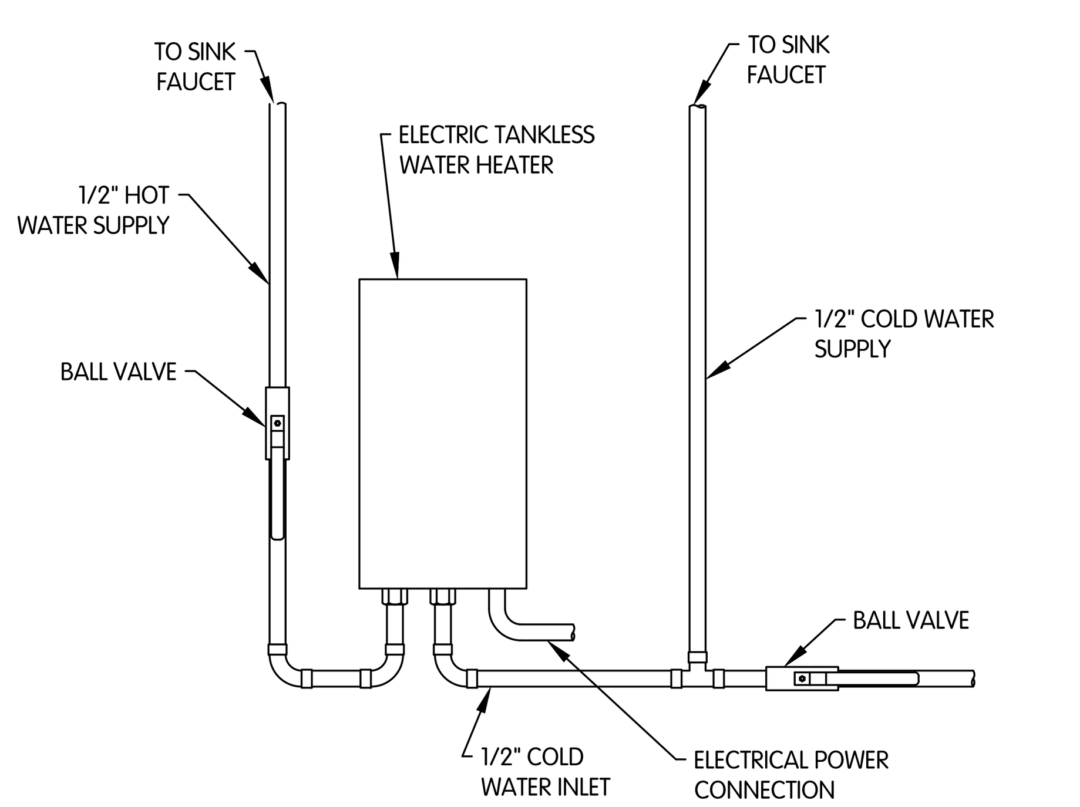
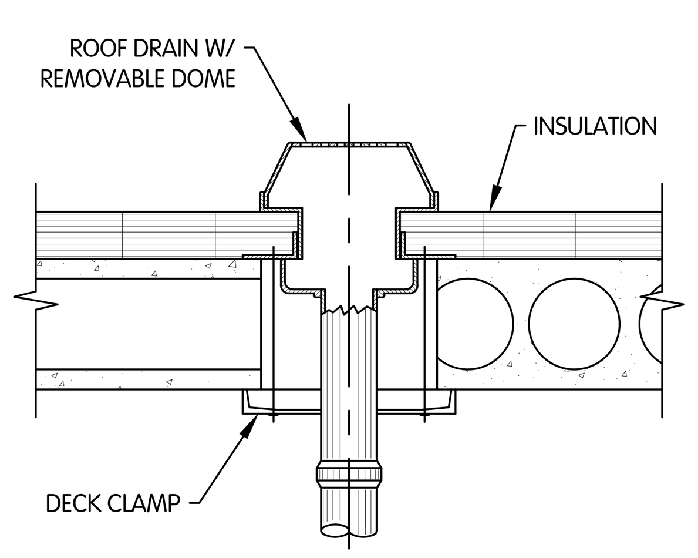


ELECTRIC TANKLESS WATER HEATER DETAIL
NTS



ROOF DRAIN DETAIL
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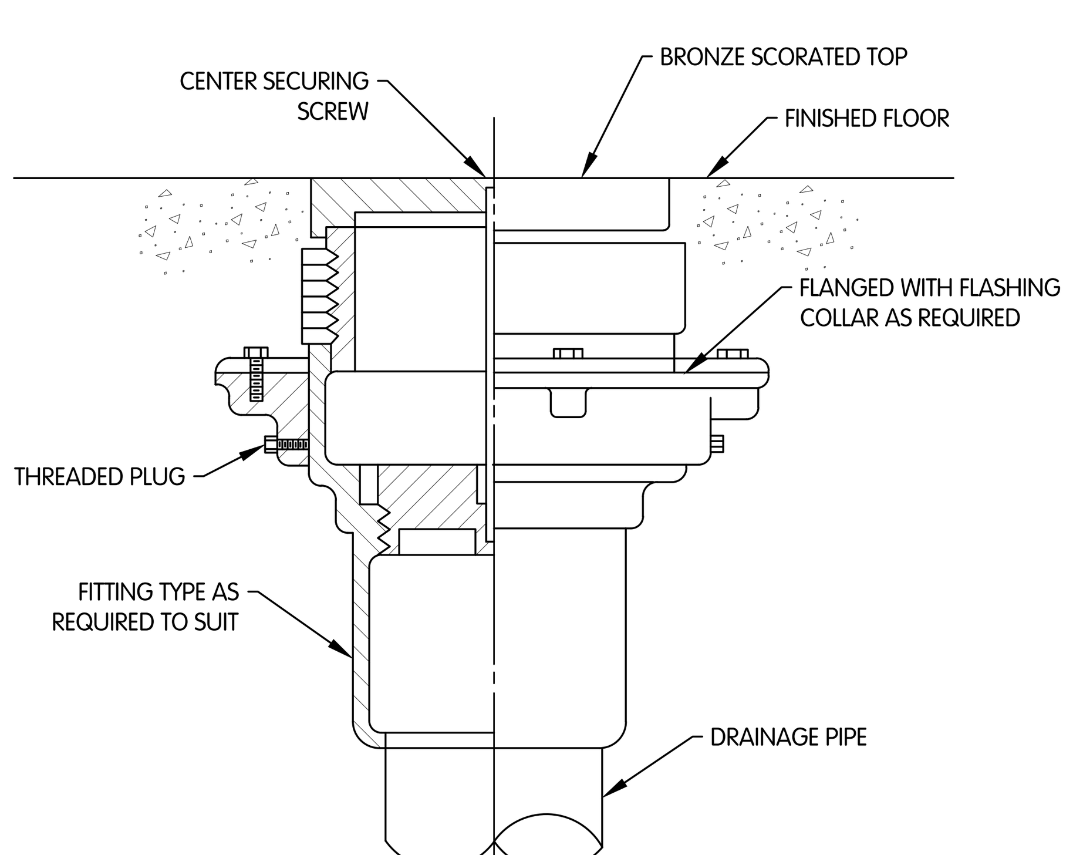

FLOOR CLEANOUT DETAIL
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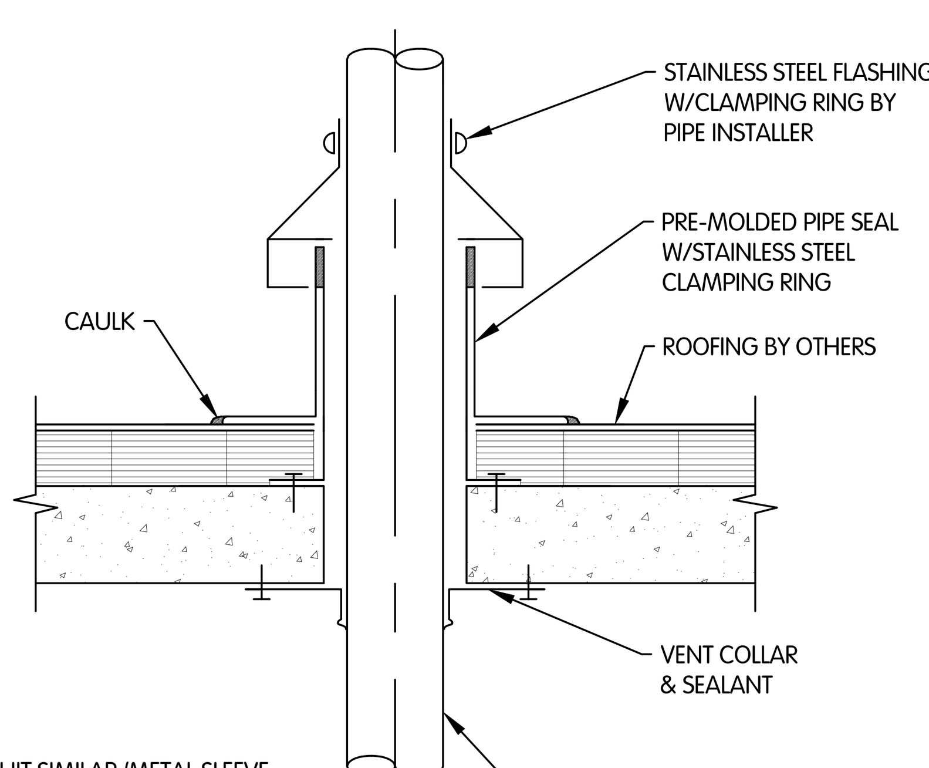
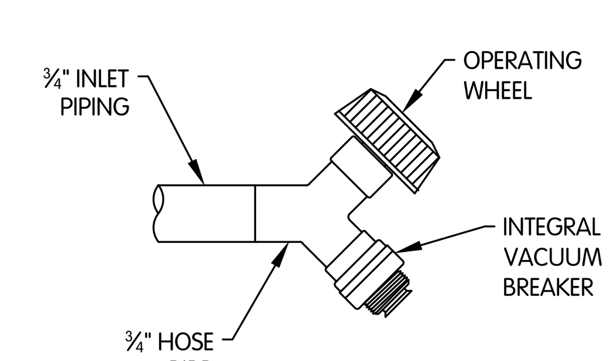


NOTE:
PIPE & CONDUIT SIMILAR (METAL SLEEVE NOT REQUIRED)

VENT PIPE DETAIL
NTS



HOSE BIBB DETAIL
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STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
PLUMBING
DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO	DATE	REVISIONS AFTER ISSUED FOR BID	BY
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25 of 35

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5/26/2023 12:45 PM - CLENDER
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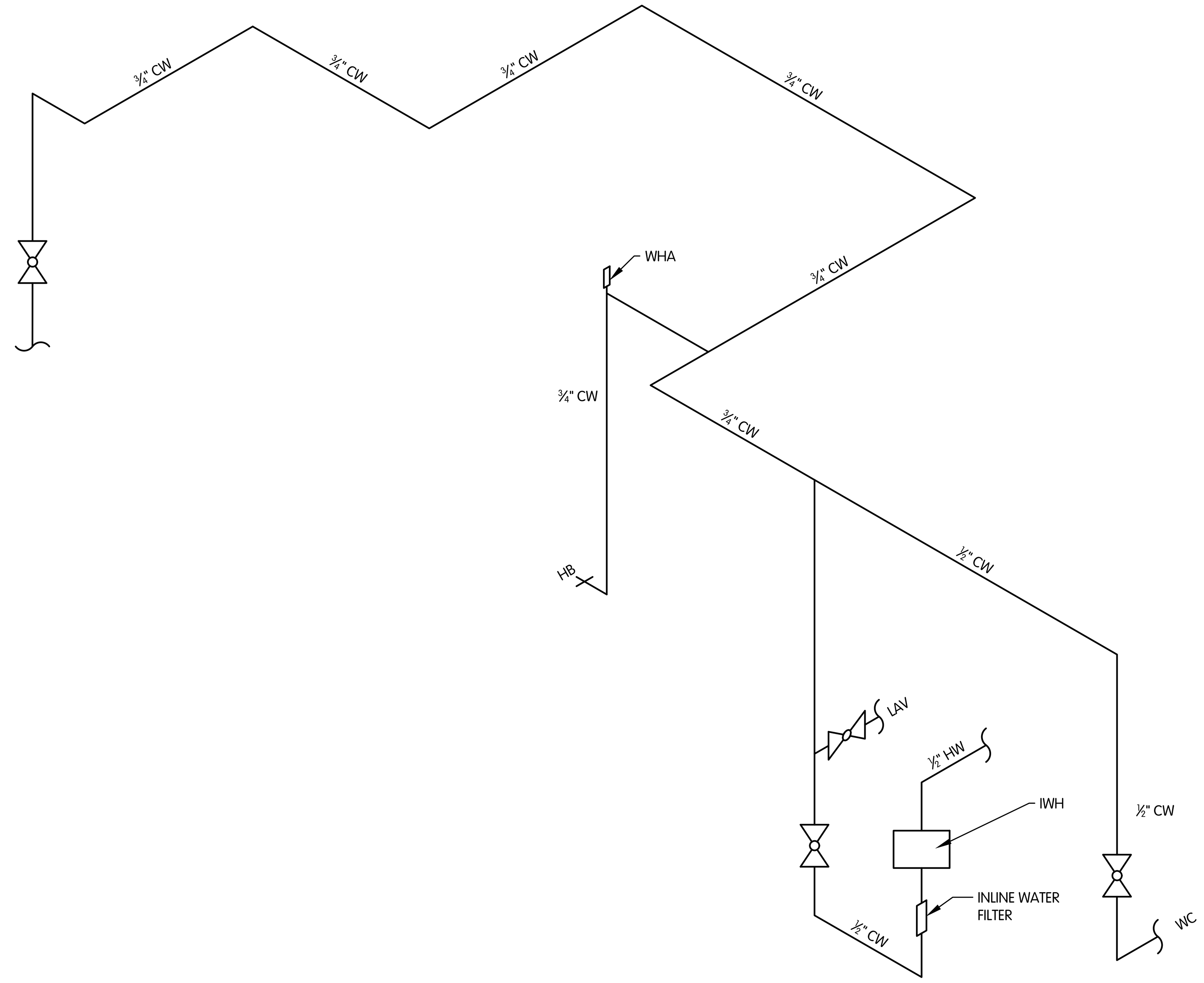
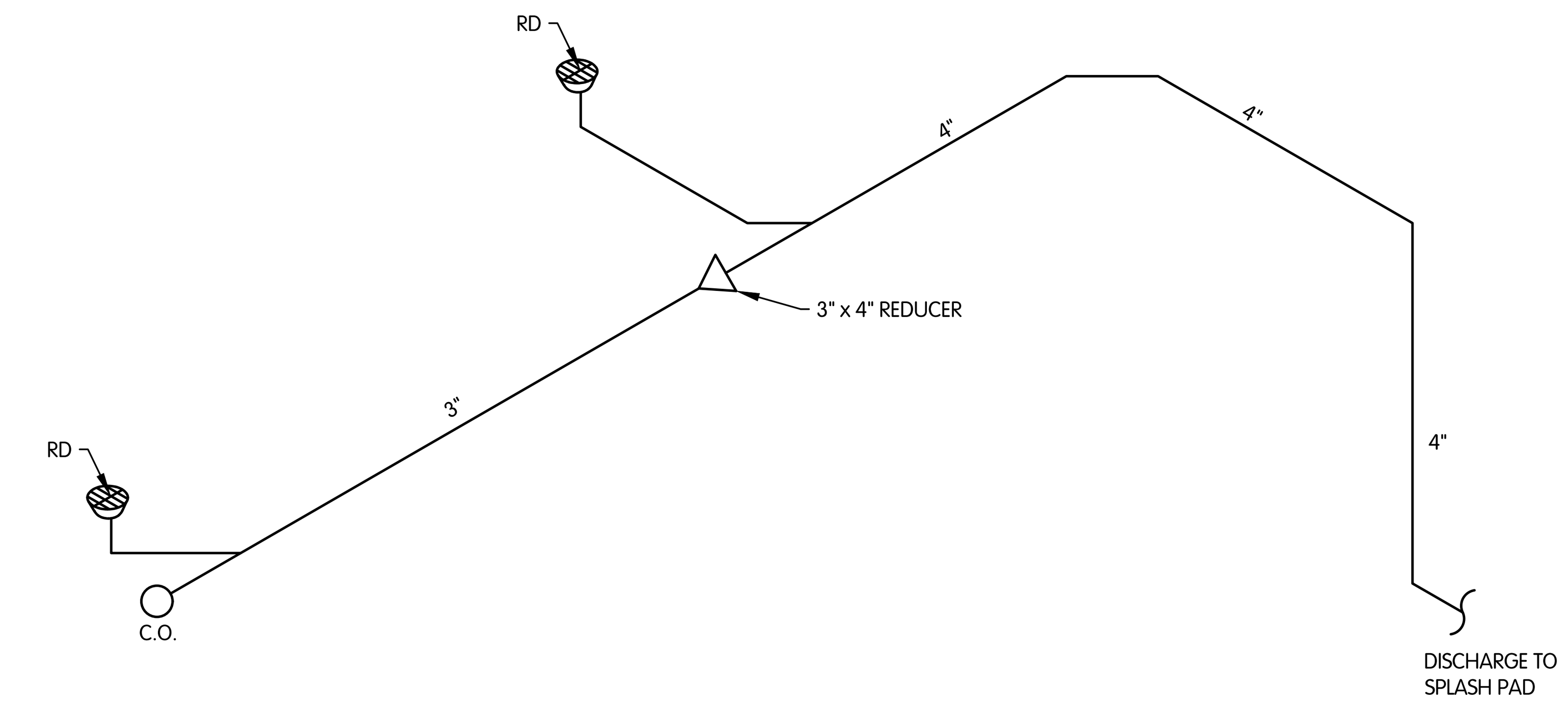


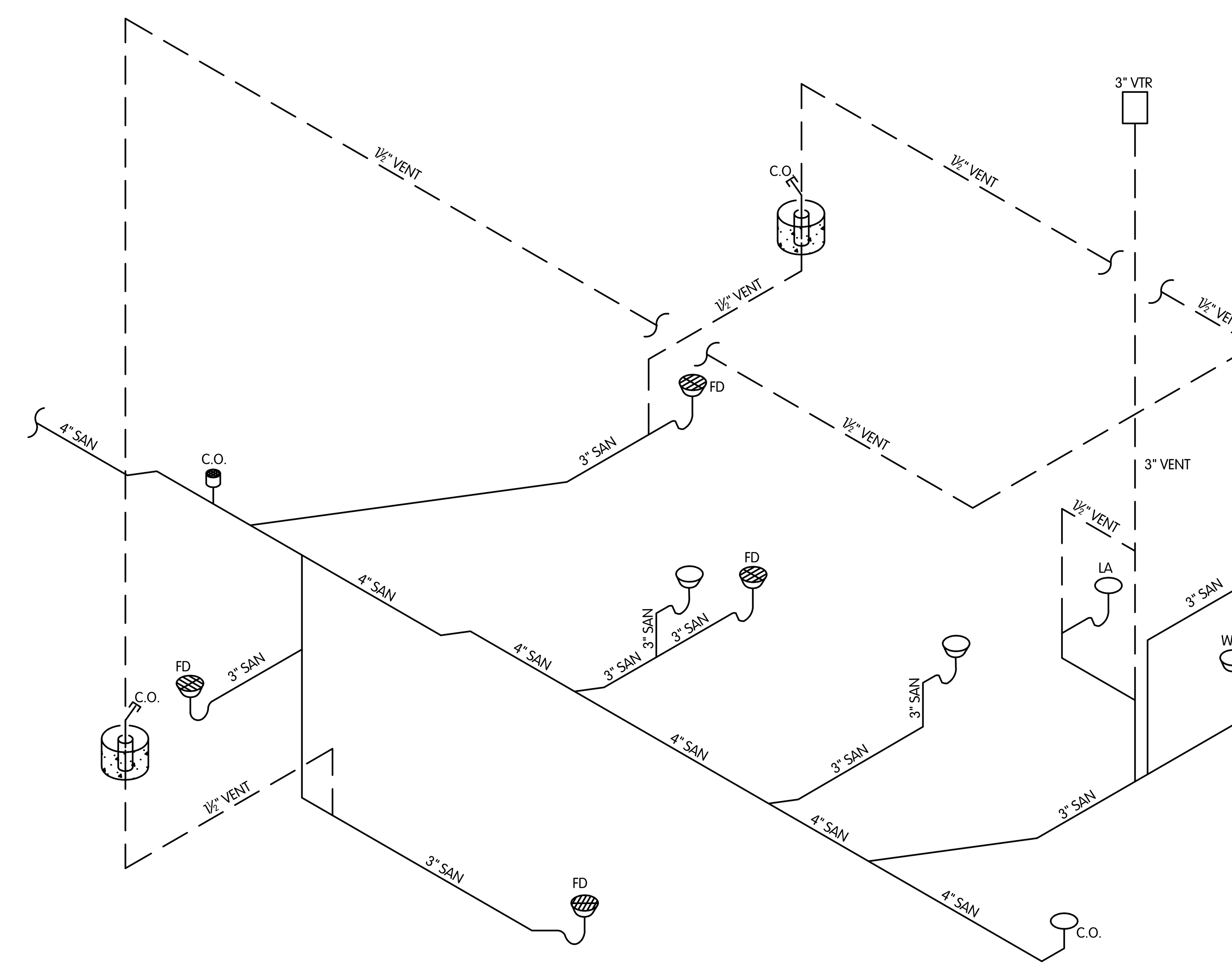
WATER SCHEMATIC
NTS

PLUMBING ABBREVIATIONS

CO - CLEAN OUT
CW - COLD WATER
FD - FLOOR DRAIN
HB - HOSE BIBB
HW - HOT WATER
IWH - INSTANTANEOUS WATER HEATER
LA - LAVATORY
RD - ROOF DRAIN
TW - TEMPERED WATER
WC - WATER CLOSET
WHA - WATER HAMMER ARRESTOR



STORM DRAIN SCHEMATIC
NTS



SANITARY AND VENT SCHEMATIC
NTS

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
PLUMBING
SCHEMATICS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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26 of 35

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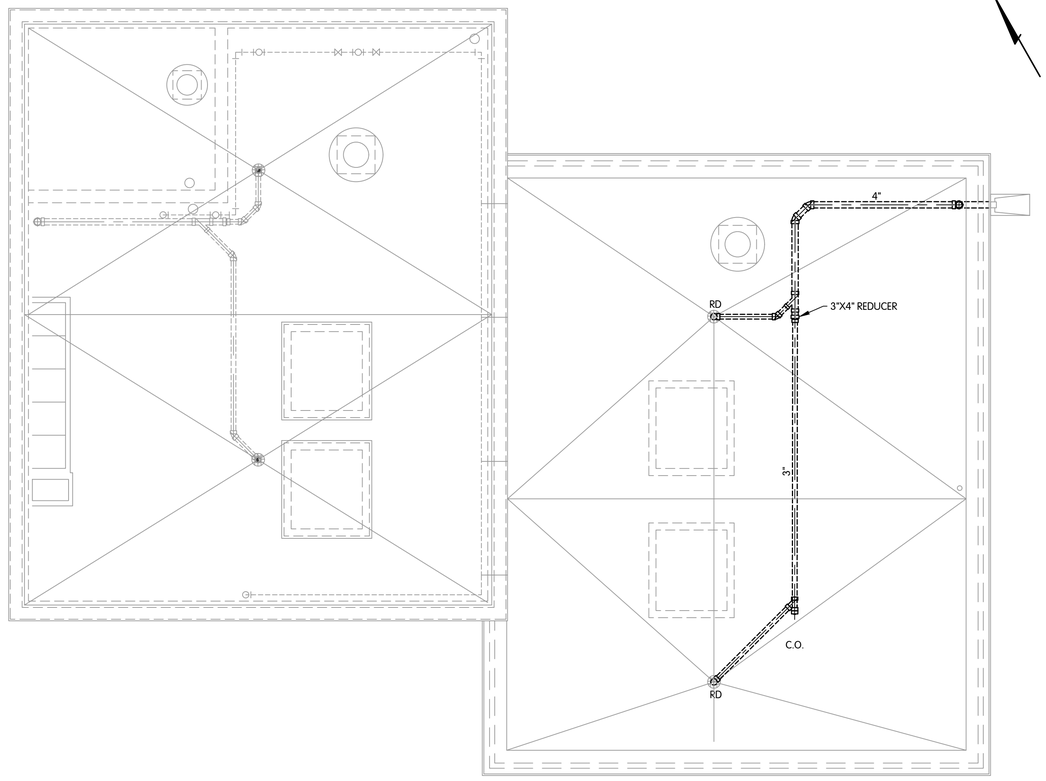
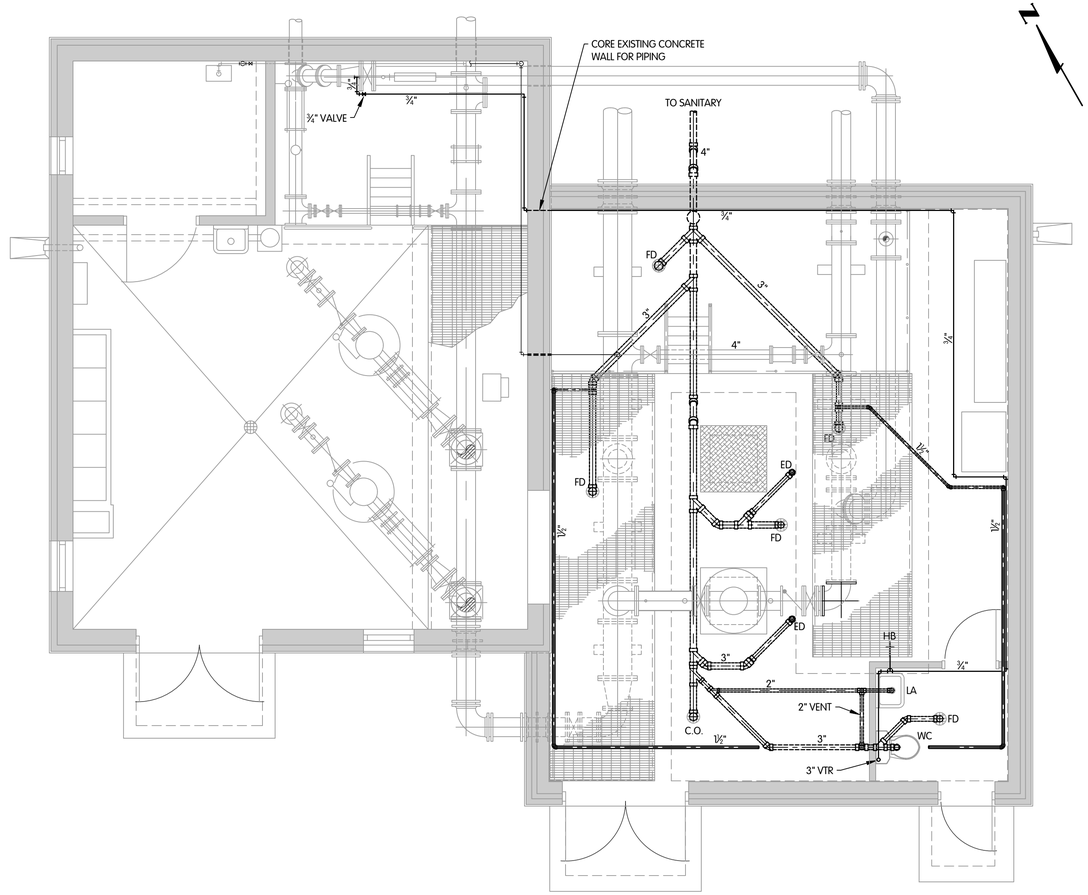
5/26/2023 12:45 PM - CLENDER
5/26/2023 12:56 PM



ROOF PLAN
¼"=1'-0"



SECTIONAL PLAN
¼"=1'-0"

DESIGN R. STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION PLUMBING PLANS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
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27 OF 35

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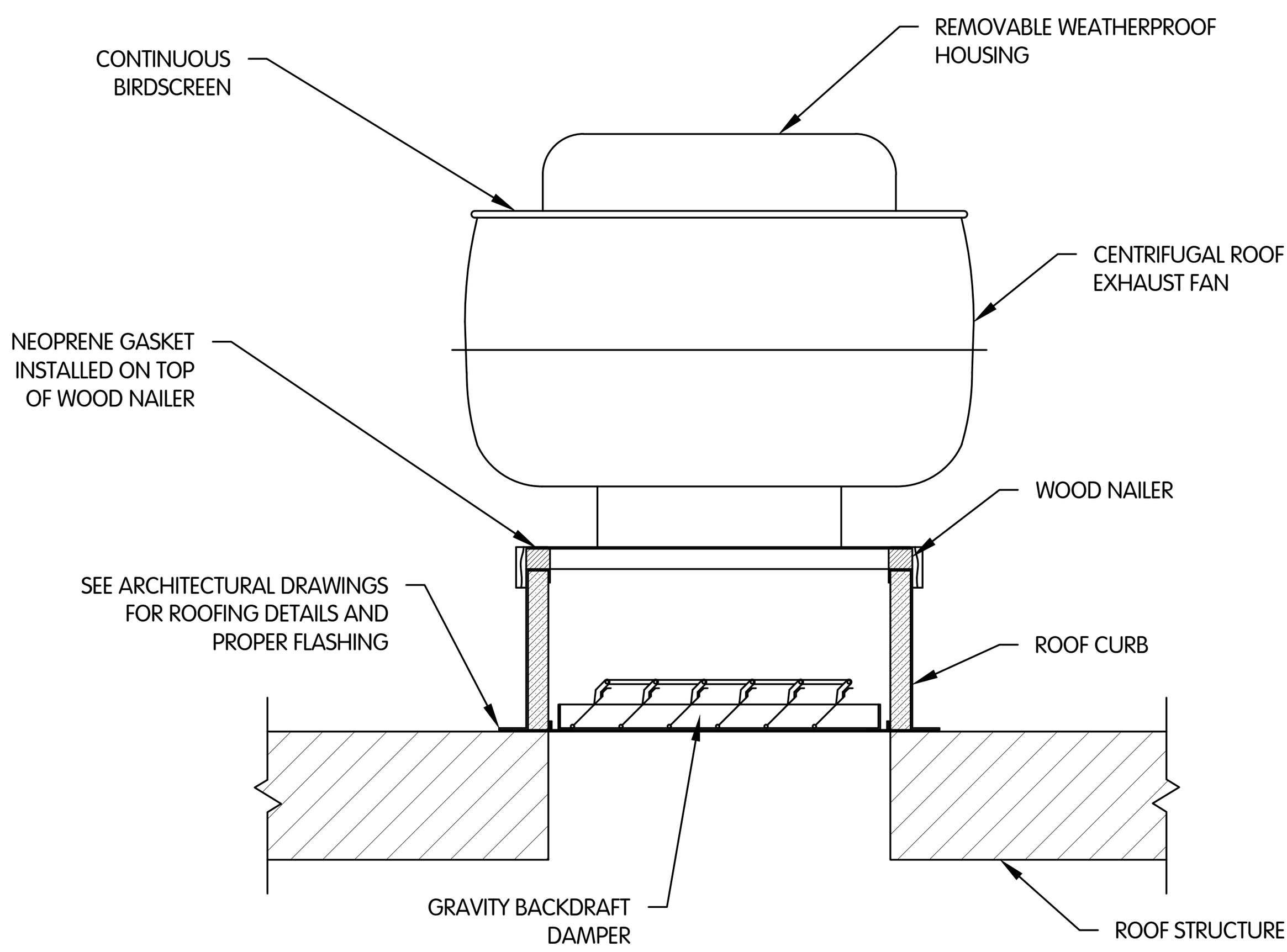
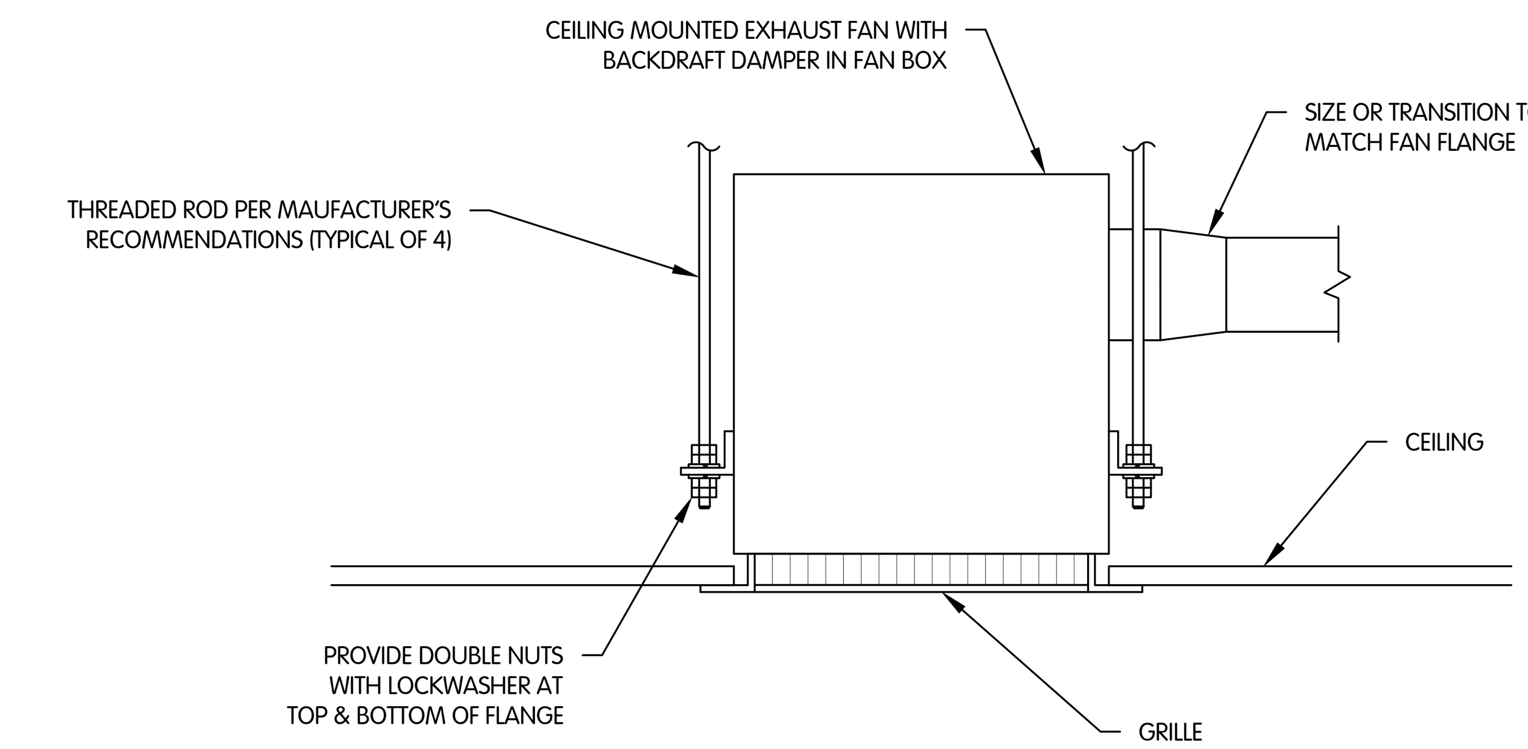


CENTRIFUGAL ROOF MOUNTED EXHAUST FAN DETAIL
NTS



CEILING MOUNTED EXHAUST FAN DETAIL
NTS

BOOSTER STATION AIRFLOW AND CONTROL SCHEMATIC

RESTROOM (EF-2) SEQUENCE OF OPERATION:

EXHAUST FAN EF-2 SHALL BE INTERLOCKED WITH THE ROOM LIGHT SWITCH.

RESTROOM HEATING (EWH-1) SEQUENCE OF OPERATION:

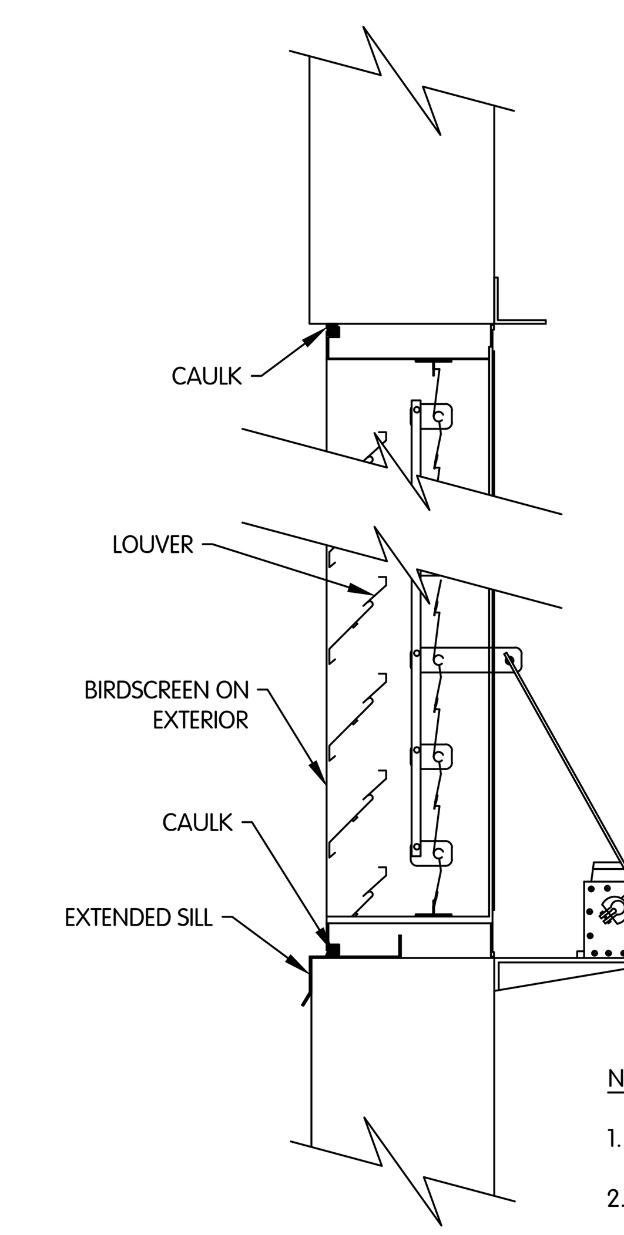
SINGLE TEMPERATURE, INTEGRAL THERMOSTAT MAINTAINS SPACE TEMPERATURE BY CYCLING UNIT HEATING ELEMENTS AND FAN SIMULTANEOUSLY.

PUMP ROOM VENTILATION (EF-1 & IL-1) SEQUENCE OF OPERATION:

VENTILATION FOR THE PUMP ROOM SHALL BE PROVIDED BY EXHAUST FAN EF-1 AND INTAKE LOUVER IL-1 WITH MOTORIZED INTEGRAL BACKDRAFT DAMPER MD. EF-1 SHALL BE CONTROLLED BY A HAND-OFF-AUTO SWITCH. IN THE HAND POSITION, THE EXHAUST FAN MOTOR IS ACTIVATED. IN THE AUTO POSITION, A SINGLE TEMPERATURE WALL MOUNTED THERMOSTAT SHALL CYCLE THE FAN MOTOR. IL-1 SHALL PROVIDE MAKE-UP AIR FOR EF-1. THE MOTORIZED INTEGRAL BACKDRAFT DAMPER MD SHALL BE ACTIVATED OPEN WHENEVER THE EXHAUST FAN MOTOR IS ACTIVATED. WHENEVER THE EXHAUST FAN MOTOR IS DEACTIVATED, THE MOTORIZED INTEGRAL BACKDRAFT DAMPER MD SHALL BE DEACTIVATED AND GO TO THE CLOSED POSITION.

PUMP ROOM HEATING (EUH-3 AND EUH-4) SEQUENCE OF OPERATION:

SINGLE TEMPERATURE, WALL MOUNTED THERMOSTAT MAINTAINS SPACE TEMPERATURE BY CYCLING UNIT HEATING ELEMENTS AND FAN SIMULTANEOUSLY.



NOTES:

1. LOUVER TO BE ASSEMBLED AT LOUVER MANUFACTURER FACTORY.
2. CLIP ANGLES AND EXTENDED SILL TO BE PROVIDED BY LOUVER MANUFACTURER.
3. INSTALLATION OF LOUVER TO BE IN ACCORDANCE WITH LOUVER MANUFACTURER'S RECOMMENDATIONS.

TYPICAL LOUVER DETAIL
NTS

HVAC GENERAL NOTES

1. PROVIDE ALL MATERIAL, EQUIPMENT, AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD AND SHALL REPORT DISCREPANCIES, IF ANY, TO THE ENGINEER FOR CLARIFICATION PRIOR TO STARTING ANY WORK.
3. EXACT LOCATION OF ALL EQUIPMENT AND ACCESSORIES SHALL BE VERIFIED IN THE FIELD. EQUIPMENT SIZES AND LOCATIONS ARE APPROXIMATE. ACTUAL DIMENSIONS TO BE DETERMINED BY EQUIPMENT FURNISHED.
4. INSTALL ALL HVAC EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
5. THE CONTRACTOR SHALL PERFORM ALL CUTTING, CORE DRILLING, CHIPPING, AND PATCHWORK AS REQUIRED.
6. ALL SURFACES DAMAGED IN THE COURSE OF THE WORK SHALL BE RESTORED TO THE ORIGINAL CONDITION AND IN ACCORDANCE TO DRAWINGS AND SPECIFICATIONS. LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH THE OTHER TRADES.
7. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING, CONDUITS, ETC., SHALL BE FIRE STOPPED WITH A PRODUCT SIMILAR TO 3M OR EQUAL.
8. ALL MATERIALS SHALL BE AS PER THE DRAWINGS AND SPECIFICATIONS AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO ITS INSTALLATION.
9. ALL WORK SHALL BE COORDINATED WITH OTHER TRADES DURING INSTALLATION.
10. EQUIPMENT SIZES AND LOCATIONS ARE APPROXIMATE. ACTUAL DIMENSIONS TO BE DETERMINED BY EQUIPMENT FURNISHED.
11. CONCRETE HOUSEKEEPING PADS TO SUIT HVAC EQUIPMENT SHALL BE SIZED AND LOCATED BY THE HVAC CONTRACTOR. PADS SHALL BE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR. COORDINATE FINAL EQUIPMENT SIZE AND LOCATION OF HOUSEKEEPING PADS WITH THE GENERAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 6 INCHES. PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 6 INCHES ON EACH SIDE.
12. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
13. PROVIDE VIBRATION ISOLATION FOR ALL HVAC EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
14. WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
15. ALL AIR CONDITIONING CONDENSATE DRAIN PIPING FROM EQUIPMENT SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN OUTLET SLOPED 1/8 INCH PER FOOT.
16. FOR INTERLOCKING WIRING SCHEMATICS SEE ELECTRICAL DRAWINGS.
17. ALL CONTROL WIRING AND CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND DIVISION 16 OF THE SPECIFICATIONS.
18. THERMOSTATS AND OTHER CONTROL COMPONENTS SHALL BE MOUNTED 5'-0" A.F.F. UNLESS OTHERWISE NOTED.
19. ALL TESTS SHALL BE COMPLETED BEFORE ANY HVAC EQUIPMENT OR PIPING INSULATION IS APPLIED.

HVAC ABBREVIATIONS

EF - EXHAUST FAN
EUH - ELECTRIC UNIT HEATER
EWH - ELECTRIC WALL HEATER
IL - INTAKE LOUVER
MD - MOTORIZED DAMPER
T - THERMOSTAT

ELECTRIC UNIT HEATER SCHEDULE

TAG	LOCATION	AIRFLOW DISCHARGE	OUTPUT CAPACITY (KW)	AIRFLOW (CFM)	TEMP. RISE (DEGREE F)	THROW (FT)	ELECTRICAL		MAKE	MODEL	NOTES
							HP	(V/PH/HZ)			
EUH-3	PUMP STATION	HORIZONTAL	5	380	42	12	1/35	480/3/60	CHROMLOX	LUH-D-05-43-00	1, 2, 3, 4
EUH-4	PUMP STATION	HORIZONTAL	5	380	42	12	1/35	480/3/60	CHROMLOX	LUH-D-05-43-00	1, 2, 3, 4
EWH-1	PUMP STATION	HORIZONTAL	1.5	65	-	-	12.5 A	120/1/60	QMARK	CWH115DSAF	1, 5

NOTES:

1. INSTALL PER MANUFACTURERS INSTRUCTIONS.
2. PROVIDE HORIZONTAL BLOWER HEATER, WALL OR CEILING MOUNTED CONFIGURATIONS, WITH A UL LISTED POWER DISCONNECT SWITCH.
3. PROVIDE WITH A WALL MOUNT SWIVEL BRACKET FOR UNIT MOUNTING.
4. PROVIDE 120 VOLT, SINGLE STAGE, WALL MOUNTED THERMOSTAT, CHORMLOX TYPE WR-80, OR EQUAL.
5. WALL UNIT HEATER WITH INTERNAL THERMOSTAT.

FAN SCHEDULE

TAG	LOCATION	TYPE	AIRFLOW (CFM)	E.S.P. (IN W.C.)	DRIVE	ELECTRICAL		MAKE	TYPE	MODEL	NOTES
						HP	(V/PH/HZ)				
EF-1	PUMP STATION	CENTRIFUGAL UPBLAST ROOF MOUNT	3400	0.25	BELT	½	120/1/60	LOREN COOK	-	ACRU-B 195R5B	1, 2, 3, 5
EF-2	PUMP STATION	CEILING FAN	100	0.25	DIRECT	45 W	120/1/60	LOREN COOK	-	GC-148	1, 4, 6, 7, 8

NOTES:

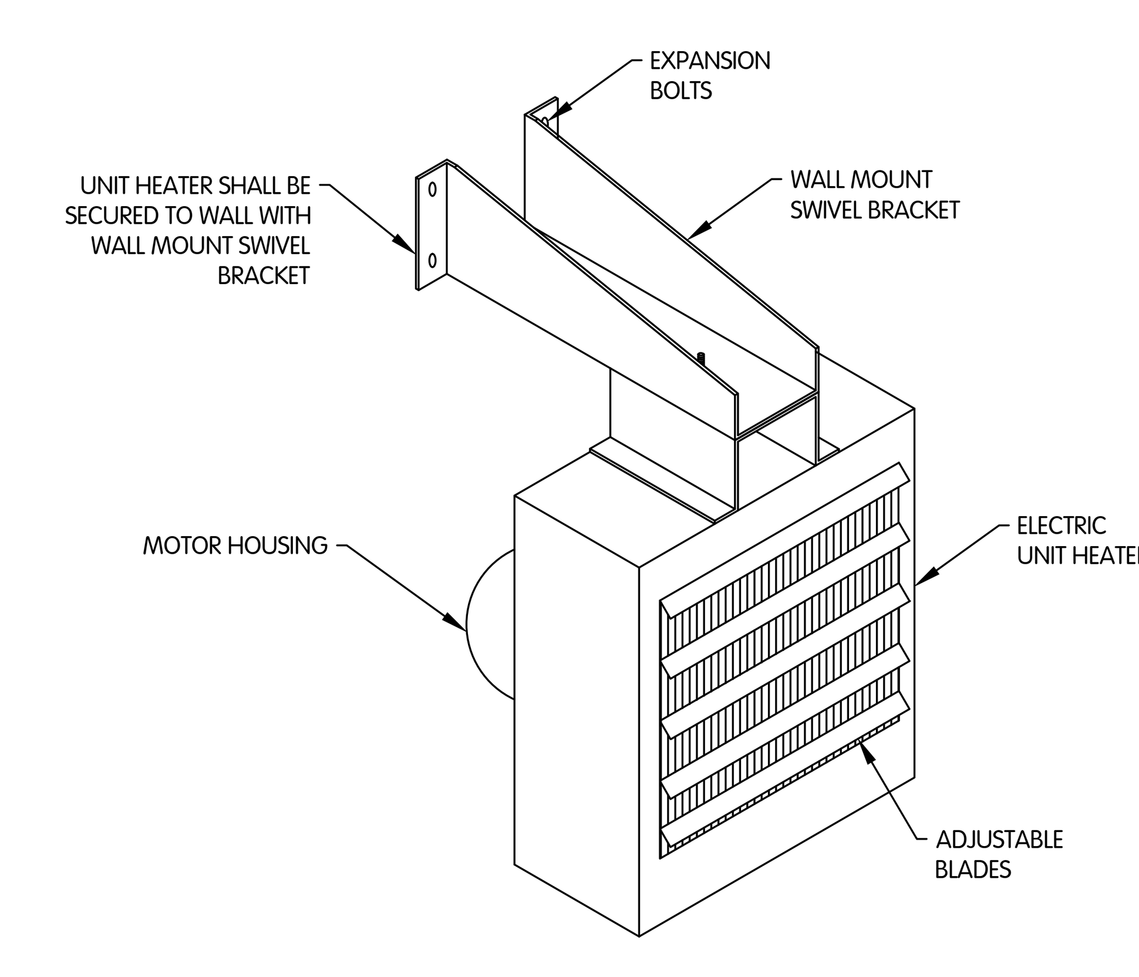
1. PROVIDE VIBRATION ISOLATORS.
2. PROVIDE INTEGRAL PRE-WIRED NEMA 3 DISCONNECT SWITCH.
3. PROVIDE WITH 12-INCH HIGH ALUMINUM ROOF CURB WITH BACKDRAFT DAMPER.
4. PROVIDE SOLID STATE FAN SPEED CONTROLLER FOR BALANCING DIRECT DRIVE MOTORS.
5. PROVIDE WITH ALUMINUM BIRD SCREEN.
6. PROVIDE INTEGRAL PRE-WIRED NEMA 1 DISCONNECT SWITCH.
7. PROVIDE WITH WALL CAP WITH BIRD SCREEN.
8. PROVIDE INTEGRAL BACKDRAFT DAMPER.

LOUVER SCHEDULE

TAG	LOCATION	SERVICE	TYPE	SIZE (IN.)	AIRFLOW (CFM)	FREE AREA (SQ. FT.)	MAKE	MODEL	NOTES
IL-1	PUMP STATION	INTAKE	COMBINATION	48"x48"	3400	6.79	RUSKIN	ELC6375DAX	1, 2, 3, 4, 5

NOTES:

1. 6 INCH DEEP, COMBINATION DRAINABLE BLADE, 6063T5 EXTRUDED ALUMINUM CONSTRUCTION.
2. KYNAR OR FLUOROPOLYMER FINISH ON ENTIRE LOUVER AND BIRDSCREEN. COLOR TO BE SELECTED BY OWNER.
3. BIRDSCREEN MOUNTED ON EXTERIOR.
4. INSECT SCREEN MOUNTED ON INTERIOR.
5. TWO POSITION, SPRING RETURN, NEMA 4X RATED, 120/1/60 MOTOR ACTUATOR.



ELECTRIC UNIT HEATER DETAIL
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STATE OF MICHIGAN
Troy McCallin Brehmer
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LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
MECHANICAL
DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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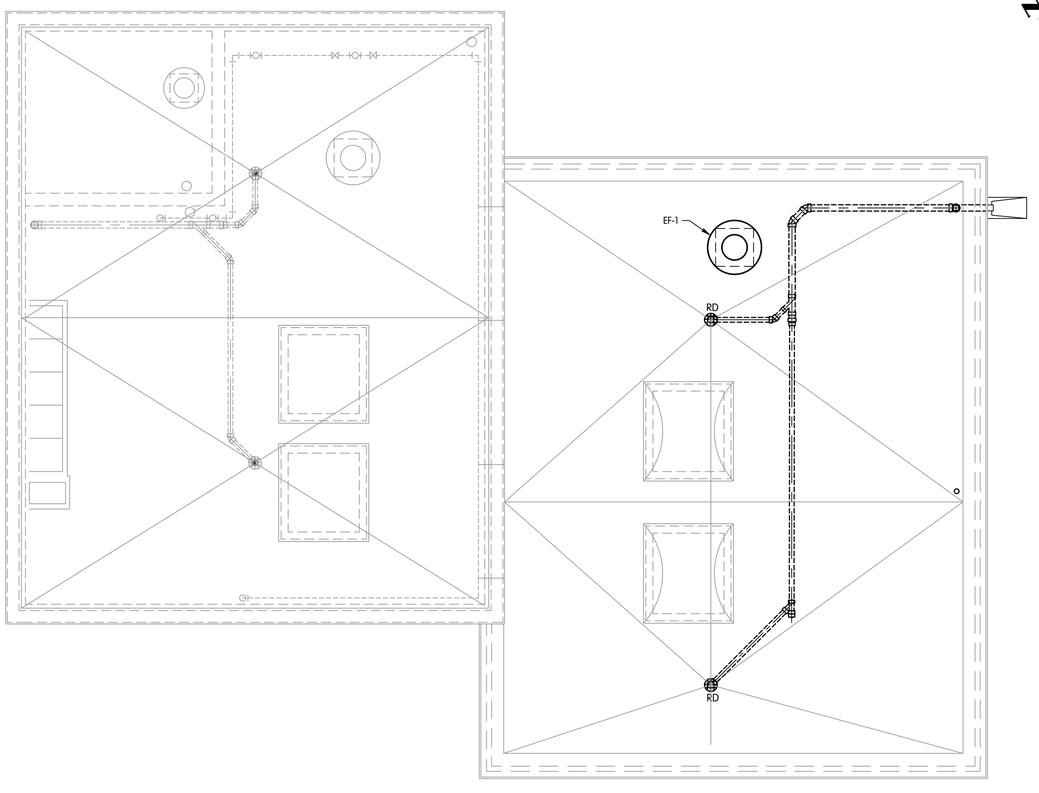

ROOF HVAC PLAN

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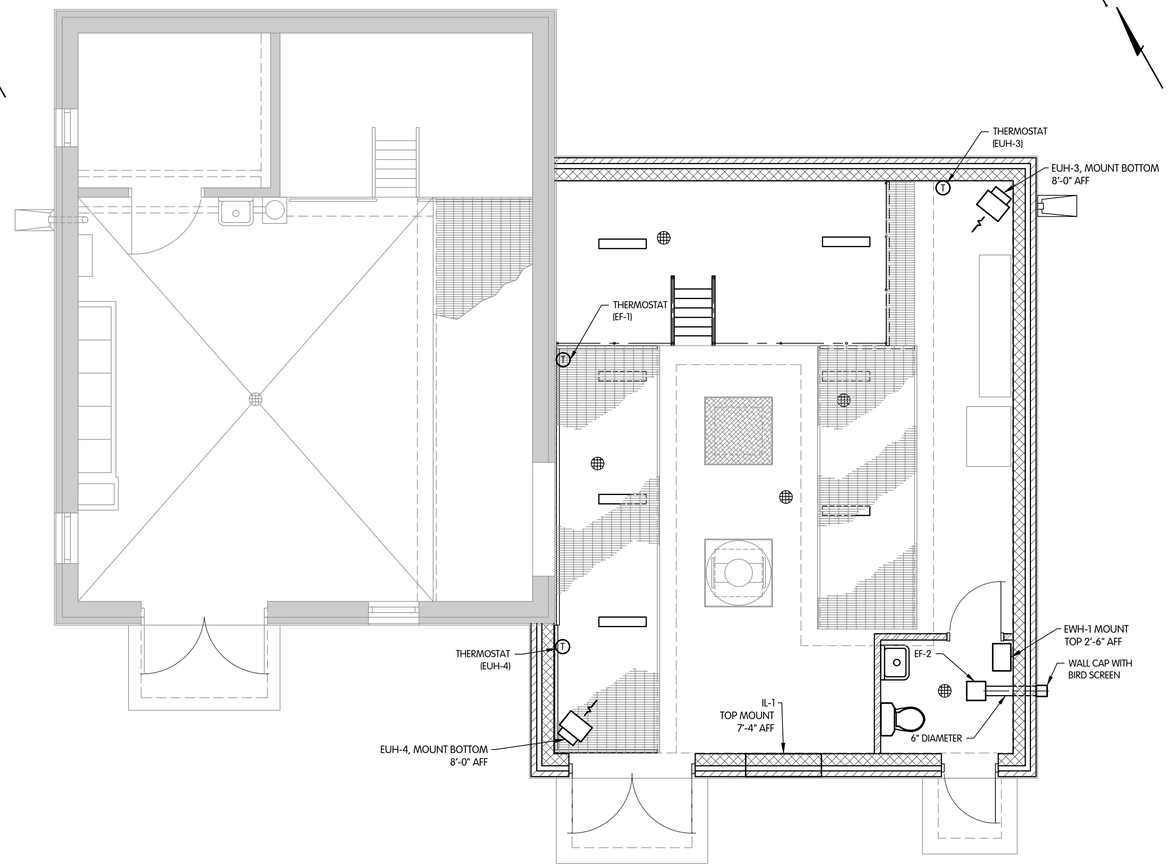

SECTIONAL PLAN

1/4"=1'-0"

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PROFESSIONAL ENGINEER
STATE OF MICHIGAN
5/26/2023

SOUTH CUSTER BOOSTER STATION MECHANICAL PLANS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

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TOL-7766001M02-29 M-1.1 - PLAN
5/26/2023 12:44 PM - CLENGER
5/26/2023 12:56 PM

SINGLE-LINE DIAGRAM LEGEND

- 30A / FRS-R -30 — FUSED DISCONNECT SWITCH. (SWITCH SIZE, FUSE TYPE AND FUSE SIZE AS SHOWN)
- 30A — UNFUSED DISCONNECT SWITCH (SWITCH SIZE AS SHOWN)
- 40A — THERMAL-MAGNETIC CIRCUIT BREAKER OR MOTOR CIRCUIT PROTECTOR-MCP (TRIP SIZE AS SHOWN)
- CB — HIGH OR MEDIUM VOLTAGE CIRCUIT BREAKER
- 12470 / 1000KVA / 480Y/277V — LIGHTING OR POWER TRANSFORMER,THREE PHASE UNLESS NOTED OTHERWISE (CONNECTION, SIZE & RATING AS SHOWN)
- FULL VOLTAGE NON-REVERSING MOTOR STARTER WITH OVERLOADS (FVNR)
- R / F — FULL VOLTAGE REVERSING MOTOR STARTER WITH OVERLOADS (FVR)
- S / F — TWO SPEED MOTOR STARTER WITH OVERLOADS
- VACUUM CONTACTOR
- 5 — THREE PHASE AC MOTOR (HORSEPOWER AS SHOWN)
- 600/5 AS AM — CURRENT TRANSFORMER WITH AMMETER SWITCH, AND AMMETER (RATIO AS SHOWN)
- 600/5 — CURRENT TRANSFORMER WITH SHORTING BLOCK (RATIO AS SHOWN)
- VS VM — POTENTIAL TRANSFORMER WITH VOLTMETER SWITCH, AND VOLTMETER
- 6KV — LIGHTNING ARRESTER (VOLTAGE RATING AS SHOWN)
- TRANSIENT VOLTAGE SURGE SUPPRESSOR (TVSS)
- GROUND CONNECTION
- LINE OR LOAD REACTOR
- K — KIRK KEY (DASHED LINES TO INTERLOCKED DEVICES)
- DRAWOUT FOR SWITCHGEAR OR MOTOR CONTROL CENTER
- POWER FACTOR CORRECTION CAPACITOR - (PFCC) (SIZE PER MOTOR MANUFACTURER RECOMMENDATIONS.)
- 100E — HIGH OR MEDIUM VOLTAGE FUSED CUTOUT (SIZE AS SHOWN)
- 4/0 — CABLE LIMITER (SIZE AS SHOWN)
- G 450KW 800A — STAND-BY GENERATOR (SIZE AS SHOWN) WITH FIELD PROTECTION CIRCUIT BREAKER (TRIP SIZE AS SHOWN)
- VFD BP — VARIABLE FREQUENCY DRIVE WITH A BY-PASS OPTION (SHOWN WITH INTEGRAL EXTERNAL DISCONNECT HANDLE)
- CP = CONTROL PANEL; SSRVS = SOLID STATE REDUCED VOLTAGE STARTER (SHOWN WITH INTEGRAL EXTERNAL DISCONNECT HANDLE)
- DPM — DIGITAL POWER METER
- WHM — WATTHOUR METER
- AUTOMATIC TRANSFER SWITCH (ATS)
- MANUAL TRANSFER SWITCH (MTS)

SCHEMATIC LEGEND

- OPEN CONTACTS WITH TIME-DELAY CLOSING
- CLOSED CONTACTS WITH TIME-DELAY OPENING
- OPEN CONTACTS WITH TIME-DELAY OPENING
- CLOSED CONTACTS WITH TIME-DELAY CLOSING
- FLOW SWITCH CLOSES ON INCREASE IN FLOW
- FLOW SWITCH OPENS ON INCREASE IN FLOW
- LIQUID LEVEL SWITCH CLOSES ON RISING LEVEL
- LIQUID LEVEL SWITCH OPENS ON RISING LEVEL
- PRESSURE OR VACUUM SWITCH CLOSES ON RISING PRESSURE
- PRESSURE OR VACUUM SWITCH OPENS ON RISING PRESSURE
- TEMPERATURE SWITCH CLOSES ON RISING TEMPERATURE
- TEMPERATURE SWITCH OPENS ON RISING TEMPERATURE
- LIMIT SWITCH NORMALLY OPEN
- LIMIT SWITCH NORMALLY OPEN - HELD CLOSED
- LIMIT SWITCH NORMALLY CLOSED
- LIMIT SWITCH NORMALLY CLOSED - HELD OPEN
- FOOT SWITCH OPENS BY FOOT PRESSURE
- FOOT SWITCH CLOSES BY FOOT PRESSURE
- MUSHROOM HEAD, MAINTAINED ACTION (PUSH-PULL) PUSH BUTTON SWITCH (SHOWN WITH ONLY 1 CIRCUIT)
- ON / OFF / XO — 2 - POSITION, MAINTAINED ACTION SELECTOR SWITCH
- H O A / XOO / OOX — 3 - POSITION, MAINTAINED ACTION SELECTOR SWITCH
  - H - O - A: HAND-OFF-AUTOMATIC
  - L - O - R: LOCAL-OFF-REMOTE
  - PCS: PLANT CONTROL SYSTEM
  - PLC: PROGRAMMABLE LOGIC CONTROLLER
- INDICATES ITEMS IN A SEPARATE COMMON ENCLOSURE
- XY — CONTACTOR COIL
  - M - MOTOR STARTER CONTACTOR
  - MF - MOTOR STARTER FORWARD CONTACTOR
  - MR - MOTOR STARTER REVERSE CONTACTOR
  - ML - MOTOR STARTER LOW SPEED CONTACTOR
  - MH - MOTOR STARTER HIGH SPEED CONTACTOR
  - SC - MOTOR STARTER STARTING CONTACTOR
  - RC - MOTOR STARTER RUN CONTACTOR
  - BP - BYPASS CONTACTOR
  - CC - CAPACITOR CONTACTOR
  - LC - LIGHTING CONTACTOR
  - IC - ISOLATION CONTACTOR
  - C - GENERAL CONTACTOR
- XR — CONTROL RELAY COIL
  - CR - INSTANTANEOUS CONTROL RELAY
  - TR - TIME DELAY RELAY
- OL — MOTOR STARTER OVERLOAD RELAY N.C. CONTACT
- SOLENOID COIL; SV - SOLENOID VALVE
- ETM — ELAPSED TIME METER
- NORMALLY OPEN MOMENTARY ACTION PUSHBUTTON SWITCH (SHOWN WITH ONLY 1 CIRCUIT)
- NORMALLY CLOSED MOMENTARY ACTION PUSHBUTTON SWITCH (SHOWN WITH ONLY 1 CIRCUIT)
- R — PUSH-TO-TEST PILOT LIGHT WITH COLORED LENS CAP
  - R - RED
  - G - GREEN
  - A - AMBER
  - W - WHITE
  - B - BLUE
  - CL - CLEAR
- F — ZERO SPEED SWITCH (NORMALLY OPEN)
- F — ZERO SPEED SWITCH (NORMALLY CLOSED)

GENERAL ELECTRICAL ABBREVIATIONS

PVC - POLYVINYL CHLORIDE
RGS - RIGID GALVANIZED STEEL
PVC/RGS - PVC COATED RGS

MOTOR STARTER ABBREVIATIONS

FVNR - FULL VOLTAGE, NON-REVERSING
FVR - FULL VOLTAGE REVERSING
TS1W - TWO SPEED, ONE WINDING
TS2W - TWO SPEED, TWO WINDING
TSR1W - TWO SPEED REVERSING, ONE WINDING TSR2W - TWO SPEED REVERSING, TWO WINDING

ELECTRICAL PLAN LEGEND

Symbol	Description
G	GROUND WIRE
	DIRECT BURIAL CABLE
	CONDUIT CONCEALED
	CONDUIT EXPOSED
	CONDUIT IN CONCRETE DUCT BANK
	HOMERUN
	CONDUIT TURNS UP
	CONDUIT TURNS DOWN
	CAPPED CONDUIT (FUTURE USE)
	CONDUIT TEE
	CADWELD CONNECTION
B	B = BUSWAY
C	C = CABLE TRAY
S	SINGLE POLE TOGGLE SWITCH
S_2	DOUBLE POLE TOGGLE SWITCH
S_3	THREE-WAY TOGGLE SWITCH
S_4	FOUR-WAY TOGGLE SWITCH
S_P	TOGGLE SWITCH WITH GREEN PILOT LIGHT
S_K	KEY-OPERATED SWITCH
5	TWIST-LOCK RECEPTACLE
3	DUPLEX RECEPTACLE
5	RECEPTACLE, (SINGLE) 120,30A.OR LARGER
6,8	RECEPTACLE, (SINGLE) 240V,2POLE
4,6,8	POWER RECEPTACLE 480V,3PH WITH DISCONNECT SWITCH (SIZE AS SHOWN)
	TELEPHONE RECEPTACLE
	COMPUTER RECEPTACLE
	BOLLARD LIGHT FIXTURE
2	CEILING MOUNTED FIXTURE
1	WALL MOUNTED FIXTURE
1	POLE MOUNTED FIXTURE
A 2	FLUORESCENT FIXTURE
A 2	FLUORESCENT TROFFER - GRID CEILING LAY IN
E 1	EMERGENCY LIGHTING FIXTURE, (2-HEAD SHOWN)
E 1	EXIT FIXTURE (WITH DIRECTION ARROW WHERE INDICATED)
MCC	MOTOR CONTROL CENTER (MCC) OR SWITCHGEAR (SWG)
	DISTRIBUTION PANEL 480V OR 480Y/277V
	LIGHTING PANEL 120/208V OR 120/240V
UPS	UNINTERRUPTIBLE POWER SUPPLY
EPP	EMERGENCY POWER PACK
CP	CONTROL PANEL (SHOWN WITH EXTERNAL DISCONNECT HANDLE)
	MAGNETIC MOTOR STARTER 480V, 3 PHASE
	MAGNETIC MOTOR STARTER 120V, 1 PHASE
	COMBINATION MAGNETIC MOTOR STARTER 480V, 3 PHASE
	COMBINATION MAGNETIC MOTOR STARTER 120V, 1 PHASE
S_M	MANUAL MOTOR STARTER 480V, 3 PHASE
S_V	MANUAL MOTOR STARTER 120V, 1 PHASE
	DISCONNECT SWITCH (SEE SINGLE LINE DIAGRAM FOR SIZE & TYPE)
1/4	SINGLE PHASE AC MOTOR(HORSEPOWER AS SHOWN,DC INDICATES DC MOTOR)
2	THREE PHASE AC MOTOR(HORSEPOWER AS SHOWN)
	MOTOR OPERATED VALVE, 3 PHASE,WITH MAGNETIC STARTER AND CONTROLS
	MOTOR OPERATED VALVE, 1 PHASE,WITH MAGNETIC STARTER AND CONTROLS
	GROUND ROD WITH CADWELD CONNECTION
PP	PP= POWER POLE, LP = LIGHT POLE
	AIR TERMINAL (LIGHTNING PROTECTION)
F	STROBE LIGHT (F=FIRE ALARM, G=GAS ALARM)
R/F	HEAT DETECTOR - RATE OF RISE/FIXED TEMPERATURE
P	SMOKE DETECTOR - (P = PHOTOELECTRIC, I = IONIZATION)
F	PULL STATION - FIRE ALARM
	HORN, BELL, OR SIREN
	HORN/STROBE COMBINATION
CA	CAPACITOR
	CONTROL STATION
JB	BOX - JUNCTION, TERMINAL, PULL OR HAND HOLE
M	ELECTRIC MANHOLE
XF	TRANSFORMER (SEE SINGLE LINE FOR SIZE & TYPE)
LC	LIGHTING CONTACTOR
FT	FLOW TRANSMITTER
LT	LEVEL TRANSMITTER
PT	PRESSURE TRANSMITTER
TT	TEMPERATURE TRANSMITTER
AT	ANALYSIS TRANSMITTER (I.E. OXYGEN, TURBIDITY)
PI	INDICATOR - PRESSURE, FLOW, LEVEL, DENSITY, ANALYSIS
DT	DENSITY TRANSMITTER
ZS	LIMIT (POSITION) SWITCH
PS	PRESSURE SWITCH
TS	TEMPERATURE SWITCH (I.E. MOTOR THERMO PROTECTOR)
CS	CONVEYOR CABLE SWITCH
SS	SPEED SWITCH
FS	FLOW SWITCH
LS	LEVEL SWITCH
NS	MOISTURE SWITCH
OS	TORQUE SWITCH
VS	VIBRATION SWITCH
LC	LOAD CELL
LE	TRANSMITTER SENSING ELEMENT - LEVEL, FLOW, DENSITY, PRESSURE, ANALYSIS
S	SOLENOID
T	THERMOSTAT
H	HEATER IN MOTOR
PC	PHOTOELECTRIC CELL
G	GAS DETECTOR WITH CONTROL PANEL (GAS TYPE AS SHOWN)
T	THERMOCOUPLE
V	PNEUMATIC VALVE OPERATOR
/	CURRENT TO PRESSURE TRANSDUCER

ELECTRICAL NOTES

1. STRUCTURAL MATERIALS ARE NOT SHOWN ON ELECTRICAL DRAWINGS. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS.
2. ALL ELECTRICAL EQUIPMENT ELEVATIONS SHOWN ARE TO BOTTOM OF DEVICE OR PANEL, UNLESS OTHERWISE NOTED.
3. NUMBER SHOWN (I.E.11735), INDICATES A SPECIFICATION REFERENCE FOR ITEMS OTHER THAN DIVISION 16. THE ELECTRICAL ITEM UNDER THIS REFERENCE IS SUPPLIED BY ANOTHER PART OF THE CONTRACT. UNLESS OTHERWISE NOTED IN THAT SPECIFICATION, THE CONTRACTOR SHALL INSTALL AND WIRE THE ITEM PER THE DRAWINGS AND DIVISION 16 SPECIFICATIONS.
4. CONTROL WIRING SHALL CONFORM TO ALL REQUIREMENTS AS SHOWN ON THE ELECTRICAL DRAWINGS.
5. WHERE LINES ARE SHOWN CONNECTING ELECTRICAL EQUIPMENT, THEY ARE NOT INTENDED AS CONDUIT ROUTING. CONTRACTOR SHALL ROUTE ALL CONDUIT RUNS (SHOWN OR NOT) PER DIVISION 16 SPECIFICATIONS.
6. WP INDICATES WATERPROOF. LETTER ON OR NEXT TO LIGHT FIXTURE INDICATES TYPE, PER SECTION 16510. NUMBER WITH LIGHT FIXTURE OR RECEPTACLE INDICATES CIRCUIT NUMBER.
7. GFCI INDICATES A CIRCUIT BREAKER OR RECEPTACLE WITH A 6 mA GROUND FAULT CIRCUIT INTERRUPTER. GFEPD INDICATES A CIRCUIT BREAKER OR RECEPTACLE WITH A 30 mA GROUND FAULT EQUIPMENT PROTECTION DEVICE.
8. FOR BELOW GRADE CONDUIT PENETRATIONS THROUGH EXISTING EXTERIOR CONCRETE WALLS, PROVIDE TYPE A CONDUIT SLEEVE FOR PVC CONDUIT. FOR RGS OR PVC-COATED RGS CONDUIT, PROVIDE TYPE B CONDUIT SLEEVE THROUGH CONCRETE WALLS, AND TYPE C CONDUIT SLEEVE THROUGH EXISTING CONCRETE WALLS.
9. FOR ABOVE GRADE CONDUIT PENETRATIONS THROUGH EXTERIOR CONCRETE WALLS, PROVIDE TYPE C CONDUIT SLEEVE. FOR MASONRY WALLS PROVIDE TYPE F CONDUIT SLEEVE.
10. FOR CONDUIT PENETRATIONS THROUGH EXISTING CONCRETE FLOORS AND WALLS BETWEEN ADJACENT NON-CLASSIFIED (NON-HAZARDOUS) AREAS, PROVIDE TYPE C CONDUIT SLEEVES FOR ALL CONDUIT TYPES. FOR SIMILAR PENETRATIONS THROUGH CONCRETE FLOORS AND WALLS, PROVIDE TYPE D CONDUIT SLEEVES FOR ALL CONDUIT TYPES.
11. FOR CONDUIT PENETRATIONS THROUGH CONCRETE FLOORS AND WALLS SEPARATING CLASSIFIED (HAZARDOUS) AREAS FROM NON-CLASSIFIED (NON-HAZARDOUS) AREAS, PROVIDE TYPE G CONDUIT SLEEVES. FOR SIMILAR PENETRATIONS THROUGH MASONRY WALLS, PROVIDE TYPE H CONDUIT SLEEVE. FOLLOW MECHANICAL SEAL MANUFACTURER'S RECOMMENDATIONS TO MEET 3-HOUR FIRE RESISTANCE REQUIREMENTS.
12. LEGENDS ARE FOR REFERENCE ONLY AND DOES NOT MEAN THAT ALL ITEMS ARE USED.

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER PUMP
ELECTRICAL
LEGEND

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
5			
4			
3			
2			
1			

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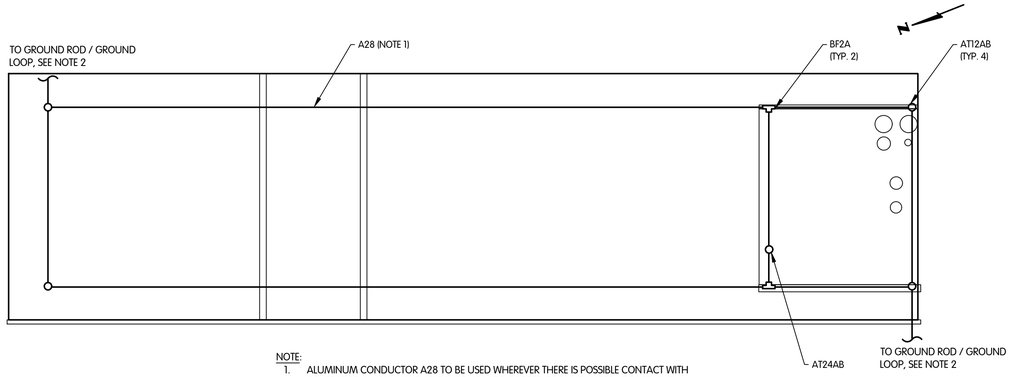
JOB NO. 538-7766.001
SCALE NONE
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
PEM	RHN	TMB

STATUS: ISSUED FOR BID
DATE: MAY 2023
SHEET NO. E-1

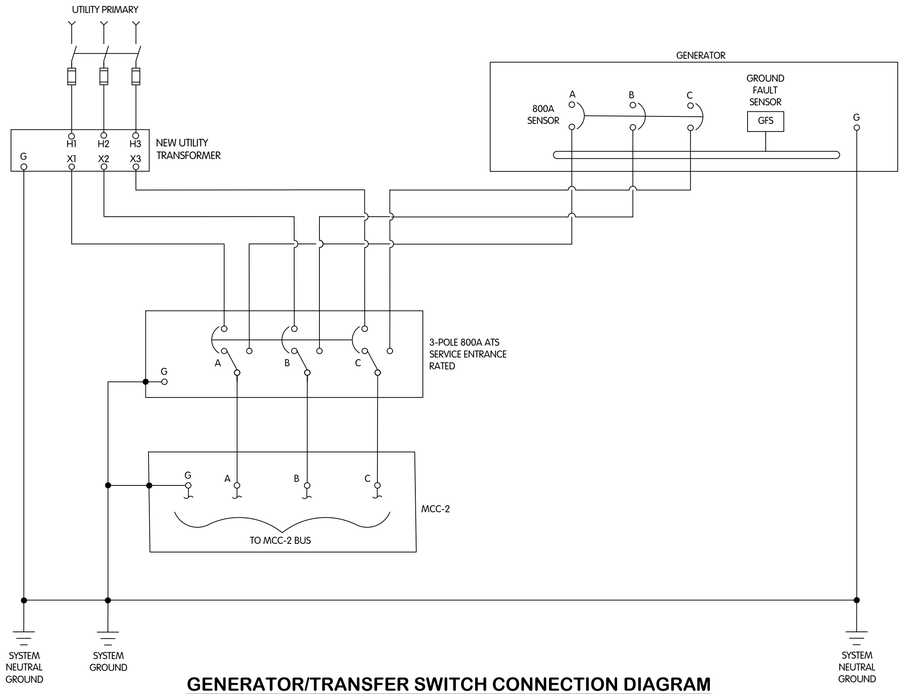
TOL-776600IE01-30 E-1 - LEGEND
5/26/2023 12:47 PM - CLENDER
5/26/2023 12:56 PM



NOTE:
1. ALUMINUM CONDUCTOR A28 TO BE USED WHEREVER THERE IS POSSIBLE CONTACT WITH GENERATOR ALUMINUM ENCLOSURE. JOIN TO COPPER GROUND WIRES AT BASE LEVEL.
2. TO MODEL GR4 GROUND ROD. PROVIDE THERMOWELD CONNECTION TO GROUND ROD. FIELD VERIFY EXISTING PUMP STATION GROUND LOOP LOCATION AND PROVIDE #4/0 BARE COPPER GROUND WIRE 30" BELOW GRADE CONNECTED TO GROUND ROD AND EXISTING GROUND LOOP WITH THERMOWELD CONNECTIONS.

GENERATOR LIGHTNING PROTECTION PLAN VIEW

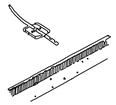
3/32" = 1'-0"



GENERATOR/TRANSFER SWITCH CONNECTION DIAGRAM

FL4A STAMPED ADHESIVE CRIMP ALUMINUM LOOP FOR USE ON BUILT-UP, SINGLE MEMBRANE OR OTHER FLAT SURFACES WHERE MECHANICAL PENETRATIONS MUST BE AVOIDED. USE WITH ADHESIVES COMPATIBLE TO ROOF SURFACES

FL4C STAMPED ADHESIVE CRIMP BRASS LOOP AS ABOVE BUT STAMPED BRASS



CLAMPS (FL)

NTS

GC ¾ CAST BRONZE CABLE TO ¾" GROUND ROD CLAMP. HAS TWO STAINLESS STEEL BOLTS ⅜" - 16 X 1¼". APPROXIMATELY 6.2 OZ.

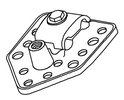
GROUND ROD CLAMPS (GC)

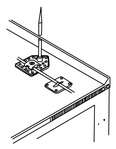
NTS

ALL MATERIALS U.L. LABELED EAST COAST LIGHTNING EQUIPMENT UL LISTING NO. 50MO

BB3B ADHESIVE BASE
A CAST BRONZE BASE WITH 2-WAY BOLT PRESSURE CABLE HOLDER. CAP CAN BE ROTATED 90 DEGREES. SUITABLE FOR USE ON BUILT-UP, SINGLE MEMBRANE OR OTHER ROOF SURFACES WHERE ALL MECHANICAL PENETRATIONS MUST BE AVOIDED. FOR USE WITH COMPATIBLE ADHESIVES TO ROOF SURFACES. 4 ¼" X 4". APPROXIMATELY 16 OZ.¾ - 18 STAINLESS STEEL BOLT AND WASHER. USE SUFFIX ⅜ OR ½ TO DENOTE AIR TERMINAL THREAD SIZE

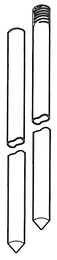
BB3A ALUMINUM
APPROXIMATELY 6 OZ. USE SUFFIX ½ OR ⅜ TO DENOTE AIR TERMINAL THREAD SIZE





BASE (BB)

NTS

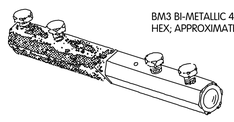


UL LISTED COPPER CLAD STEEL GROUND RODS

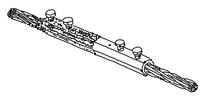
GR4 ¾" X 10"

GROUND RODS (GR)

NTS

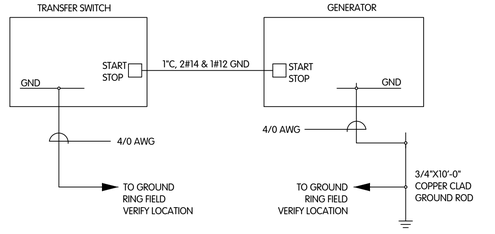


BM3 BI-METALLIC 4-BOLT STRAIGHT SPLICER 3½" X ⅞" HEX; APPROXIMATELY 6 OZ. STAINLESS STEEL BOLTS.

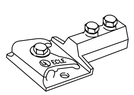


BI-METAL STRAIGHT CONNECTOR (BM)

NTS

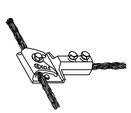


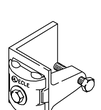
AUTOMATIC TRANSFER SWITCH-GENERATOR SCHEMATIC



BF2B TEE
CAST BRONZE PRESSURE "TEE" SPLICER. STAINLESS STEEL BOLTS AND WASHER. 2¼" X 2" 5" (5.7CM X 5.1CM X 12.7CM); APPROXIMATELY 10 OZ. (284 GRAMS).

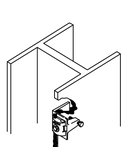
BF2A ALUMINUM
APPROXIMATELY 3.5OZ (99 GRAMS)





BF19B 4 SQUARE INCH BEAM CLAMP
CAST BRONZE 4 SQUARE INCH BONDING PLATE WITH 1 TWO-WAY BOLT PRESSURE CABLE HOLDER. FOR PRIMARY BONDING TO BEAMS AND SIMILAR FLAT METAL PROTRUSIONS. STAINLESS STEEL BOLT AND WASHER, 3 ¼" X 2" (82.6 MM X 50.8MM): APPROXIMATELY 1 LB. 1 OZ. (482 GRAMS)

BF19A ALUMINUM
APPROXIMATELY 6.7 OZ. (190 GRAMS)



BOLT FITTINGS (BF)

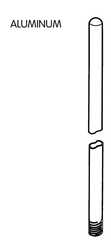
NTS

ALUMINUM

CLASS I - ½" DIAMETER, THREADED BASE, UL LISTED.

AT12AB ½" X 12"

AT12AB ½" X 24"



BLUNT AIR TERMINALS (AT)

NTS

A28

28 STRANDS OF 14 GAUGE BASKET WEAVE ALUMINUM CABLE. 115 POUNDS PER THOUSAND FEET. 115,047 CIRCULAR MILS OF CONDUCTIVITY. EXCEEDS CLASS I REQUIREMENTS.

C385

28 STRANDS OF .066 GAUGE ROPE LAY COPPER CABLE. 385 POUNDS PER THOUSAND FEET. 121,968 CIRCULAR MILS OF CONDUCTIVITY. EXCEEDS CLASS II REQUIREMENTS.

C385T

SAME AS ABOVE WITH TINNED STRANDS

CONDUCTERS

NTS

ALL MATERIALS EAST COAST LIGHTNING EQUIPMENT PER MICHIGAN LIGHTNING PROTECTION INC. (OR EQUAL)

QUANTITY	DESCRIPTION	MODEL
95'-0"	CLASS I ALUMINUM CONDUCTOR	A28
80'-0"	CLASS II COPPER CONDUCTOR	C385
30	ALUMINUM CLIPS	FL4A
2	COPPER CLIPS	FL4C
4	AT ½" X 12" ALUMINUM BLUNT AIR TERMINALS	AT12AB
1	AT ½" X 24" ALUMINUM BLUNT AIR TERMINALS	AT24AB
5	ALUMINUM ADHESIVE BASE	BB3A ½
2	BI-METAL STRAIGHT CONNECTOR	BM3
2	¾" X 10" COPPER CLAD GROUND ELECTRODE	GR4
2	¾" GROUND ROD CLAMPS	GC ¾
2	4" SQUARE INCH BEAM CLAMP	BF19B
2	ALUMINUM TEE	BF2A
2	TUBE ADHESIVE COMPATIBLE WITH ENCLOSURE SURFACE	

SOUTH CUSTER BOOSTER STATION
ELECTRICAL
SCHEMATIC, DIAGRAMS AND DETAILS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
5			
4			
3			
2			
1			

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JOB NO. 538-7766.001

SCALE 1/4"=1'-0"

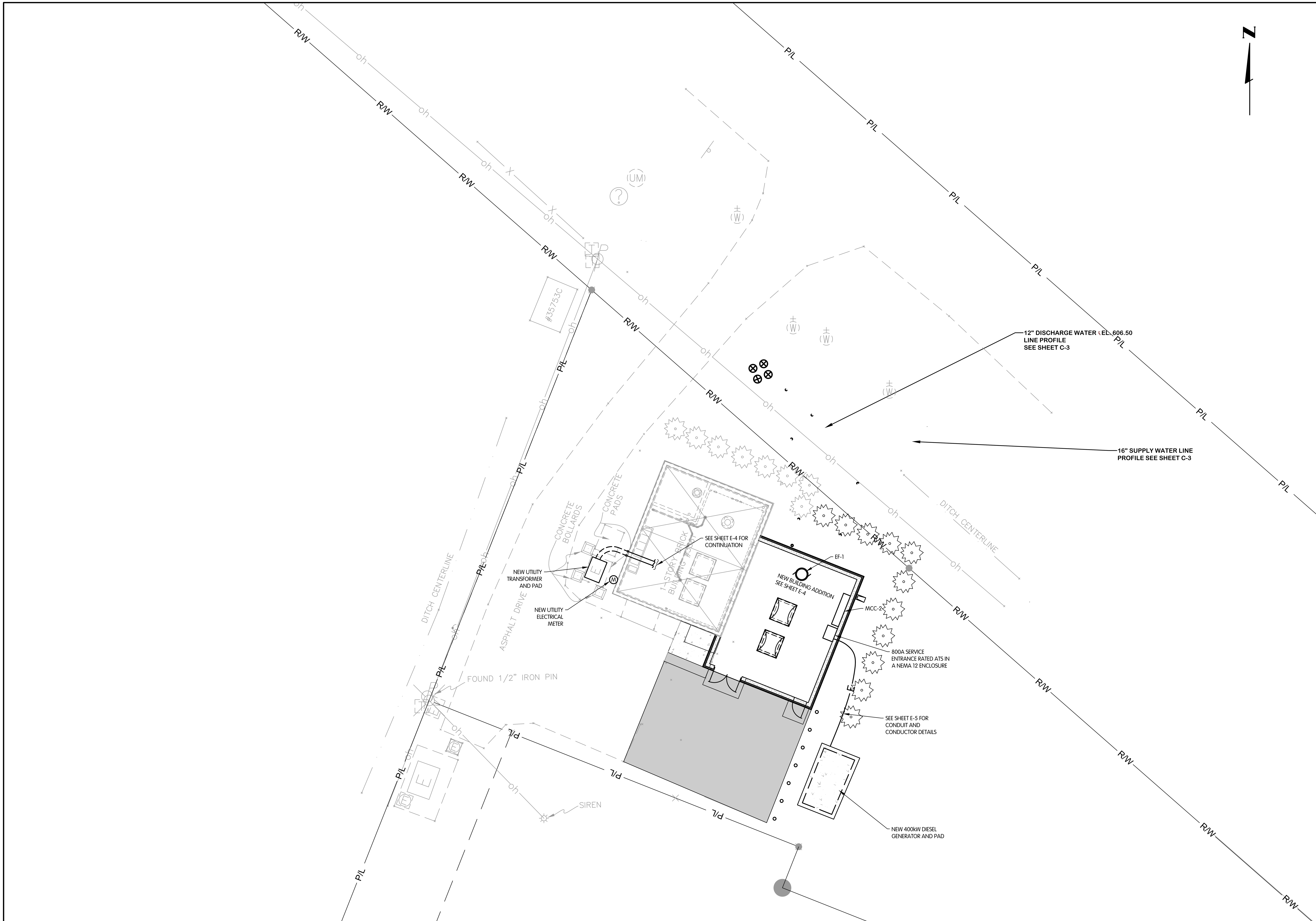
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
PEM	RHN	TMB

STATUS: ISSUED FOR BID

DATE: MAY 2023

SHEET NO.
E-2
31 OF 35



State of Michigan Licensed Professional Engineer — Troy McCallin Brehmer — License No. 6201309851 — 5/26/2023

SOUTH CUSTER BOOSTER STATION
ELECTRICAL
SITE PLAN

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
1			
2			
3			
4			
5			

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SCALE 1/4"=1'-0"

THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
PEM	RHN	TMB

STATUS: ISSUED FOR BID

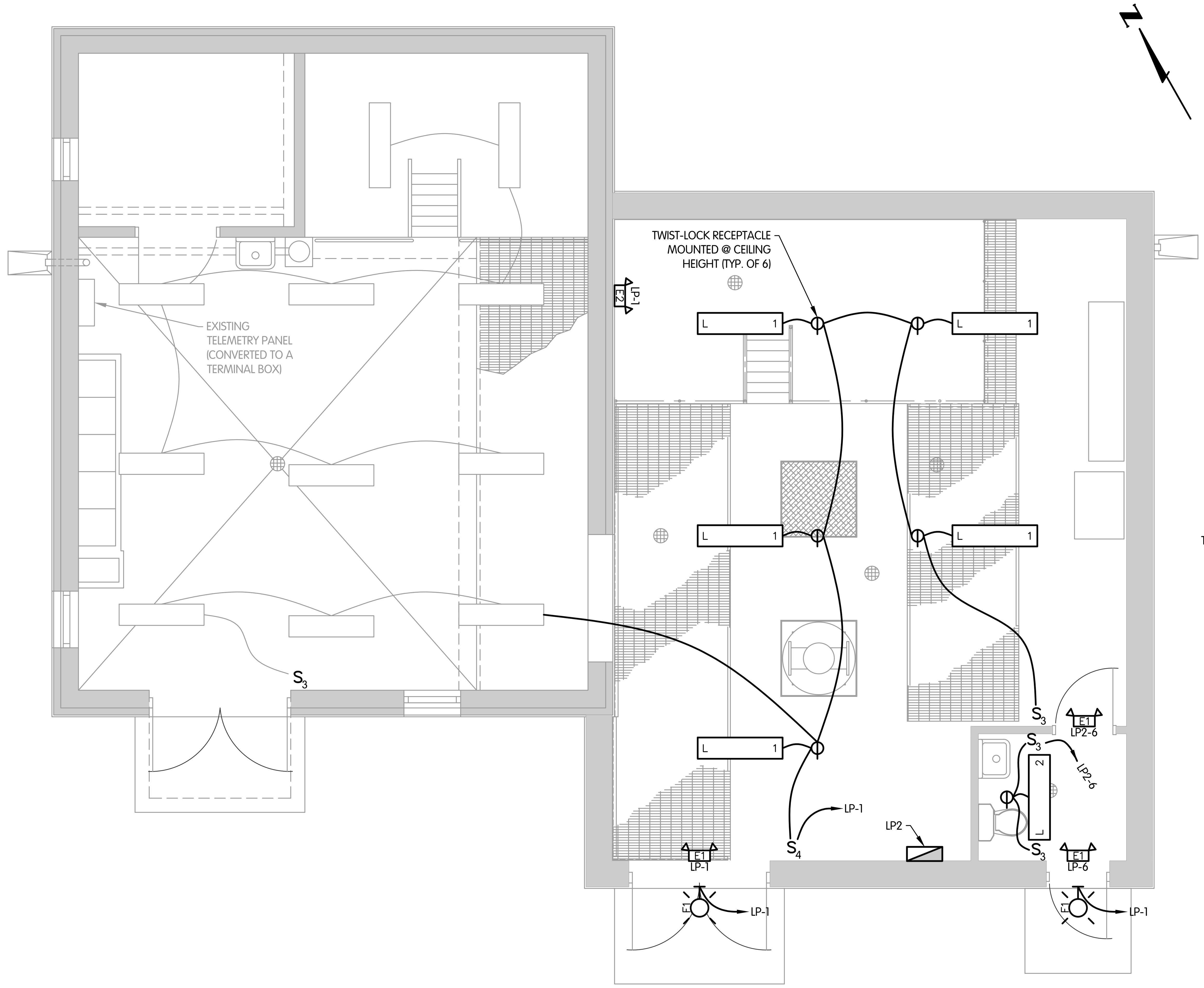
DATE: MAY 2023

SHEET NO.

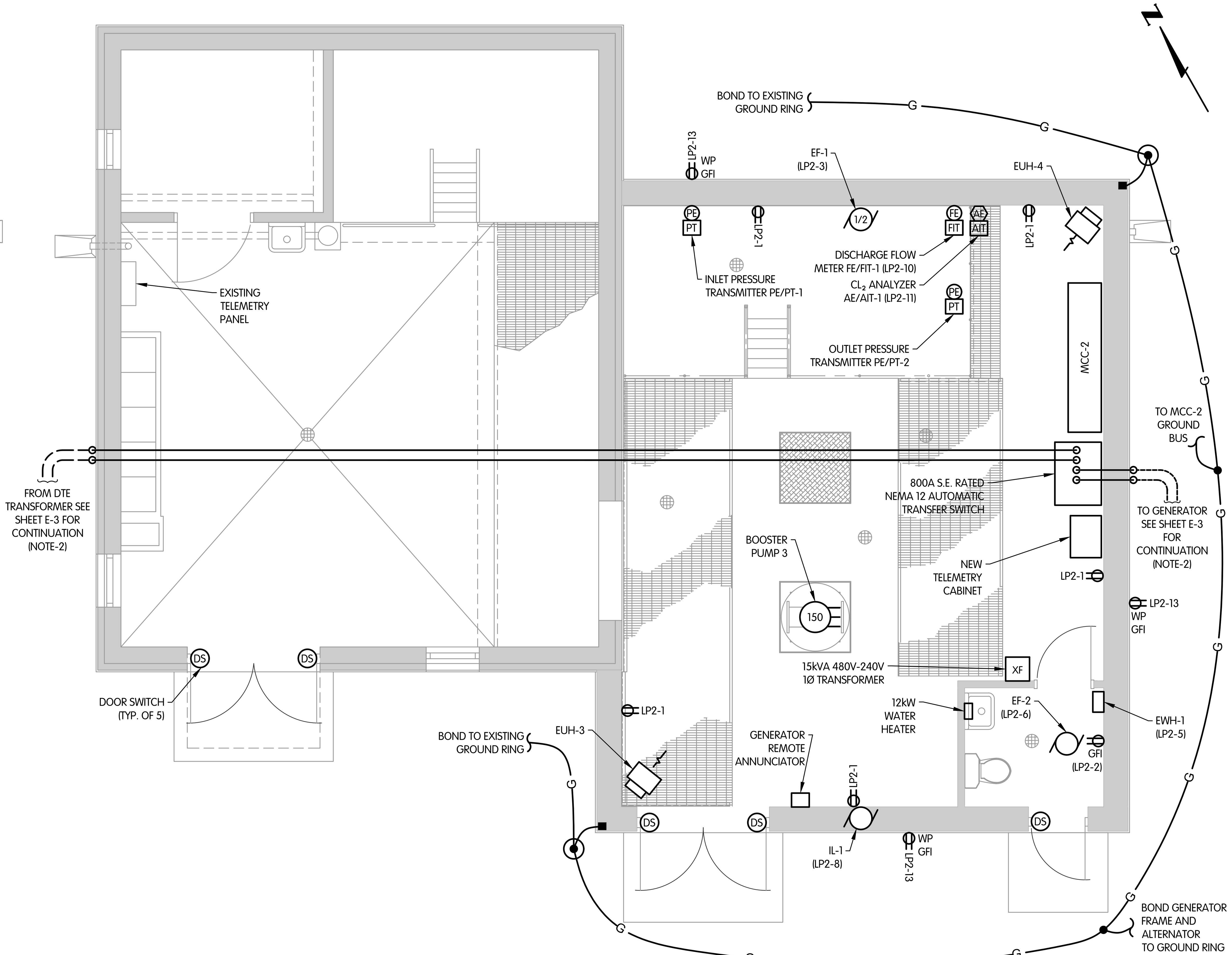
E-3

32 OF 35

TOL-7766001E03-32 E-3 - SITE PLAN
5/26/2023 12:47 PM - CLENDER
5/26/2023 12:56 PM



LIGHTING PLAN
¼"=1'-0"



POWER - PLAN
¼"=1'-0"

LIGHTING SCHEDULE

SYMBOL	DESCRIPTION
L 1	LITHONIA CAT. NO. FEM-L48-8000LM-IMACD-MD-MVOLT-40K-80CRI LINEAR LED, 8000 LUMENS, ACRYLIC CLEAR DEEP LENS, MEDIUM DISTRIBUTION, MULTIVOLT, 4000K, 80CRI, 62 WATTS. MOUNTED AT CEILING HEIGHT
L 2	LITHONIA CAT. NO. FEM-L48-6000LM-IMACD-MD-MVOLT-40K-80CRI LINEAR LED, 6000 LUMENS, ACRYLIC CLEAR DEEP LENS, MEDIUM DISTRIBUTION, MULTIVOLT, 4000K, 80CRI, 37.8 WATTS. MOUNTED AT CEILING HEIGHT
F1	LITHONIA CAT. NO. DSXW2-LED-30C-700-40K-T2S-MVOLT-PE-HS D-SERIES LED WALL LUMINAIRE, 30 LEDS, 700mA DRIVE CURRENT, 4000K, TYPE 2 SHORT DISTRIBUTION, MULTIVOLT, BUTTON STYLE PHOTOCELL, HOUSE-SIDE SHIELD, 8170 LUMENS, 71 WATTS. MOUNTED AT 10' ABOVE GRADE
E1	LITHONIA CAT. NO. LHQM-LED-R-HO / ELA-T-SD-Q-L0309 COMBO EXIT/EMERGENCY LED, WHITE HOUSING W/ RED LETTERS, 120/277V, 50° - 104° OPERATION, 90-MINUTE NI-CAD BATTERY, SELF-DIAGNOTICS, 4 WATTS, TWIN LED HEADS. MOUNTED AT 8' AFF. WIRE AHEAD OF SWITCH FOR LIGHTS SERVING AREA
E2	LITHONIA CAT. NO. EU2L EMERGENCY LED, WHITE HOUSING, 120/277V, 50° - 104° OPERATION, 90-MINUTE NI-CAD BATTERY, SELF-DIAGNOTICS, 2 WATTS, TWIN LED HEADS. MOUNTED AT 8' AFF. WIRE AHEAD OF SWITCH FOR LIGHTS SERVING AREA

NOTES:
1. SEE LP2 PANELBOARD SCHEDULE ON SHEET E-5.
2. SEE MCC-2 ONE-LINE AND ELEVATION ON SHEET E-5

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
ELECTRICAL
POWER AND LIGHTING PLANS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
1			
2			
3			
4			
5			

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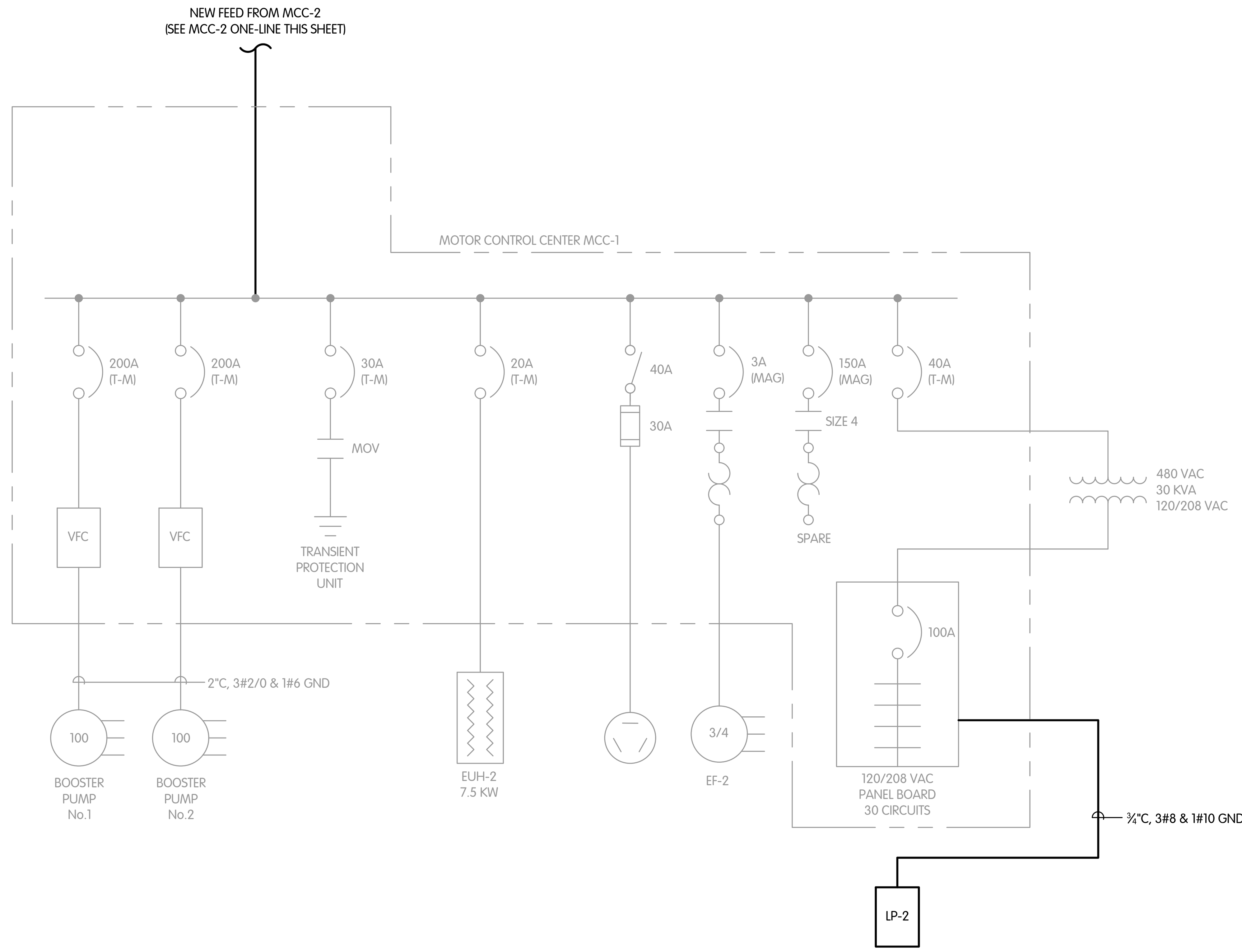
JOB NO. 538-7766.001
SCALE 1/4"=1'-0"
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

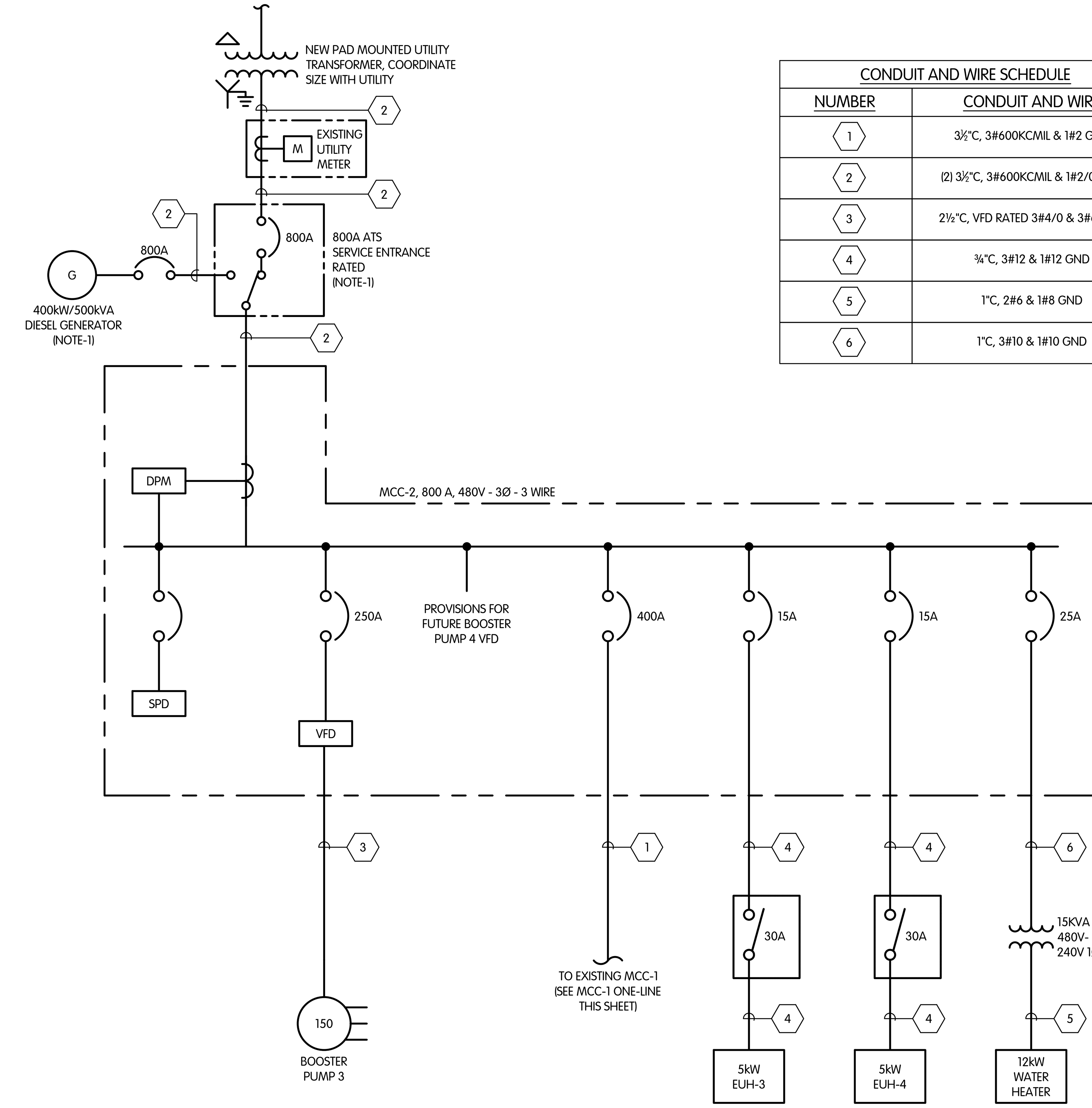
DESIGNED	DRAWN	CHECKED
PEM	RHN	TMB

STATUS: ISSUED FOR BID
DATE: MAY 2023
SHEET NO. E-4

TOL-7766001E04-33 E-4 - POWER AND LIGHTING PLANS
5/26/2023 12:49 PM - CLENDER
5/26/2023 12:56 PM



MOTOR CONTROL CENTER MCC-1 ONE-LINE DIAGRAM



CONDUIT AND WIRE SCHEDULE	
NUMBER	CONDUIT AND WIRE
1	3½"C, 3#600KCMIL & 1#2 GND
2	(2) 3½"C, 3#600KCMIL & 1#2/0 GND
3	2½"C, VFD RATED 3#4/0 & 3#6 GND
4	¾"C, 3#12 & 1#12 GND
5	1"C, 2#6 & 1#8 GND
6	1"C, 3#10 & 1#10 GND

MOTOR CONTROL CENTER MCC-2 ONE-LINE DIAGRAM

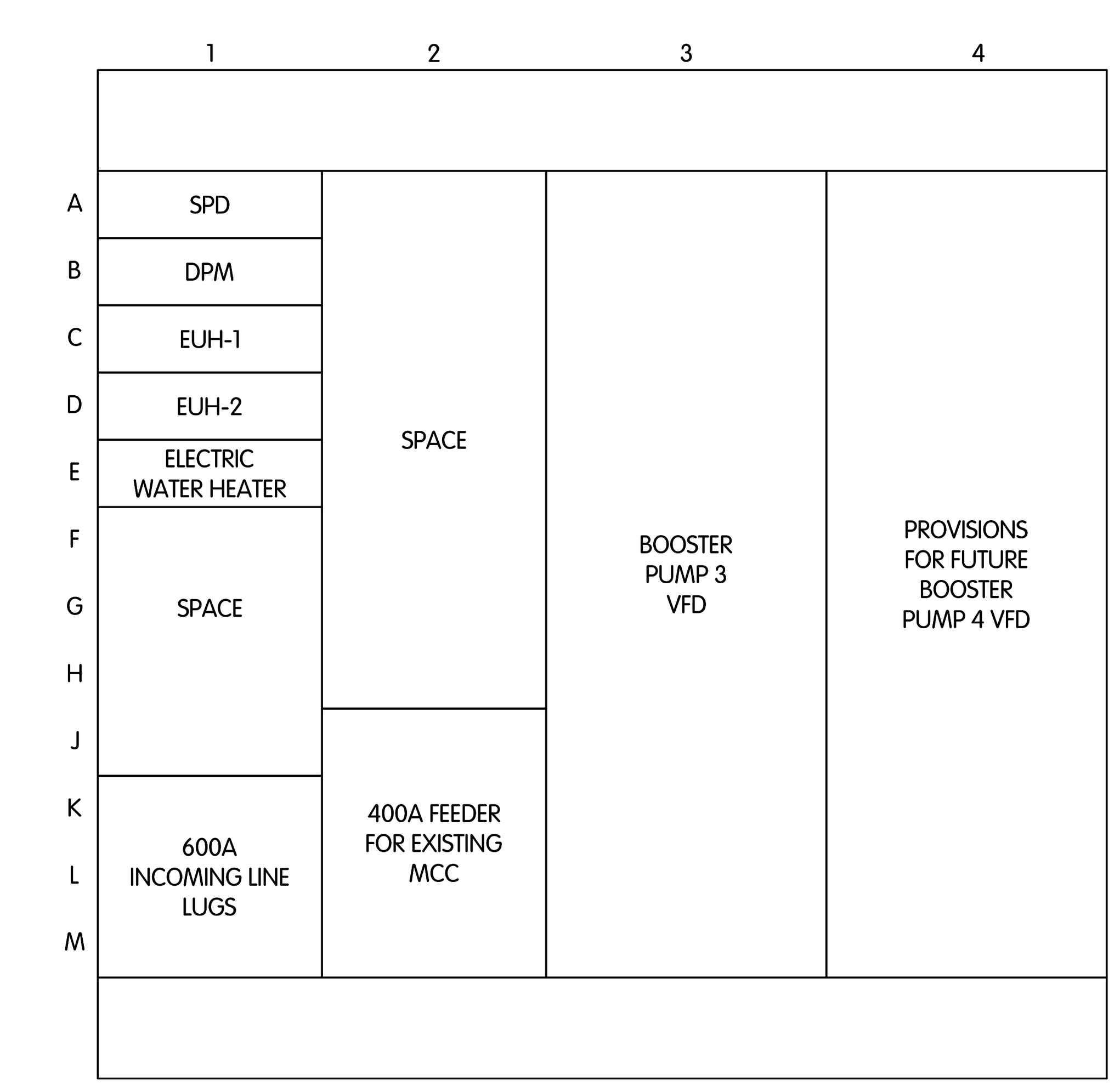
NOTES:
1. GENERATOR AND AUTOMATIC TRANSFER SWITCH TO BE PURCHASED BY OWNER AND INSTALLED BY CONTRACTOR

PANELBOARD DESIGNATION / TAG:	LP2	LOCATION:	BOOSTER PUMP STATION
ELECTRICAL CHARACTERISTICS:	120/208v - 3ph - 4w	FEEDER SIZE:	Refer to One-Line diagram(s)
PANELBOARD CONSTRUCTION:		FED FROM:	EXISTING 120/208V PANELBOARD

60 AMP MAIN LUGS	A.I.C. (FULLY RATED)	SURFACE MOUNTING	
AMP MAIN BREAKER/SWITCH	% NEUTRAL (SOLID)	NEMA 12 ENCLOSURE	
24 AVAILABLE CIRCUIT SPACES	INCOMING FEED	MISC.	
'L' After the circuit no. indicates handle locking device.			

Options:	Options:
SUB-FEED LUGS	MULTIPLE SECTIONS
SUB-FEED BREAKER	INTEGRAL SPD
FEED-THRU LUGS	BOLT-ON BREAKERS
SERVICE ENTRANCE RATED	MAIN TERMINAL LUGS

		VOLT AMPS			CIRCUIT		WIRE SIZE		CIRCUIT		VOLT AMPS				
	LOAD DESCRIPTION	A	B	C	POLE	AMP			AMP	POLE	A	B	C	LOAD DESCRIPTION	
1	RECEPTACLES - EAST WING	800			1	20	#12	#12	20	1	200			RECEPTACLE - BATHROOM	2
3	EXHAUST FAN EF-1-1		1,176		1	15	#12	#12	15	1		66		LIGHTING - BATHROOM	4
5	ELECTRIC WATER HEATER EWH-1			1,500	1	20	#12	#12	15	1			45	EXHAUST FAN EF-1-2	6
7	GENERATOR JACKET WATER HEATER (1"C)	1,125			2	15	#12	#12	15	1	100			IL-1	8
9			1,125					#12	15	1		100		DISCHARGE FLOW METER	10
11	CHLORINE ANALYZER			100	1	15	#12	#12	15	1			1200	GENERATOR BATTERY CHARGER (1"C)	12
13	EXTERIOR RECEPTACLES (1"C)	600			1	20	#10		20	1				SPARE	14
15	SPARE				1	20			20	1				SPARE	16
17	SPACE													SPACE	18
19	SPACE													SPACE	20
21	SPACE													SPACE	22
23	SPACE													SPACE	24
	SUB TOTAL VA	2,525	2,301	1,600							300	166	1,245	SUB TOTAL VA	
	PHASE TOTALS	A	B	C											
	TOTAL PHASE VA	2,825	2,467	2,845							22.6			CONNECTED AMPS (Balanced)	
	TOTAL PHASE AMPS	24	21	24										PHASE DEMAND AMPS (Balanced)	
	TOTAL CONNECTED KVA	8.137												TOTAL DEMAND KVA	



MCC-2 ELEVATION
NTS

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
LICENSED PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION
ELECTRICAL
SINGLE LINE AND MCC ELEVATIONS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	REVISIONS AFTER ISSUED FOR BID	DATE	BY
1			
2			
3			
4			
5			

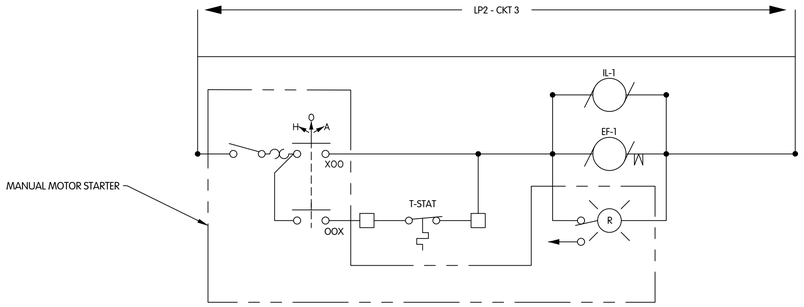
Jones & Henry Engineers, Ltd.
Fluid thinking®.
www.JHeng.com

JOB NO.	538-7766.001
SCALE	NONE

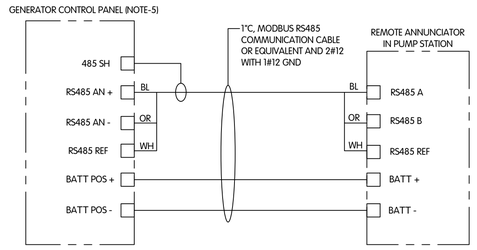
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
PEM	RHN	TMB

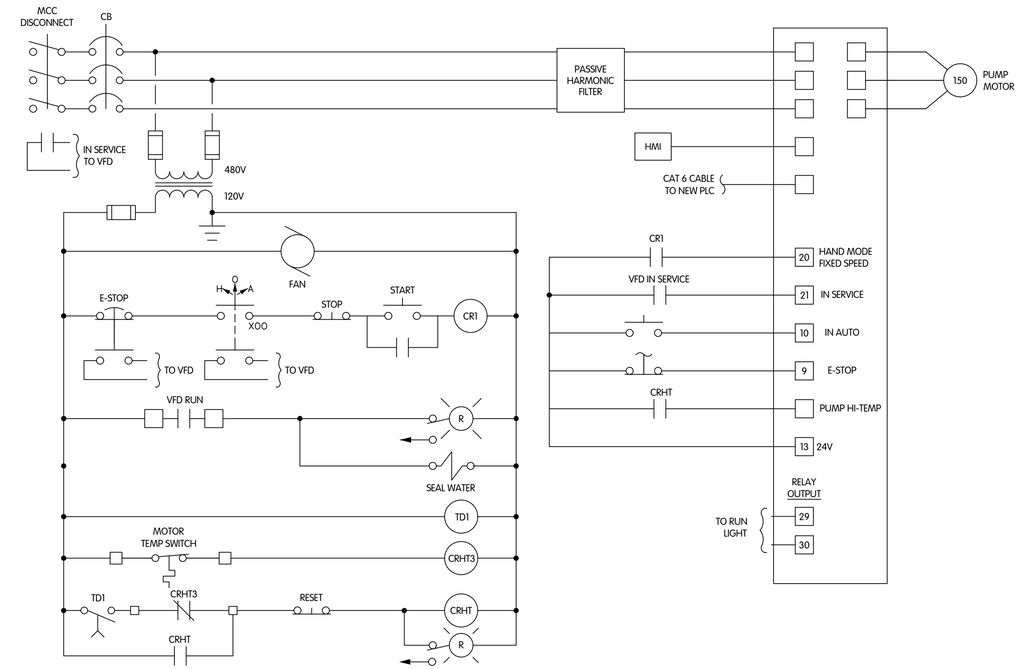
STATUS: ISSUED FOR BID
DATE: MAY 2023
SHEET NO.
E-5



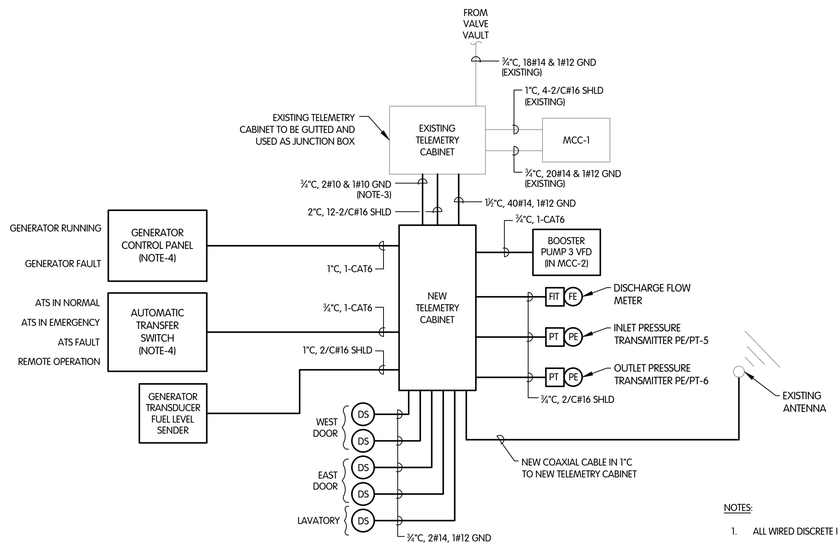
EXHAUST FAN EF-1-1 SCHEMATIC



LOCAL / REMOTE ANNUNCIATOR SCHEMATIC



WATER BOOSTER PUMP 3 SCHEMATIC



NEW PLC RISER DIAGRAM

NOTES:

1. ALL WIRED DISCRETE INPUTS COMMUNICATED TO PLC VIA ETHERNET.
2. ALL VFD CONTROL TO PLC VIA ETHERNET.
3. EXTEND 120 V CIRCUIT FROM EXISTING TELEMETRY PANEL TO NEW PLC PANEL.
4. SPARE CONDUIT SHALL BE ROUTED TO EQUIPMENT INDICATED FROM MAIN TELEMETRY UNIT. CONDUITS SHALL BE CAPPED AT EQUIPMENT AND LABELED AS SPARE.
5. END-OF-LINE RESISTOR BETWEEN RS485 AN+ AND RS485 AN- MUST BE REMOVED

STATE OF MICHIGAN
Troy McCallin Brehmer
License No. 6201309851
PROFESSIONAL ENGINEER
5/26/2023

SOUTH CUSTER BOOSTER STATION ELECTRICAL
SCHEMATICS AND RISER DIAGRAMS

SOUTH CUSTER BOOSTER STATION EXPANSION
CITY OF MONROE, MICHIGAN

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
5			
4			
3			
2			
1			

Jones & Henry Engineers, Ltd.
Fluid thinking©.
www.JHeng.com

JOB NO.	538-7766.001
SCALE	AS SHOWN
	THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE
DESIGNED	PEM
DRAWN	RHN
CHECKED	TMB
STATUS:	ISSUED FOR BID
DATE:	MAY 2023
SHEET NO.	E-6
	35 OF 35

TOL-7766001E06-35 E-6 - SCHEMATICS & RISER DIAGRAMS
5/26/2023 12:56 PM - CLEMDER

AUTOMATION ENGINEER

PAC ENGINEERING, LLC

LAMBERTVILLE, MICHIGAN

CITY OF MONROE MICHIGAN
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
MAY 2023

DRAWING INDEX

PREPARED FOR:

COUNTY OF MONROE MICHIGAN 1817

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL

------- FIELD WIRING

▲ FIELD MOUNTED

AUTOMATION & CONTROLS ENGINEERS
3608 Sterns Road
Lambertville, MI 48144
(734) 708-4PAC
www.pac-llc.com

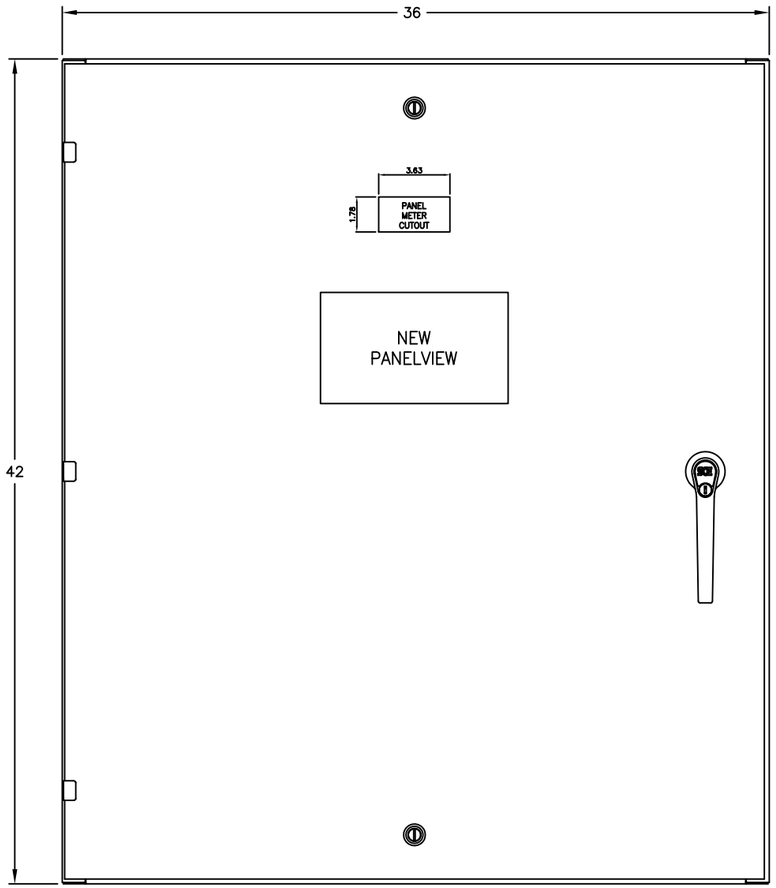
SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
TITLE SHEET

DRAWN *TLP* | SCALE NONE | SHEET NO. *1 of 12* | DWG NO. *E-1*

CHECKED – | DATE 09/30/2021



FRONT VIEW

NOTES:

1. NAMEPLATES SHALL BE SECURED TO THE PANEL DOOR WITH GASKETED SEALABLE SCREWS SUITABLE FOR OUTDOOR PLACEMENT.

3. PROVIDE A PANEL GROUNDING BUS BONDED TO THE PANEL ENCLOSURE AND A BRAIDED GROUNDING STRAP CONNECTING THE PANEL DOOR TO THE PANEL ENCLOSURE FRAME.

4. PANEL IS TO BE UL LABELED.

5. ALL WIRING TO CONFORM WITH NATIONAL ELECTRICAL CODE.

RED: ALL 120 VOLT AC CONTROL WIRING.
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

WHITE: ALL 120 VOLT AC NEUTRAL WIRING.
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

BLACK: ALL 240 VOLT AC AND 575 VOLT AC POWER WIRING AND 90VDC & ABOVE
AWG #12 MINIMUM FOR MOTOR CIRCUITS

BLUE: DC CONTROL WIRING BELOW 90VDC.
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

WHITE W/BLUE TRACER: ALL DC COMMON WIRING BELOW 90VDC.
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

LIGHT BLUE: ALL INTRINSICALLY SAFE WIRING
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

BROWN: ALL AC AND DC DRIVE SIGNAL CIRCUITRY, MISCELLANEOUS WIRING.
AWG #18 MINIMUM

YELLOW: ALL INTERFACE WIRING AND EXTERNALLY FED CIRCUITS.
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

GREEN: ALL GROUNDING CONDUCTORS.
AWG #12 MINIMUM FOR MOTOR CIRCUITS
AWG #14 MINIMUM FOR FIELD WIRING
AWG #16 MINIMUM FOR PANEL WIRING

PROVIDE ALL CAT 5e CABLES INTERNAL TO CABINET.

MULTI-CONDUCTOR CABLE: LOW VOLTAGE DC SIGNALS, SHIELDED WHEN NECESSARY. CONDUIT SEPARATION: 480V (MOTORS), 120V (CONTROL), AND LOW VOLTAGE DC SHOULD EACH HAVE THEIR OWN CONDUIT RUN

6. IF THE DESIGNATED CIRCUITS ARE NOT AVAILABLE, THE CONTRACTOR SHALL ENSURE ALL 120V CIRCUITS ARE FED FROM THE SAME POLE/PHASE SO THERE ARE NO VOLTAGES GREATER THAN 120VAC IN THE PANEL.

10. ALL SHIELDED TWISTED PAIR CABLES TO BE GROUNDED ONLY IN CONTROL PANEL.

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL
------- FIELD WIRING
▲ FIELD MOUNTED

ENGINEERING
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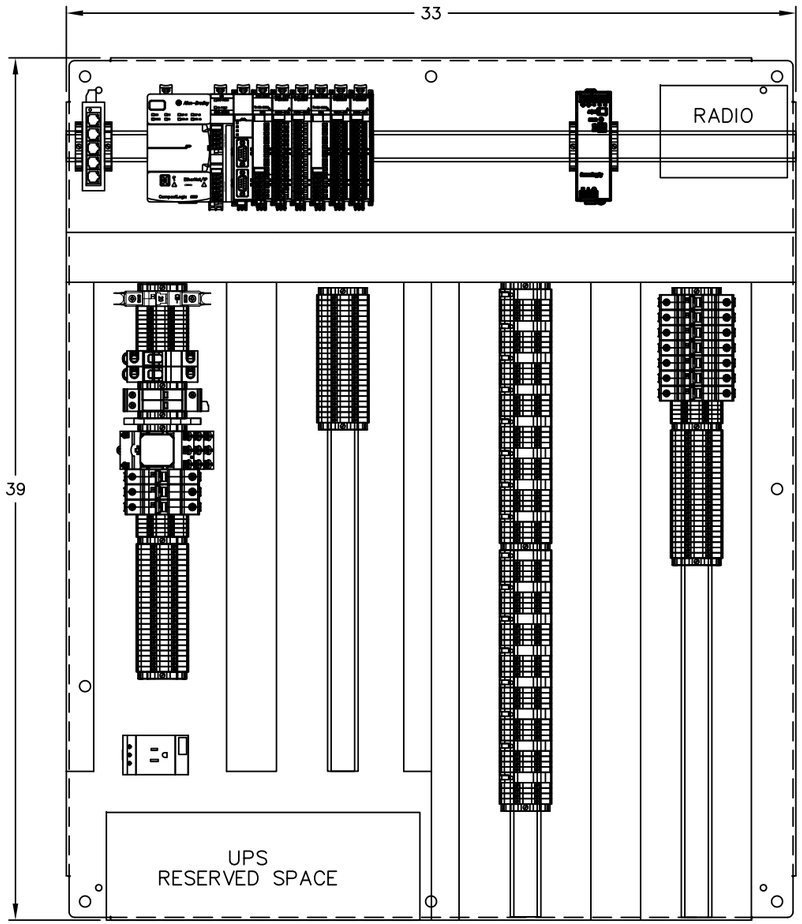
SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

CITY OF MONROE MICHIGAN
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL LAYOUT & NOTES - INSTALLATION

DRAWN TLP	SCALE NONE	SHEET NO. 2 of 12	DWG NO. E-2
CHECKED -	DATE 09/30/2021		



SUBPANEL FRONT
VIEW

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PAC# MONWTP2102

LEGEND

INTERNAL PANEL WIRING — PANEL TERMINAL
FIELD WIRING
▲ FIELD MOUNTED

ENGINEERING
AUTOMATION & CONTROLS ENGINEERS
3608 Sterns Road
Lambertville, MI 48144
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CITY OF MONROE MICHIGAN
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL LAYOUT & NOTES – INSTALLATION

SYM	DATE	REVISIONS	BY
B	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN BLT | SCALE NONE | SHEET NO. 2 of 12 | DWG NO. E-3
CHECKED – | DATE 09/30/2021

TB1					TB2					TB3					TB4					TB4 (CONTINUED)					TB5			
ITEM #	TAG	MFR	PART #		ITEM #	TAG	MFR	PART #		ITEM #	TAG	MFR	PART #		ITEM #	TAG	MFR	PART #		ITEM #	TAG	MFR	PART #		ITEM #	TAG	MFR	PART #
40		A-B	1492-EAJ35		40		A-B	1492-EAJ35		40		A-B	1492-EAJ35		40		A-B	1492-EAJ35		42	FU-0602	A-B	1492-J8FB124		40		A-B	1492-EAJ35
22	NET-0133	A-B	1783-US8T		13	CB-0101	A-B	1489-M1C200		36	O:3/00	A-B	1492-J4		42	FU-0502	A-B	1492-J8FB124		36	I:5/00+	A-B	1492-J4		14	CB-0129	A-B	1492-SPM1C020
40		A-B	1492-EAJ35		36	01012	A-B	1492-J4		36	O:3/01	A-B	1492-J4		36	I:4/00+	A-B	1492-J4		36	I:5/00-	A-B	1492-J4		14	CB-0130	A-B	1492-SPM1C020
24	PLC RACK 0	A-B	5069-L306ER		36	01012	A-B	1492-J4		36	O:3/02	A-B	1492-J4		36	I:4/00-	A-B	1492-J4		36	01282	A-B	1492-J4		14	CB-0131	A-B	1492-SPM1C020
26		A-B	5069-SERIAL		36	01012	A-B	1492-J4		36	O:3/03	A-B	1492-J4		36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		14	CB-0132	A-B	1492-SPM1C020
30		A-B	5069-FPD		36	01012	A-B	1492-J4		36	O:3/04	A-B	1492-J4		41	PE	A-B	1492-JG4		42	FU-0607	A-B	1492-J8FB124		14	CB-0133	A-B	1492-SPM1C020
32		A-B	5069-IA16		36	01012	A-B	1492-J4		36	O:3/05	A-B	1492-J4		42	FU-0507	A-B	1492-J8FB124		36	I:5/01+	A-B	1492-J4		14	CB-0134	A-B	1492-SPM1C020
27		A-B	5069-OA16		41	PE	A-B	1492-JG4		36	O:3/06	A-B	1492-J4		36	I:4/01+	A-B	1492-J4		36	I:5/01-	A-B	1492-J4		14	CB-0135	A-B	1492-SPM1C020
30		A-B	5069-FPD		41	PE	A-B	1492-JG4		36	O:3/07	A-B	1492-J4		36	I:4/01-	A-B	1492-J4		36	01282	A-B	1492-J4		36	01282	A-B	1492-J4
28		A-B	5069-IF8		41	PE	A-B	1492-JG4		36	O:3/08	A-B	1492-J4		36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		36	01282	A-B	1492-J4
28		A-B	5069-IF8		41	PE	A-B	1492-JG4		36	O:3/09	A-B	1492-J4		41	PE	A-B	1492-JG4		42	FU-0612	A-B	1492-J8FB124		36	01282	A-B	1492-J4
29		A-B	5069-OF8		41	PE	A-B	1492-JG4		36	O:3/10	A-B	1492-J4		42	FU-0512	A-B	1492-J8FB124		36	I:5/02+	A-B	1492-J4		36	01282	A-B	1492-J4
40		A-B	1492-EAJ35		44	FU-0103	A-B	1492-FB1C30-L		36	O:3/11	A-B	1492-J4		36	I:4/02+	A-B	1492-J4		36	I:5/02-	A-B	1492-J4		36	01282	A-B	1492-J4
21	PS-125	A-B	1606-XLB240E		44	FU-0110	A-B	1492-FB1C30-L		36	O:3/12	A-B	1492-J4		36	I:4/02-	A-B	1492-J4		36	01282	A-B	1492-J4		40		A-B	1492-EAJ35
40		A-B	1492-EAJ35		40		A-B	1492-EAJ35		36	O:3/13	A-B	1492-J4		36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		36	O:6/00+	A-B	1492-J4
N/A	RTU-132	?	?		10	SPD-0110	PHOENIX	2905348		36	O:3/14	A-B	1492-J4		41	PE	A-B	1492-JG4		42	FU-0617	A-B	1492-J8FB124		36	O:6/00-	A-B	1492-J4
					40		A-B	1492-EAJ35		36	O:3/15	A-B	1492-J4		42	FU-0517	A-B	1492-J8FB124		36	I:5/03+	A-B	1492-J4		41	PE	A-B	1492-JG4
					15	CR-0111	A-B	700-HLT1U1		36	01162	A-B	1492-J4		36	I:4/03+	A-B	1492-J4		36	I:5/03-	A-B	1492-J4		36	O:6/01+	A-B	1492-J4
					40		A-B	1492-EAJ35		36	01162	A-B	1492-J4		36	I:4/03-	A-B	1492-J4		36	01282	A-B	1492-J4		36	O:6/01-	A-B	1492-J4
					18	CR-0116	A-B	700-HN153		36	01162	A-B	1492-J4		36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		41	PE	A-B	1492-JG4
					14	CB-0118	A-B	1492-SPM1C020		36	01162	A-B	1492-J4		41	PE	A-B	1492-JG4		42	FU-0627	A-B	1492-J8FB124		36	O:6/02+	A-B	1492-J4
					14	CB-0119	A-B	1492-SPM1C020		36	01162	A-B	1492-J4		42	FU-0527	A-B	1492-J8FB124		36	I:5/04+	A-B	1492-J4		36	O:6/02-	A-B	1492-J4
					14	CB-0125	A-B	1492-SPM1C020		36	01162	A-B	1492-J4		36	I:4/04+	A-B	1492-J4		36	I:5/04-	A-B	1492-J4		41	PE	A-B	1492-JG4
					36	01162	A-B	1492-J4		36	01162	A-B	1492-J4		36	I:4/04-	A-B	1492-J4		36	01282	A-B	1492-J4		36	O:6/03+	A-B	1492-J4
					36	01162	A-B	1492-J4		36	01162	A-B	1492-J4		36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		36	O:6/03-	A-B	1492-J4
					36	01162	A-B	1492-J4		40		A-B	1492-EAJ35		41	PE	A-B	1492-JG4		42	FU-0632	A-B	1492-J8FB124		41	PE	A-B	1492-JG4
					36	01162	A-B	1492-J4							42	FU-0532	A-B	1492-J8FB124		36	I:5/05+	A-B	1492-J4		36	O:6/04+	A-B	1492-J4
					36	01162	A-B	1492-J4							36	I:4/05+	A-B	1492-J4		36	I:5/05-	A-B	1492-J4		36	O:6/04-	A-B	1492-J4
					40		A-B	1492-EAJ35							36	I:4/05-	A-B	1492-J4		36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4
					36	01181	A-B	1492-J4							36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		36	O:6/05+	A-B	1492-J4
					36	01181	A-B	1492-J4							41	PE	A-B	1492-JG4		42	FU-0637	A-B	1492-J8FB124		36	O:6/05-	A-B	1492-J4
					36	01181	A-B	1492-J4							42	FU-0537	A-B	1492-J8FB124		36	I:5/06+	A-B	1492-J4		41	PE	A-B	1492-JG4
					36	01181	A-B	1492-J4							36	I:4/06+	A-B	1492-J4		36	I:5/06-	A-B	1492-J4		36	O:6/06+	A-B	1492-J4
					36	01181	A-B	1492-J4							36	I:4/06-	A-B	1492-J4		36	01282	A-B	1492-J4		36	O:6/06-	A-B	1492-J4
					36	01181	A-B	1492-J4							36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4		41	PE	A-B	1492-JG4
					36	01181	A-B	1492-J4							41	PE	A-B	1492-JG4		42	FU-0642	A-B	1492-J8FB124		36	O:6/07+	A-B	1492-J4
					36	01181	A-B	1492-J4							42	FU-0542	A-B	1492-J8FB124		36	I:5/07+	A-B	1492-J4		36	O:6/07-	A-B	1492-J4
					36	I:2/00	A-B	1492-J4							36	I:4/07+	A-B	1492-J4		36	I:5/07-	A-B	1492-J4		41	PE	A-B	1492-JG4
					36	I:2/01	A-B	1492-J4							36	I:4/07-	A-B	1492-J4		36	01282	A-B	1492-J4		40		A-B	1492-EAJ35
					36	I:2/02	A-B	1492-J4							36	01282	A-B	1492-J4		41	PE	A-B	1492-JG4					
					36	I:2/03	A-B	1492-J4							41	PE	A-B	1492-JG4		40		A-B	1492-EAJ35					
					36	I:2/04	A-B	1492-J4							40		A-B	1492-EAJ35										
					36	I:2/05	A-B	1492-J4																				
					36	I:2/06	A-B	1492-J4																				
					36	I:2/07	A-B	1492-J4																				
					36	I:2/08	A-B	1492-J4																				
					36	I:2/09	A-B	1492-J4																				
					36	I:2/10	A-B	1492-J4																				
					36	I:2/11	A-B	1492-J4																				
					36	I:2/12	A-B	1492-J4																				
					36	I:2/13	A-B	1492-J4																				
					36	I:2/14	A-B	1492-J4																				
					36	I:2/15	A-B	1492-J4																				
					40		A-B	1492-EAJ35																				
					11	REC-0114	PHOENIX	804155																				

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL
------- FIELD WIRING
▲ FIELD MOUNTED

AUTOMATION & CONTROLS ENGINEERS
3608 Sterns Road
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(734) 708-4PAC
www.pac-llc.com

CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
TERMINAL BLOCK LAYOUT

SYM	DATE	REVISIONS	BY
B	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN BLT | SCALE NONE | SHEET NO. 4 of 12 | DWG NO. E-4
CHECKED – | DATE 09/30/2021

Item	Qty	Description	MFR	Product
1	1	SAGINAW - ENCLOSURE (42" X 36" X 12", NEMA 4, 3-POINT LATCH)	SAGINAW	SCE-42EL3612LPPL
2	1	SAGINAW - SUB-PANEL (39" X 33", PAINTED WHITE)	SAGINAW	SCE-42P36
3	1	LED Light, 15 in.	NVENT HOFFMAN	LED24V15
4	1	250 AC / 48 DC Touch-Safe UL Light Switch	NVENT HOFFMAN	LDSWITCH
5	1	GRACEPORT - RJ-45 F/F, NEMA 12/4 & IP-65 , 120VAC Duplex , NO CB	GRACE ENGINEERING	P-R2-K2RF0
6	2	Panduct® type F narrow slot wiring duct, 1" W x 4" H, 6' length, PVC, white.	PANDUIT	F1X4WH6
7	1	Panduct® type F narrow slot wiring duct, 2" W x 4" H, 6' length, PVC, white.	PANDUIT	F2X4WH6
8	1	Duct cover, 1" W x 6' length, PVC, white.	PANDUIT	C1WH6
9	1	Duct cover, 2" W x 6' length, PVC, white.	PANDUIT	C2WH6
10	1	PHOENIX CONTACT - SURGE PROTECTOR (120V, TYPE 2)	PHOENIX CONTACT	2905348
11	1	PHOENIX CONTACT - RECEPTACLE (SIMPLEX, 120V, 15A)	PHOENIX CONTACT	0804155
12	1	APC - UPS (950VA, 120V, NEMA OUTLETS)	APC	BKV950M2
13	1	Bulletin 1489-M Thermal-magnetic Circuit Breakers	ALLEN-BRADLEY	1489-M1C200
14	10	Bulletin 1492-SPM Supplemental Circuit Breaker, 1-Pole, Trip Curve C, 2A, No Neutral	ALLEN-BRADLEY	1492-SPM1C020
15	1	700-HL Electromechanical Relay Output, SPDT (1 C/O)	ALLEN-BRADLEY	700-HLT1U1
16	1	Replacement Relay, SPDT (1 C/O), 48V, 110/125V, 120/125V, 220-240V, 240V, Pkg. Qty. of 20	ALLEN-BRADLEY	700-TBR60
17	1	700-HB RELAY, 15 Amp, 3PDT, 120V 50/60Hz, Pilot Light	ALLEN-BRADLEY	700-HB33A1-4
18	1	700-H RELAY BASE (Touch Safe Screw Terminals)	ALLEN-BRADLEY	700-HN153
19	1	700-H RELAY Surge Suppressor (110...240VAC, LED)	ALLEN-BRADLEY	700-AV3R
20	1	700-H RELAY RETAINER CLIP	ALLEN-BRADLEY	700-HN158
21	1	Power Supply, 24-28V DC, 240 W, 90-264V AC Input Voltage	ALLEN-BRADLEY	1606-XLB240E
22	1	ETHERNET Switch, Unmanaged, 8 Copper Ports	ALLEN-BRADLEY	1783-US8T
23	1	PanelView Plus 7 Standard Terminal, Touch Screen	ALLEN-BRADLEY	2711P-T7C21D8S
24	1	Controller, CompactLogix 5380, 600 KB User Memory, 8 I/Os, 16 EtherNet/IP Devices	ALLEN-BRADLEY	5069-L306ER
25	2	5069 Compact I/O Power terminal RTB kit for both 4 and 6 pin Screw type	ALLEN-BRADLEY	5069-RTB64-SCREW
26	1	Compact 5000 Serial Interface Module	ALLEN-BRADLEY	5069-SERIAL
27	1	5069 Compact I/O 16 Channel 120VAC Output Module	ALLEN-BRADLEY	5069-OA16
28	2	5069 Compact I/O 8 Channel Voltage/Current Analog Input Module	ALLEN-BRADLEY	5069-IF8
29	1	5069 Compact I/O 8 Channel Voltage/Current Analog Output Module	ALLEN-BRADLEY	5069-OF8
30	2	5069 Compact I/O Field Potential Distributor Module	ALLEN-BRADLEY	5069-FPD
31	2	5069 Compact I/O 6 pin Screw type RTB packed kit in a pack of 1pcs	ALLEN-BRADLEY	5069-RTB6-SCREW
32	1	5069 Compact I/O 16 channels AC input modules, supporting both 120 & 240 VAC signals	ALLEN-BRADLEY	5069-IA16
33	5	5069 Compact I/O 18 pins Screw type terminal block kit in a pack of 1 pcs	ALLEN-BRADLEY	5069-RTB18-SCREW
34	1	DIN Mounting Rail, Zinc Plated, Chromated Steel, 35mm x 7.5mm DIN Rail, 1 Meter (Pkg. Qty. 10)	ALLEN-BRADLEY	199-DR1
35	3	DIN Mounting Rail, Aluminum, 35mm x 7.5mm x 57.4mm Raised DIN Rail, 1 Meter (Pkg. Qty. 2)	ALLEN-BRADLEY	1492-DR6
36	100	Terminal Block	ALLEN-BRADLEY	1492-J4
37	1	1492 Terminal Block Accessories Screw Driver with hardened 3mm diameter blade	ALLEN-BRADLEY	1492-N90
38	20	1492 Terminal Block Accessories End Barrier , Grey (Standard), Qty. 50	ALLEN-BRADLEY	1492-EBJ3
39	5	1492 Terminal Block Accessories Screw Center Jumper , 5 mm Center to Center , 10 Pole , Gray ,	ALLEN-BRADLEY	1492-CJJ5-10
40	20	1492 Terminal Block Accessories End Anchor, End Anchor	ALLEN-BRADLEY	1492-EAJ35
41	50	Ground TERMINAL Block	ALLEN-BRADLEY	1492-JG4
42	16	Fuse Block (1/4 x 1 1/4" Fuses, 24VDC)	ALLEN-BRADLEY	1492-J6FB124
43	25	FUSE (FAST ACTING, 1/2AMP, 1/4" x 1-1/4", GLASS TUBE)	EATON BUSSMANN	AGC-1/2-R
44	2	FUSE BLOCK (CLASS CC, 1-POLE, 30A, 100-600V AC/DC, INDICATING)	ALLEN-BRADLEY	1492-FB1C30-L
45	2	FUSE (CLASS CC, CURRENT LIMITING, TIME DELAY, 3AMP)	EATON BUSSMANN	LP-CC-3
46	2	FUSE (CLASS CC, CURRENT LIMITING, TIME DELAY, 15AMP)	EATON BUSSMANN	LP-CC-15

NAMEPLATE LEGEND

MARK	LINE 1	LINE 2	LINE 3	COLOR	SIZE (INCHES)
				WHITE/BLK LTR	3 x 4
A	PAC ENGINEERING LLC	3608 Sterns Road	Lambertville, MI 48144		
	Phone 734-708-4722	WWW.PAC-LLC.COM			
				WHITE/BLK LTR	A/R
B	CITY OF MONROE	WATER TREATMENT PLANT	SOUTH CUSTER PUMP STATION		

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL
------- FIELD WIRING
▲ FIELD MOUNTED

ENGINEERING
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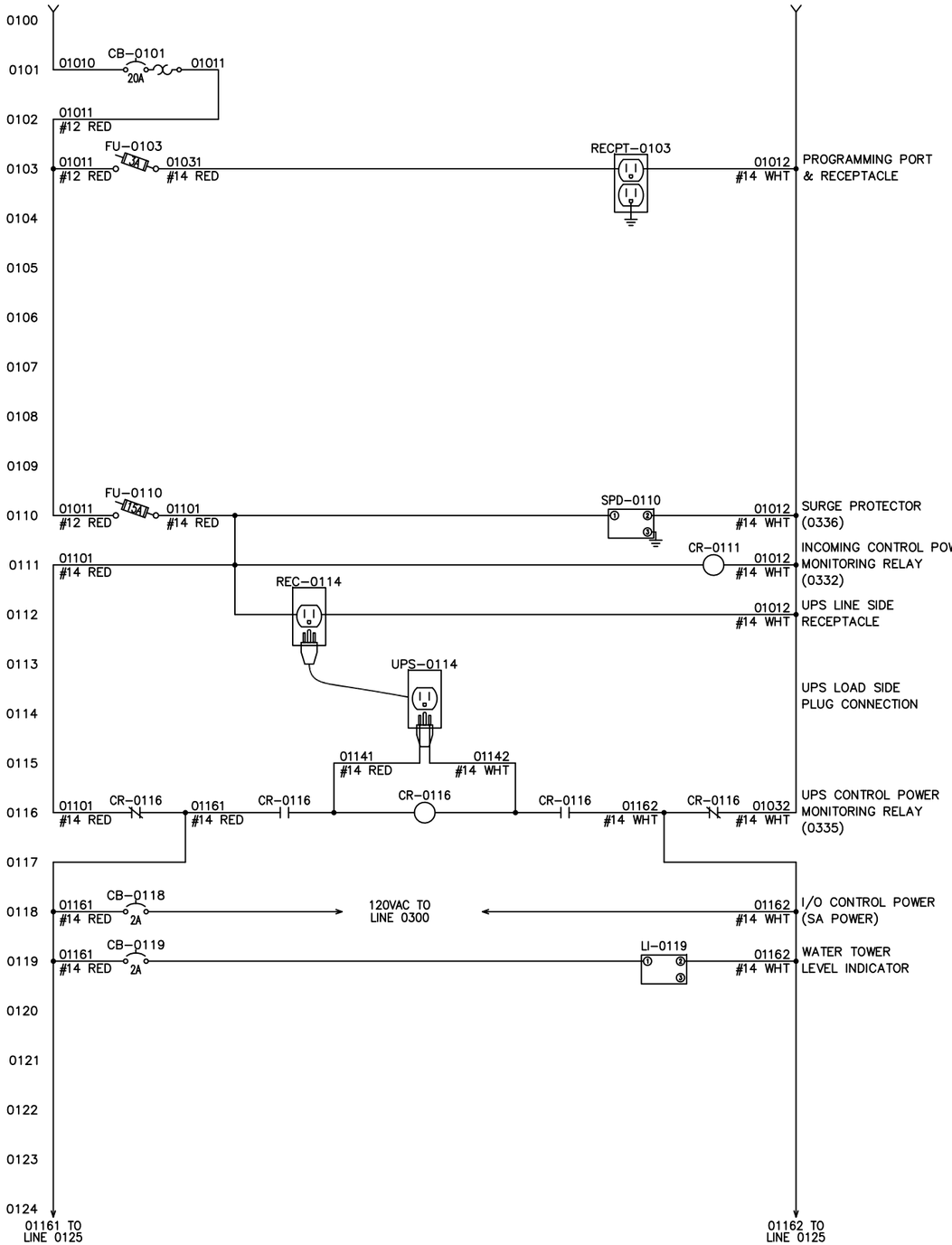
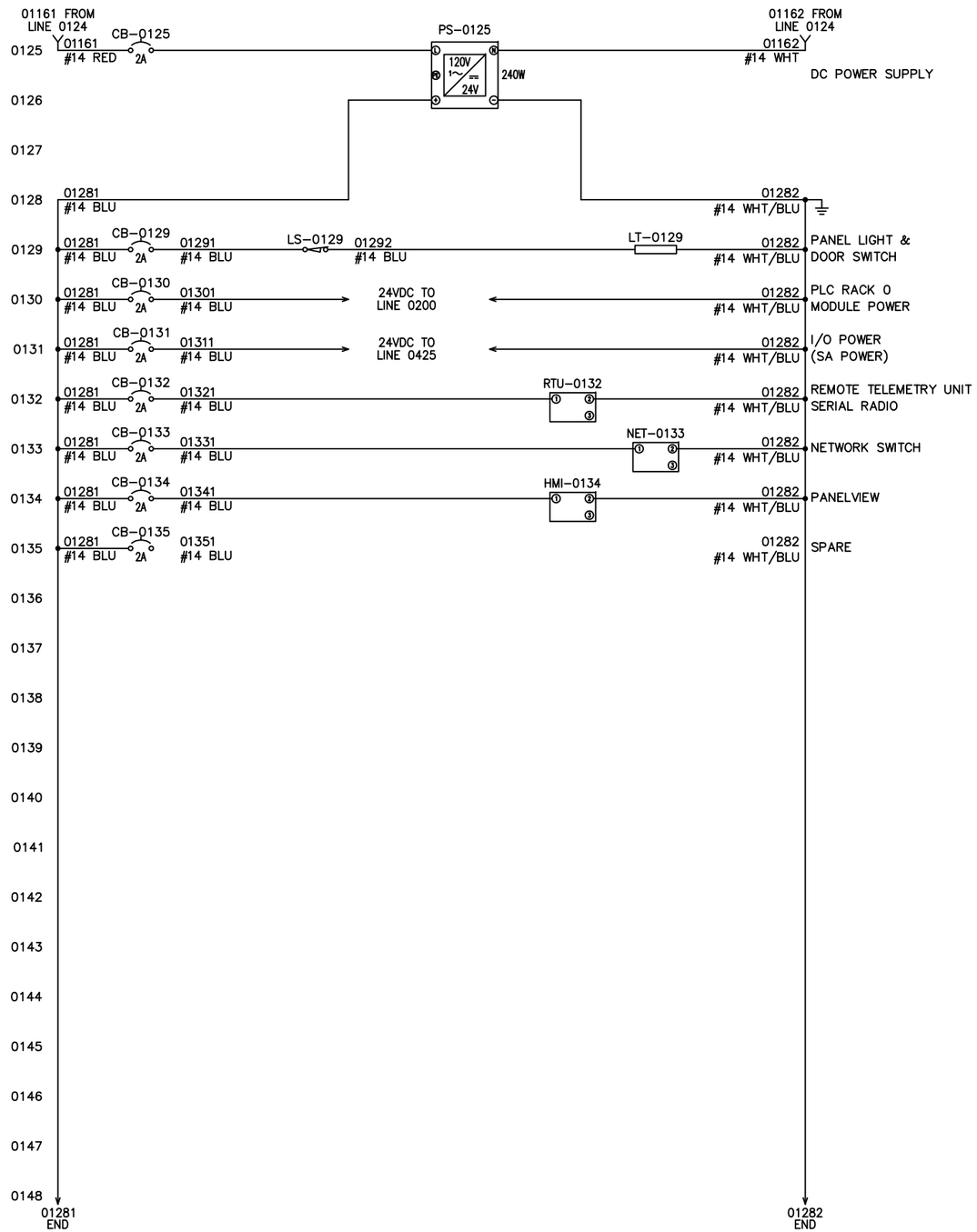
www.pac-llc.com

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

CITY OF MONROE MICHIGAN
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
LIST OF MATERIALS & NAMEPLATE LEGEND

DRAWN TLP | SCALE NONE | SHEET NO. 5 of 12 | DWG NO. E-5
CHECKED – | DATE 09/30/2021





○ NEW PANEL TERMINAL

□ OLD PANEL TERMINAL

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL

------- FIELD WIRING

▲ FIELD MOUNTED

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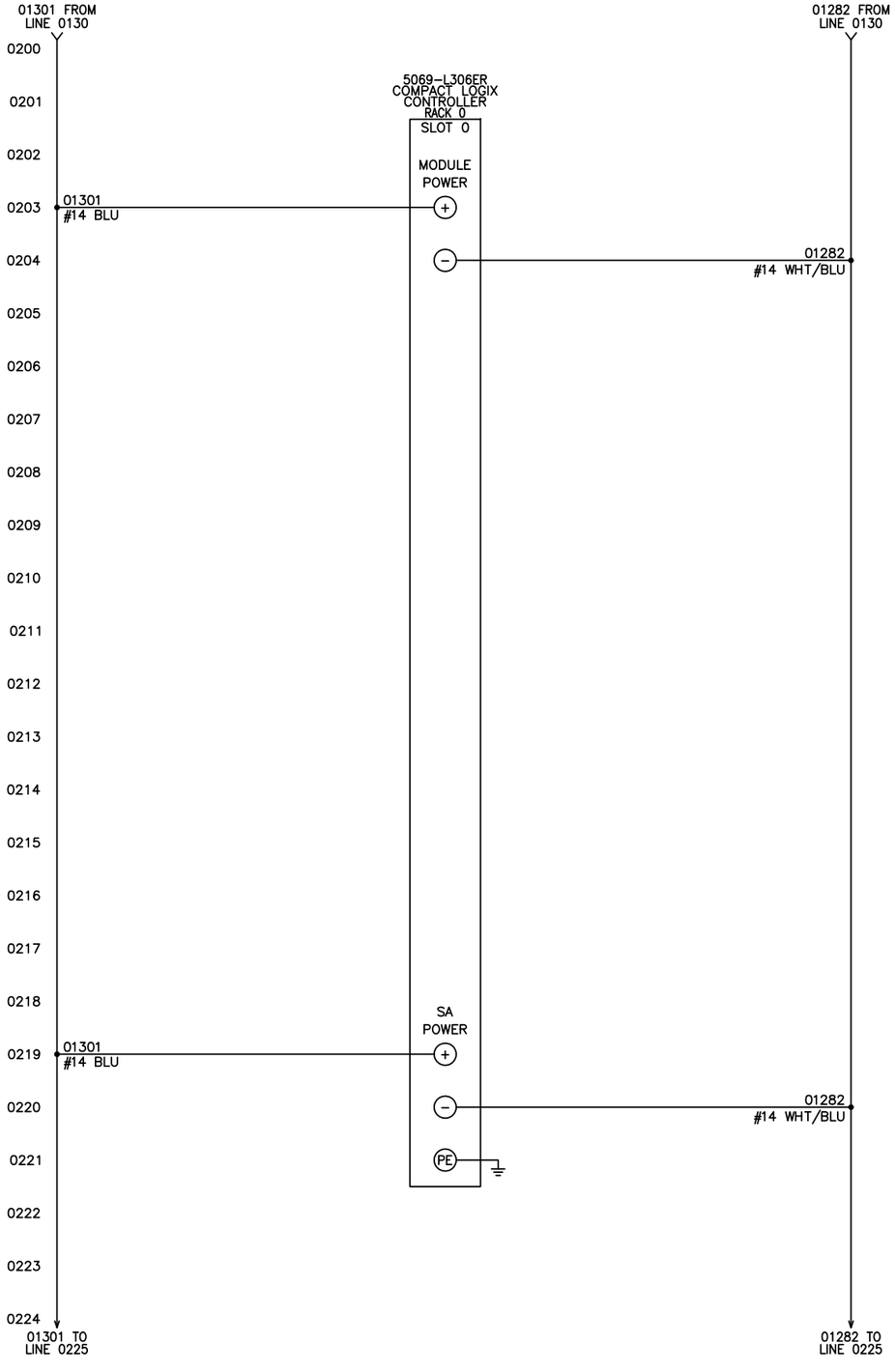
CITY OF MONROE MICHIGAN

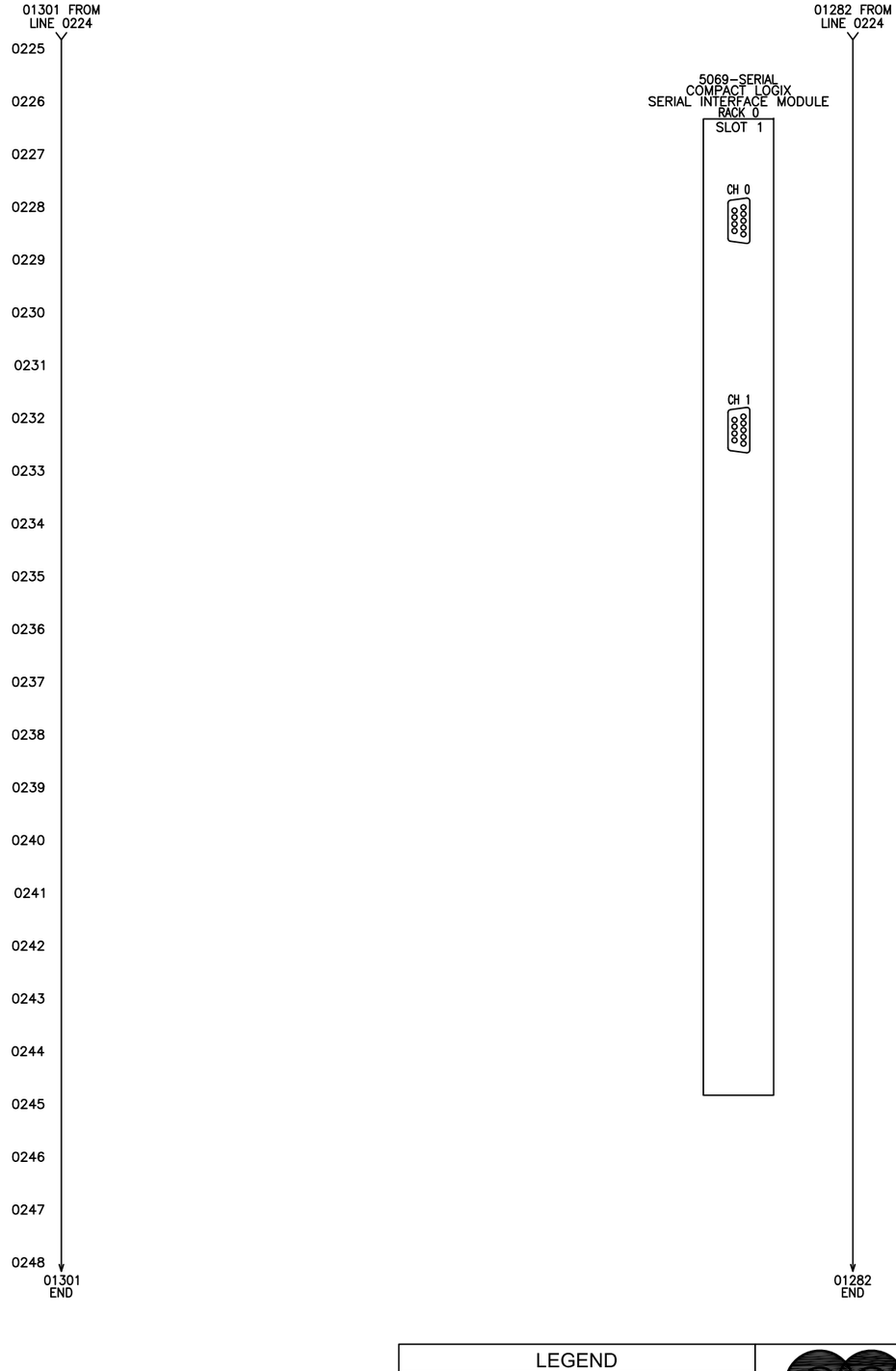
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 1 OF 6

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN *TLP* | SCALE NONE | SHEET NO. 6 of 12 | DWG NO. *E–6*

CHECKED – | DATE 09/30/2021





○ NEW PANEL TERMINAL

□ OLD PANEL TERMINAL

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL

------- FIELD WIRING

▲ FIELD MOUNTED

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CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 2 OF 6

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN TLP | SCALE No Scale | SHEET NO. 7 of 12 | DWG NO. E-7
CHECKED – | DATE 09/30/2021

01181 FROM LINE 0118

0300
0301
0302
0303
0304
0305
0306
0307
0308
0309
0310
0311
0312
0313
0314
0315
0316
0317
0318
0319 01181 #14 RED
0320
0321
0322
0323
0324 01181 TO LINE 0325

5069-FPD COMPACT LOGIX FIELD POWER DISTRIBUTOR RACK 0
SLOT N/A

SA POWER
(+)
(−) 01162 #14 WHT
(PE)

01162 FROM LINE 0118

01162 TO LINE 0325

01181 FROM LINE 0324

0325
0326
0327
0328 01181 #14 RED — R11091 — MCC-1 VFD-1 R1I2000
0329 01181 #14 RED — R11091 — MCC-1 VFD-2 R1I2001
0330 01181 #14 RED — R11091 — MCC-1 VFD-1 R1I2002
0331 01181 #14 RED — R11091 — MCC-1 VFD-2 R1I2003
0332 01181 #14 RED — R11091 — R1I2005
0333 01181 #14 RED — CR-0111
0334 01181 #14 RED — SPD-0110
0335 01181 #14 RED — CR-0116
0336
0337
0338
0339
0340
0341
0342
0343 01181 #14 RED — DS-W1
0344 DS-W2
0345 DS-E1
0346 DS-E2
0347 DS-LAV
0348 01181 TO LINE 0400

5069-IA16 COMPACT LOGIX 120V AC INPUT RACK 0
SLOT 2

I:2/00 #14 RED	I00 (0)	BOOSTER PUMP #1 RUNNING
I:2/01 #14 RED	I01 (1)	BOOSTER PUMP #2 RUNNING
I:2/02 #14 RED	I02 (2)	BOOSTER PUMP #1 FAULTED
I:2/03 #14 RED	I03 (3)	BOOSTER PUMP #2 FAULTED
I:2/04 #14 RED	I04 (4)	CHLORINE ALARM
I:2/05 #14 RED	I05 (5)	CONTROL PANEL LINE POWER ON
I:2/06 #14 RED	I06 (6)	SURGE PROTECTOR STATUS OK
I:2/07 #14 RED	I07 (7)	CONTROL PANEL UPS POWER ON
I:2/08 #14 RED	I08 (8)	SPARE
I:2/09 #14 RED	I09 (9)	SPARE
I:2/10 #14 RED	I10 (10)	SPARE
I:2/11 #14 RED	I11 (11)	SPARE
I:2/12 #14 RED	I12 (12)	SPARE
I:2/13 #14 RED	I13 (13)	SPARE
I:2/14 #14 RED	I14 (14)	SPARE
I:2/15 #14 RED	I15 (15)	DOOR ENTRY ALARM WEST 1 & 2 EAST 1 & 2 LAVATORY
	N/C (16)	
	N/C (17)	

01162 FROM LINE 0324

01162 TO LINE 0400

○ NEW PANEL TERMINAL
□ OLD PANEL TERMINAL

PAC# MONWTP2102

LEGEND
——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL
------- FIELD WIRING
▲ FIELD MOUNTED

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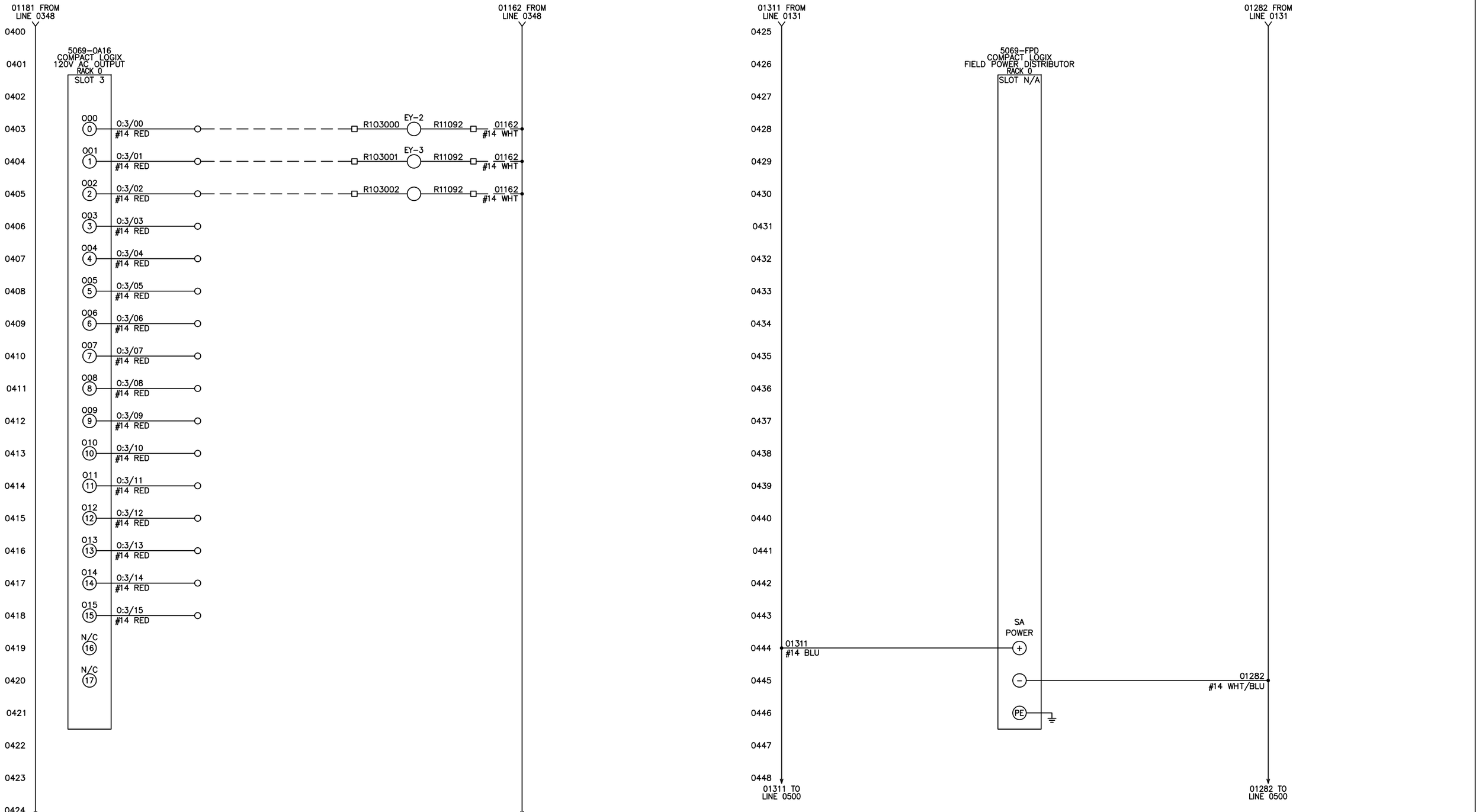
CITY OF MONROE MICHIGAN
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 3 OF 6

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN TLP | SCALE No Scale | SHEET NO. 8 of 12 | DWG NO. E-8
CHECKED – | DATE 09/30/2021



○ NEW PANEL TERMINAL

□ OLD PANEL TERMINAL

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL

- - - - - - - FIELD WIRING

▲ FIELD MOUNTED

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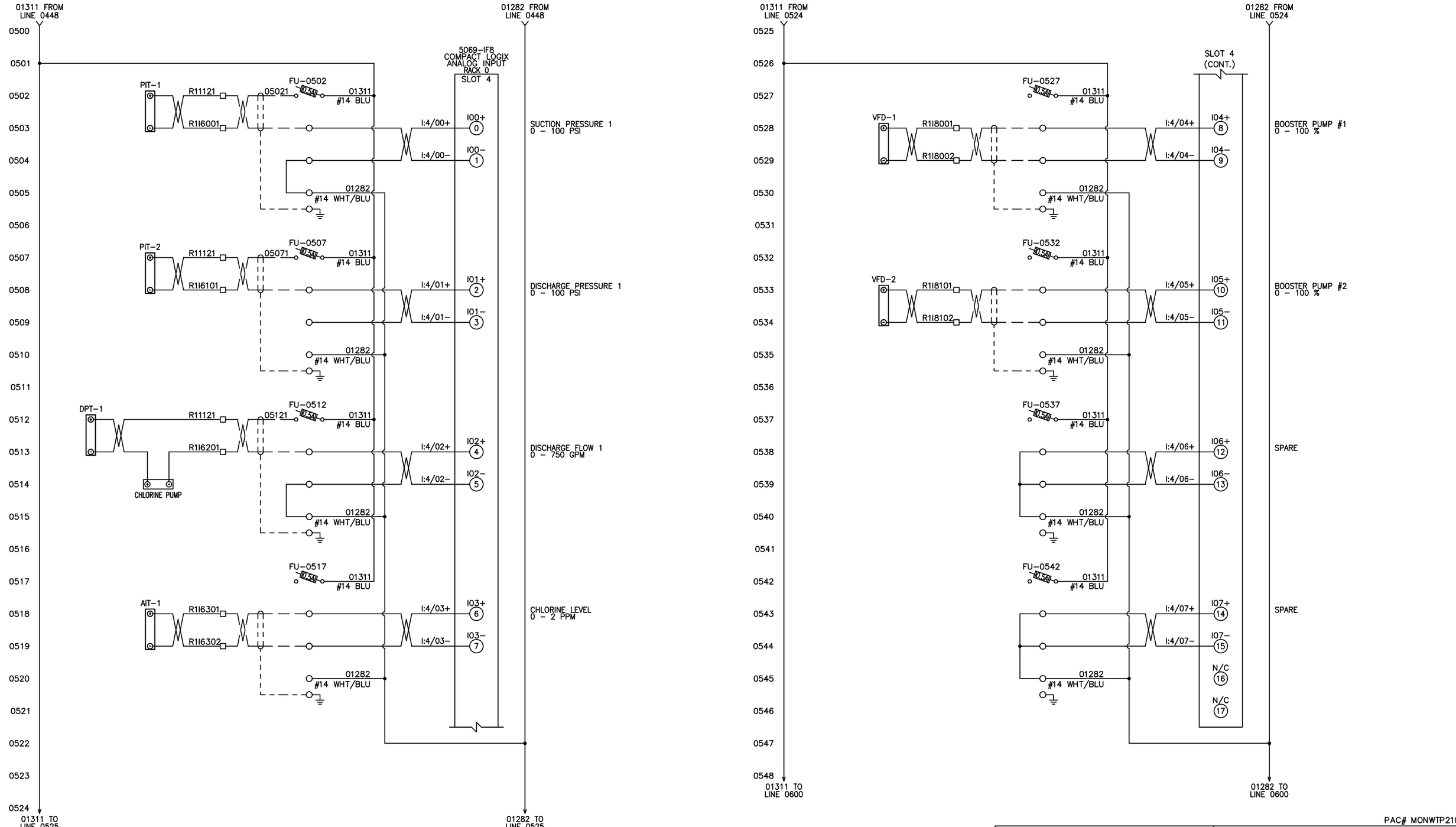
CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 4 OF 6

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN TLP | SCALE No Scale | SHEET NO. 9of12 | DWG NO. E-9
CHECKED – | DATE 09/30/2021



PAC# MONWTP2102

LEGEND

- INTERNAL PANEL WIRING
- PANEL TERMINAL
- FIELD WIRING
- FIELD MOUNTED

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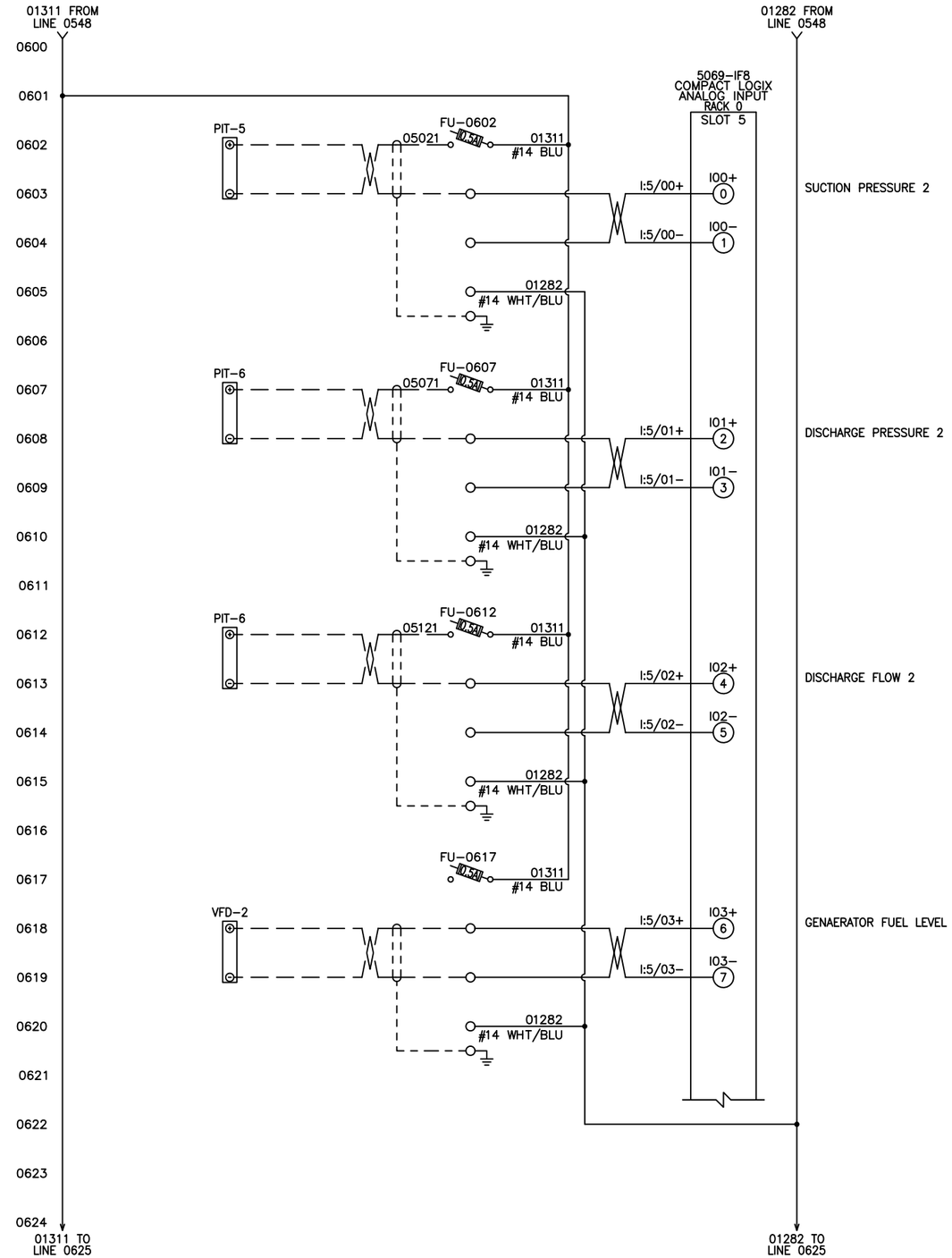
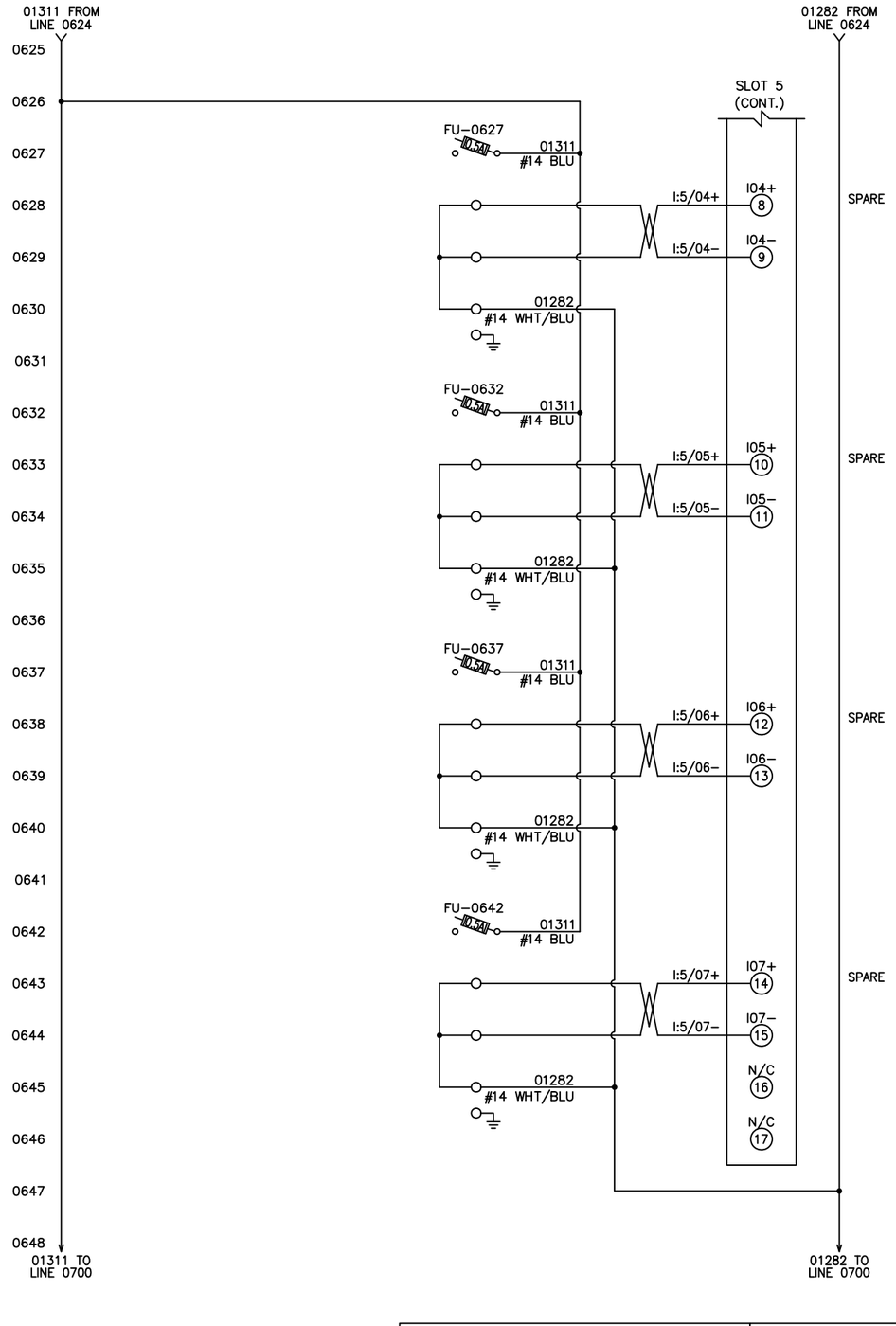
CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 5 OF 7

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN TLP | SCALE No Scale | SHEET NO. 10 of 12 | DWG NO. E-10
CHECKED – | DATE 09/30/2021





○ NEW PANEL TERMINAL

□ OLD PANEL TERMINAL

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL

------- FIELD WIRING

▲ FIELD MOUNTED

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CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 6 OF 7

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN TLP | CHECKED – | SCALE No Scale | DATE 09/30/2021 | SHEET NO. 11 of 12 | DWG NO. E-11

01311 FROM LINE 0648

5069-OF8 COMPACT LOGIX ANALOG OUTPUT RACK 0 SLOT 6

000+ (0) 0:6/00+ — R107001 — VFD-1
000- (1) 0:6/00- — R107002

01282 FROM LINE 0648

BOOSTER PUMP 1 SPEED FEEDBACK
0 - 100 %

001+ (2) 0:6/01+ — R107101 — VFD-2
001- (3) 0:6/01- — R107102

BOOSTER PUMP 2 SPEED FEEDBACK
0 - 100 %

002+ (4) 0:6/02+ — LI-0119
002- (5) 0:6/02-

MAYBEE ELEVATED TANK LEVEL
0 - 32.5 FT

003+ (6) 0:6/03+ — ? — CLP
003- (7) 0:6/03- — ?

CHLORINE SETPOINT

01311 TO LINE 0725

01282 TO LINE 0725

01311 FROM LINE 0724

SLOT 6 (CONT.)

004+ (8) 0:6/04+
004- (9) 0:6/04-

01282 FROM LINE 0724

SPARE

005+ (10) 0:6/05+
005- (11) 0:6/05-

SPARE

006+ (12) 0:6/06+
006- (13) 0:6/06-

SPARE

007+ (14) 0:6/07+
007- (15) 0:6/07-

SPARE

N/C (16)
N/C (17)

01311 END

01282 END

○ NEW PANEL TERMINAL
□ OLD PANEL TERMINAL

PAC# MONWTP2102

LEGEND

——— INTERNAL PANEL WIRING ⊘ PANEL TERMINAL
------- FIELD WIRING
▲ FIELD MOUNTED

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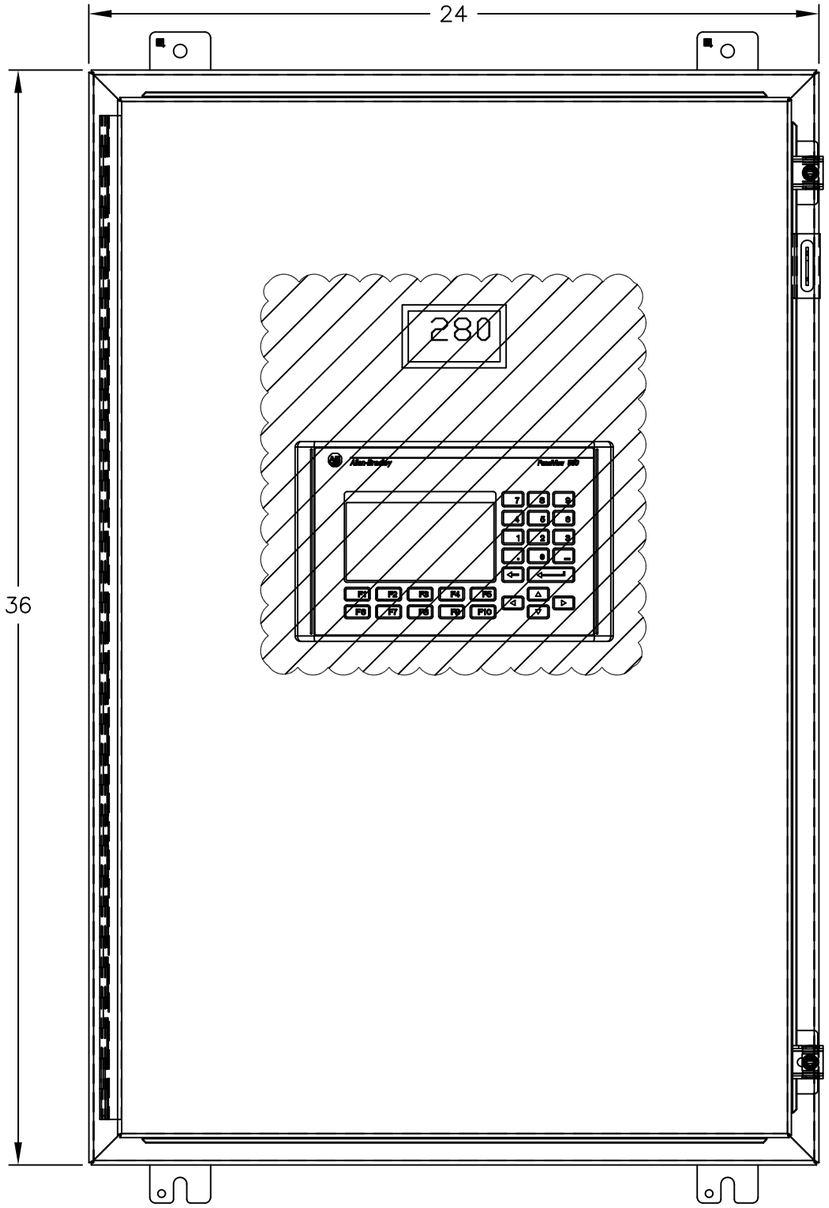
CITY OF MONROE MICHIGAN

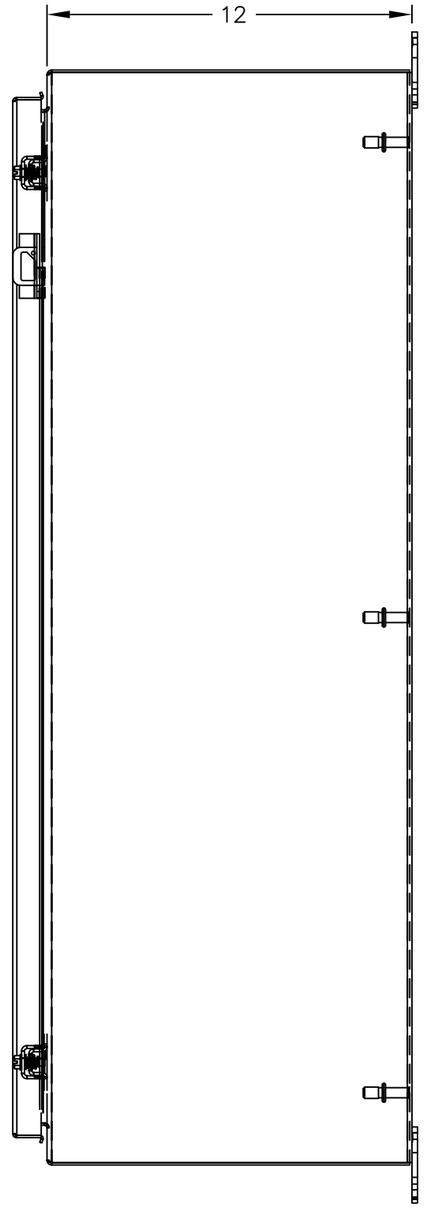
WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL WIRING 7 OF 7

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN *TLP* | SCALE No Scale | SHEET NO. *12 of 12* | DWG NO. *E-12*
CHECKED – | DATE 09/30/2021



FRONT VIEW



SIDE VIEW

PAC# MONWTP2102

FOR DEMOLITION

NOTE: HATCHED AREAS INDICATE EQUIPMENT TO BE REMOVED.

LEGEND

- INTERNAL PANEL WIRING
- FIELD WIRING
- FIELD MOUNTED
- PANEL TERMINAL

ENGINEERING
AUTOMATION & CONTROLS ENGINEERS
3608 Sterns Road
Lambertville, MI 48144
(734) 708-4PAC
www.pac-llc.com

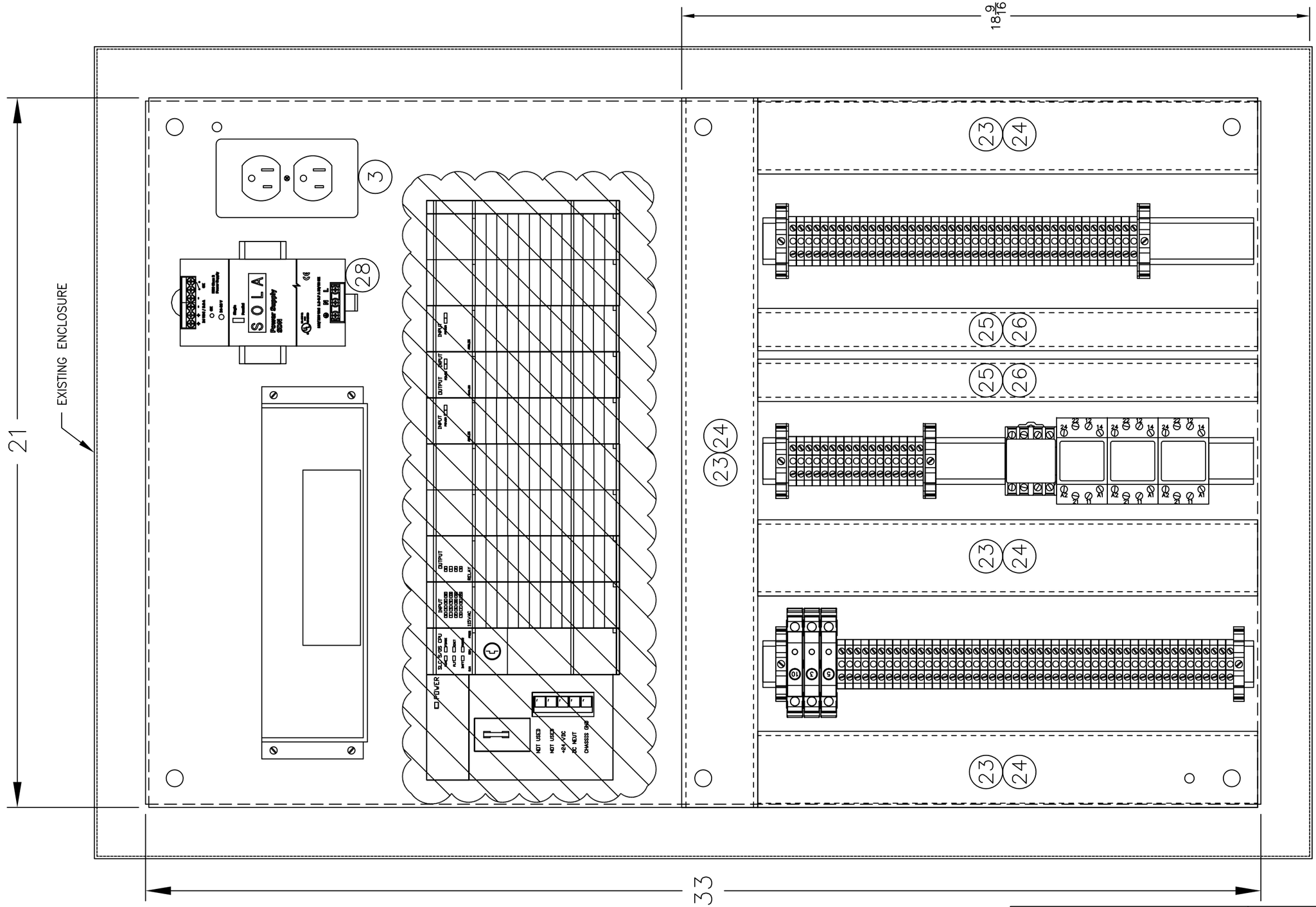
CITY OF MONROE MICHIGAN

WATER TREATMENT PLANT
SOUTH CUSTER PUMP STATION
CONTROL PANEL LAYOUT & NOTES – DEMOLITION

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN *TLP* | SCALE 1:5 | SHEET NO. *1 of 2* | DWG NO. *DEMO-1*
CHECKED – | DATE 09/30/2021

SUBPANEL FRONT VIEW (DEMO)



FOR DEMOLITION

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LEGEND

- INTERNAL PANEL WIRING
- FIELD WIRING
- ▲ FIELD MOUNTED
- ⊘ PANEL TERMINAL

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SUB-PANEL LAYOUT - DEMOLITION

SYM	DATE	REVISIONS	BY
0	05/30/2023	ISSUED FOR FABRICATION	BLT

DRAWN TLP | SCALE 1:4 | SHEET NO. 2 of 2 | DWG NO. DEMO-2
CHECKED - | DATE 09/30/2021