



CAPITAL PROJECTS CONSTRUCTION STANDARDS



Volume 3 of 3
4th Edition
Standard Details
Divisions 1-40

Capital Projects Construction Standards
Volume 3 of 3
4th Edition

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Capital Projects Construction Standards

Volume 3 of 3 – 4th Edition

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33123	STEEL PIPE O-RING JOINTS (CEMENT-MORTAR LINING)
33124	CEMENT-MORTAR COATED STEEL PIPE O-RING JOINTS (LIQUID-EPOXY LINING)
33125	CEMENT-MORTAR COATED STEEL PIPE O-RING JOINTS (CEMENT-MORTAR LINING)
33126	STEEL PIPE TIED JOINT-LAP JOINTS (LIQUID-EPOXY LINING)
33127	STEEL PIPE TIED JOINT-LAP JOINTS (CEMENT-MORTAR LINING)
33128	CEMENT-MORTAR COATED STEEL PIPE TIED JOINT-LAP JOINTS (LIQUID-EPOXY LINING)
33129	CEMENT-MORTAR COATED STEEL PIPE TIED JOINT-LAP JOINTS (CEMENT MORTAR LINING)
33130	POLYURETHANE TO CEMENT-MORTAR TRANSITION
33131	CONCRETE TO STEEL ADAPTER
33132	GROUT COUPLING
33133	GROUT RINGS
33134	HARNESSED DOUBLE BOLTED SLEEVE TYPE COUPLING
33135	SLEEVE COUPLING
33136	MECHANICAL JOINT TIE-IN
33137	INTERNAL JOINT SEAL
33138	PIPE ABANDONMENT PLUG
33140	NON-INSULATED FLANGE LUGS
33141	INSULATED FLANGE LUGS
33142	STUD NUT TIGHTENING SEQUENCE
33143	STUD NUT TIGHTENING SEQUENCE TABLE
33144	LENGTH OF RESTRAINED PIPE
33150	THREADED OUTLET (STEEL PIPE)
33155	SLIPLINE ELEVATION AND SECTION
33156	SLIPLINE WELDED LAP JOINT
33200	WATER DISTRIBUTION SYSTEM TYPICAL LAYOUT
33201	WATER DISTRIBUTION SYSTEM TYPICAL LAYOUT FOR CUL-DE-SAC
33202	WATER DISTRIBUTION SYSTEM TYPICAL LAYOUT FOR CURVED STREETS
33203	TYPICAL QUARTER SECTION HYDRAULIC GRID SYSTEM
33204	TYPICAL PRIVATE STREET SECTION
33205	TYPICAL PUBLIC RIGHT-OF-WAY SECTION
33206	PLAN, PROFILE & LOCATION FOR FIRE HYDRANTS, MAINS, & VALVES
33207	PIPING AT STREET INTERSECTIONS FOR FUTURE CONNECTIONS
33208	DENVER INTERNATIONAL AIRPORT AIRSIDE FIRE HYDRANT ASSEMBLY
33214	DITCH OR CANAL CROSSING
33215	STORM AND SANITARY SEWER CROSSING
33216	OPEN CUT CROSSING OVER OR UNDER CONDUIT OR CONFLICTING UTILITY
33217	BORED CROSSING
33218	BORE CASING DETAIL
33225	TRACER WIRE INSTALLATION FOR PVC WATER MAIN
33226	NON-PROGRAMMABLE MARKER BALL INSTALLATION
33252	RECYCLE WATER SYSTEM PENTAGON OPERATING NUT
33253	POTABLE WATER SYSTEM SQUARE OPERATION NUT
33254	ONE PIECE BUTTSTRAP 20" & SMALLER
33255	20" & SMALLER CLOSURE (STEEL PIPE)
33260	GENERAL METER AND SERVICE NOTES
33261	3" AND LARGER DOMESTIC AND FIRELINE CONNECTION
33262	FIRELINE CONNECTION WITH DOMESTIC SERVICE TAP
33263	NATIONAL FIRE PROTECTION ASSOCIATION 13D RESIDENTIAL SPRINKLER SERVICES
33264	3/4" & 1" SERVICE LINE, STOP BOX, & OUTSIDE METER INSTALLATION
33265	2" AND SMALLER NON-COPPER SERVICE LINE REPLACEMENT

DIVISION 33 – UTILITIES (CONTINUED)

33266	2" & SMALLER NON-COPPER SERVICE LINE REPLACEMENT & INSIDE METER RELOCATION
33267	MANIFOLD SERVICE LINE WITH INDIVIDUAL METER PITS
33268	MANIFOLD SERVICE LINE WITH SHARED ACCESS
33269	OUTSIDE SETTING FOR 3/4" & 1" METER
33270	OUTSIDE SETTING FOR 1 1/2" & 2" METER W/ CHECK VALVE & BYPASS IN MANHOLE
33271	LARGE METER IN VAULT
33272	LARGE METER IN VAULT (IRRIGATION SERVICE ONLY)
33280	OUTSIDE SETTING FOR 2" & SMALLER DOUBLE CHECK VALVE ASSEMBLY IN MANHOLE
33281	OUTSIDE SETTING FOR 2 1/2" TO 10" DOUBLE CHECK VALVE ASSEMBLY IN VAULT
33282	OUTSIDE SETTING FOR 2" & SMALLER REDUCED PRESSURE PRINCIPLE ASSY IN ENCLOSURE
33283	OUTSIDE SETTING FOR 3" & LARGER REDUCED PRESSURE PRINCIPLE ASSY N-TYPE, ABOVE GROUND
33290	STANDARD DESIGN FOR HYDRANT INTERCONNECTION
33291	STANDARD HYDRANT METER INSTALLATION

DIVISION 40 – PROCESS INTERCONNECTIONS

40501	SHIELDED CABLE TERMINATION
40502	DIN RAIL MOUNTING
40503	PANEL WIRING DUCT
40504	ANALOG SIGNAL SHIELD TERMINATIONS
40505	DC RELAY BASE CONFIGURATION
40506	ANALOG INSTRUMENT / TRANSMITTER SCHEMATICS
40507	TYPICAL DISCRETE INPUT WIRING DIAGRAM
40508	TYPICAL DISCRETE OUTPUT WIRING DIAGRAM
40509	TYPICAL ANALOG INPUT WIRING DIAGRAM
40510	TYPICAL ANALOG OUTPUT WIRING DIAGRAM
40511	YAGI ANTENNA MOUNTING
40512	EXHAUST FAN AND DAMPER CONTROL SCHEMATIC
40515	CHECK VALVE LIMIT SWITCH
40520	RISING STEM VALVE LIMIT SWITCH
40521	PHOTO ELECTRIC SENSOR ON ACCESS HATCH
40522	TYPICAL PLC SCHEMATIC NO 1
40523	TYPICAL PLC SCHEMATIC NO 2
40524	TYPICAL PLC SCHEMATIC NO 3
40525	TYPICAL PLC SCHEMATIC NO 4 DIAGNOSTICS
40526	WIRING DIAGRAM FORMAT AND LABELING
40532	WATER QUALITY MONITORING STATION PANEL
40533	ANALOG TERMINAL TABLE AND NOTES
40534	TYPE A ANALOG TERMINAL SCHEMATIC
40535	TYPE B ANALOG TERMINAL SCHEMATIC
40536	TYPE C ANALOG TERMINAL SCHEMATIC
40537	TYPE D ANALOG TERMINAL SCHEMATIC
40538	TYPE E ANALOG TERMINAL SCHEMATIC
40542	TOXIC GAS DETECTOR INSTALLATION
40545	OUTSIDE TEMPERATURE AND HUMIDITY SENSOR MOUNTING IN VENT PIPE MUSHROOM CAP
40548	SURGE TANK LEVEL CONTROLS INSTALLATION
40549	VAULT SUMP PUMP CONTROLLER INSTALLATION
40550	ULTRASONIC LEVEL TRANSDUCER MOUNTING
40551	SINGLE FLOAT LEVEL SWITCH INSTALLATION
40552	MULTIPLE FLOAT LEVEL SWITCH INSTALLATION

DIVISION 40 – PROCESS INTERCONNECTIONS (CONTINUED)

40553	TANK FLOAT LEVEL SWITCH INSTALLATION
40554	WATER ON FLOOR LEVEL SWITCH INSTALLATION
40555	TANK ULTRASONIC LEVEL ELEMENT INSTALLATION
40556	WALL ULTRASONIC LEVEL ELEMENT INSTALLATION
40559	ULTRASONIC LEVEL ELEMENT INSTALLATION (STILLING WELL)
40560	SUBMERSIBLE LEVEL PRESSURE SENSOR
40561	PRESSURE MEASUREMENT INSTALLATION (TANKS)
40563	PRESSURE INSTRUMENT SPRINGLINE INSTALLATION
40564	PRESSURE INSTRUMENT INSTALLATION
40565	PRESSURE INSTRUMENT INSTALLATION (ANNULAR SEAL)
40566	PRESSURE INSTRUMENT INSTALLATION (DIAPHRAGM SEAL)
40569	PENSTOCK PRESSURE RING
40570	NATURAL GAS SUPPLY POSITION SWITCH
40572	ULTRASONIC LEVEL ELEMENT INSTALLATION (RESERVOIR ROOF)
40581	MAGNETIC FLOWMETER INSTALLATION
40583	THERMAL FLOW SWITCH
40585	ULTRASONIC FLOWMETER TRANSDUCER OUTSIDE INSTALLATION
40586	ULTRASONIC FLOWMETER TRANSDUCER INSIDE FEED THROUGH INSTALLATION
40587	ULTRASONIC FLOWMETER (8 PATH)
40588	ULTRASONIC FLOWMETER (4 PATH)
40589	ULTRASONIC FLOWMETER (2 PATH)
40590	INSTRUMENT MOUNTING

Capital Projects Construction Standards

July 2021

The Capital Projects Construction Standards, 4th Edition (CPCS) establishes the standard requirements for projects within the Denver Water service area including Denver Water Capital Projects. The CPCS includes General Conditions, Standard Technical Specifications, and Standard Details that are no longer referenced in the individual project Contract Documents. (The General Conditions apply exclusively to Denver Water Capital Projects.) Project-specific changes and additions to the CPCS in the form of the Supplementary Technical Specifications, bidding and other contract requirements, and Project Specific Details, will be prepared separately for each Capital Project. Used in conjunction with the Engineering Standards, projects approved under the Denver Water Plan Review process shall adhere to the Technical Specifications and Standard Details.

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@	AT (SPACING)	ASC	AUTOMATIC SPRINKLER CONNECTION
&	AND	ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
∠	ANGLE	ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERING
⏟	CENTERLINE	ASSY	ASSEMBLY
°	DEGREES	ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
°C	DEGREES CELSIUS	ASYMM	ASYMMETRICAL
°F	DEGREES FAHRENHEIT	AT	AMPERE TRIP, AUTOTRANSFORMER
Δ	DELTA ANGLE	ATC	AUTOMATIC THROWOVER CONTROL, AIR TERMINAL CHAMBER
∅	DIAMETER	ATS	AUTOMATIC TRANSFER SWITCH
H	EFFICIENCY	ATO	AUTOMATIC TRANSFER OPERATION
ℓ	FLOW LINE	AUTO	AUTOMATIC
<	LESS THAN	AUX	AUXILIARY
>	GREATER THAN	AV	AIR VALVE, AUDIO VISUAL
√	MACHINED SURFACE	AVE	AVENUE
#	NUMBER	AVRV	AIR AND VACUUM RELEASE VALVE
Ω	OHM	AVG	AVERAGE
1/2	ONE TWO SELECTOR, ONE HALF	AWG	AMERICAN WIRE GAUGE
φ	PHASE	AWS	AMERICAN WELDING SOCIETY
+	PLUS	AWWA	AMERICAN WATER WORKS ASSOCIATION
±	PLUS/MINUS	B	BELL, BLUE
ℓ	PROPERTY LINE	BD	BOARD, BALANCING DAMPER
Σ	SUMMATION	BDD	BACKDRAFT DAMPER
		BE	BELL END
A	AMMETER, AMPERAGE, AMPERE, AMBER, ANALOG, AUTOMATIC, AUTO, AUXILIARY, AIR, PLANT UTILITY, ANODE	BF	BLIND FLANGE, BOTH FACES
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	BFI	BLOWN FUSE INDICATOR
ABBR	ABBREVIATION	BFP	BACKFLOW PREVENTER
ABPA	AMERICAN BACKFLOW PREVENTION ASSOCIATION	BFV	BUTTERFLY VALVE
ABS	ACRYLONIRILE-BUTADIENE-STYRENE	BHP	BRAKE HORSEPOWER
ABUT	ABUTMENT	BIl	BASIC IMPULSE INSULATION LEVEL
A/C	AIR CONDITIONING	BK	BACK, BRAKE
AC	ASPHALTIC CONCRETE, ASBESTOS-CEMENT PIPE, ALTERNATING CURRENT	BKR	BREAKER
ACI	AMERICAN CONCRETE INSTITUTE	BL	BEARING LUBE
ACK	ACKNOWLEDGE	BLDG	BUILDING
ACP	ASBESTOS-CEMENT PIPE	BLK	BLACK
ACS	ACCESS	BLU	BLUE
ACSR	ALUMINUM CONDUCTOR STEEL REINFORCED	BLVD	BOULEVARD
ACU	AIR CONDITIONING UNIT	BM	BENCH MARK, BEAM
AD	AREA DRAIN	BNSF	BURLINGTON NORTHERN/SANTA FE RAILROAD
ADA	AMERICANS WITH DISABILITIES ACT	BO	BLOW OFF
ADDL	ADDITIONAL	BOC	BACK OF CURB
ADH	ADHESIVE	BOF	BOTTOM OF FOOTING
ADJ	ADJUSTABLE, ADJOINING	BOT	BOTTOM
AF	AMPERE FRAME, ARC FLASH	BP	BACK PRESSURE
AFB	ARC FLASH BOUNDARY	BRE	BURIED REFERENCE ELECTRODE
AFBMA	ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION	BRG	BEARING
AFD	ADJUSTABLE FREQUENCY DRIVE	BRN	BROWN
AFF	ABOVE FINISH FLOOR	BS	BACK-SIPHONAGE
AFG	ABOVE FINISH GRADE	BSP-40	BLACK STEEL PIPE, SCHEDULE 40
AG	AIR GAP	BSP-80	BLACK STEEL PIPE, SCHEDULE 80
AGGR	AGGREGATE	BSTC	BOLTED SLEEVE TYPE COUPLING
Ah	AMPERE HOUR	BTU	BRITISH THERMAL UNITS
AH	AHEAD	BTWN	BETWEEN
AHJ	AUTHORITY HAVING JURISDICTION	BUR	BUILT UP ROOFING
AHR	ANCHOR	BV	BALL VALVE
AHU	AIR HANDLING UNIT	BVC	BEGINNING OF VERTICAL CURVE
AI	AIR INSTRUMENT, ANALOG INPUT	BWS	BACKWASH SUPPLY
AIC	AMPERE INTERRUPTING CURRENT	BWW	BACKWASH WASTE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	C	CHANNEL (BEAM), CONDUIT, CONTROLLER, COUPON
AISI	AMERICAN IRON AND STEEL INSTITUTE	C TO C	CENTER TO CENTER
ALKY	ALKALINITY	C&CT	CONVENTIONAL AND CHEMICAL TREATMENT
ALT	ALTERNATE, ALTITUDE	C&G	CURB AND GUTTER
ALUM	ALUMINUM	CA	COMPRESSED AIR
AM	AUTO-MANUAL, AMMETER	CAB	CABINET
AMP	AMPERES	CAD	COMPUTER AIDED DRAFTING
AMR	AUTOMATIC METER READING (SYSTEM)	cal/cm ²	ARC FLASH HAZARD LEVEL
ANOD	ANODIZE	CAP	CAPACITOR
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	CB	CATCH BASIN, CIRCUIT BREAKER
AO	ANALOG OUTPUT	CBI	CONTAINED BY ISOLATION
AP	ANGLE POINT	CC	CALIBRATION COLUMN, CLOSING COIL
APPD	APPROVED	CCP	CONCRETE CYLINDER PIPE (PRETENSION)
APPROX	APPROXIMATE, APPROXIMATELY	CCW	COUNTER CLOCKWISE
AQ	AQUASTAT	CD	CEILING DIFFUSER, CONDENSATE DRAIN, CHLORINE DETECTOR
AR	AUXILIARY RELAY	CF	CUBIC FEET, CABINET FAN
ARCH	ARCHITECTURAL	CFM	CUBIC FEET PER MINUTE
ARMC	ALUMINUM RIGID METAL CONDUIT	CFS	CUBIC FEET PER SECOND
ARV	AIR RELIEF VALVE, AIR RELEASE VALVE	CG	CEILING GRILLE, CHLORINE GAS (PRESSURE)
AS	AMMETER SWITCH	CGV	CHLORINE GAS VACUUM
		CG/V	CHLORINE GAS/VENT
		CHEM	CHEMICAL
		CHFR	CHAMFER
		CHKD	CHECKED, CHECKERED
		CHKV	CHECK VALVE

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01001 ABBREVIATIONS AND SYMBOLS



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CHWR	CHILLED WATER RETURN	DHW	DOMESTIC HOT WATER
CHWS	CHILLED WATER SUPPLY	DI	DUCTILE IRON, DROP INLET, DIGITAL INPUT, DOOR INTERLOCK
CI	CAST IRON, CONTOUR INTERVAL	DIAG	DIAGONAL
CIMJ	CAST IRON MECHANICAL JOINT	DIL	DILUTE
CIP	CAST IRON PIPE, CAST-IN-PLACE	DIM	DIMENSION
CIR	CIRCLE, CIRCUIT	DIMJ	DUCTILE IRON MECHANICAL JOINT
CISP	CAST IRON SOIL PIPE	DIP	DUCTILE IRON PIPE
CJ	CONSTRUCTION JOINT	DISC	DISCONNECT
CKT	CIRCUIT	DISP	DISPLAY
CL ₂ L	CHLORINE LIQUID	DIST	DISTANCE, DISTRIBUTED, DISTRICT
CL ₂	CHLORINE	DLS	DAMPER LIMIT SWITCH
CL ₂ RESD	CHLORINE RESIDUAL	DN	DOWN
CLF	CURRENT LIMITING FUSE	DO	DIGITAL OUTPUT, DISSOLVED OXYGEN
CLG	CEILING	DP	DISTRIBUTION PANELBOARD
CLO	CLOSET	DPC	DISTRIBUTED PROCESS CONTROLLER
CLR	CLEAR, CLEARANCE	DPDT	DOUBLE POLE DOUBLE THROW
CLSM	CONTROLLED LOW STRENGTH MATERIAL	DPST	DOUBLE POLE SINGLE THROW
CMC	CEMENT MORTAR COATING	DPS	DIFFERENTIAL PRESSURE SWITCH
CMP	CORRUGATED METAL PIPE	DR	DRAIN, DOOR, DRIVE, DRAWER
CMU	CONCRETE MASONRY UNIT	DS	DISCONNECT, DISCONNECT SWITCH, DOWNSTREAM
CNR	CORNER	DT	DOUBLE TEE
CO	CLEANOUT, CARBON MONOXIDE, COUNTY	DV	DISCHARGE VALVE
CO ₂	CARBON DIOXIDE	DW	DENVER WATER, DOMESTIC WATER, DISINFECTED WATER
COL	COLUMN	DWG	DRAWING
COM	COMMON, COMMUNICATIONS	DWL	DOWEL
CONC	CONCRETE, CONCENTRIC	E	EAST, ELECTRIC, EDUCTOR, ENGINE
COND	CONDUIT, CONDUCTIVITY	EA	EACH
CONN	CONNECT, CONNECTION	EAT	ENTERING AIR TEMPERATURE
CONST	CONSTRUCTION	EC	EMERGENCY CLOSE
CONT	CONTINUE, CONTINUED, CONTINUOUS, CONTRACTION	ECC	ECCENTRIC
COORD	COORDINATE	ECP	ENVIRONMENTAL CONTROL PANEL
CORP	CORPORATION	EEW	EMERGENCY EYE WASH
CP	COOLING WATER PUMP, CONTROL PANEL, CONTROL POWER, CATHODIC PROTECTION	EF	EACH FACE, EXHAUST FAN
CPLG	COUPLING	EFF	EFFICIENCY
CPT	CONTROL POWER TRANSFORMER	EFL	EFFLUENT
CPU	CENTRAL PROCESSING UNIT	EHH	ELECTRICAL HANDHOLE
CPVC	CHLORINATED POLY (VINYL CHLORIDE)	EL	ELEVATION
CR	CONDENSATE RETURN, CEILING REGISTER, CONTROL RELAY	ELB	ELBOW
CRM	CONTROL RELAY MASTER	ELC	ELECTRICAL LOAD CENTER
CRS	COLD ROLLED STEEL	ELEC	ELECTRIC, ELECTRICAL
CRT	CATHODE RAY TUBE, MONITOR	EMBED	EMBEDMENT
CRZ	CRITICAL ROOT ZONE	EMER	EMERGENCY
CS	CONTROL STATION, CLOSE SOLENOID, CHLORINE SOLUTION	EMI	ELECTROMAGNETIC INTERFACE
CST	CARBON STEEL	EMT	ELECTRICAL METALLIC TUBING
CT	COURT, CURRENT TRANSFORMER	ENCL	ENCLOSURE
CTD	CAPACITIVE TRIP DEVICE	END	ENCODER
CTE	COAL-TAR ENAMEL	ENG	ENGINEERING
CTKR	CARETAKER	ENGR	ENGINEER
CTR	CENTER, COUNTER	ENTR	ENTRANCE
CTRD	CENTERED	EO	EMERGENCY OVERFLOW, ELECTRIC OPERATOR
CTRL	CONTROL	EOA	EDGE OF ASPHALT
CTV	CABLE TELEVISION	EOC	EDGE OF CONCRETE
CU	CUBIC	EOG	EDGE OF GRAVEL
Cu	COPPER	EOL	END OF LINE RESISTOR
CuCuSO ₄	COPPER/COPPER SULFATE	EOR	EDGE OF ROAD
CV	CONTROL VALVE, CONE VALVE	EPDM	ETHYLENE PROPYLENE DIENE MONOMER (M-CLASS) RUBBER
CW	CLOCKWISE, COLD WATER, CHLORINATED WATER	EPT	EXCITER POWER TRANSFORMER
CWR	COOLING WATER RETURN	EQ	EQUAL
CWS	COOLING WATER SUPPLY	EQN	EQUATION
D	PENNY (NAIL SIZE), DEPTH, DAMPER, DIGITAL, DIODE, DRAIN	EQUIP	EQUIPMENT
DB	DISTRIBUTION BOX, DRY BULB, DIRECT BURIED	ER	EMERGENCY RELAY
Db	DECIBEL	ERT	ENCODER-RECEIVER-TRANSMITTER
DBA	DEFORMED BAR ANCHOR	ES	EMERGENCY STOP
DbA	DECIBEL (WEIGHTED SCALE)	ESEW	EMERGENCY SHOWER/EYEWASH
DBL	DOUBLE	ESMT	EASEMENT
DC	DOUBLE CHECK VALVE, DIRECT CURRENT	ESTOP	EMERGENCY STOP
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	ETC	ET CETERA
DCP	DISTRIBUTION CONTROL PANEL	ETM	ELAPSED TIME METER
DCS	DISTRIBUTED CONTROL SYSTEM	EUH	ELECTRIC UNIT HEATER
DCW	DOMESTIC COLD WATER	EVC	END OF VERTICAL CURVE
DE	DRIVE END	EW	EACH WAY
DEC	DECREASE	EWT	ENTERING WATER TEMPERATURE
DECS	DIGITAL EXCITATION CONTROL SYSTEM	EXC	EXCITER
DEFL	DEFLECTION	EXH	EXHAUST
DEMO	DEMOLISH	EXIST	EXISTING
DESC	DESCRIPTION, DESCRIBED	EXP	EXPANSION, EXPOSED, EXPLOSION PROOF
DET	DETAIL	EXT	EXTERIOR, EXTEND, EXTENSION
DF	DOUGLAS FIR, DRINKING FOUNTAIN, DUCT FURNACE, DIESEL FUEL	F	FREQUENCY, FUSE, FAHRENHEIT, FIELD GENERATOR
DFT	DRY FILM THICKNESS	f'c	REQUIRED DESIGN STRENGTH OF CONCRETE
DG	DOOR GRILLE	FAAP	FIRE ALARM ANNUNCIATION PANEL
		FACP	FIRE ALARM CONTROL PANEL
		FC	FLEXIBLE COUPLING, FLEXIBLE CONNECTION
		FCA	FLANGED COUPLING ADAPTER
		FCU	FAN COIL UNIT

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01002 ABBREVIATIONS



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FCV	FLOW CONTROL VALVE	HAZ	HAZARD, HAZARDOUS
FD	FLOOR DRAIN, FIRE DAMPER	HDPE	HIGH DENSITY POLYETHYLENE
FDA	FLOOR DRAIN W/INTEGRAL TRAP	HDW	HARDWARE
FDR	FEEDER	HEX	HEXAGONAL
FDRS	FIELD DISCHARGE RESISTOR	HGL	HYDRAULIC GRADE LINE
FDS	FUSED DISCONNECT SWITCH	HH	HANDHOLE
FDTN	FOUNDATION	HI	HIGH
FE	FIRE EXTINGUISHER, FILTER EFFLUENT	HID	HIGH INTENSITY DISCHARGE
FEC	FIRE EXTINGUISHER CABINET	HM	HOLLOW METAL
FeCl ₃	FERRIC CHLORIDE	HMI	HUMAN MACHINE INTERFACE
FF	FINISH FLOOR, FAR FACE	HMWPE	HIGH MOLECULAR WEIGHT POLYETHYLENE
FG	FINISH GRADE, FLOOR GRILLE	HNDRL	HANDRAIL
FH	FIRE HYDRANT	HOA	HAND-OFF-AUTO
FIG	FIGURE	HOR	HAND-OFF-REMOTE
FIN	FINISH	HORIZ	HORIZONTAL
FIT	FLOW TRANSMITTER (INDICATING)	HP, hp	HORSEPOWER, HIGH PRESSURE
FIPT	FEMALE IRON PIPE THREAD	HPS	HIGH PRESSURE SODIUM
FL	FLUORIDE	HPT	HIGH POINT
FLA	FULL LOAD AMPERES	HPU	HYDRAULIC POWER UNIT, HYDRAULIC PRESSURE UNIT
FLASH	FLASHING	HQ	HEADQUARTERS
FLD	FIELD	HR	HOSE RACK
FLEX	FLEXIBLE	HRG	HIGH RESISTANCE GROUND
FLG	FLANGE	HR WS	HYDROPHILIC WATER STOP
FLR	FLOOR	HS	HIGH STRENGTH, HAND SWITCH
FLS	FLOW SWITCH	HSS	HOLLOW STRUCTURAL SECTION
FLTR	FILTER	HT	HEIGHT
FLUOR	FLUORESCENT	HTIP	HEAT TRACE INSULATED PIPE
FMC	FLEXIBLE METAL CONDUIT	HTR	HEATER
FMCT	FIRELINE METER AND COMPOUND TORRENT	HTS	HEAT TAPE SYSTEM
FO	FIBER OPTIC	HV	HOSE VALVE
FOR	FUEL OIL RETURN	HVAC	HEATING, VENTILATING AND AIR CONDITIONING
FOS	FUEL OIL SUPPLY	HVY	HEAVY
FPM	FEET PER MINUTE	HW	HOT WATER
FPS	FEET PER SECOND	HWP	HOT WATER PUMP
FPT	FEMALE PIPE THREAD	HWR	HOT WATER RETURN, HEATING WATER RETURN
FR	FORWARD-REVERSE	HWS	HOT WATER SUPPLY, HEATING WATER SUPPLY
FRMG	FRAMING	HWT	HOT WATER TANK
FRP	FIBERGLASS REINFORCED PLASTIC	HWY	HIGHWAY
FS	FLOW SWITCH	HX	HEAT EXCHANGER
FT	FOOT OR FEET, FLOW TRANSMITTER	HY	HYDROPHILIC
FTD	FREQUENCY TRANSDUCER	HYD	HYDRANT, HYDRAULIC
FTG	FOOTING, FITTING	Hz	HERTZ
FTS	FOOT SWITCH	I	CURRENT
FU	FUSE	IBC	INTERNATIONAL BUILDING CODE
FV	FLOW VALVE	IC	INTERRUPTING CAPACITY, INTEGRATED CIRCUIT
FVNR	FULL VOLTAGE NON-REVERSING	ICBO	INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS
FVR	FULL VOLTAGE REVERSING	ICS	INTERCOM CONTROL STATION
FW	FINISHED WATER	ID	INSIDE DIAMETER
FWD	FORWARD	IE	INVERT ELEVATION, INCIDENT ENERGY
F _y	YIELD STRENGTH	IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
G	NATURAL GAS, GREEN, GROUND (ELECTRICAL), GENERATOR, GATE	IF	INSIDE FACE
GA	GAUGE	I/I	CURRENT TO CURRENT ISOLATOR
GAL	GALLON	IL	INDICATING LIGHT
GALV	GALVANIZED	IN	INCH, INCHES
GB	GRAB BAR	INC	INCREASE
GC	GROOVED COUPLING	IND	INDICATION, INDUCTION, INDUCTOR
GCF	GROOVED COUPLING FITTING	INFL	INFLUENT
GCP	GENERATOR CONTROL PANEL	INSLFG	INSULATED FLANGE
GE	GROOVED END	INST	INSTANTANEOUS, INSTRUMENT
GEN	GENERATOR	INSTL	INSTALL, INSTALLATION
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	INSTM	INSTRUMENTATION
GFEP	GROUND FAULT EQUIPMENT PROTECTION	INSUL	INSULATE, INSULATION
GFI	GROUND FAULT INTERRUPTER	INT	INTERIOR
GFR	GROUND FAULT RELAY, GROUND FAULT RECEPTACLE	INV	INVERT, INVERTER
GH	GAUGE HOUSE	IP	IRON PIPE
GL	GLASS	IRR	IRRIGATION
GND	GROUND (ELECTRICAL)	ISA	INTERNATIONAL SOCIETY OF AUTOMATION
GOX	GASEOUS OXYGEN	ISW	INSTRUMENT SOCIETY OF AMERICA
GPD	GALLONS PER DAY	I/O	ISOLATION SWITCH
GPH	GALLONS PER HOUR	IO	INPUTS AND OUTPUTS
GPM	GALLONS PER MINUTE	I&C	INSTRUMENTATION AND CONTROL
GPS	GENERATOR PROTECTION SYSTEM	IR	INTRUSION RELAY, INTERPOSING RELAY
GR	GRADE	IS	ISOLATING/INSULATING GASKET
GRN	GREEN	J	JUNCTION BOX
GRY	GRAY	JB	JUNCTION BOX
GUI	GRAPHICAL USER INTERFACE	JAN	JANITOR
GSP	GALVANIZED STEEL PIPE	JT	JOINT
GV	GATE VALVE	K	KEY INTERLOCK
GVL	GRAVEL	KAIC	KILOAMP INTERRUPTING CAPACITY
GYP BD	GYPSON WALLBOARD	KB	KICKBLOCK, KNOX BOX
H	HAND, HIGH, HIGH SPEED, HORN	kcMil	THOUSAND CIRCULAR MILLS
HA	HAND-AUTO	KIP	THOUSAND POUNDS
HAB	HEADED ANCHOR BOLT	KM _r O ₄	POTASSIUM PERMANGANATE
HAS	HEADED ANCHOR STUD		

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KO	KNOCKOUT	MISC	MISCELLANEOUS
KP	KEY PAD	MJ	MECHANICAL JOINT
KSI	KIPS PER SQUARE INCH	ML	MOTORIZED LOUVER
KSF	KIPS PER SQUARE FOOT	MLO	MAIN LUGS ONLY
kV	KILOVOLT	MO	MASONRY OPENING, MOTOR OPERATOR
kVA	KILOVOLT AMPERES	MOA	MACHINED OVER ALL
kVAR	KILOVAR, KILOVOLT AMPERES REACTIVE	MOC	MECHANISM OPERATED CONTACT
kW	KILOWATT	MOV	METAL OXIDE VARISTOR
kWH	KILOWATT-HOUR	MPC	MANUFACTURER PROVIDED CABLE
L	LENGTH, LINE, LOUVER, LOCAL, LOW SPEED INDUCTOR, LIGHTING CONTACTOR, LOW SPEED, ARC LENGTH	MPR	MOTOR PROTECTIVE RELAY
LA	LIGHTNING ARRESTORS	MPT	MALE PIPE THREAD, MAIN POWER TRANSFORMER
LAB	LABORATORY	MPZ	MINI-POWER ZONE
LAH	LEVEL ALARM HIGH	MS	MILD STEEL, MOTOR STARTER
LAN	LOCAL AREA NETWORK	MSC	MANUFACTURER SUPPLIED CABLE
LAT	LEAVING AIR TEMPERATURE, LATITUDE	MSK	MOP SINK
LAV	LAVATORY	MSS	MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY
LB	POUND	MTD	MOUNTED
LBS	POUNDS	MTG	MOUNTING
LC	LIGHTING CONTACTOR	MTL	METAL
LCC	LIGHTING CONTROL CABINET	MTR	MOTOR
LCP	LOCAL CONTROL PANEL	MV	MEDIUM VOLTAGE, MERCURY VAPOR
LCS	LOCAL CONTROL STATION	MW	MANWAY, MEGAWATT
LED	LIGHT EMITTING DIODE	MWS	MAXIMUM WATER SURFACE
LF	LINEAR FEET, LINEAR FOOT	N	NORTH, NEUTRAL
LFMC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT	N/A	NOT APPLICABLE
LH	LEFT HAND	Na	SODIUM
LIT	LEVEL TRANSMITTER (INDICATING)	NaCl	SODIUM CHLORIDE
LLV	LONG LEG VERTICAL	NaOH	SODIUM HYDROXIDE
LLDPE	LINEAR LOW DENSITY POLYETHYLENE	NAC	NOTIFICATION ALARM CIRCUIT
lm	LUMEN	NAH	TORQUE ALARM HIGH
LM	LIME	NAHH	TORQUE ALARM HIGH-HIGH
LNTL	LINTEL	NC	NORMALLY CLOSED
LO	LOW	NCTC	NORMALLY CLOSED TIME CLOSED
LOA	LOAD-OUT ACCEPTED	NCTO	NORMALLY CLOSED TIME OPEN
LOC	LOCATION, LOCATE, LOAD-OUT COMPLETE	NEC	NATIONAL ELECTRICAL CODE
LOI	LOAD-OUT INITIATED	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
LONG	LONGITUDE, LONGITUDINAL	NEU	NEUTRAL
LOP	LOSS OF POWER	NF	NEAR FACE
LOR	LOCAL-OFF-REMOTE	NFDS	NONE FUSED DISCONNECT SWITCH
LOSP	LOAD-OUT SET-POINT	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
LOX	LIQUID OXYGEN	NFS	NATIONAL FOREST SERVICE
LP	LIGHTING PANELBOARD, LEGEND PLATE, LOW PRESSURE, LIGHT PANEL	NG	NATURAL GAS
LPG	LIQUEFIED PETROLEUM GAS	NH ₃	AMMONIA
LPS	LIGHTNING PROTECTION SYSTEM	NIC	NOT IN CONTRACT
LPT	LOW POINT	NO	NUMBER, NORMALLY OPEN
LR	LONG RADIUS, LATCHING RELAY, LOCAL-REMOTE	NOS	NUMBERS
LRA	LOCKED ROTOR AMPERES	NOM	NOMINAL
LS	LIMIT SWITCH, LEVEL SWITCH, LIME SLURRY	NOTO	NORMALLY OPEN TIME OPEN
LSC	LIMIT SWITCH CLOSE	NP	NAME PLATE
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND FAULT TRIP FUNCTION	NPT	NATIONAL PIPE THREAD
LSO	LIMIT SWITCH OPEN	NSF	NATIONAL SANITATION FOUNDATION
LT	LEFT, LIGHT, LEVEL TRANSMITTER	NTS	NOT TO SCALE
LTG	LIGHTING	NWS	NORMAL WATER SURFACE
LVDI	LINEAR VARIABLE DIFFERENTIAL TRANSFORMER	O	OVER
LVR	LOUVER	O ₂	OXYGEN
LWT	LEAVING WATER TEMPERATURE	OA	OVERALL, OUTSIDE AIR
M	MAGNETIC CONTACTOR, MOTOR, MOTOR STARTER, MANUAL, MECHANICAL EQUIPMENT	OBD	OPPOSED BLADE DAMPER
mA	MILLIAMPERE	OC	ON CENTER, OPEN-CLOSE, OVERCURRENT
MA	MANUAL-AUTO	OD	OUTSIDE DIAMETER, OVERFLOW DRAIN
MATL	MATERIAL, MATERIALS	ODE	OPPOSITE DRIVE END
MAU	MAKE-UP AIR UNIT	OF	OUTSIDE FACE
MAX	MAXIMUM	OH	OVERHEAD
MC	METAL-CLAD CABLE, METAL-CLAD, MOTOR CONTROLLER	OHP	OVERHEAD POWER
MCC	MOTOR CONTROL CENTER	OHW	OVERHEAD WIRE
MCM	THOUSAND CIRCULAR MILS	OHWL	ORDINARY HIGH WATER LINE
MCP	MOTOR CIRCUIT PROTECTOR, MAIN CONTROL PANEL	OL	OVERLOAD RELAY
MD	MOTORIZED DAMPER, MOTION DETECTOR	OMAD	OFF-MANUAL-AUTO-DCS
MDP	MAIN DISTRIBUTION PANEL	OO	ON-OFF (MAINTAINED CONTROL)
ME	METAL-ENCLOSED	OOA	ON-OFF-AUTO
MECH	MECHANICAL	OOAR	ON-OFF-AUTO-REMOTE
MEE	MACHINED EACH END	OOC	ON-OFF-COMPUTER
MELM	MINIATURE EMBEDDED LIGHT MODULE	OOR	ON-OFF-REMOTE
MERC	MERCURY VAPOR	OPNG	OPENING
MFD	MANUFACTURED	OPP	OPPOSITE
MFR	MANUFACTURER	OPS	OVERCURRENT PROTECTION SYSTEM
MG	MOTOR GENERATOR	ORG	ORANGE
MGD	MILLION GALLONS PER DAY	OS	OPEN SOLENOID
MH	MANHOLE, METAL HALIDE	OSA	OUTSIDE AIR
MIN	MINIMUM, MINUTE	OSC	OPEN-STOP-CLOSE
MIP	MALE IRON PIPE	OSD	OPEN SITE DRAIN
MIPT	MALE IRON PIPE THREAD	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
		OV	OPEN VALVE
		OVFL	OVERFLOW
		OZ	OUNCE
		P	POLE, PHASE, PUMP, PIPE CONNECTION (CP)

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PA	PUBLIC ADDRESS	R/I	RESISTANCE TO CURRENT CONVERTOR
PB	PULL BOX, PUSHBUTTON, PANELBOARD, PULLBOX	RM	ROOM
PBD	PARALLEL BLADE DAMPER	RMS	ROOT MEAN SQUARE
PC	POINT OF CURVATURE, PHOTO CELL, PERSONAL COMPUTER	RND	ROUND
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE	RO	ROUGH OPENING
PCF	POUNDS PER CUBIC FOOT	ROD	ROLLING OVERHEAD DOOR
PCV	PRESSURE CONTROL VALVE	ROW	RIGHT-OF-WAY
PD	PULSATION DAMPER	RP	REDUCED PRESSURE PRINCIPAL
PDS	PRODUCT DATA SHEET	RPDA	REDUCED PRESSURE DETECTOR ASSEMBLY
PE	PLAIN END	RPM	REVOLUTIONS PER MINUTE
PERIM	PERIMETER	RR	RAILROAD
PF	POWER FACTOR	RST	REINFORCING STEEL
PFCC	POWER FACTOR CORRECTING CAPACITOR	RT	RIGHT, RING-TITE
PH	PHASE	RTD	RESISTANCE TEMPERATURE DEVICE
PI	POINT OF INTERSECTION, PRESSURE INDICATOR	RTU	ROOFTOP AIR CONDITIONING UNIT, REMOTE TERMINAL UNIT
PIT	PRESSURE TRANSMITTER (INDICATING)	RV	ROOF VENT
PJF	PREMOLDED JOINT FILLER	RVSS	REDUCED VOLTAGE SOFT START
PL	PLATE, PLACE, PLASTIC	RW	RAW WATER OR RECYCLED WATER
PLC	PROGRAMMABLE LOGIC CONTROLLER	RWD	REDWOOD
PL LAM	PLASTIC LAMINATE	RWR	RAW WATER RETURN
PLSS	PUBLIC LAND SURVEY SYSTEM	RWS	RAW WATER SUPPLY
PLYWD	PLYWOOD	S	SOUTH, SLOPE, I-BEAM, SWITCH, SPIGOT
PNL	PANEL	SA	SUPPLY AIR, SURGE ARRESTOR, SAMPLE WATER
PNK	PINK	SAE	SOCIETY OF AUTOMOTIVE ENGINEERS
POD	POINT OF DELIVERY	SAN	SANITARY, SANITARY SEWER
POE	POWER OVER ETHERNET	SB	STANDBY
POLY	POLYMER, POLYETHYLENE	SC	SOLID CORE, SURGE CAPACITORS, SYNC CHECK
POS	POINT OF SERVICE	SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
POT	POTENTIOMETER	SCFM	STANDARD CUBIC FEET PER MINUTE
PPE	PERSONAL PROTECTIVE EQUIPMENT	SCHED	SCHEDULE
PQM	POWER QUALITY METER	SCP	SECURITY CONTROL PANEL
PR	POINT OF RADIUS	SCR	SILICON CONTROLLED RECTIFIER
PREF	PREFERRED	SD	STORM DRAIN, SOAP DISPENSER, SUPPLY DIFFUSER
PREFAB	PREFABRICATED	SDBC	SOFT DRAWN BARE COPPER
PREFIN	PREFINISHED	SDS	SAFETY DATA SHEET
PRELIM	PRELIMINARY	SEC	SECONDARY, SECONDS
PRESS	PRESSURE	SECT	SECTION
PRI	PRIMARY	SES	STATIC EXCITATION SYSTEM
PROJ	PROJECTION, PROJECT	SF	SQUARE FEET, SQUARE FOOT, SERVICE FACTOR
PROP	PROPERTY	SG	SUPPLY GRILLE, SPILLWAY GATE
PRV	PRESSURE REGULATING VALVE, PRESSURE RELIEF VALVE	SH	SHIELD
PS	PUMP STATION, PRESSURE SWITCH, POWER SUPPLY, POWER SOLENOID, POTASSIUM SOLUTION	SHC	SOCKET HEAD CAP
PSF	POUNDS PER SQUARE FOOT	SHLD	SHIELD
PSI	POUNDS PER SQUARE INCH	SHT	SHEET
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE	SIM	SIMILAR
PSIG	POUNDS PER SQUARE INCH, GAUGE	SJI	STEEL JOIST INSTITUTE
PT	POINT OF TANGENCY, POST TENSIONED, POTENTIAL TRANSFORMER, PRESSURE TRANSMITTER	SL	SYNCHRONIZING LIGHT
PUD/PBG	PLANNED UNIT DEVELOPMENT/PLANNED BUILDING GROUP	SLC	SIGNALING LINE CIRCUIT
PUR	PURPLE	SLV	SLEEVE
PV	PLUG VALVE	SLIP	SLIP ON PIPE CONNECTION
PVB	PRESSURE VACUUM BREAKER	SMP	SUMP PUMP
PVC	POLYVINYL CHLORIDE (CONDUIT OR COATING)	SNSR	SENSOR
PVMT	PAVEMENT	SOL	SOLENOID
PW	POTABLE WATER	SOLN	SOLUTION
PWR	POWER	SP	SET POINT, SPARE, STATIC PRESSURE, SINGLE POLE
PWS	POWER SUPPLY	SPA	SPACE, SPACING
Q	RATE OF FLOW, OIL	SPD	SUMP PUMP DISCHARGE, SURGE PROTECTION DEVICE
QDRNT	QUADRANT	SPDT	SINGLE POLE DOUBLE THROW
QTY	QUANTITY	SPEC	SPECIFICATIONS, SPECIFIED
R	RADIUS, RANGE, RED, REMOTE, RESISTANCE, RELAY, REFERENCE ELECTRODE	SPLY	SUPPLY
RA	RETURN AIR	SPRT	SUPPORT
RAD	RADIANT	SPST	SINGLE POLE SINGLE THROW
RCCP	REINFORCED CONCRETE CYLINDER PIPE	SQ	SQUARE
RCP	REINFORCED CONCRETE PIPE	SQRT	SQUARE ROOT
RCPT	RECEPTACLE	SR	START OR STOP RELAY
RD	ROAD, ROOF DRAIN	SS	SOLID SLEEVE, START-STOP, SOLID STATE
RDCR	REDUCER	SST	STAINLESS STEEL
REC	RECTIFIER	SSOL	SOLID STATE OVERLOAD
REF	REFER, REFERENCE, REFERENCED	SSPC	THE SOCIETY FOR PROTECTIVE COATINGS
REFR	REFRIGERATOR	ST	STREET
REINF	REINFORCED, REINFORCING, REINFORCE	STA	STATION
RES	RESERVOIR, RESISTOR	STB	SHORTING TEST BLOCK
REQD	REQUIRED	STD	STANDARD
REQMTS	REQUIREMENTS	STDS	STANDARDS
RET	RETURN	STIF	STIFFENER
RFI	RADIO FREQUENCY INTERFERENCE	STL	STEEL
RGS	RIGID GALVANIZED STEEL	STR	STRAINER
RH	RIGHT HAND, ROOF HATCH, RADIANT HEATER, RHEOSTAT	STRM	STORM SEWER
		STRUCT	STRUCTURE, STRUCTURAL
		SUP	SUPPRESSOR
		SUSP	SUSPEND
		SV	SOLENOID VALVE
		SW	SERVICE WATER, SOURCE WATER, SURFACE WASH, SWITCH
		SWBD	SWITCH BOARD

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SWGR	SWITCH GEAR	VAR	VOLT AMPERE REACTIVE, VARISTOR
SWV	STOP AND WASTE VALVE	VAV	VARIABLE AIR VOLUME
SWYD	SWITCHYARD	VB	VALVE BOX
SYM	SYMMETRICAL, SYMBOL	VC	VERTICAL CURVE
SYMM	SYMMETRICAL	VCP	VITRIFIED CLAY PIPE
SYNC	SYNCHRONOUS	VDC	VOLTS DIRECT CURRENT
T	TOWNSHIP, THERMOSTAT, TRANSFORMER, TELEPHONE, TANK, TANGENT	VERT	VERTICAL
T/C	THERMOCOUPLE	VFD	VARIABLE FREQUENCY DRIVE
T&B	TOP AND BOTTOM	VH	VALVE HOUSE
T&G	TONGUE AND GROOVE	VIB	VIBRATION
TACH	TACHOMETER GENERATOR, TACHOMETER	VIF	VERIFY IN FIELD
TAN	TANGENT	VLV	VALVE
TAS	THREADED ANCHOR STUD	VMS	VOLTAGE MONITORING SYSTEM
TB	TERMINAL BLOCK	VR	VOLTAGE REGULATOR
TBD	TO BE DETERMINED	VS	VOLTMETER SWITCH
TBG	TUBING	VTD	VOLTAGE TRANSDUCER
TBK	TEST BLOCK	VTR	VENT TO ROOF
TC	TRAY CABLE, TIME CLOCK, TIME CLOSE, TRIP COIL	W	WEST, WATER, WIDE FLANGE (BEAM), WATTS, WHITE, WIRE
TD	TIME DELAY RELAY	W/	WITH
TDH	TOTAL DYNAMIC HEAD	W/O	WITHOUT
TECH	TECHNICAL	WAH	WALL HEATER
TEL	TELEPHONE	WB	WET BULB
TEMP	TEMPERATURE, TEMPORARY	WC	WATER CLOSET, WATER COLUMN
TH	TEST HOLE	WDG	WINDING
THD	THREAD, THREADED	WDW	WINDOW
THK	THICK, THICKNESS	WH	WATER HEATER, HOT WATER HEATER, WATT HOUR DEMAND METER
THKD	THICKENED	WHP	WATER HIGH PRESSURE
THM	THERM	WHT	WHITE
THY	THYRISTOR SURGE SUPPRESSOR	WLP	WATER LOW PRESSURE
TIT	TEMPERATURE TRANSMITTER (INDICATING)	WOF	WATER ON FLOOR
TIV	TURBINE INLET VALVE	WOG	WATER-OIL-GAS
TJB	TERMINAL JUNCTION BOX	WP	WEATHERPROOF
TO	TIME OPEN	WRA	WATER REDUCING AGENT
TOC	TOP OF CURB, TRUCK OPERATED CONTACT	WS	WATER STOP, WELDED STEEL
TOP	TOP OF PIPE	WSC	WATER SERVICE CONTRACTOR
TORQ	TORQUE	WSEL	WATER SURFACE ELEVATION
TOS	TAKE-OFF STRUCTURE	WSP	WELDED STEEL PIPE, WORKING STEAM PRESSURE
TOW	TOP OF WALL	WT	WEIGHT
TPD	TONS PER DAY	WTR	WATER
TPE-R	THERMOPLASTIC ELASTOMERIC	WWF	WELDED WIRE FABRIC
TPH	TOILET PAPER HOLDER	X	REACTANCE
TR	TIMING RELAY	XFMR	TRANSFORMER
TRANSV	TRANSVERSE	XING	CROSSING
TS	TEMPERATURE SWITCH, THICKENED SLUDGE, TEST STATION	Y	YELLOW, WYE
TSC	TORQUE SWITCH CLOSE	YD	YARD
TSDR	TRANSDUCER	YEL	YELLOW
TSH	TEMPERATURE SWITCH HIGH	Z	IMPEDANCE
TSL	TEMPERATURE SWITCH LOW	ZIT	POSITION TRANSMITTER (INDICATING TYPE)
TSO	TORQUE SWITCH OPEN	ZS	POSITION (LIMIT) SWITCH
TSP	TWISTED SHIELDED PAIR		
TST	TWISTED SHIELDED TRIAD		
TSTAT	THERMOSTAT		
TSTL	TUBE STEEL		
TT	THRUST TIE		
TURB	TURBINE, TURBIDITY		
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR		
TW	THERMOPLASTIC WIRE, TREATED WATER		
TX	TRANSFORMER		
TXPH	PHASE SHIFTING TRANSFORMER		
TYP	TYPICAL		
U	UNDER		
UBC	UNIFORM BUILDING CODE		
UG	UNDERGROUND		
UH	UNIT HEATER		
UL	UNDERWRITERS LABORATORY		
UMC	UNIFORM MECHANICAL CODE		
UNO	UNLESS NOTED OTHERWISE		
UPC	UNIFORM PLUMBING CODE		
UPRR	UNION PACIFIC RAILROAD		
UPS	UNINTERRUPTIBLE POWER SUPPLY		
UR	URINAL		
US	UPSTREAM		
USC	UNIVERSITY OF SOUTHERN CALIFORNIA		
FCCCHR	FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH		
UVR	UNDER VOLTAGE RELAY		
V	VENT, VOLT, VOLTMETER, VOLTAGE		
VA	VOLT AMPERE		
VAC	VACUUM, VACANT, VOLTS OF ALTERNATING CURRENT		

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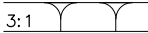



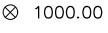

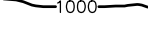


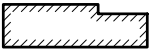


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	UNDISTURBED EARTH		CENTERLINE
	COMPACTED FILL		DENVER WATER PROPERTY LINE
	ASPHALT		DENVER WATER RIGHT-OF-WAY
	CRUSHED ROCK		SECTION LINE - FULL
	CONCRETE		SECTION LINE - QUARTER
	SAND, MORTAR, GROUT		SECTION LINE - 16TH
	RIPRAP		SECTION LINE - 64TH
	EXISTING EMBANKMENT SLOPE AS INDICATED		RANGE LINE
	NEW EMBANKMENT SLOPE AS INDICATED		CURB & GUTTER
	DRAINAGE DITCH		PAVED ROAD
	ELEVATION (EXISTING)		UNPAVED ROAD
	FINISH ELEVATION		TRAIL
	CONTOUR (EXISTING)		FENCE - BARB WIRE
	CONTOUR (NEW)		FENCE - CHAIN LINK
	DEMOLITION		FENCE - WOOD
	ABANDONED		RAILROAD TRACKS
	WATER CONDUIT		STRUCTURE
	WATER MAIN		STRUCTURE - BURIED
	NATURAL GAS MAIN		
	ELECTRIC		
	TELEPHONE		
	FIBER OPTIC CABLE		
	CABLE TV		
	STORM DRAIN		
	SANITARY SEWER		
	DROP INLET		
	CLEANOUT		

NOTE:

NEW FEATURE: SOLID LINETYPE
 EXISTING FEATURE: SCREENED LINETYPE

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

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ORIGINATION DATE: *JULY 2021*

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**01010
CIVIL LEGEND**



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	ACCESS MANHOLE		CASING
	AIR VALVE ASSEMBLY		NATURAL GAS METER
	AIR VALVE W/ ACCESS		ELECTRIC METER
	BLOWOFF VALVE ASSEMBLY		BUSH - DECIDUOUS
	PITOT		BUSH - EVERGREEN
	BUTTERFLY VALVE ASSEMBLY		TREE - DECIDUOUS
	BUTTERFLY VALVE ASSEMBLY WITH MANHOLE		TREE - EVERGREEN
	GATE VALVE - OPEN		WELL
	GATE VALVE - CLOSED		IRRIGATION WELL
	GATE VALVE - INOPERABLE		BORE HOLE
	CORP STOP		MONITORING WELL
	CURB STOP		PIEZOMETER
	FIRE HYDRANT		POTHOLE
	WATER METER MANHOLE		TEST HOLE
	WATER METER VAULT		BACKFLOW PREVENTER
	PRV MANHOLE		ANGLE POINT
	PRV VAULT		COORDINATE LABEL

NOTE:

NEW FEATURE: SOLID LINETYPE
 EXISTING FEATURE: SCREENED LINETYPE

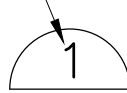
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**01011
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SECTION (LETTER) OR
DETAIL (NUMERAL) DESIGNATION



ON DRAWING WHERE SECTION
OR DETAIL IS TAKEN:
DRAWING NUMBER(S) WHERE SHOWN

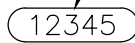
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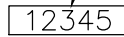
DETAIL & SECTION DESIGNATION

CPCS DETAIL DESIGNATION
(NUMERAL)



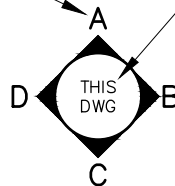
STANDARD DETAIL DESIGNATION

NON-CPCS DETAIL DESIGNATION
(NUMERAL)



NON-STANDARD DETAIL DESIGNATION

ELEVATION
DESIGNATION



ON DRAWING WHERE
ELEVATION IS SHOWN

STANDARD ELEVATION DESIGNATOR

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



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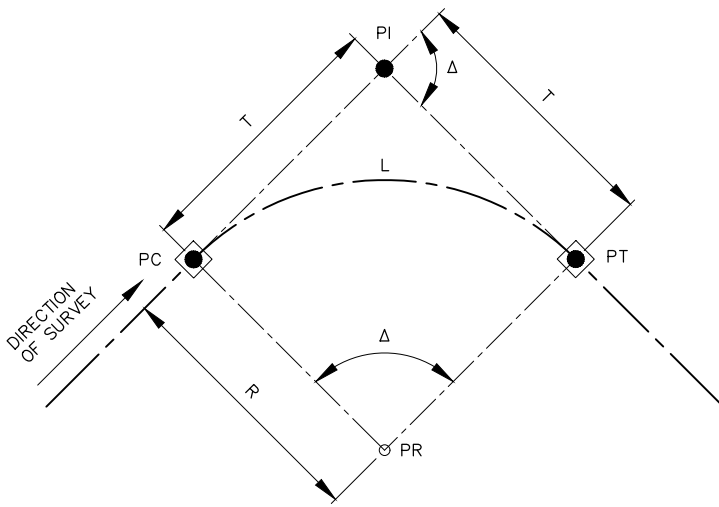
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01012 DRAWING SYMBOL LEGEND



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	ALUMINUM CAP		IRON PIPE
	AXLE		NAIL
	BAR		NATIONAL GEODETIC SURVEY
	BENCHMARK		PLASTIC CAP
	BRASS CAP		PANEL POINT
	CHISELED CROSS		RANGE POINT
	CROW'S FOOT		REBAR
	CONTROL POINT		ROD
	COPPER PLUG		PLSS CORNER
	DRILL HOLE		SHINER
	DW CAP		STONE
	HUB		



R = RADIUS
 Δ = DELTA ANGLE
 L = ARC LENGTH
 T = TANGENT

 PR - POINT OF RADIUS
 PC - POINT OF CURVATURE
 PI - POINT OF INTERSECTION
 PT - POINT OF TANGENCY








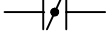











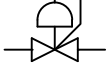
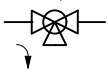
CURVE DATA

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

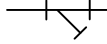
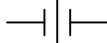


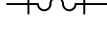

01015
SURVEY LEGEND


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VALVE SYMBOLS

	CONE VALVE
	GATE, FREE DISCHARGE, RING JET
	KNIFE GATE
	BALL
	GLOBE
	VEE-BALL
	PINCH
	BUTTERFLY
	PLUG
	SEAT PORT ECCENTRIC PLUG
	DIAPHRAGM
	NEEDLE
	SWING CHECK
	BALL CHECK
	SOLENOID
	HOSE BIB (HB-X) X = NO IN SPECS
	MUD
	PRESSURE RELIEF
	AIR AND/OR VACUUM RELIEF
	REGULATED SIDE PRESSURE CONTROL
	MULTI-PORT VALVE (BALL VALVE SHOWN, USE APPROPRIATE SYMBOLS FOR OTHER VALVE TYPES) ARROWS INDICATE FLOW PATTERN, SEAT PORTS ARE IMPLIED BY INDICATED FLOW PATTERN











MISCELLANEOUS SYMBOLS

	STRAINER
	TRUE UNION
	SAMPLE STATION
	SITE GLASS
	FLEXIBLE (ELASTOMER) PIPE CONNECTION
	ROTAMETER

GATE SYMBOLS

ELEVATION

PLAN

		SLUICE
		BUTTERFLY
		FLAP
		SHEAR
		FABRICATED SLIDE

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

REVISION DATE:

01020
MECHANICAL, ELECTRICAL,
INSTRUMENTATION AND
CONTROL GENERAL LEGEND

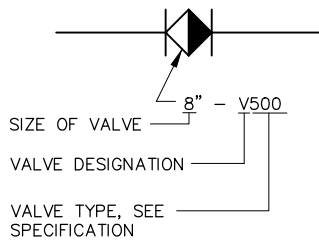
D DENVER WATER

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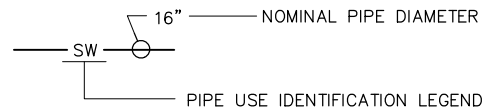
GENERAL PIPING NOTES:

1. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.
2. SIZE OF FITTINGS SHOWN ON DRAWINGS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.
3. LOCATION AND NUMBER OF PIPE HANGERS AND PIPE SUPPORTS SHOWN ARE ONLY APPROXIMATE. FINAL SUPPORT REQUIREMENTS SHALL BE DETERMINED IN THE FIELD AND APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
4. JOINTS SHALL BE WATERTIGHT. PENETRATION TYPE DETAIL SHALL BE USED WHEREVER PIPING PASSES FROM A STRUCTURE TO BACKFILL.
5. FLEXIBLE CONNECTORS OR FLANGED COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCKS, OR ANCHORS. THRUST PROTECTION SHALL BE ADEQUATE FOR PRESSURES SPECIFIED.
6. SYMBOLS, LEGENDS, AND PIPE USE IDENTIFICATIONS SHOWN SHALL BE FOLLOWED THROUGHOUT THE PLANS, WHEREVER APPLICABLE. ALL OF THE VARIOUS PIPING APPLICATIONS ARE NOT NECESSARILY USED IN THE PROJECT.
7. BURIED PIPING SPECIFIED TO BE PRESSURE TESTED AND SHALL BE PROVIDED WITH THRUST RESTRAINT. SEE DRAWINGS AND SPECIFICATIONS FOR MORE INFORMATION.
8. NUMBER AND LOCATION OF UNIONS SHOWN ON DRAWINGS ARE APPROXIMATE. PROVIDE UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.
9. WHERE A GROOVED END COUPLING IS SHOWN, IT SHALL BE THE RIGID JOINT TYPE. WHERE A FLANGED COUPLING ADAPTER IS SHOWN, A STANDARD FLANGE SHALL BE USED TO JOIN THE COUPLING ADAPTER.
10. SYMBOLS SHOWN ARE GENERIC. REFER TO THE CONTRACT DOCUMENTS FOR SPECIFIC END CONNECTIONS FOR PIPE AND FITTINGS.

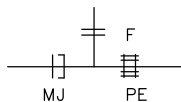
VALVE DESIGNATIONS



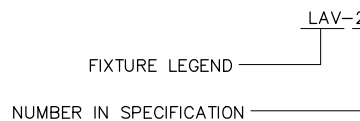
PIPING DESIGNATION



**PIPE AND FITTING
END PATTERNS**



**PLUMBING FIXTURE
IDENTIFICATION**



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REVISION DATE:

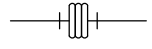
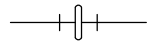

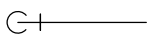
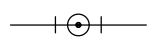
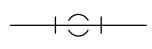
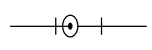
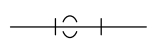
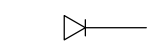
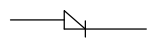
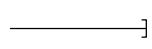
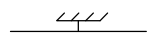

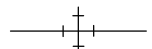
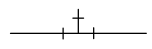
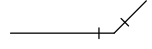
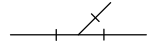
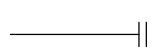
**01030
MECHANICAL NOTES
AND LEGENDS**

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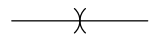
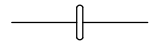
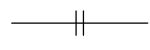
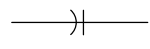
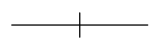
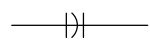
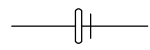


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PIPE AND FITTING SYMBOLS



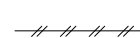
SINGLE LINE

	STEEL BELLOWS EXPANSION JOINT
	ELASTOMER BELLOWS EXPANSION JOINT
	ELBOW UP
	ELBOW DOWN
	TEE UP
	TEE DOWN
	LATERAL UP
	LATERAL DOWN
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	CAP
	ANCHOR
	ELBOW, 90°
	CROSS
	TEE
	ELBOW, 45°
	LATERAL
	BLIND FLANGE



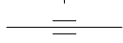




SINGLE LINE

	WELDED JOINT
	GROOVED END JOINT
	FLANGED JOINT
	MECHANICAL RESTRAINED JOINT
	PUSH-ON JOINT
	BALL JOINT
	GROOVED END ADAPTER FLANGE
	FLANGED COUPLING ADAPTER (SEE 01030 GENERAL PIPING NOTE 5)
	FLEXIBLE COUPLING (SEE 01030 GENERAL PIPING NOTE 5)

PLANT AIR LEGEND

	AIR PURGE SET
	HARD Cu COPPER TUBING
	INSTRUMENT AIR

MISCELLANEOUS PIPING SYMBOLS

	GAUGE WITH OUTLET
	THERMOMETER
	PIPE ALIGNMENT GUIDE
	GAUGE GLASS WITH OUTLET
	FLOW SWITCH
	PRESSURE SWITCH
	XX AIR SET XX = SUPPLY PRESSURE - PSIG

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

REVISION DATE:

01031 MECHANICAL LEGEND



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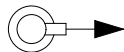
PUMP AND COMPRESSOR SYMBOLS



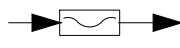
HORIZONTAL PUMP
(DRY PIT)



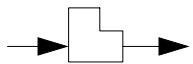
PISTON PUMP



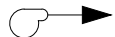
VERTICAL PUMP
(WET PIT)



PROGRESSING
CAVITY PUMP



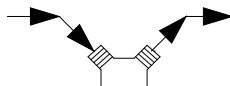
CHEMICAL FEED PUMP
(METERING)



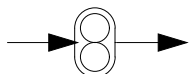
SUBMERSIBLE
SUMP PUMP



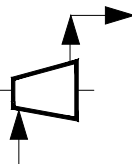
DIAPHRAGM PUMP



COMPRESSOR
(PISTON)



GEAR PUMP OR BLOWER
(POSITIVE DISPLACEMENT)



COMPRESSOR
(CENTRIFUGAL)
OR BLOWER



EJECTOR



PERISTALTIC HOSE PUMP
(POSITIVE DISPLACEMENT)

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

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MECHANICAL LEGEND

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HEATING, VENTILATING, AND AIR CONDITIONING SYMBOLS

	WALL REGISTER OR GRILLE (SUPPLY) SG
	CEILING DIFFUSER OR REGISTER (SUPPLY) CD, CR
	CEILING REGISTER OR GRILLE (RETURN AND EXHAUST) CG, CR
	WALL REGISTER OR GRILLE (RETURN AND EXHAUST) RG
	FLOOR GRILLE (SUPPLY AND RETURN) FG
	TURNING VANES
	EXTRACTOR VANES
	SOUND ATTENUATED DUCT
	FIRE DAMPER
	SPLITTER DAMPER
	MANUAL OPPOSED-BLADE DAMPER
	MOTORIZED DAMPER
	SMOKE DAMPER
	FLEXIBLE CONNECTION
	FLEXIBLE DUCTWORK
	INCLINED RISE IN DUCT
	INCLINED DROP IN DUCT
	SUPPLY DUCT (SECTION)
	INTAKE, RETURN, OR EXHAUST DUCT (SECTION)
	TEMPERATURE SENSOR
	THERMOSTAT
	CARBON MONOXIDE SENSOR

HEATING, VENTILATING, AND AIR CONDITIONING SYMBOLS

	HUMIDISTAT
	ENVIRONMENTAL CONTROL PANEL
	VIBRATION ELIMINATOR
	200 AIRFLOW AT ACTUAL ELEVATION (ACFM)
	MOTORIZED VALVE
	BOD EL-XX

BUILDING SERVICES SYMBOLS

	PRESSURE SWITCH
	HOSE RACK (TYPE AS INDICATED)
	FIRE EXTINGUISHER X = NO IN SPECS
	X = F - FLOOR CLEANOUT D - DECK CLEANOUT W - WALL CLEANOUT
	HUB DRAIN X - NO IN SPECS Y - T WITH TRAP Y - P WITH PRIMED TRAP
	FLOOR DRAIN X - NO IN SPECS Y - T WITH TRAP Y - P WITH PRIMED TRAP
	OVERFLOW DRAIN X = NO IN SPECS
	ROOF DRAIN X = NO IN SPECS
	WATER HAMMER ARRESTOR
	BACKFLOW PREVENTER

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

01033
MECHANICAL LEGEND

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NOTES:

1. SEE DRAWINGS FOR ADDITIONAL LEGENDS, SYMBOLS, AND ABBREVIATIONS USED.
2. DEVICES SHOWN IN LOCAL CONTROL PANEL, MOTOR CONTROL CENTER, AND ENVIRONMENTAL CONTROL PANEL SHALL BE MOUNTED IN THE ENCLOSURE INTERIOR.
3. RELAYS AND CONTACTORS SHALL BE PROVIDED AND INSTALLED WITH SURGE PROTECTION ACROSS THE COILS.
4. THE NUMBER OF AUXILIARY CONTACTS INDICATED FOR RELAYS, CONTACTORS, SWITCHES, AND DEVICES ARE THE MINIMUM ACCEPTABLE NUMBER.
5. INDICATING LIGHTS SHALL BE PUSH-TO-TEST TYPE. CONSTANT POWER SHALL BE CONNECTED TO THE PUSH-TO-TEST TERMINAL WHETHER INDICATED OR NOT.
6. PROVIDE AND INSTALL ELECTRICAL INSTRUMENTATION AND CONTROLS COMPLETE WITH DEVICES AND ASSOCIATED CIRCUITRY NECESSARY TO PERFORM THE INTENDED FUNCTIONS OF THE CONTRACT DOCUMENTS. PROVIDE AND INSTALL ANY MATERIALS, DEVICES, AND CIRCUITRY NOT SPECIFICALLY INDICATED BUT NECESSARY TO PERFORM INTENDED FUNCTIONS AND CORRECT OPERATION.
7. EQUIPMENT, DEVICE, GROUND AND RACEWAY SYSTEM LOCATIONS, DIMENSIONS, PLANS, AND ELEVATIONS INDICATED ARE APPROXIMATE. USE ACTUAL EQUIPMENT FOR INSTALLATION. COORDINATE EXACT LOCATIONS WITH THE CIVIL, STRUCTURAL, AND MECHANICAL WORK, AS WELL AS THE EQUIPMENT MANUFACTURERS, ENGINEER, AND OTHER TRADES.
8. NOT ALL INTERFERENCES AND UNDERGROUND UTILITIES ARE SHOWN ON THE DRAWINGS. LOCATE ALL INTERFERENCES AND UNDERGROUND UTILITIES TO ROUTE RACEWAYS ACCORDINGLY.
9. PACKAGE PROVIDED EQUIPMENT MAY REQUIRE ADDITIONAL DEVICES, CONDUITS, AND CONDUCTORS FOR PROPER OPERATION. PROVIDE AND INSTALL ADDITIONAL CONDUITS, CONDUCTORS, AND CABLES REQUIRED BY THE EQUIPMENT MANUFACTURERS TO COMPLETE THE INSTALLATION.
10. OVERCURRENT DEVICE SIZES INDICATED ARE ESTIMATED. PROVIDE AND INSTALL OVERCURRENT DEVICES SIZED AS REQUIRED FOR THE ACTUAL EQUIPMENT RATING. OVERCURRENT DEVICES SIZES SHALL BE APPROVED BY THE ENGINEER.
11. INSTALLATION DRAWING DETAILS AND SPECIFICATION REQUIREMENTS ARE REQUIRED WHETHER SPECIFICALLY REFERENCED BY A DETAIL NUMBER OR NOT.
12. CONDUIT TERMINATIONS SHALL BE PROVIDED AND INSTALLED WITH GROUND BUSHINGS AND SHALL BE BONDED TO THE GROUND GRID. THE BONDING CONDUCTOR SHALL BE SOLID #10 AWG, MINIMUM.
13. CONDUIT, RACEWAY, CONDUCTOR, AND CABLE SIZES ARE THE MINIMUM ACCEPTABLE SIZE, CONDUITS SHALL BE CONCEALED.
14. WHERE ONLY HOMERUNS AND CIRCUIT NUMBERS OR SCHEMATIC CONNECTION DIAGRAMS ARE SHOWN, PROVIDE AND INSTALL THE COMPLETE RACEWAY SYSTEM.
15. CONTROLS ARE SHOWN DE-ENERGIZED, CONTROL DIAGRAMS SHOW INTENDED CONTROL FUNCTION. INCORPORATE OTHER NECESSARY FUNCTIONS AND DEVICES FOR PROPER OPERATIONS AND PROTECTION OF THE SYSTEMS.
16. COMPONENTS AND PANELS SHOWN WITH A DOUBLE ASTERISK (**) WILL BE PROVIDED BY OTHERS.

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS / KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**01040
ELECTRICAL
INSTRUMENTATION AND
CONTROL NOTES**

 **DENVER WATER**

1600 West 12th Ave
Denver, Colorado 80204-3412
T: 303.628.6000
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denverwater.org

SYMBOL

DESCRIPTION

	LOW VOLTAGE CIRCUIT BREAKER – 20 AMPERE, 3 POLE (THERMAL MAGNETIC UNLESS INDICATED OTHERWISE)
	FUSE – RATING INDICATED
	DISCONNECT SWITCH – RATING INDICATED
	FUSED DISCONNECT SWITCH (3 POLE UNLESS INDICATED OTHERWISE)
	POLE MOUNTED CUTOUT WITH FUSIBLE LINK
	FUSED OR NONFUSED DISCONNECT SWITCH 3 POLE FUSED UNLESS INDICATED OTHERWISE
	POWER CIRCUIT BREAKER
	DRAWOUT POWER CIRCUIT BREAKER
	KIRK KEY INTERLOCK
	DISCONNECT (ROLLOUT, ETC)
	TERMINAL POINT (TERMINAL BLOCK OR DEVICE TERMINAL)
	TERMINAL BLOCK/POINT TO INTERFACE WITH "FIELD DEVICES"
	KNIFE-DISCONNECT TERMINAL BLOCK
	<p>← DENOTES CABLE NUMBER FOR INTERCONNECTION WIRING</p> <p>← TERMINAL POINT</p> <p>← TERMINAL BLOCK</p> <p>P – POWER C – CONTROL/COMMUNICATIONS A – SIGNAL</p>
	NOT CONNECTED
	CONNECTED
	PANEL, TERMINAL BOX, PULL BOX, JUNCTION BOX, ETC
	EQUIPMENT, DEVICE, METER, PROTECTIVE RELAY, ETC.
	MOTOR, SQUIRREL CAGE INDUCTION, HORSEPOWER INDICATED
	LUMINAIRE, SEE SCHEDULE
	EXIT LIGHT

SYMBOL

DESCRIPTION

	EXPOSED CONDUIT OR HEAT TAPE SYSTEM
	CONCEALED CONDUIT OR HEAT TAPE SYSTEM
	GROUND CABLE
	GROUND ROD
	GROUND PIGTAIL OR LOOP
	EXOTHERMIC WELD CONNECTION
	<p>* WALL SWITCH: 2 – DOUBLE POLE P – PILOT LIGHT 3 – THREE WAY K – KEY OPERATED 4 – FOUR WAY D – DIMMER WP – WEATHERPROOF</p>
	MANUAL MOTOR STARTER SWITCH, WITH HEATERS
	CONVENIENCE RECEPTACLE – DUPLEX UNLESS SPECIFIED OTHERWISE
	RECEPTACLE – 240V, 1Ø, AMPERAGE INDICATED
	INSTRUMENT, DEVICE, ETC
	VOICE
	DATA JACK
	JUNCTION BOX OR PULL BOX
	STRIP HEATER
	THERMOSTAT
	RELAY
	ELAPSED TIME METER
	FLASHING BEACON
	INDICATING LIGHT – LETTER INDICATES COLOR A – AMBER R – RED B – BLUE W – WHITE C – CLEAR Y – YELLOW G – GREEN SL – SYNCHRONIZING LIGHT
	INDICATING LIGHT, PUSH-TO-TEST, LETTER INDICATES COLOR
	POWER POLE
	GUY WIRE
	LIGHT POLE

LEVEL SWITCH INDICATOR

	LEVEL SWITCH HIGH HIGH
	LEVEL SWITCH HIGH
	LEVEL SWITCH LOW
	LEVEL SWITCH LOW LOW

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

01050 ELECTRICAL AND CATHODIC PROTECTION LEGEND



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SYMBOL

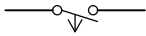
DESCRIPTION

SYMBOL

DESCRIPTION



ON TIME DELAY SWITCH
(NORMALLY OPEN WITH TIME DELAY CLOSING
AFTER COIL IS ENERGIZED) NOTC



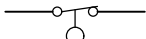
OFF TIME DELAY SWITCH
(NORMALLY OPEN WITH TIME DELAY OPENING
AFTER COIL IS DE-ENERGIZED) NOTO



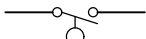
ON TIME DELAY SWITCH
(NORMALLY CLOSED WITH TIME DELAY
OPENING AFTER COIL IS ENERGIZED) NCTO



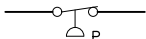
OFF TIME DELAY SWITCH
(NORMALLY CLOSED WITH TIME DELAY
CLOSING AFTER COIL IS DE-ENERGIZED) NCTC



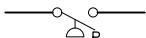
FLOAT SWITCH
(OPENING ON RISING LEVEL)



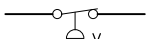
FLOAT SWITCH
(CLOSING ON RISING LEVEL)



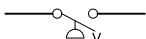
PRESSURE SWITCH
(OPENING ON RISING PRESSURE)



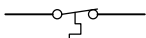
PRESSURE SWITCH
(CLOSING ON RISING PRESSURE)



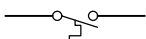
VACUUM SWITCH
(OPENING ON RISING PRESSURE)



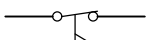
VACUUM SWITCH
(CLOSING ON RISING PRESSURE)



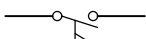
TEMPERATURE SWITCH
(OPENING ON RISING TEMPERATURE)



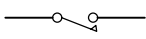
TEMPERATURE SWITCH
(CLOSING ON RISING TEMPERATURE)



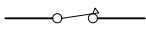
FLOW ACTUATED SWITCH
(OPENING ON INCREASE OF FLOW)



FLOW ACTUATED SWITCH
(CLOSING ON INCREASE OF FLOW)



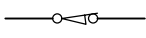
TORQUE SWITCH
(NORMALLY OPEN)



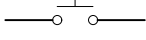
TORQUE SWITCH
(NORMALLY CLOSED)



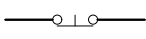
LIMIT SWITCH
(NORMALLY OPEN)



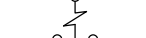
LIMIT SWITCH
(NORMALLY CLOSED)



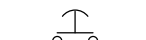
PUSH-BUTTON SWITCH, MOMENTARY
CONTACT, NORMALLY OPEN



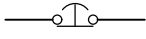
PUSH-BUTTON SWITCH, MOMENTARY
CONTACT, NORMALLY CLOSED



EMERGENCY STOP PULL CORD



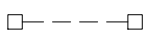
PUSH BUTTON, MAINTAINED CONTACT,
MUSHROOM HEAD, NORMALLY CLOSED



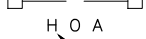
PUSH BUTTON, MAINTAINED CONTACT,
MUSHROOM HEAD, NORMALLY OPEN



3 POSITION SELECTOR SWITCH SPRING
RETURN TO CENTER



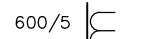
REMOTE OR FIELD DEVICE



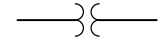
SELECTOR SWITCH - MAINTAINED CONTACT -
CHART IDENTIFIES OPERATION:

CIRCUIT	POSITION		
	HAND	OFF	AUTO
1	X	O	O
2	O	O	X

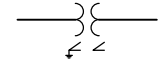
X - CLOSED CONTACT
O - OPEN CONTACT



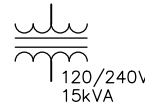
CURRENT TRANSFORMER
(600/5 INDICATES RATIO)



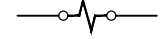
POTENTIAL TRANSFORMER



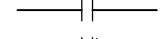
POTENTIAL TRANSFORMER
WITH DESIGNATORS



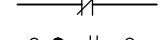
TRANSFORMER, SECONDARY VOLTAGES,
PHASE AND RATING INDICATED AS
APPLICABLE



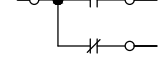
SOLENOID COIL OR PROTECTIVE RELAY COIL



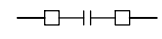
CONTACT - NORMALLY OPEN



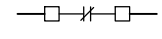
CONTACT - NORMALLY CLOSED



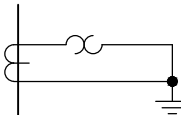
SIGNAL/CONTROL CIRCUIT SWITCHING RELAYS
INDICATED BY FORM C CONTACTS



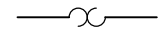
MAGNETIC CONTROL, MACHINE TOOL AND
INDUSTRIAL RELAYS INDICATED BY MULTIPLE
SINGLE POLE SINGLE THROW CONTACTS
(NORMALLY OPEN)



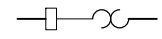
MAGNETIC CONTROL, MACHINE TOOL AND
INDUSTRIAL RELAYS INDICATED BY MULTIPLE
SINGLE POLE SINGLE THROW CONTACTS
(NORMALLY CLOSED)



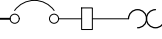
SOLID STATE OVERLOAD



OVERLOAD RELAY HEATER



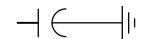
MAGNETIC STARTER



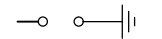
COMBINATION MAGNETIC STARTER



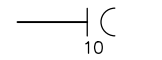
COMBINATION MAGNETIC STARTER



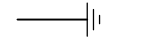
SURGE CAPACITOR



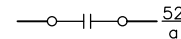
LIGHTNING ARRESTOR



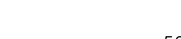
CAPACITOR - KILOVAR INDICATED



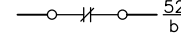
GROUND



CIRCUIT BREAKER



NORMALLY OPEN "a" CONTACT
(OPEN WHEN 52 BREAKER IS OPEN)



CIRCUIT BREAKER
NORMALLY CLOSED "b" CONTACT
(CLOSED WHEN 52 BREAKER IS OPEN)

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021










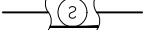








REVISION DATE:

01051
ELECTRICAL AND CATHODIC
PROTECTION LEGEND




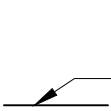
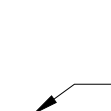









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SYMBOL DESCRIPTION

	PRESSURE SENSING LOOP
	TURBINE
	GENERATOR
	TEST BLOCK OR SHORTING TEST BLOCK
	KEYPAD
	SECURITY DOOR INTER LOCK (DETECTION)
	PHOTOELECTRIC SMOKE DETECTOR
	HEAT DETECTOR
	ION DUCT DETECTOR
	PHOTO DUCT DETECTOR
	MANUAL PULL STATION
	HORN/STROBE (WALL MOUNT)
	HORN/STROBE (CEILING MOUNT)
	RESISTOR
	DIODE
	LIGHT EMITTING DIODE
	METAL OXIDE VARISTOR
	BATTERY

SYMBOL DESCRIPTION

	HORN
	INDICATES EQUIPMENT LOCATED ON THE ROOF
	MECHANICAL EQUIPMENT TAG, REFER TO SCHEDULE
	CONDUIT INDICATOR IDENTIFICATION NUMBER [PXXX] CONDUIT WITH CONDUCTORS
	CONDUIT INDICATOR IDENTIFICATION NUMBER [PXXX] EXISTING CONDUIT WITH NEW CONDUCTORS INSTALLED
	ANODE
	TEST STATION IDENTIFICATION NUMBER
	REFERENCE ELECTRODE
	COUPON
	TEST STATION
	AT GRADE TEST STATION
	CATHODIC PROTECTION

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

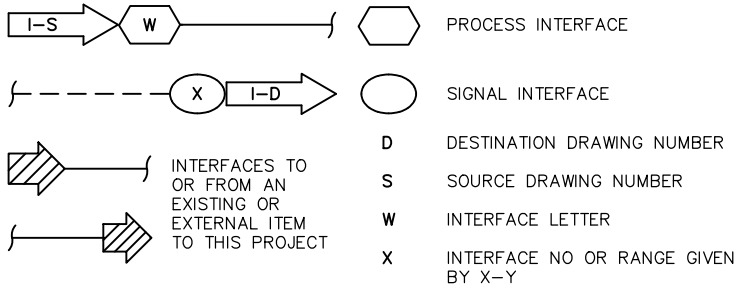
REVISION DATE:

**01052
ELECTRICAL AND CATHODIC
PROTECTION LEGEND**

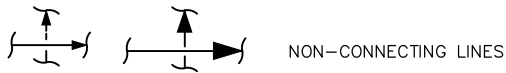
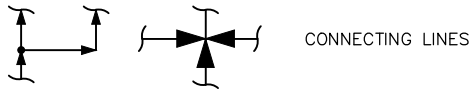
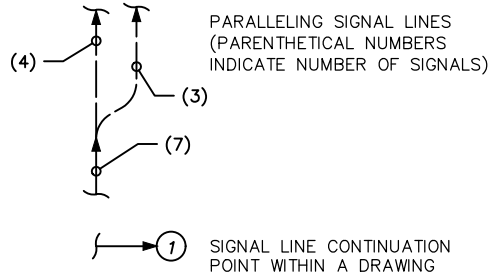
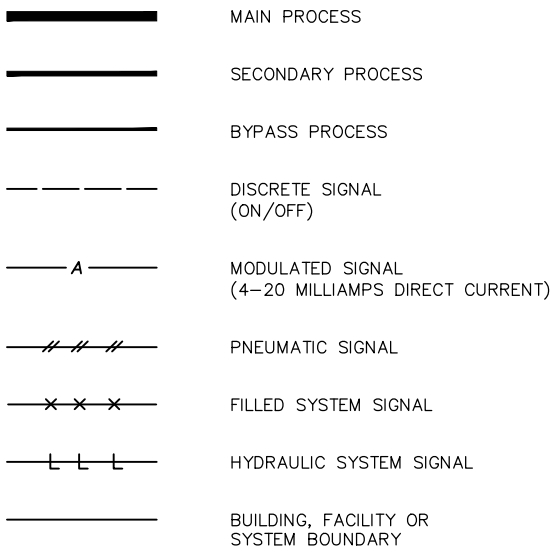


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INTERFACE SYMBOLS



LINE LEGEND



DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

01060
INSTRUMENTATION AND
CONTROL LEGEND

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PRIMARY ELEMENT SYMBOLS

	ORIFICE PLATE
	FLOW TUBE/FLUME
	PITOT-STATIC
	PROPELLER OR TURBINE METER
	ELECTROMAGNETIC FLOWMETER
	ULTRASONIC FLOWMETER
	CORIOLIS MASS FLOWMETER
	DENSITY METER X: N = NUCLEAR O = OPTICAL U = ULTRASONIC
	SWIRL FLOWMETER
	LEVEL (FLOAT)
	LEVEL (ULTRASONIC)
	LEVEL (ROTARY PADDLE)

MISCELLANEOUS SYMBOLS

	DIAPHRAGM SEAL
	ANNULAR DIAPHRAGM SEAL
	PIG INSERT POINT
	PIG CATCH POINT
	MIXER
	ELECTRIC MOTOR
	AIR GAP
	VENT TO ATMOSPHERE
	CALIBRATION COLUMN
	AIR SUPPLY
	PURGE POINT X: W = WATER A = AIR
	SEAL WATER
	FLUSHING CONNECTION
	LOAD CELL OR STRAIN GAUGE
	PULSATION DAMPENER
	POWER SUPPLY INPUT

EQUIPMENT TAG NUMBERS

VVWW-XX-ZZ

VV	UNIT PROCESS NUMBER
WW	LOOP NUMBER
-XX	TRAIN/UNIT NUMBER
-ZZ	MULTIPLE UNIT NUMBER

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

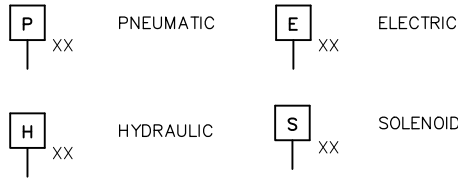
01061 INSTRUMENTATION AND CONTROL LEGEND

D DENVER WATER

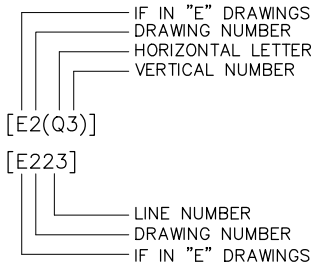
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ACTUATOR SYMBOLS

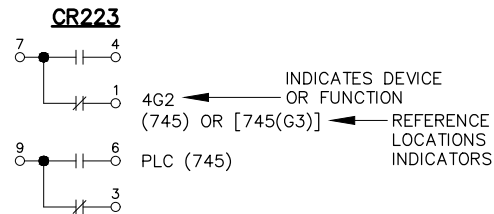
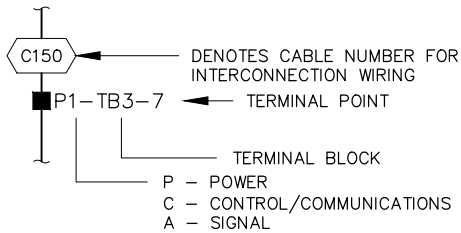
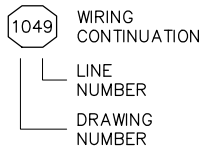
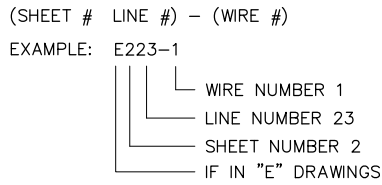
XX DENOTES: FO = FAIL OPEN
 FC = FAIL CLOSED
 FLP = FAIL TO LAST POSITION



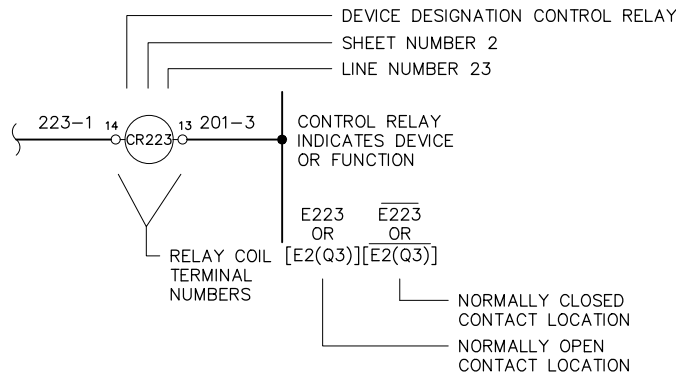
DRAWING LOCATION INDICATOR



WIRE NUMBERING INDICATOR



DEVICE NUMBERING CONVENTION



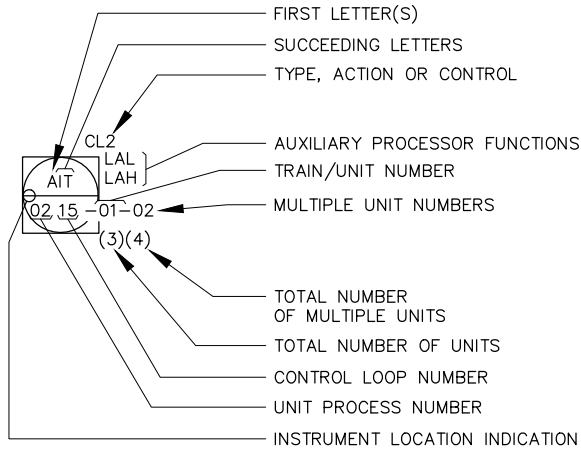
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01062 INSTRUMENTATION AND CONTROL LEGEND



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P&ID / I&C IDENTIFICATION



- FIELD MOUNTED INSTRUMENT
- REAR-OF-PANEL MOUNTED INSTRUMENT
- PANEL MOUNTED INSTRUMENT
- HARD-WIRED CONTROL LOGIC INTERLOCK & PERMISSIVES
- HARD-WIRED CONTROL LOGIC
- LOGIC CONTROL INTEGRAL TO THE SOFTWARE (NOT ACCESSIBLE TO THE OPERATOR)
- LOGIC CONTROL INTEGRAL TO THE SOFTWARE (FUNCTION OPERATOR ACCESSIBLE)
- CONTROL OR DISPLAY FUNCTION VIA SOFTWARE (FUNCTION NOT NORMALLY ACCESSIBLE TO THE OPERATOR)
- CONTROL OR DISPLAY FUNCTION VIA SOFTWARE (FUNCTION OPERATOR ACCESSIBLE)

INTERNATIONAL SOCIETY OF AUTOMATION (ISA) TABLE

LETTER	FIRST LETTER(S)		SUCCEEDING LETTERS	
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION MODIFIER
A	ANALYZER		ALARM	
B	BURNER		USER'S CHOICE (*)	USER'S CHOICE (*)
C	CONDUCTIVITY			CONTROL
D	DENSITY, DISCHARGE	DIFFERENTIAL		
E	VOLTAGE		PRIMARY ELEMENT	
F	FLOW RATE	RATIO		
G	GAUGE		GLASS	GATE
H	HAND (MANUAL)			HIGH
I	CURRENT		INDICATE	
J	POWER	SCAN		
K	TIME OR SCHEDULE			CONTROL STATION
L	LEVEL		LIGHT (PILOT)	LOW
M	MOTION			MIDDLE
N	TORQUE		USER'S CHOICE (*)	USER'S CHOICE (*)
O	USER'S CHOICE (*)		ORIFICE	
P	PRESSURE (OR VACUUM)		POINT (TEST CONNECTION)	
Q	QUANTITY OR EVENT (*)	INTEGRATE	INTEGRATE	
R			RECORD OR PRINT	
S	SPEED OR FREQUENCY	SAFETY		SWITCH
T	TEMPERATURE			TRANSMIT
U	MULTIVARIABLE (*)		MULTIFUNCTION (*)	
V	VISCOSITY			VALVE
W	WEIGHT OR FORCE	WELL		
X	UNCLASSIFIED (*)		UNCLASSIFIED (*)	UNCLASSIFIED (*)
Y	USER'S CHOICE (*)			RELAY OR COMPUTE (*)
Z	POSITION			DRIVE, ACTUATE, OR UNCLASSIFIED FINAL CONTROL ELEMENT

(*) WHEN USED, EXPLANATION MAY BE SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

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01070 ELECTRICAL AND INSTRUMENTATION LEGEND

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DEVICE
NUMBER FUNCTION

- 1 MASTER ELEMENT
- 2 TIME-DELAY STARTING OR CLOSING RELAY
- 3 CHECKING OR INTERLOCKING RELAY
- 4 MASTER CONTACTOR
- 5 STOPPING DEVICE
- 6 STARTING CIRCUIT BREAKER
- 7 RATE-OF-RISE RELAY
- 8 CONTROL POWER DISCONNECTING DEVICE
- 9 REVERSING DEVICE
- 10 UNIT SEQUENCE SWITCH
- 11 MULTIFUNCTION DEVICE
- 12 OVERSPEED DEVICE
- 13 SYNCHRONOUS-SPEED DEVICE
- 14 UNDERSPEED DEVICE
- 15 SPEED OR FREQUENCY MATCHING DEVICE
- 16 RESERVED
- 17 SHUNTING OR DISCHARGE SWITCH
- 18 ACCELERATING OR DECELERATING DEVICE
- 19 STARTING-TO-RUNNING TRANSITION CONTACTOR
- 20 ELECTRICALLY OPERATED VALVE
- 21 DISTANCE RELAY
- 22 EQUALIZER CIRCUIT BREAKER
- 23 TEMPERATURE CONTROL DEVICE
- 24 VOLTS PER HERTZ RELAY
- 25 SYNCHRONIZING OR SYNCHRONISM CHECK DEVICE
- 26 APPARATUS THERMAL DEVICE
- 27 UNDERVOLTAGE RELAY
- 28 FLAME DETECTOR
- 29 ISOLATING CONTACTOR
- 30 ANNUNCIATOR RELAY
- 31 SEPARATE EXCITATION DEVICE
- 32 DIRECTIONAL POWER RELAY
- 33 POSITION SWITCH
- 34 MASTER SEQUENCE DEVICE
- 35 BRUSH-OPERATING OR SLIP-RING SHORT-CIRCUITING DEVICE
- 36 POLARITY OR POLARIZING VOLTAGE DEVICE
- 37 UNDERCURRENT OR UNDERPOWER RELAY
- 38 BEARING PROTECTIVE DEVICE - THERMAL
- 39 MECHANICAL CONDITION MONITOR - VIBRATION
- 40 FIELD RELAY - LOSS OF EXCITATION
- 41 FIELD CIRCUIT BREAKER
- 42 RUNNING CIRCUIT BREAKER - GENERATOR BREAKER
- 43 MANUAL TRANSFER OR SELECTOR DEVICE
- 44 UNIT SEQUENCE STARTING RELAY
- 45 ATMOSPHERIC CONDITION MONITOR
- 46 REVERSE-PHASE OR PHASE-BALANCE CURRENT RELAY (NEGATIVE SEQUENCE)
- 47 PHASE-SEQUENCE OR PHASE-BALANCE VOLTAGE RELAY (NEGATIVE SEQUENCE)
- 48 INCOMPLETE SEQUENCE RELAY
- 49 MACHINE OR TRANSFORMER THERMAL DEVICE
- 50 INSTANTANEOUS OVERCURRENT RELAY
- 51 ALTERNATING CURRENT TIME OVERCURRENT RELAY

DEVICE
NUMBER FUNCTION

- 52 ALTERNATING CURRENT CIRCUIT BREAKER
- 53 EXCITER OR DIRECT CURRENT GENERATOR RELAY
- 54 TURNING GEAR ENGAGING DEVICE
- 55 POWER FACTOR RELAY
- 56 FIELD APPLICATION RELAY
- 57 SHORT-CIRCUITING OR GROUNDING DEVICE
- 58 RECTIFICATION FAILURE RELAY
- 59 OVERVOLTAGE RELAY
- 60 VOLTAGE OR CURRENT BALANCE RELAY
- 61 DENSITY SWITCH OR SENSOR
- 62 TIME-DELAY STOPPING OR OPENING RELAY
- 63 PRESSURE SWITCH
- 64 GROUND PROTECTIVE RELAY
- 65 GOVERNOR
- 66 NOTCHING OR JOGGING DEVICE
- 67 ALTERNATING CURRENT DIRECTIONAL OVERCURRENT RELAY
- 68 BLOCKING RELAY
- 69 PERMISSIVE CONTROL DEVICE
- 70 RHEOSTAT
- 71 LEVEL SWITCH
- 72 DIRECT CURRENT CIRCUIT BREAKER
- 73 LOAD-RESISTOR CONTACTOR
- 74 ALARM RELAY
- 75 POSITION CHANGING MECHANISM
- 76 DIRECT CURRENT OVERCURRENT RELAY
- 77 TELEMETERING DEVICE
- 78 PHASE-ANGLE MEASURING OR OUT-OF-STEP PROTECTIVE RELAY
- 79 ALTERNATING CURRENT RE-CLOSING RELAY
- 80 FLOW SWITCH
- 81 FREQUENCY RELAY
- 82 DIRECT CURRENT LOAD-MEASURING RE-CLOSING RELAY
- 83 AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY
- 84 OPERATING MECHANISM
- 85 CARRIER OR PILOT-WIRE RECEIVER RELAY
- 86 LOCKOUT RELAY
- 87 DIFFERENTIAL PROTECTIVE RELAY
- 88 AUXILIARY MOTOR OR MOTOR GENERATOR
- 89 LINE SWITCH
- 90 REGULATING DEVICE
- 91 VOLTAGE DIRECTIONAL RELAY
- 92 VOLTAGE AND POWER DIRECTIONAL RELAY
- 93 FIELD-CHANGING CONTACTOR
- 94 TRIPPING OR TRIP-FREE RELAY (NON-LOCKOUT)
- 95 } USED ONLY FOR SPECIFIC APPLICATIONS IN
- 96 } INDIVIDUAL INSTALLATIONS WHERE NONE
- 97 } OF THE ASSIGNED NUMBER FUNCTIONS
- 98 } FROM 1 TO 94 ARE SUITABLE.
- 99 } POTENTIAL THROWOVER

DEVICE
SUFFIX LETTERS

- A AUXILIARY OR AUTOMATIC
- BK BRAKE
- C CONTROLLER
- D DRIVE END
- DC DIRECT CURRENT
- F FIELD GENERATOR
- G GENERATOR
- L LINE
- N NEUTRAL
- O OVER
- ODE OPPOSITE DRIVE END
- Q OIL
- SC SYNC CHECK
- T TRANSFORMER
- U UNDER
- V VOLTAGE

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CHKD BY: *K ROSS / KLR*

APPD BY: *JH*

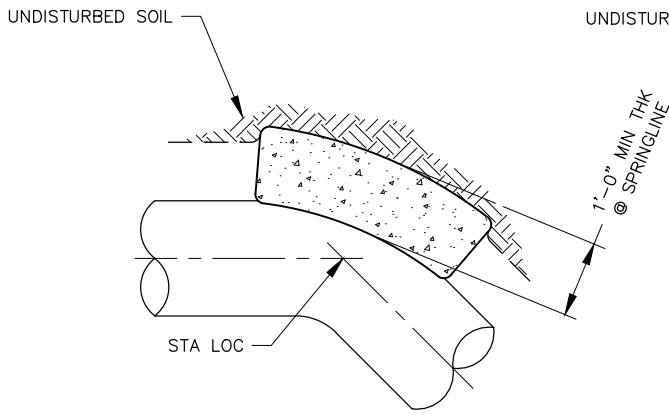
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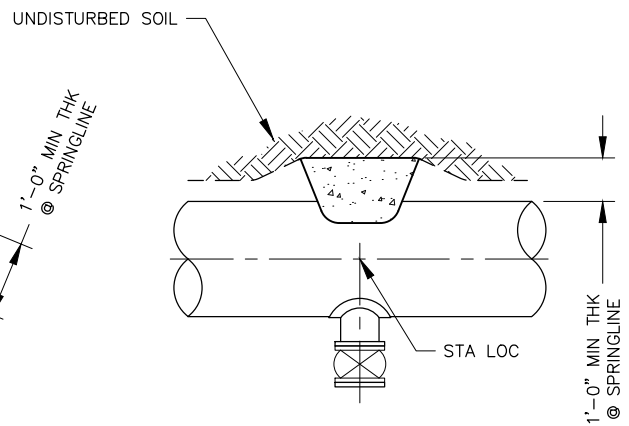
01080
IEEE STANDARD DEVICE
IDENTIFICATION



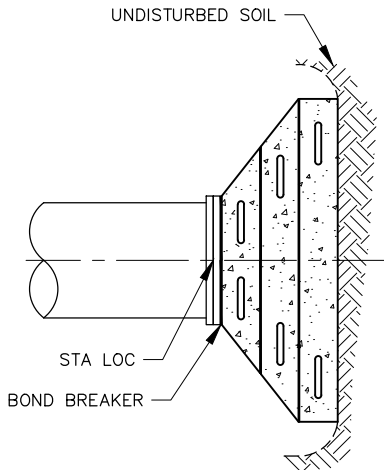
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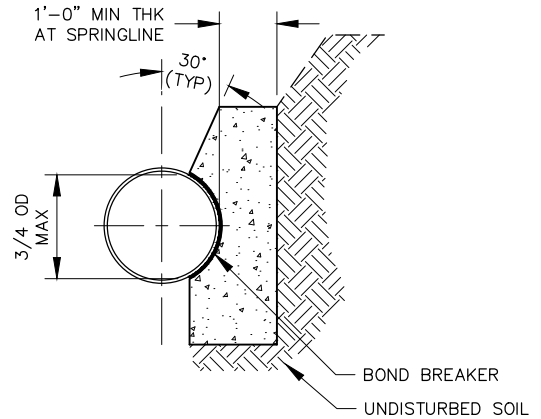
PLAN-TYPE 1



PLAN-TYPE 2

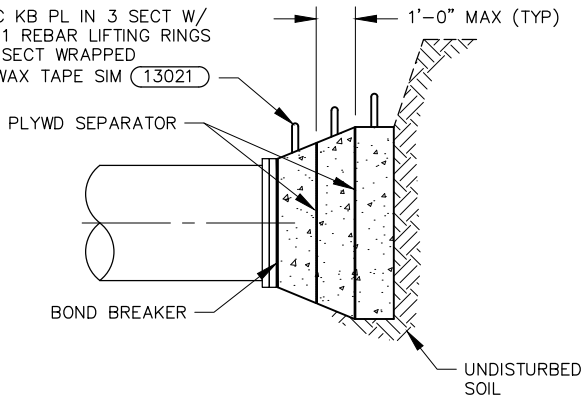


PLAN-TYPE 3



ELEVATION-TYPE 1&2

CONC KB PL IN 3 SECT W/
2-#11 REBAR LIFTING RINGS
PER SECT WRAPPED
W/ WAX TAPE SIM (13021)



ELEVATION-TYPE 3

MINIMUM BEARING SURFACE AREA
(IN SQUARE FEET)

NOMINAL PIPE Ø	BENDS				TEE OR DEAD END
	11 1/4°	22 1/2°	45°	90°	
4"	1.00	1.00	1.00	1.75	1.25
6"	1.00	1.25	2.25	3.25	2.75
8"	1.00	2.00	3.75	6.75	5.00
12"	2.25	4.25	8.25	15.00	10.75
16"	3.25	7.50	14.25	26.50	18.75
20"	5.00	9.75	19.25	35.50	25.00
24" & LARGER-SEE DRAWINGS FOR DIMENSIONS TABLE					

NOTE:

THE MINIMUM BEARING SURFACE AREAS SHOWN IN THE TABLE ARE BASED ON 150 POUNDS PER SQUARE INCH INTERNAL PIPE PRESSURE PLUS WATER HAMMER AND 3000 POUNDS PER SQUARE FOOT ALLOWABLE SOIL BEARING CAPACITY.

- A. WATER HAMMER = 110 POUNDS PER SQUARE INCH FOR 4 INCH, 6 INCH, 8 INCH, 12 INCH, AND 16 INCH.
- B. WATER HAMMER = 70 POUNDS PER SQUARE INCH FOR 20 INCH.

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CHKD BY: K ROSS/KLR

APPD BY: [Signature]

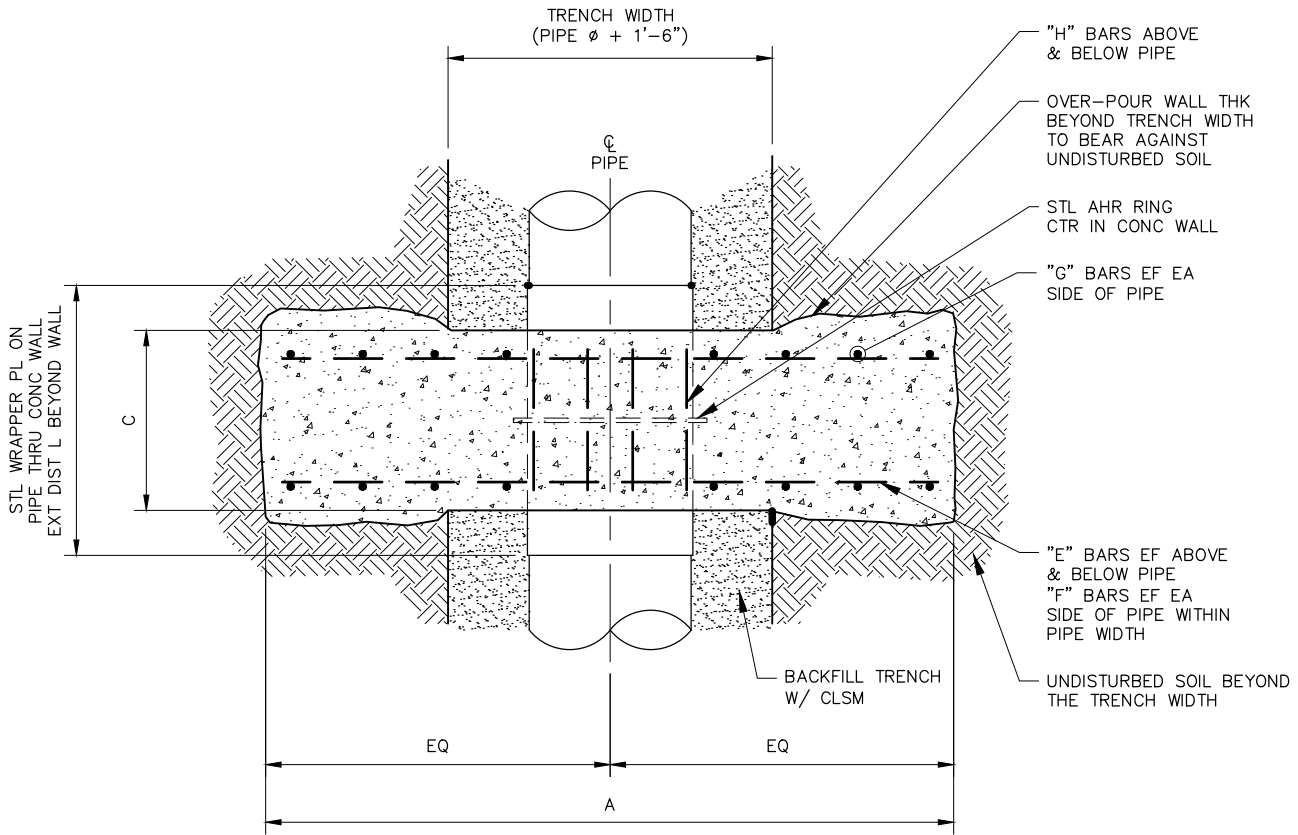
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03001
CONCRETE KICKBLOCKS



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PLAN

(SEE 03003 FOR ELEVATION & TYPICAL SECTION)

PIPE Ø (NOMINAL)	CONCRETE WALL DIMENSIONS			CONCRETE WALL REINFORCEMENT					THICKENED STEEL PIPE AT THRUST WALL (NOTE 1)		STEEL ANCHOR RING		
	WIDTH A	DEPTH B	THK C	"E" BARS	"F" BARS	"G" BARS	"H" BARS	"J" BARS	EXT LENGTH L	MIN TOTAL THK M	HEIGHT N	MIN THK P	MIN WELD SIZE Tw
24"	12'-0"	6'-0"	1'-10"	4-#6	3-#6	7-#6	4-#4	2-#6x6'-0"	7"	1/2"	1 1/2"	1/2"	1/4"
30"	18'-0"	7'-6"	3'-0"	4-#6	3-#6	7-#6	4-#4	2-#6x6'-0"	6"	3/4"	2"	5/8"	5/16"
36"	21'-0"	9'-0"	3'-9"	6-#9	4-#9	12-#7	4-#4	3-#6x8'-0"	10"	1"	2"	1"	5/16"

NOTES:

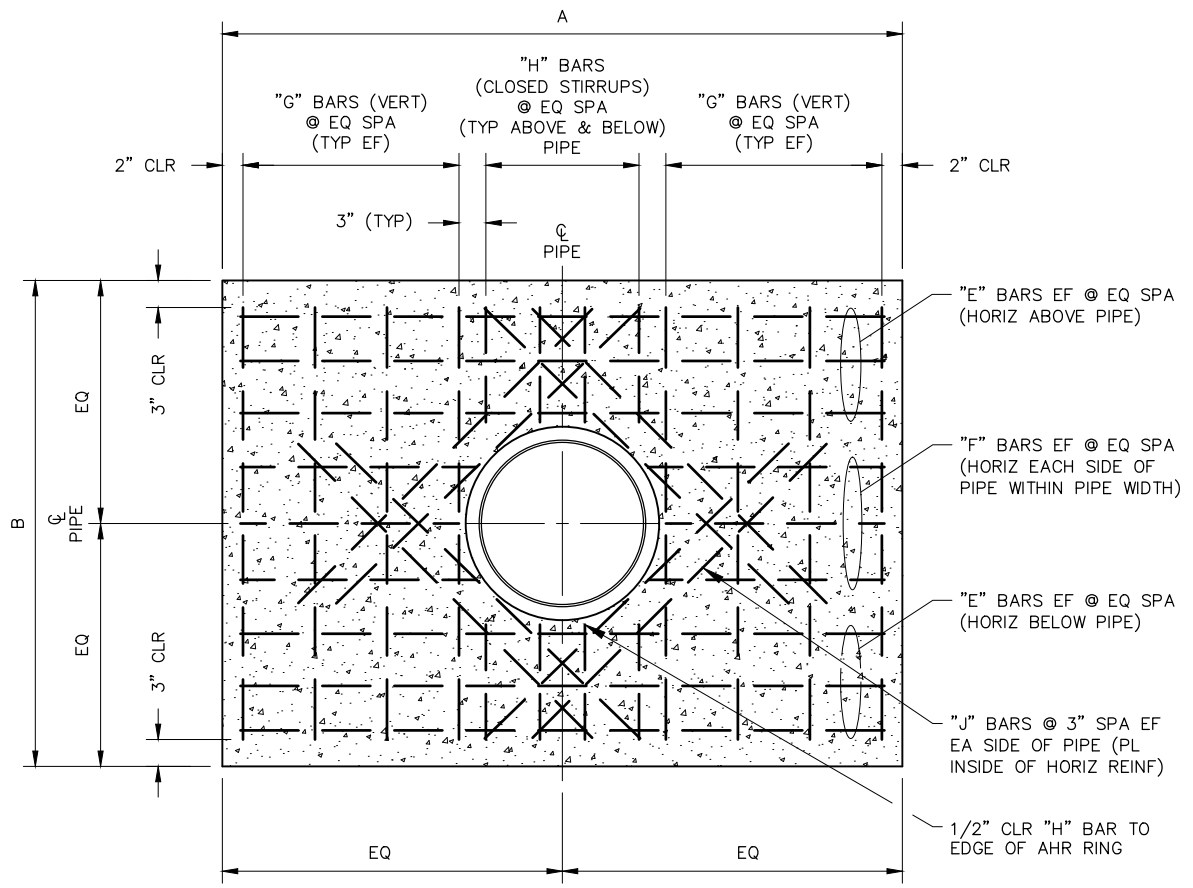
1. THE MINIMUM WRAPPER PLATE THICKNESS (TR) SHALL BE DIMENSION (M) LESS THE BASE PIPE THICKNESS (TS). THE FILLET WELD SIZE SHALL BE EQUAL TO THE THINNEST OF THE WRAPPER PLATE (TR) OR (TS).
2. CONCRETE SHALL BE CLASS D STRUCTURAL CONCRETE IN ACCORDANCE WITH SPECIFICATION SECTION 03 30 00.
3. SEE SPECIFICATION 33 05 24.23 FOR STEEL MATERIAL AND WELDING REQUIREMENTS FOR THICKENED PIPE WALLS AND ANCHOR RINGS.
4. DESIGN THRUST PRESSURES = 150 POUNDS PER SQUARE INCH + 70 POUNDS PER SQUARE INCH WATER HAMMER = 220 POUNDS PER SQUARE INCH FOR THE LARGEST PIPE DIAMETER INFLUENCING THE VALVE ADJACENT TO THE THRUST WALL.
5. DESIGN ALLOWABLE PASSIVE BEARING PRESSURES ARE LOCATION SPECIFIC AS PROVIDED IN THE PROJECT GEOTECHNICAL AND ENVIRONMENTAL EVALUATION.
6. FIELD COORDINATE ALL EXISTING UTILITIES AND OBSTRUCTIONS PRIOR TO THRUST WALL EXCAVATION.

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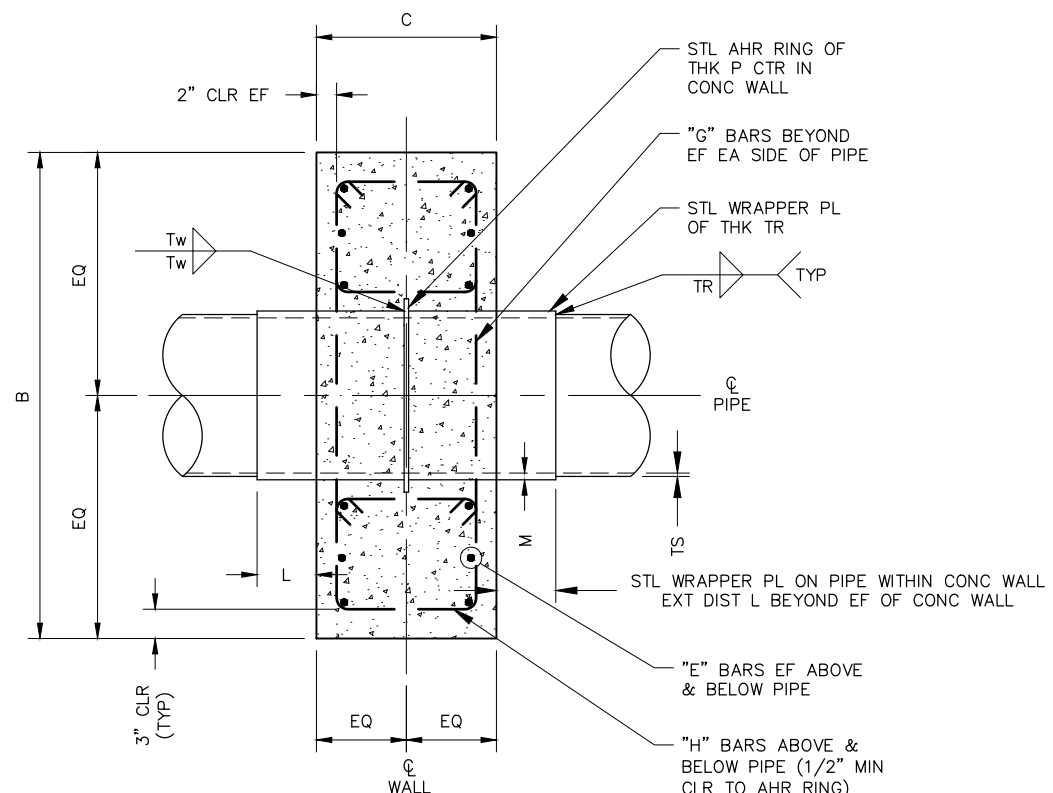
**03002
THRUST WALL**



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ELEVATION



TYPICAL SECTION

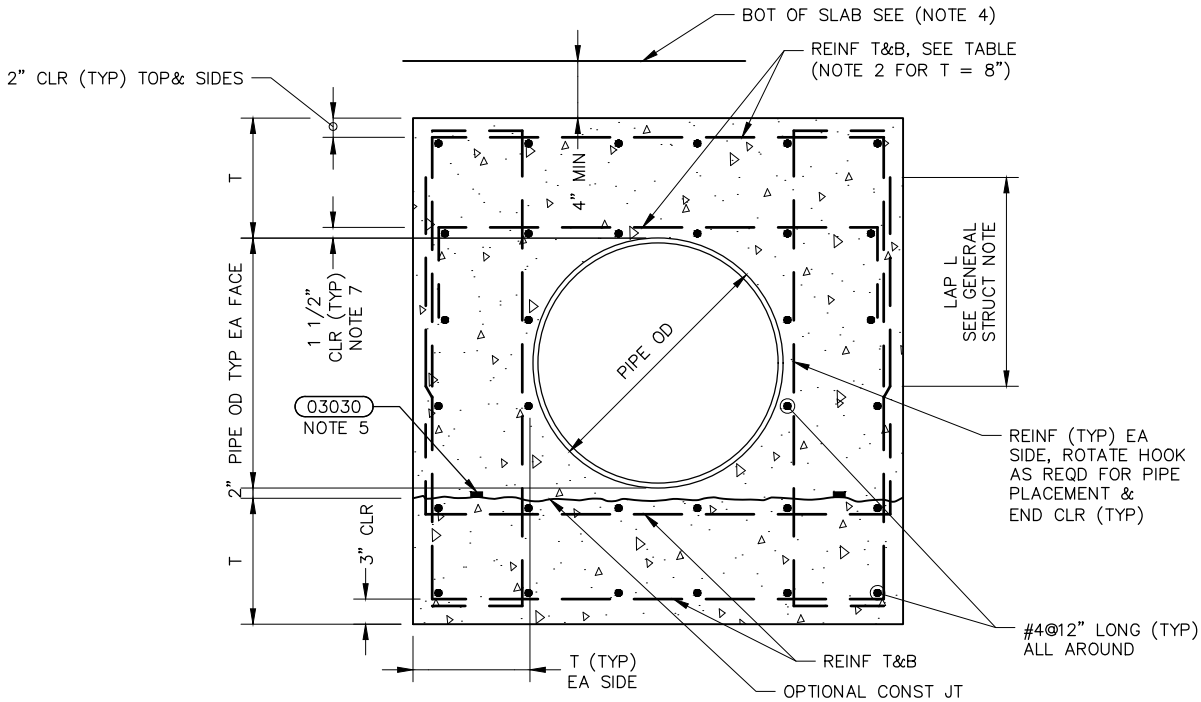
DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
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**03003
THRUST WALL ELEVATION
AND TYPICAL SECTION**

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PIPE ENCASEMENT TABLE								
PIPE ϕ (IN)	H=10 FEET		H=20 FEET		H=30 FEET		H=40 FEET	
	T (in)	REINF	T (in)	REINF	T (in)	REINF	T (in)	REINF
20 THRU 30	8	#5@12"	10	#5@12"	10	#5@12"	10	#6@12"
36 THRU 42	10	#5@12"	10	#6@12"	10	#7@12"	10	#6@6"
48 THRU 54	10	#6@12"	10	#7@12"	10	#7@6"	12	#7@6"
60 THRU 78	12	#6@12"	12	#6@6"	14	#7@6"	14	#7@6"

HEAVY DARK LINE INDICATES BREAK BETWEEN ONE LAYER OF REINFORCEMENT AND TWO. SEE NOTE 2.



NOTES:

1. DETAIL APPLIES TO PIPE DIAMETER OF 20 INCH AND LARGER.
2. FOR T=8 INCH, REINFORCEMENT SHALL BE ONE LAYER AND CENTERED IN SLABS OR WALLS.
3. "H" IS FILL HEIGHT OR WATER DEPTH OR COMBINATION ABOVE CROWN OF PIPE.
4. WHEN PIPE ENCASEMENT IS CLOSER THAN 4 INCHES TO SLAB ABOVE, TIE SLAB & ENCASEMENT TOGETHER BY PROVIDING ROUGHENED CONTACT SURFACE OF 1/4 INCH AMPLITUDE.
5. HYDROPHILIC WATERSTOP SHALL BE CONTINUOUS ALL AROUND AT ALL CONSTRUCTION JOINTS.
6. LONGITUDINAL CONSTRUCTION JOINTS ARE OPTIONAL. EXTEND LONGITUDINAL REINFORCEMENT CLASS "B" LAP SPLICE LENGTH BEYOND FACE OF JOINT.
7. FOR METALLIC PIPE, VERIFY PIPE AND WALL REINFORCEMENT BARS ARE NOT ELECTRICALLY CONTINUOUS PRIOR TO CONCRETE PLACEMENT.

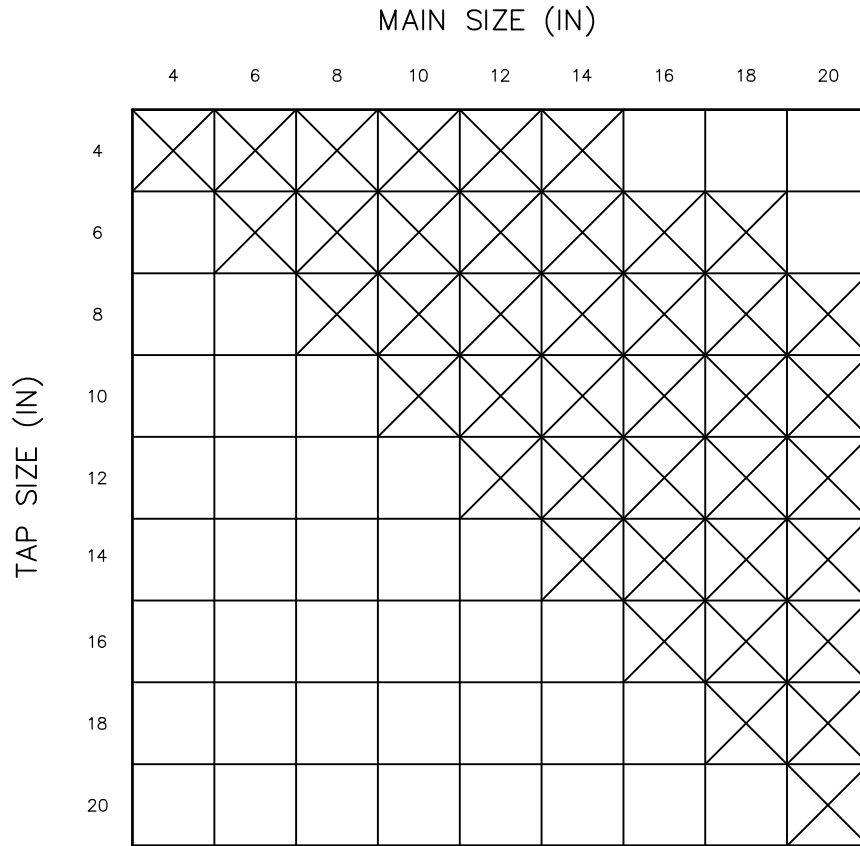
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**03004
 PIPE ENCASEMENT**



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WATER MAIN AND TAP SIZE COMBINATIONS WHICH
REQUIRE A CONC KB BEHIND THE MAIN AT THE
TAPPING SLV, SADDLE, OR TEE



LEGEND:



CONCRETE KICKBLOCK REQUIRED

NOTE:

KICKBLOCK REQUIREMENTS FOR WATER MAIN AND TAP SIZE COMBINATIONS OTHER THAN THOSE SHOWN WILL REQUIRE SPECIAL DESIGN APPROVAL BY DENVER WATER.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

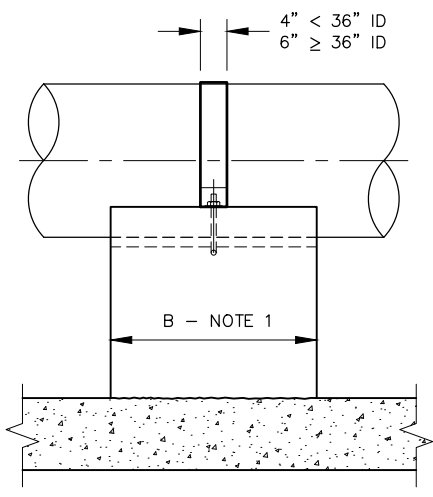
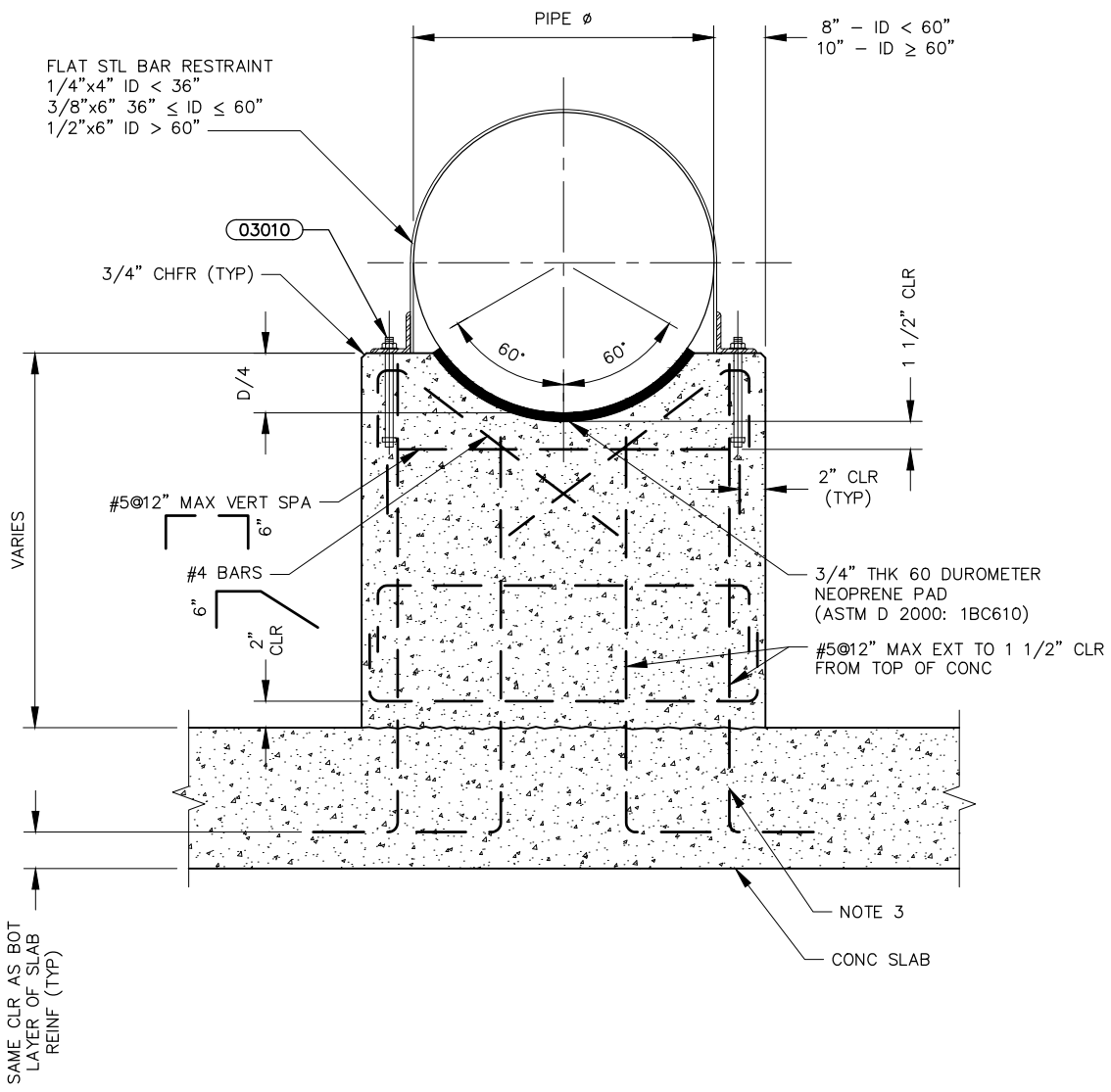
ORIGINATION DATE: *JULY 2021*

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
03005
CONCRETE KICKBLOCK
REQUIREMENTS FOR WATER
MAIN AND TAP SIZE COMBOS



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NOTES:

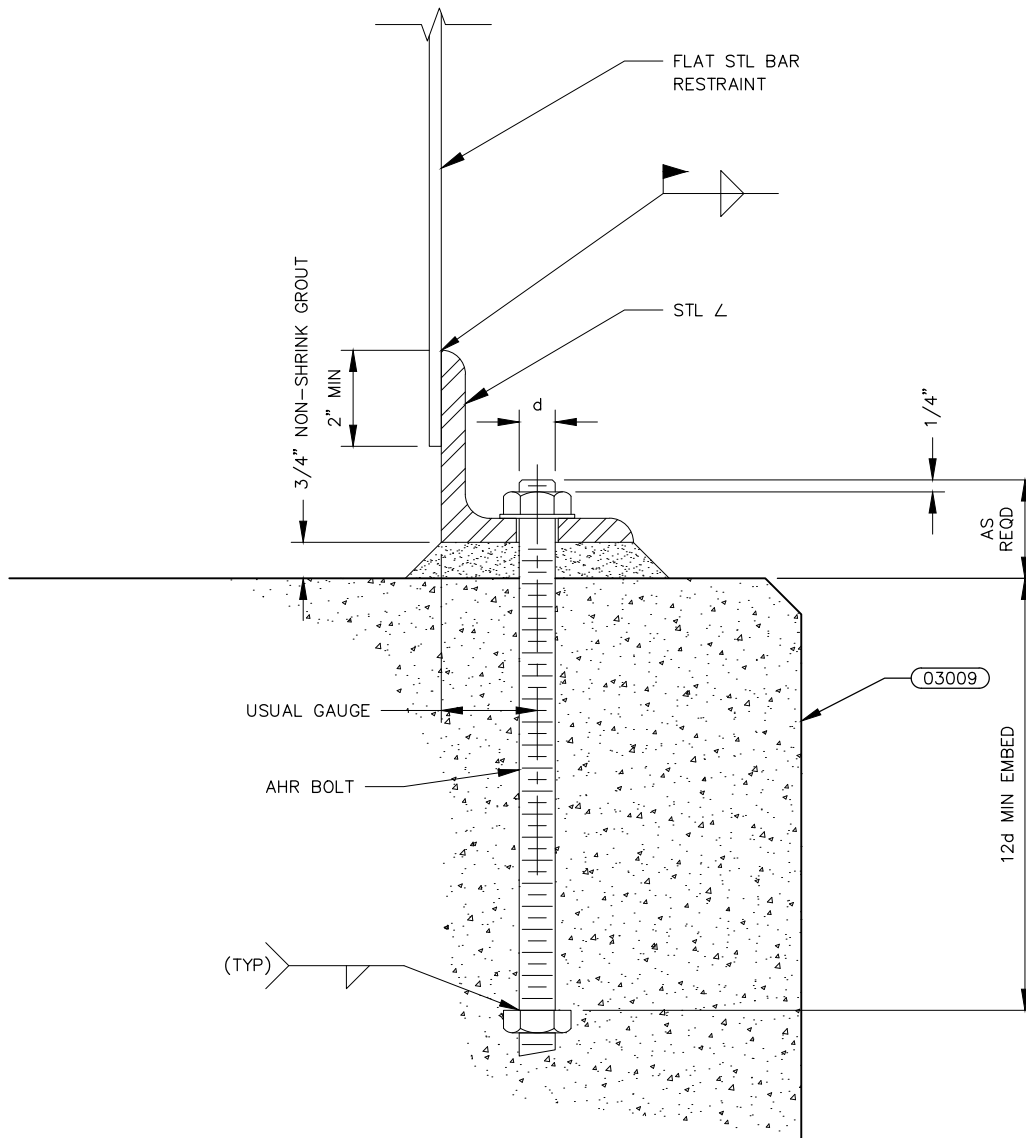
1. B = 8 INCHES WHEN ID < 24 INCHES
 B = 10 INCHES WHEN 24 INCHES ≤ ID ≤ 42 INCHES
 B = 12 INCHES WHEN ID > 42 INCHES
 PLACE REINFORCEMENT EACH FACE WHEN B = 12 INCHES
2. TURN HORIZONTAL BARS 90 DEGREES TO HOOK AROUND VERTICALS. 
3. ADHESIVE ANCHORED DOWELS MAY BE USED IN EXISTING SLABS.

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS / KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

03009
CONCRETE PIPE SUPPORT

D DENVER WATER

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PIPE ID	ANCHOR BOLT ϕ , d	ANGLE SIZE, \angle
ID \leq 36"	3/4"	4"x4"x1/2" x 0'-5"
36" \leq ID \leq 60"	1"	4"x4"x3/4" x 0'-8"
ID > 60"	1 1/4"	6"x6"x1" x 0'-8"

NOTES:

1. STEEL FLAT BAR AND STEEL ANGLE SHALL BE ASTM A 36.
2. COAT FLAT BAR AND ANGLE WITH LIQUID EPOXY, 16 MILS DRY FILM THICKNESS IN ACCORDANCE WITH AWWA C210. COLOR AND SHEEN TO MATCH PIPE COATING.

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

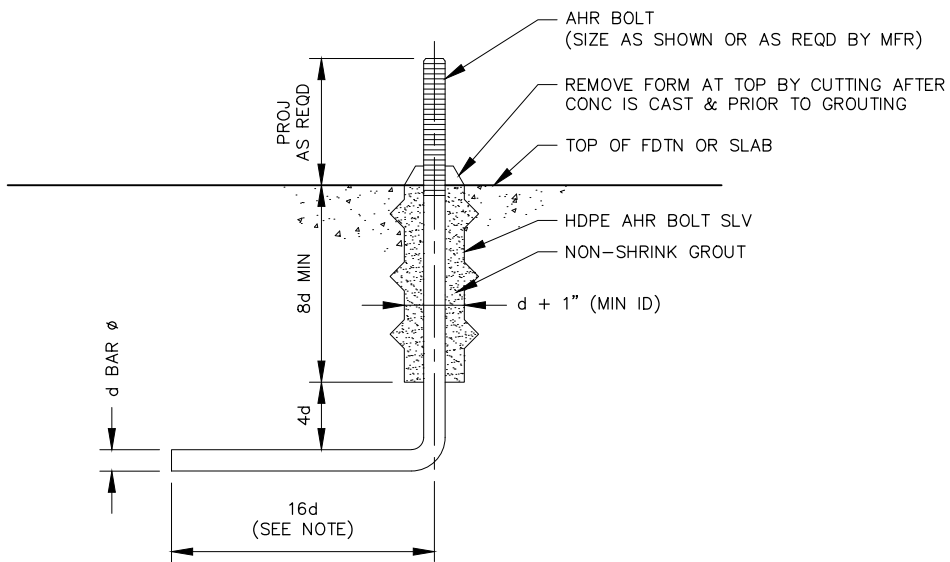
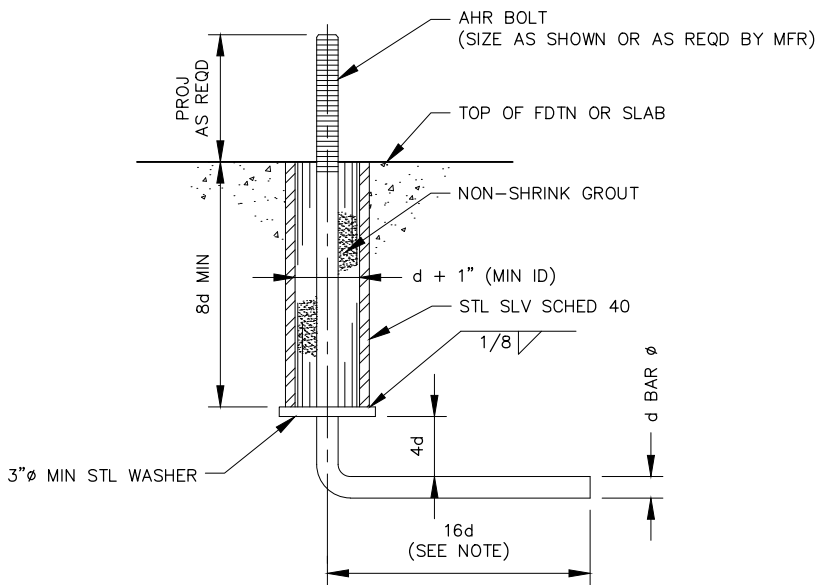
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**03010
FLAT BAR RESTRAINT
CONNECTION**



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NOTE:

3d WHERE EQUIPMENT MANUFACTURER VERIFIES NO BOLT PULLOUT RESISTANCE IS REQUIRED.

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

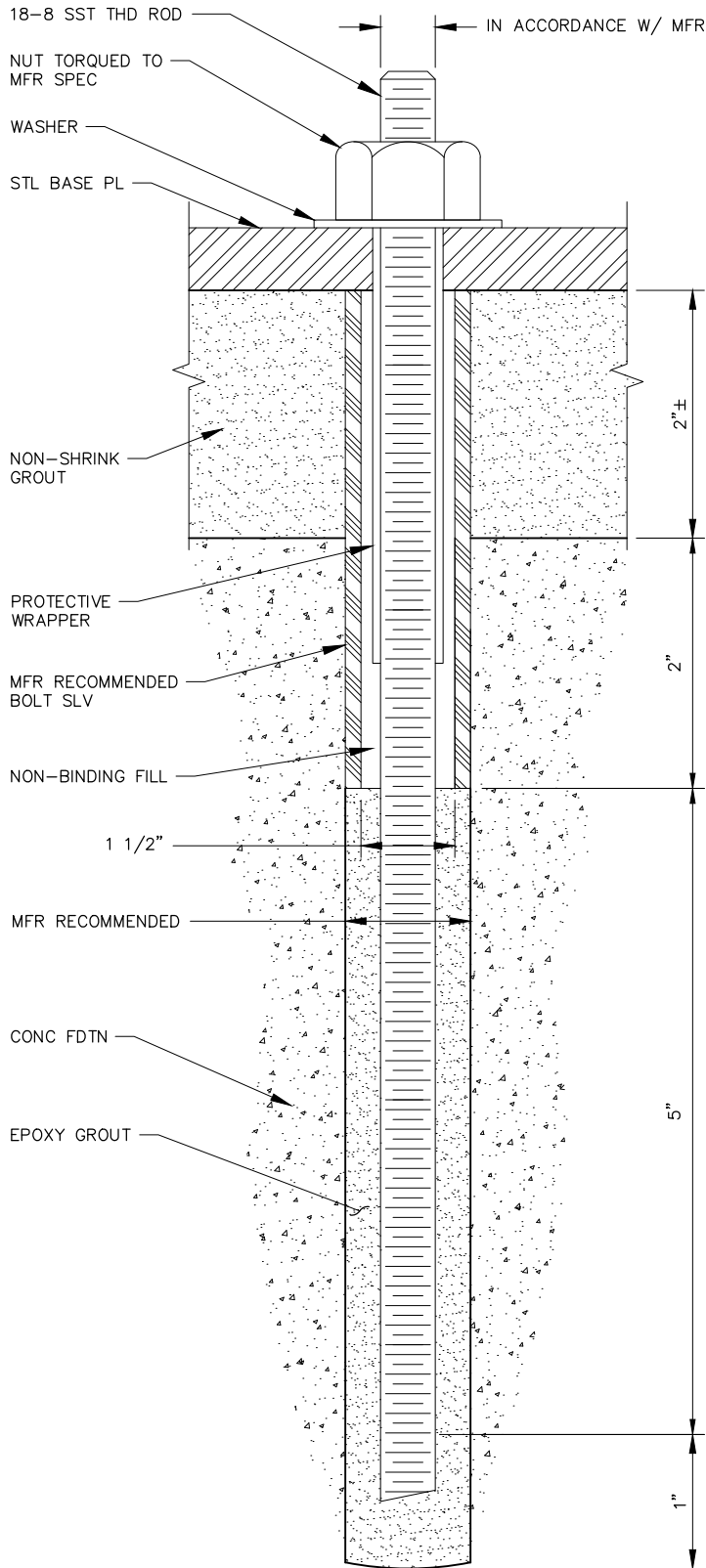
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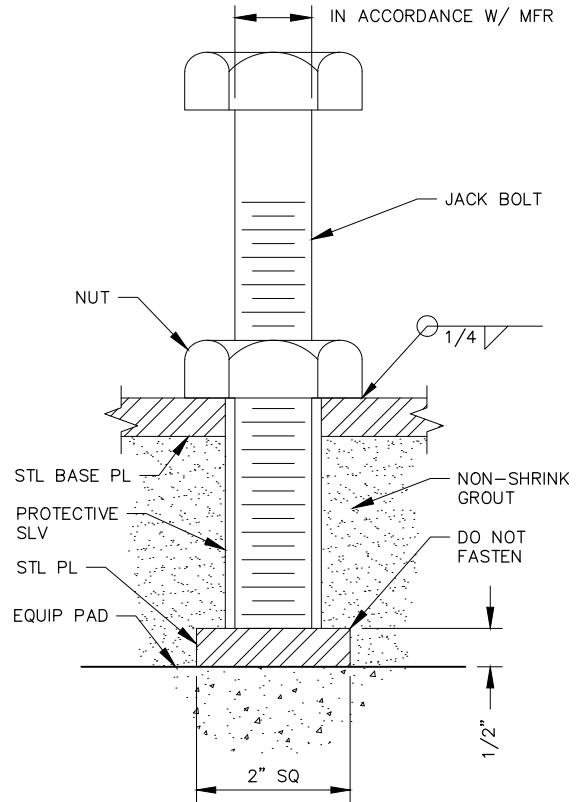
**03011
MACHINERY ANCHOR BOLT**



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**EQUIPMENT
ANCHOR BOLT**



NOTE:

REMOVE JACK BOLT AFTER
NON-SHRINK GROUT SETS.

JACK BOLT

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

**03012
EQUIPMENT MOUNT
INSTALLATION**



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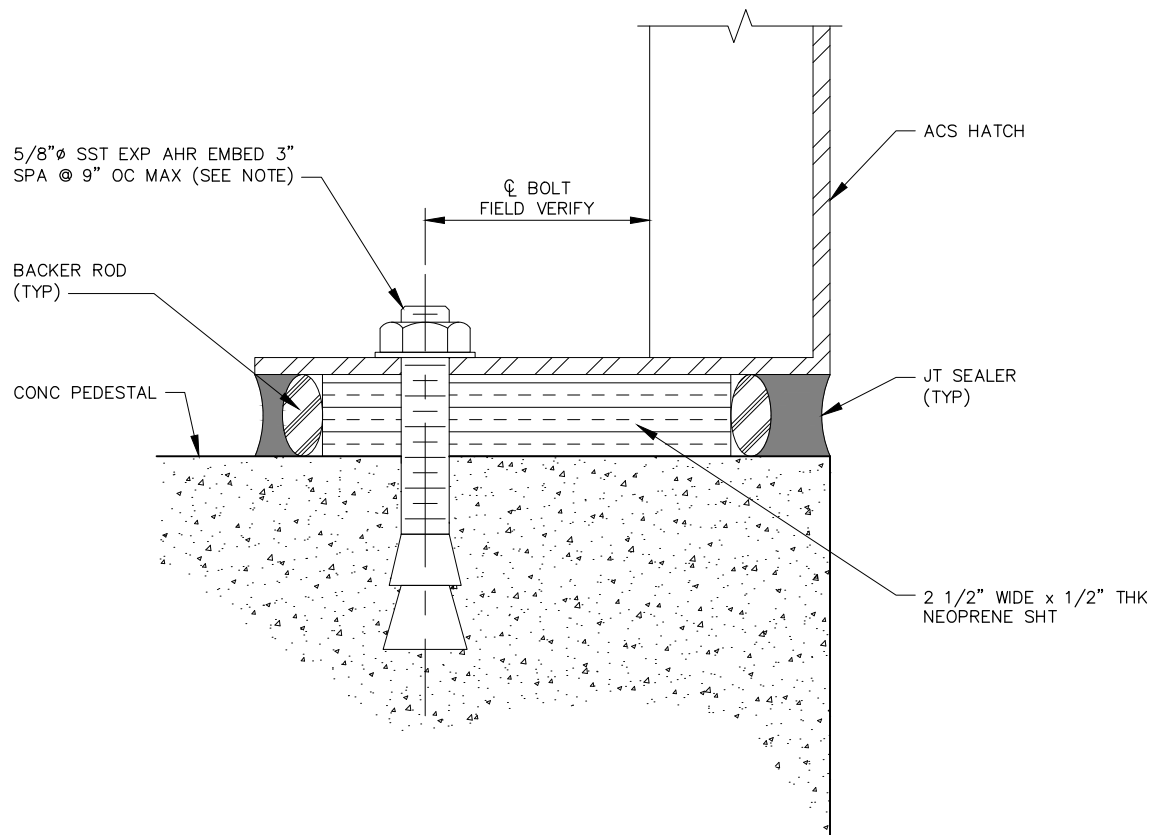
NOTES:

1. AFTER CONCRETE EQUIPMENT PAD HAS BEEN BUILT TO SIZE, FINISH ROUGH, OR ROUGHEN UP EXISTING CONCRETE SURFACE WITH SMALL, HAND-HELD PNEUMATIC CHIPPER TO PROVIDE BONDING SURFACE FOR NON-SHRINK GROUT. THOROUGHLY CLEAN BEFORE GROUT APPLICATION.
2. CORE DRILL OR BLOCK OUT CONCRETE IN PROPER LOCATIONS FOR ANCHOR BOLTS IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS. SET ANCHOR BOLTS IN NON-SHRINK GROUT AS SHOWN ON THE DRAWINGS. PROVIDE RIGID BOLT SLEEVE WITH 1/4 INCH ANNULAR CLEARANCE AROUND BOLT TO PREVENT LEVELING GROUT FROM STICKING TO BOLT AND TO ALLOW FOR PROPER STRETCH OF BOLT DURING TIGHTENING.
3. MOUNT AND LEVEL EQUIPMENT BASE WITH JACKING BOLTS.
 - A. ENSURE THAT PUMP SUCTION AND DISCHARGE LINE UP VERTICALLY AND ANGULARLY WITH PIPING. DOWELS OR BOLTS MAY BE USED FOR INITIAL ALIGNMENT, BUT MUST BE IMMEDIATELY REMOVED AFTER ALIGNMENT TO ALLEVIATE STRESS.
 - B. LEVEL EQUIPMENT BASE WITH A STARRETT 98 MACHINIST'S LEVEL UNTIL A LEVEL OF 0.0005 INCH/FEET IS OBTAINED ON MACHINE SURFACES IN TWO DIRECTIONS 90 DEGREES APART.
 - C. ANCHOR BOLTS CAN BE TEMPORARILY SNUGGED DOWN TO HOLD BASE IN POSITION FOR NON-SHRINK GROUT PLACEMENT.
 - D. PROVIDE DUXSEAL OR CAULKING COMPOUND AND DUCT TAPE AROUND JACKING BOLTS SO THAT REMOVAL CAN BE ATTAINED AFTER NON-SHRINK GROUT SETS.
4. INSTALL REBAR AND BUILD FORMS FOR GROUT PLACEMENT. NON-SHRINK GROUT PLACEMENT SHALL BE A SINGLE CONTINUOUS PLACEMENT. PROVIDE GROUT APPLICATION AND VENT HOLES. ENSURE THAT GROUT WILL FLOW CONTINUOUSLY THROUGH ALL AREAS BY PROVIDING 2 INCH MINIMUM FLOW HOLES THROUGH ANY OBSTRUCTING FRAMEWORK.
5. FILL AREA BETWEEN STEEL BASE AND CONCRETE EQUIPMENT PAD WITH NON-SHRINK GROUT TO JUST BELOW THE LEVEL OF THE HOLD-DOWN BOLTS ON BOTH THE PUMP AND THE MOTOR.
6. TORQUE DOWN ANCHOR BOLTS AND HOLD-DOWN BOLTS TO MANUFACTURER SPECIFICATIONS.
7. PERFORM FINAL LASER ALIGNING TO FACTORY SPECIFICATIONS.

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ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

03013
EQUIPMENT MOUNT
INSTALLATION NOTES

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NOTE:

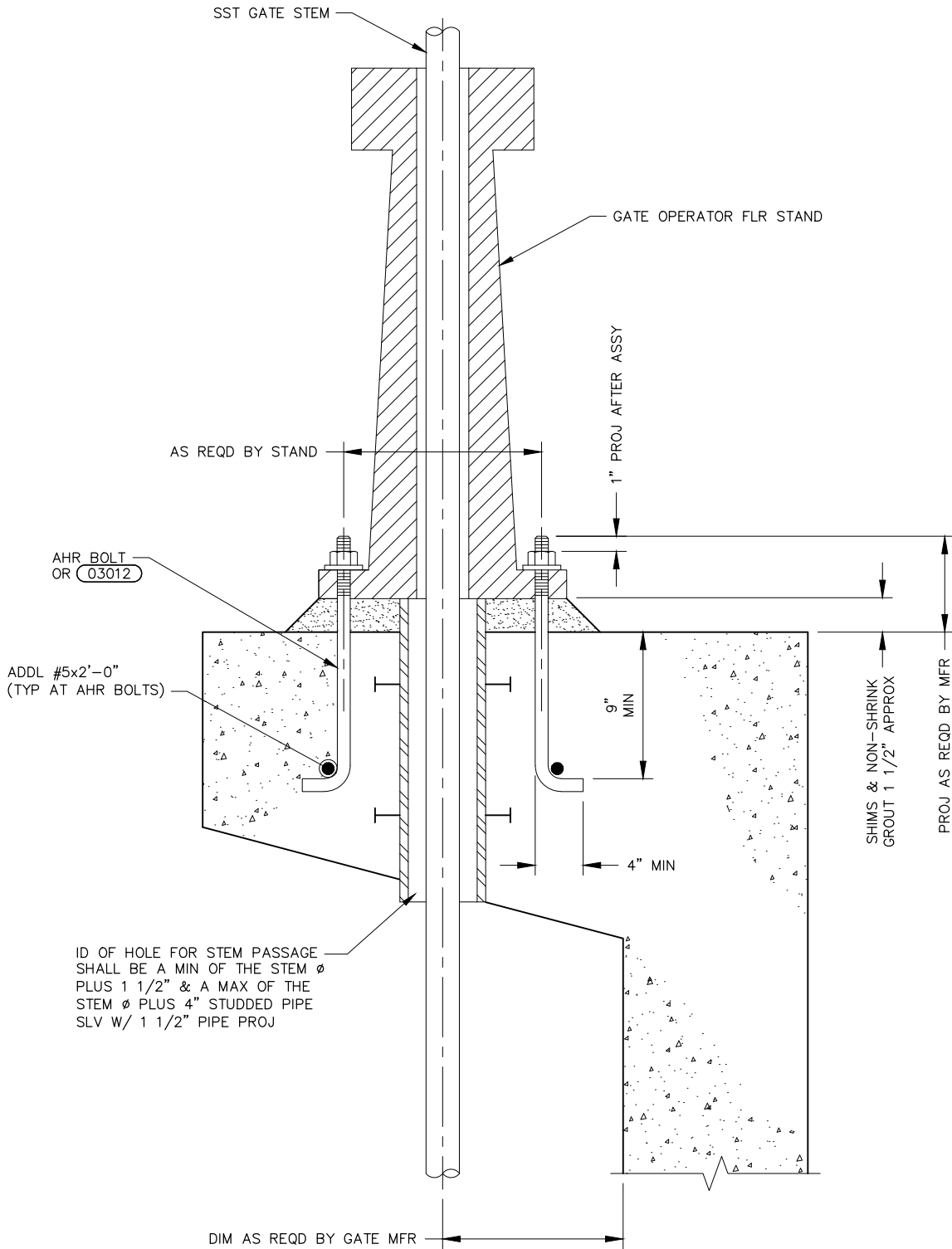
ACCESS HATCH SHALL BE PRE-DRILLED FOR CONCRETE ANCHOR INSTALLATION.

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**03015
ACCESS HATCH MOUNTING**

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NOTE:

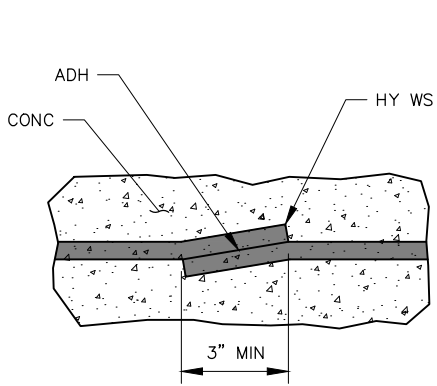
FLOOR STAND IS REPRESENTATIVE ONLY.

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APPD BY: <i>[Signature]</i>
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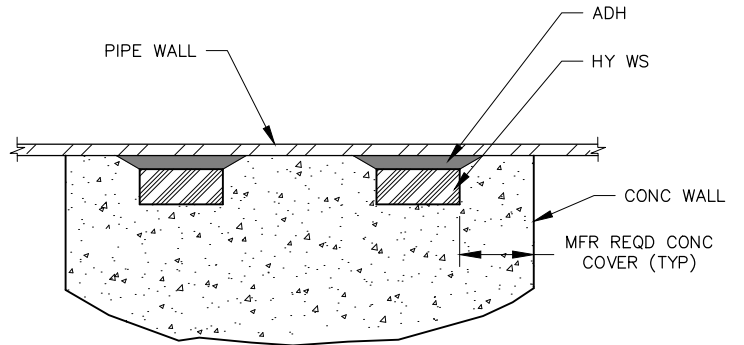
**03020
FLOOR STAND INSTALLATION**



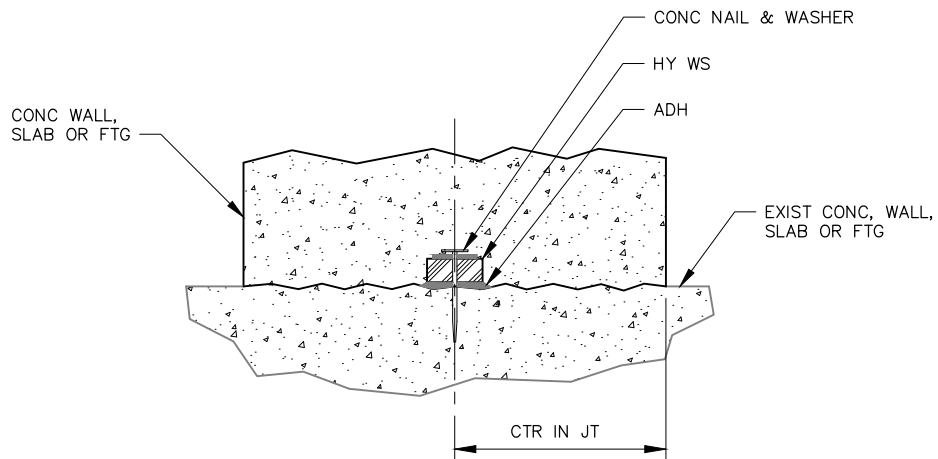
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END OVERLAP



PIPE PENETRATION



TYPICAL SECTION

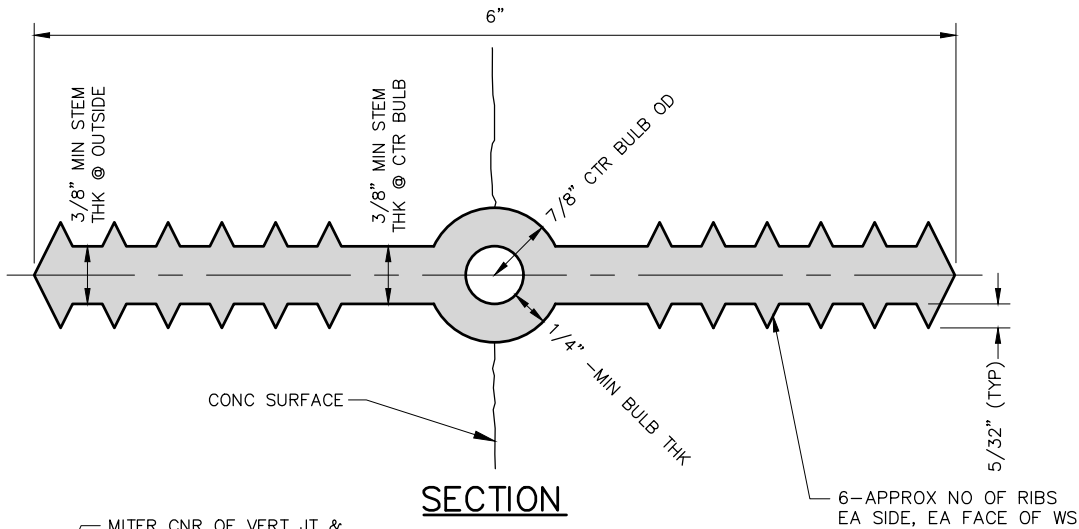
NOTE:

APPLY BEAD OF ADHESIVE TO ENSURE SMOOTH SURFACE.
 ATTACH HYDROPHILIC WATERSTOP USING CONCRETE NAIL
 AND WASHER AT INTERVALS OF 10 INCHES TO 12 INCHES.

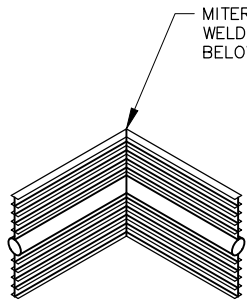
DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

03030
 HYDROPHILIC WATERSTOP

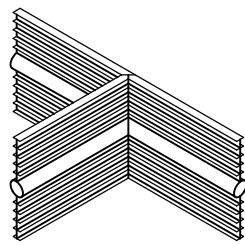
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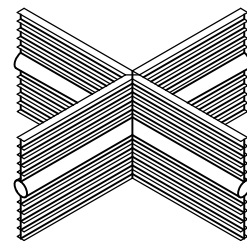
SECTION



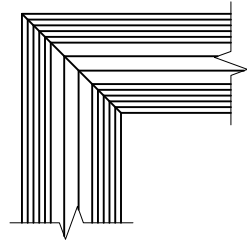
VERTICAL ELL



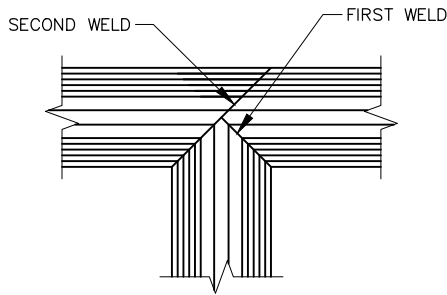
VERTICAL TEE



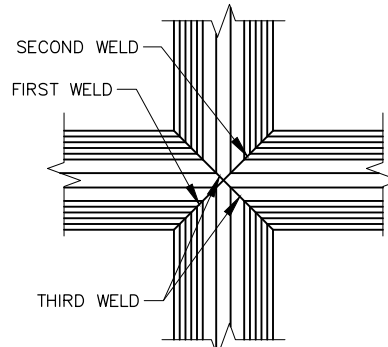
VERTICAL CROSS



FLAT ELL



**FLAT TEE
SPLICE DETAIL**



FLAT CROSS

NOTES:

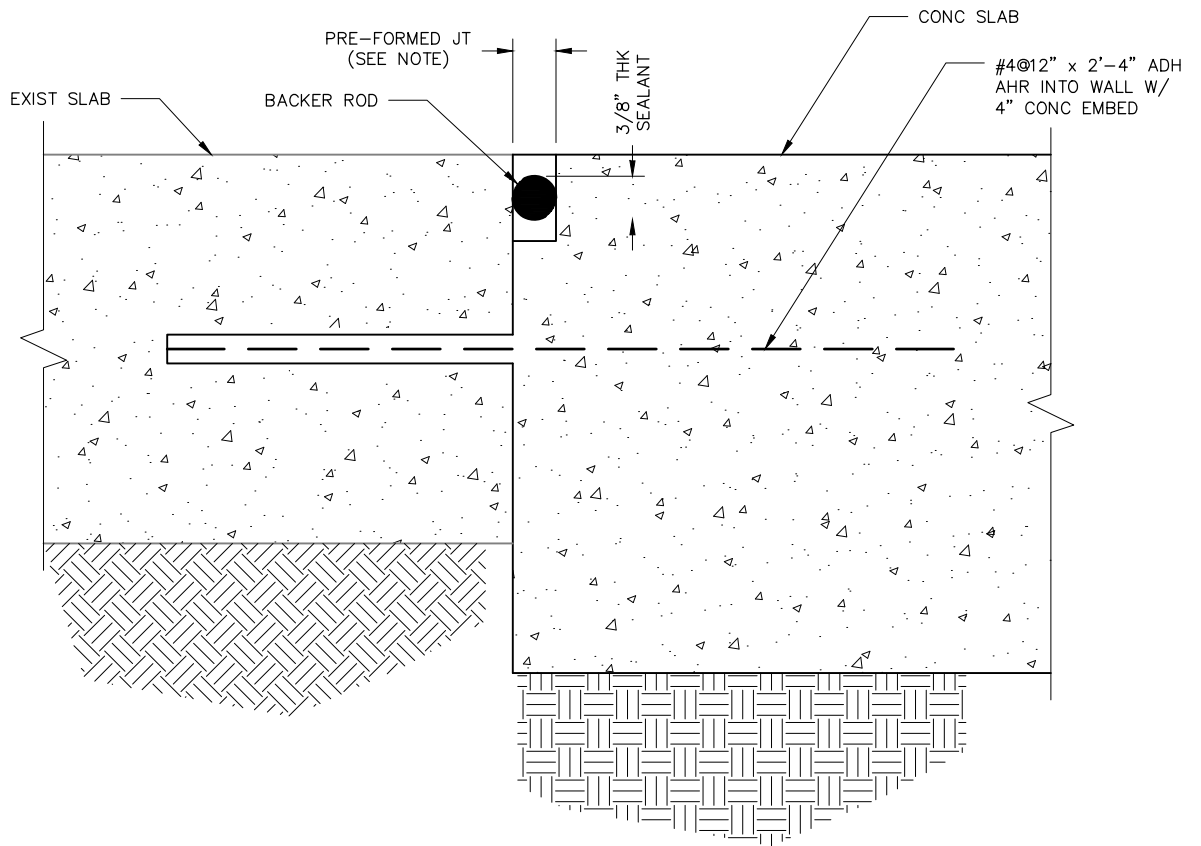
1. FIELD WELDS SHALL BE MADE IN ACCORDANCE WITH WATERSTOP MANUFACTURER RECOMMENDATIONS.
2. THE INDICATED 3-D WATERSTOP JOINTS SHALL BE PRE-FABRICATED BY WATERSTOP MANUFACTURER.
3. WATERSTOPS SHALL BE MADE CONTINUOUS BY SPLICING AND CONNECTING TO OTHER WATERSTOPS AS SHOWN ON THE DRAWINGS.
4. SEE JOINT NOTES AND SPECIFICATIONS FOR REQUIRED LOCATIONS.
5. NON-ROUND CENTER BULBS SHALL HAVE A MINIMUM OUTSIDE DIMENSION OF 7/8 INCH.
6. BULB TYPE WATERSTOP SHOWN IS REQUIRED FOR EXPANSION AND CONTROL JOINTS. SIMILAR WATERSTOPS WITHOUT CENTER BULB MAY BE SUBSTITUTED AT CONSTRUCTION JOINTS.
7. USE 6-INCH WATERSTOPS IN ALL CONSTRUCTION JOINTS UNLESS SPECIFICALLY SHOWN OTHERWISE.

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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

03031
**6" PVC CENTER BULB
WATERSTOP**



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NOTES:

FORM 1/2 INCH WIDE BY 1 1/2 INCH DEEP SLOT WITH PREFORMED JOINT FILLER SECURED TO FACE OF EXISTING CONCRETE SLAB. REMOVE FILLER TO INSTALL BACKER ROD AND SEALANT.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

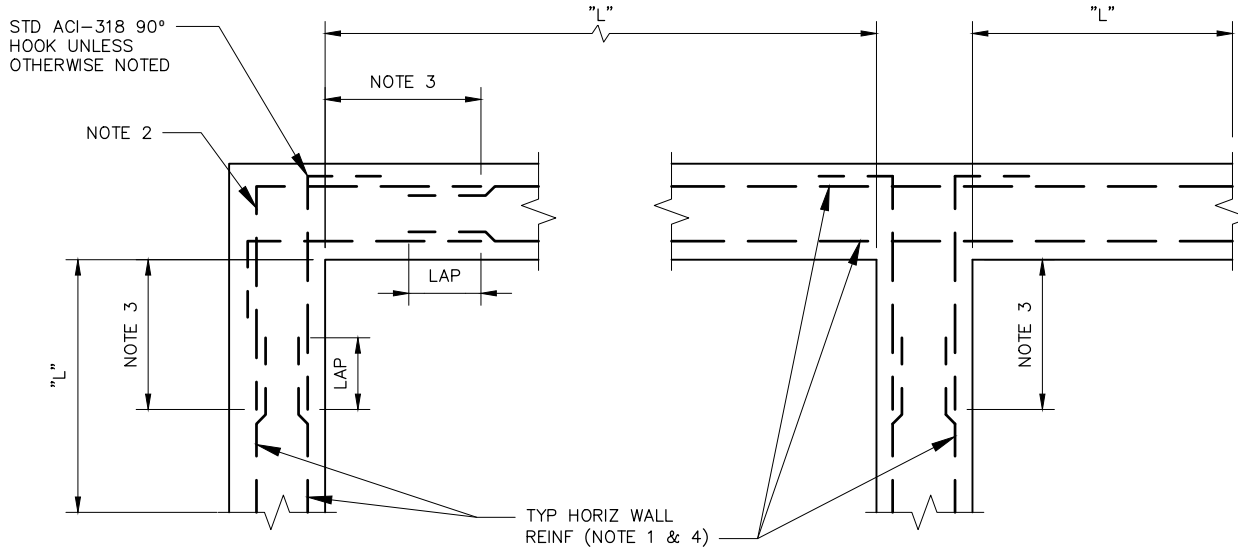
ORIGINATION DATE: JULY 2021

REVISION DATE:

**03032
SEALANT AT JOINT**



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PLAN

NOTES:

1. WHERE SHOWN ON PLANS, ALTERNATE ADDITIONAL HORIZONTAL WALL CORNER AND INTERSECTION REINFORCEMENT WITH THE TYPICAL HORIZONTAL REINFORCEMENT SHOWN IN THIS DETAIL.
2. CORNER BARS SHALL MATCH SIZE OF TYPICAL HORIZONTAL REINFORCEMENT SHOWN IN SECTIONS.
3. EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS, THE LENGTH INDICATED AS "NOTE 3" SHALL BE THE LESSER OF "L"/4, 10 FEET, OR 1.0 TIMES THE HEIGHT OF THE WALL, EXCEPT THAT IN NO CASE SHALL IT BE LESS THAN 2 FEET.
4. TYPICAL HORIZONTAL REINFORCEMENT SHALL BE LAPPED WHERE SHOWN OR AS INDICATED IN THE GENERAL STRUCTURAL NOTES.
5. WHERE LAPPED BARS ARE DIFFERENT SIZE, USE THE LAP LENGTH REQUIRED FOR THE SMALLER OF THE TWO REINFORCEMENT BARS BEING SPLICED.

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

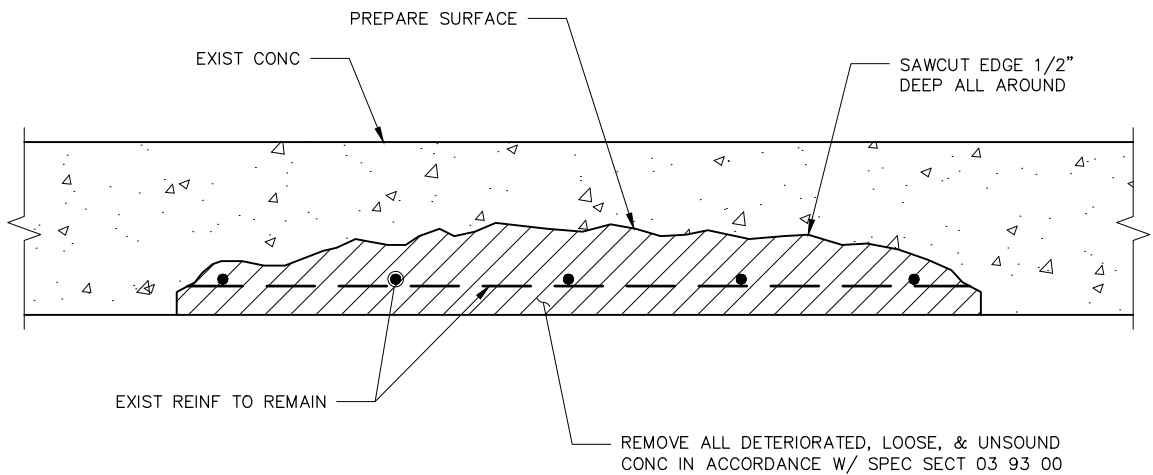
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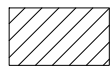
03040 TYPICAL WALL CORNER AND INTERSECTION REINFORCEMENT



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LEGEND:



REMOVE UNSOUND CONCRETE.

NOTES:

1. PRIOR TO WORK, PROVIDE SHORING AS REQUIRED.
2. REMOVE CONCRETE TO PROVIDE 3/4 INCH MINIMUM CLEARANCE BEHIND EXPOSED AND CORRODED REINFORCING STEEL.
3. REMOVE ALL OXIDATION AND SCALE FROM THE EXPOSED REINFORCING STEEL.
4. SAWCUT THE PERIMETER OF THE AREA TO BE REPAIRED TO A DEPTH OF 1/2 INCH. SAWCUT PERIMETER SHALL USE 90-DEGREE CORNERS, EXCEPT PROVIDE 45 DEGREE ANGLES WHEN NECESSARY TO AVOID RE-ENTRANT CORNERS.
5. DO NOT CUT OR DAMAGE EXISTING REINFORCEMENT.
6. ASSUME REPAIR DEPTH OF 2 INCHES FOR QUANTITY PURPOSES ONLY.

DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

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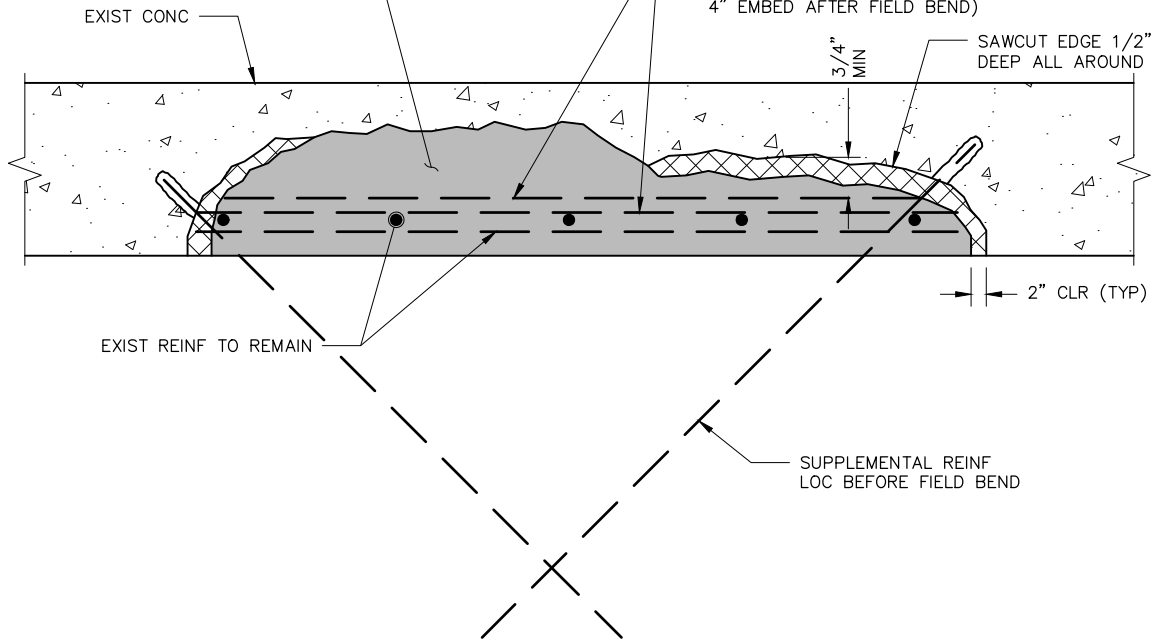
**03041
TYPICAL CONCRETE
SURFACE DEMOLITION**



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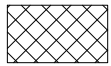
PERFORM SURFACE PREPARATION & PATCH
IN ACCORDANCE W/ SPEC SECT 03 93 00

SUPPLEMENTAL REINF
AS REQD BY ENG
(NEW DRILL & EPOXY DWL W/
4" EMBED AFTER FIELD BEND)



REPAIR FOR REINFORCEMENT W/ MORE
THAN 15% DEGRADATION OF THICKNESS

LEGEND:



REMOVE UNSOUND AND ENOUGH SOUND
CONCRETE TO PROVIDE 3/4 INCH
MINIMUM CLEARANCE BEHIND REBAR AND
TO PROVIDE A SQUARE REPAIR



CONCRETE REPAIR MORTAR

SURFACE PREPARATION NOTES:

1. AFTER CONCRETE REMOVAL AND BEFORE PLACEMENT, MECHANICALLY ABRAD THE CONCRETE SURFACE TO REMOVE ALL BOND-INHIBITING MATERIALS.
2. PRIOR TO CONCRETE PLACEMENT, WIPE WITH SOLVENT CLEANING SOLUTION AND CLEAN SURFACE WITH COMPRESSED AIR. ENSURE CONCRETE IS PROPERLY ROUGHENED AFTER REMOVING DELAMINATION. KEEP CONCRETE MOIST FOR AT LEAST 36 HOURS PRIOR TO PLACING REPAIR MORTAR TO ACHIEVE A SOUND, CLEAN, AND OPEN PORE SURFACE.

CONCRETE REPAIR NOTES:

1. PROVIDE SCRUB COAT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. FOR REPAIR DEPTHS GREATER THAN 1 INCH, REPAIR WITH FORMED FLOWABLE REPAIR CONCRETE OR POLYMER MODIFIED CONCRETE. POLYMER MODIFIED CONCRETE REQUIRES MULTIPLE LIFTS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS. REPAIR IN ACCORDANCE WITH SPECIFICATION SECTION 03 93 00.
3. FOR REPAIR DEPTHS LESS THAN 1 INCH, REPAIR WITH HAND APPLIED POLYMER MODIFIED MORTAR IN ACCORDANCE WITH SPECIFICATION SECTION 03 93 00.
4. NOTIFY ENGINEER IF REINFORCEMENT WITH GREATER THAN 15 PERCENT DEGRADATION OF THICKNESS IS ENCOUNTERED. PROVIDE SUPPLEMENTAL REINFORCEMENT AS REQUIRED BY ENGINEER.
5. AFTER CONCRETE REPAIR IS COMPLETED, SOUND THE CONCRETE REPAIR AREA. REMOVE AND REPLACE DELAMINATED AND UNSOUND CONCRETE REPAIRS AT CONTRACTOR'S EXPENSE.

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APPD BY: *[Signature]*

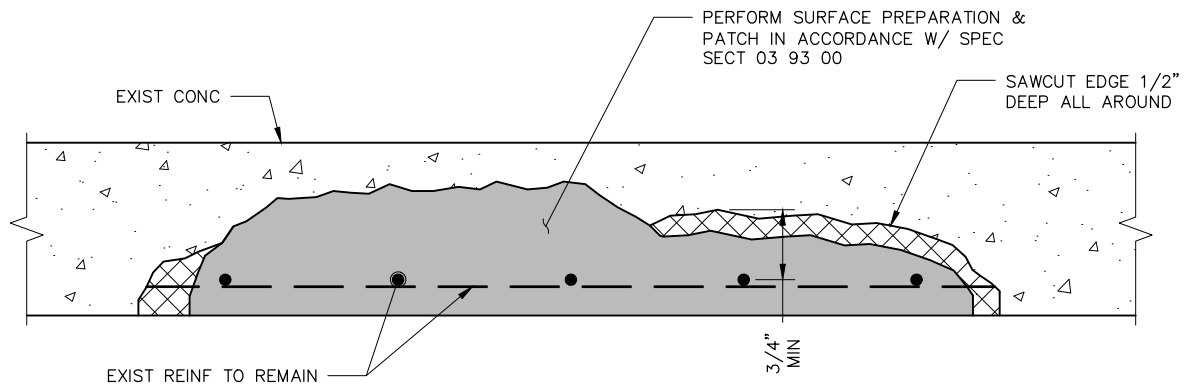
ORIGINATION DATE: JULY 2021

REVISION DATE:

03042
TYPICAL CONCRETE SURFACE
PREPARATION AND REPAIR





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REPAIR FOR REINFORCEMENT W/ LESS THAN 15% DEGRADATION OF THICKNESS

LEGEND:

-  REMOVE UNSOUND AND ENOUGH SOUND CONCRETE TO PROVIDE 3/4 INCH MINIMUM CLEARANCE BEHIND REBAR AND TO PROVIDE A SQUARE REPAIR
 CONCRETE REPAIR MORTAR

SURFACE PREPARATION NOTES:

1. AFTER CONCRETE REMOVAL AND BEFORE PLACEMENT, MECHANICALLY ABRADE THE CONCRETE SURFACE TO REMOVE ALL BOND-INHIBITING MATERIALS.
2. PRIOR TO CONCRETE PLACEMENT, WIPE WITH SOLVENT CLEANING SOLUTION AND CLEAN SURFACE WITH COMPRESSED AIR. ENSURE CONCRETE IS PROPERLY ROUGHENED AFTER REMOVING DELAMINATION. KEEP CONCRETE MOIST FOR AT LEAST 36 HOURS PRIOR TO PLACING REPAIR MORTAR TO ACHIEVE A SOUND, CLEAN, AND OPEN PORE SURFACE.

CONCRETE REPAIR NOTES:

1. PROVIDE SCRUB COAT IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
2. FOR REPAIR DEPTHS GREATER THAN 1 INCH, REPAIR WITH FORMED FLOWABLE REPAIR CONCRETE OR POLYMER MODIFIED CONCRETE. POLYMER MODIFIED CONCRETE REQUIRES MULTIPLE LIFTS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS. REPAIR IN ACCORDANCE WITH SPECIFICATION SECTION 03 93 00.
3. FOR REPAIR DEPTHS LESS THAN 1 INCH, REPAIR WITH HAND APPLIED POLYMER MODIFIED MORTAR IN ACCORDANCE WITH SPECIFICATION SECTION 03 93 00.
4. NOTIFY ENGINEER IF REINFORCEMENT WITH GREATER THAN 15 PERCENT DEGRADATION OF THICKNESS IS ENCOUNTERED. PROVIDE SUPPLEMENTAL REINFORCEMENT AS REQUIRED BY ENGINEER.
5. AFTER CONCRETE REPAIR IS COMPLETED, SOUND THE CONCRETE REPAIR AREA. REMOVE AND REPLACE DELAMINATED AND UNSOUND CONCRETE REPAIRS AT CONTRACTOR'S EXPENSE.

DRAWN BY: VAICIKASKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

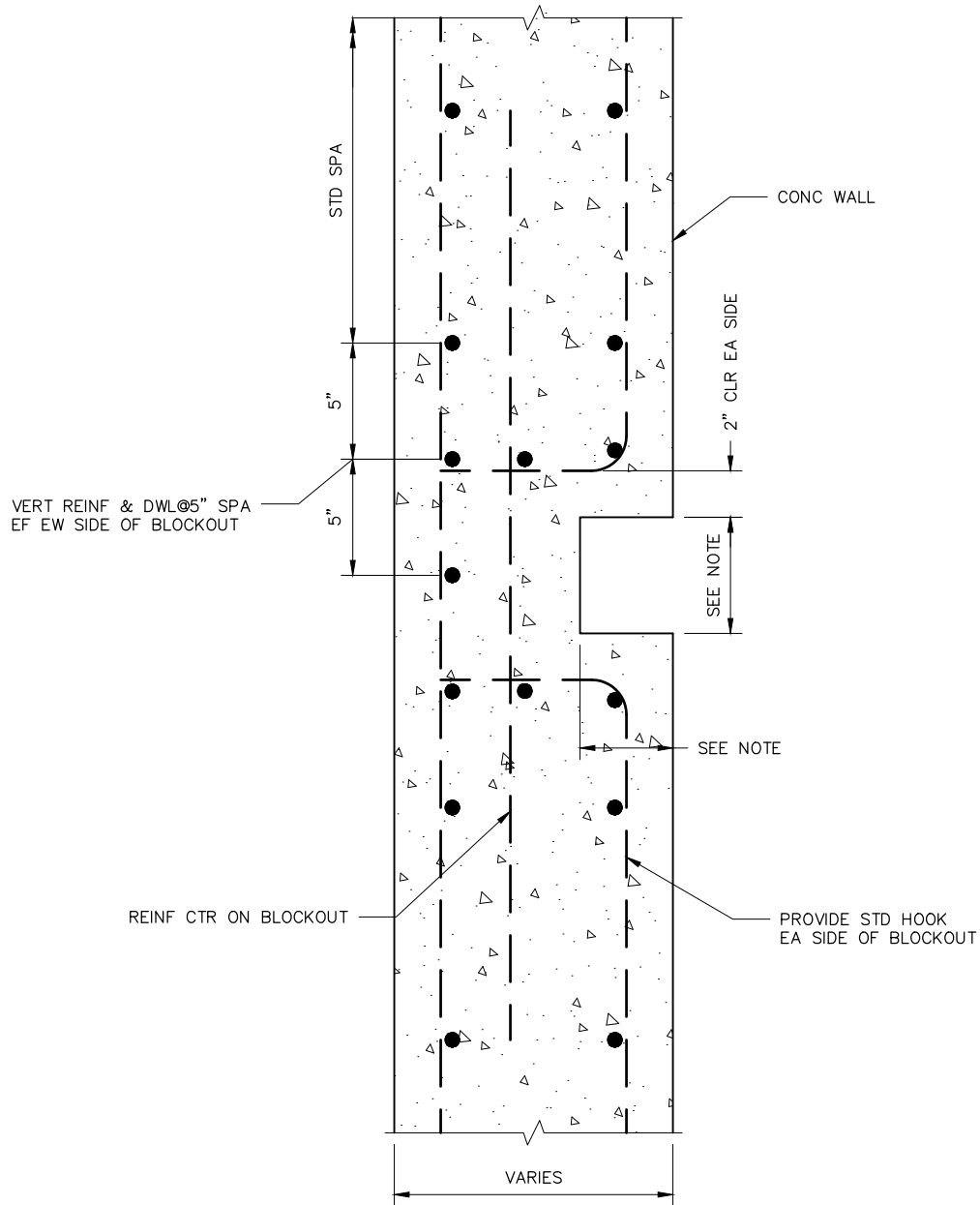
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REVISION DATE:

03043
TYPICAL CONCRETE SURFACE
PREPARATION AND REPAIR

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PLAN

NOTE:

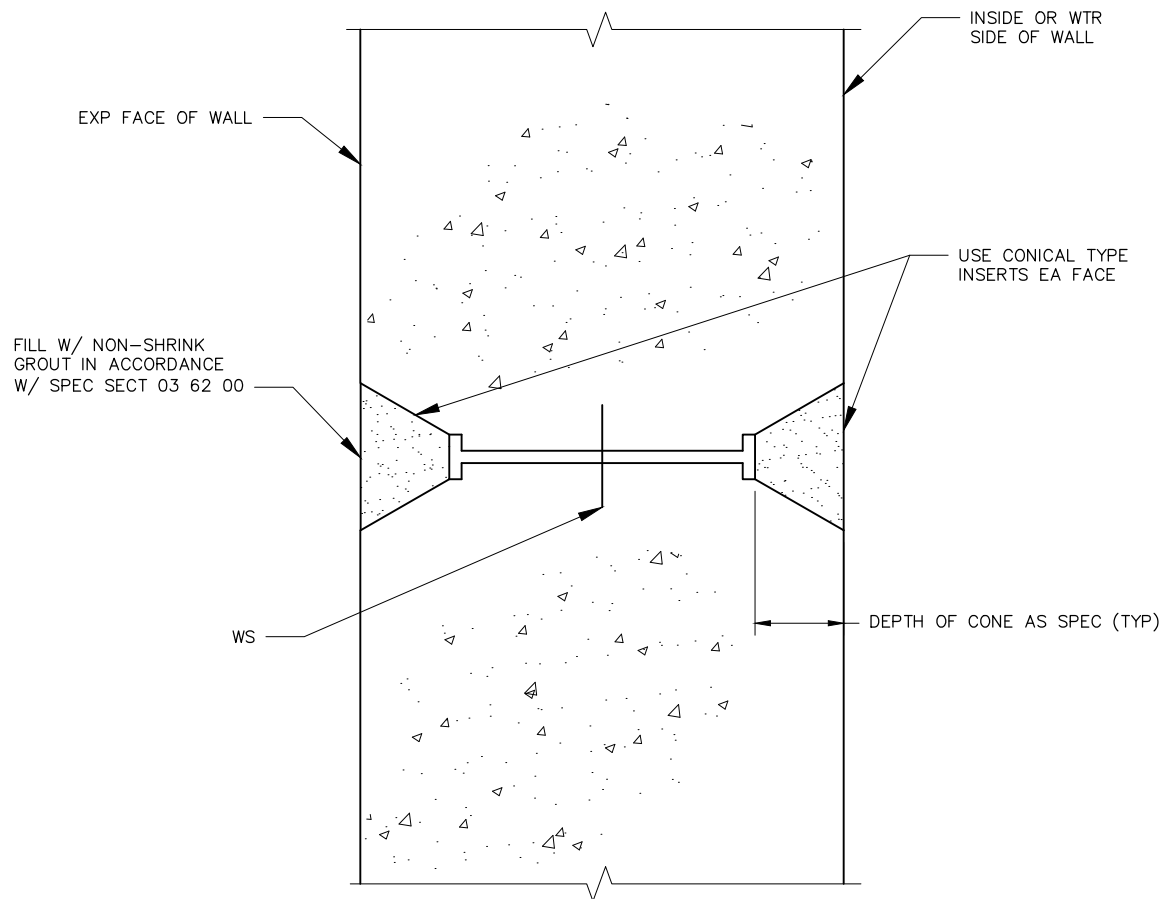
COORDINATE SLIDE GATE BLOCKOUT WITH SLIDE GATE MANUFACTURER REQUIREMENTS.

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APPD BY: <i>[Signature]</i>
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**03044
SLIDE GATE BLOCKOUT
IN WALL**



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NOTE:

THE SPACING OF FORM TIES ON EXPOSED PORTIONS OF WALLS SHALL BE APPROXIMATELY EQUAL HORIZONTALLY AND VERTICALLY AND SHALL BE UNIFORM IN EACH DIRECTION.

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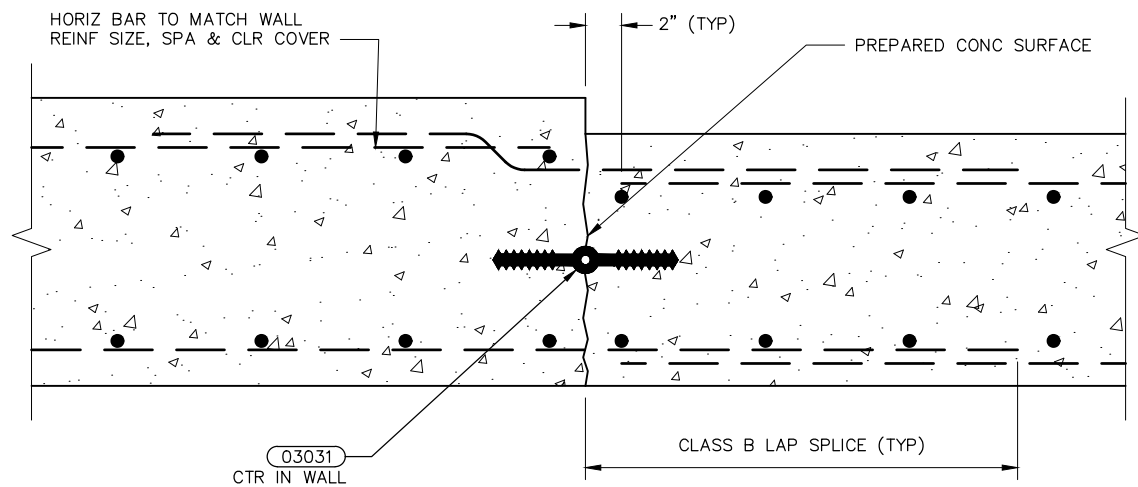
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**03045
FORM SNAP-TIE HOLE**



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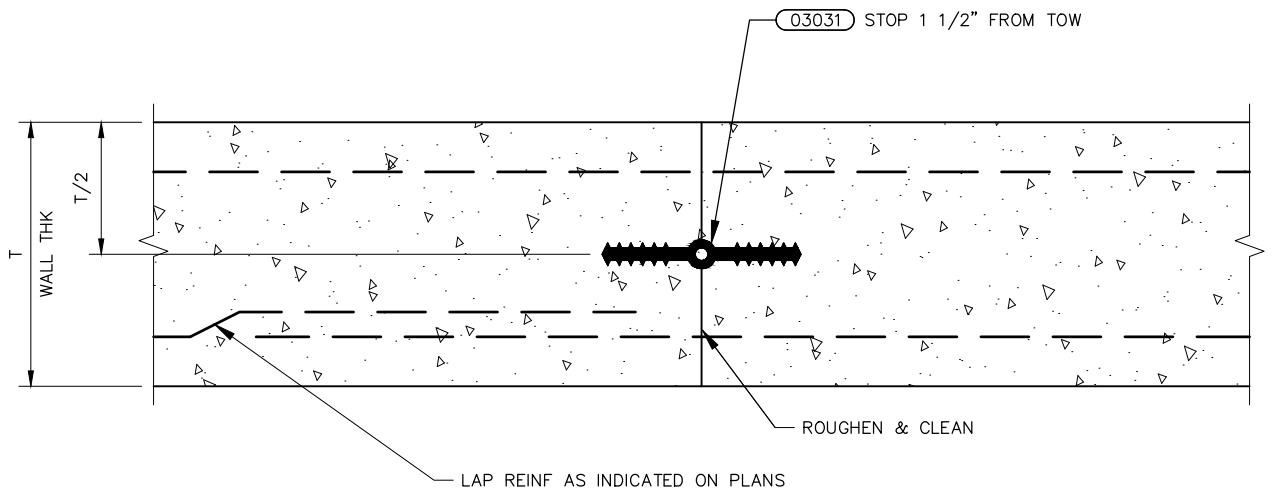


PLAN

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ORIGINATION DATE: JULY 2021
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03046
ALIGNED WALL
CONSTRUCTION JOINT


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PLAN

NOTE:

ALL REINFORCEMENT CONTINUOUS ACROSS JOINT.

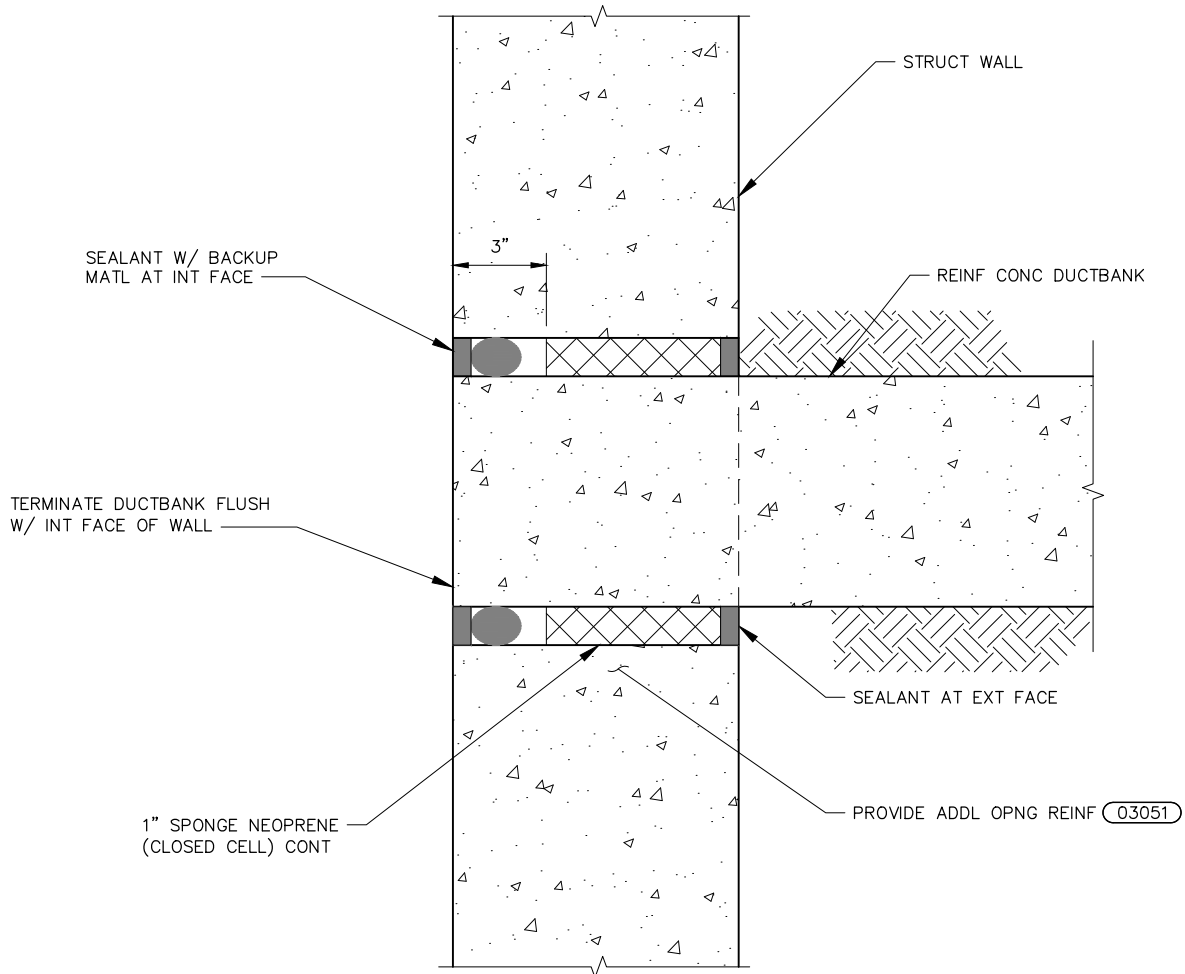
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CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
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03047
**WALL VERTICAL
 CONSTRUCTION JOINT**

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INT

EXT

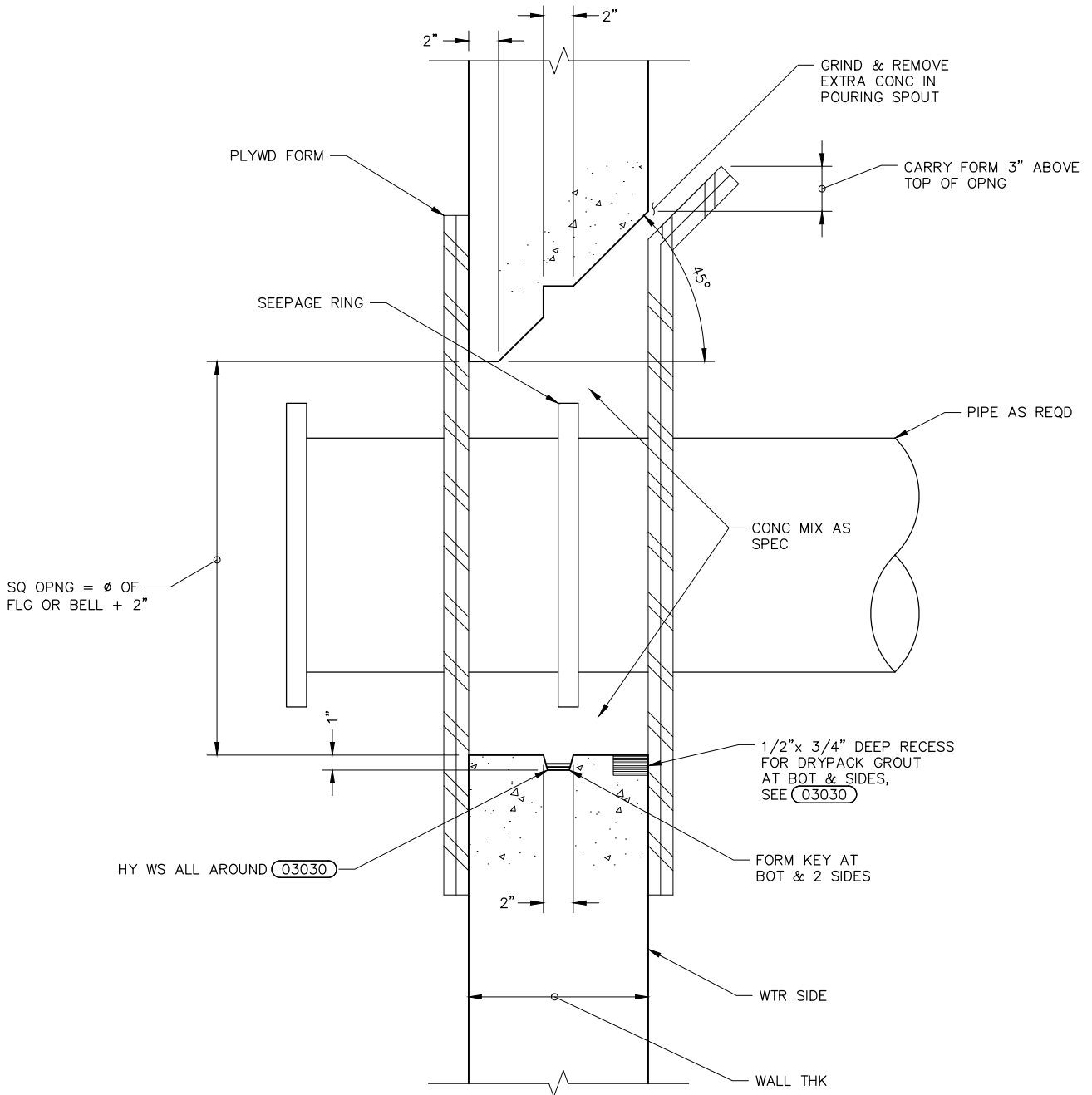


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03048
DUCTBANK THROUGH
BELOW GRADE WALL



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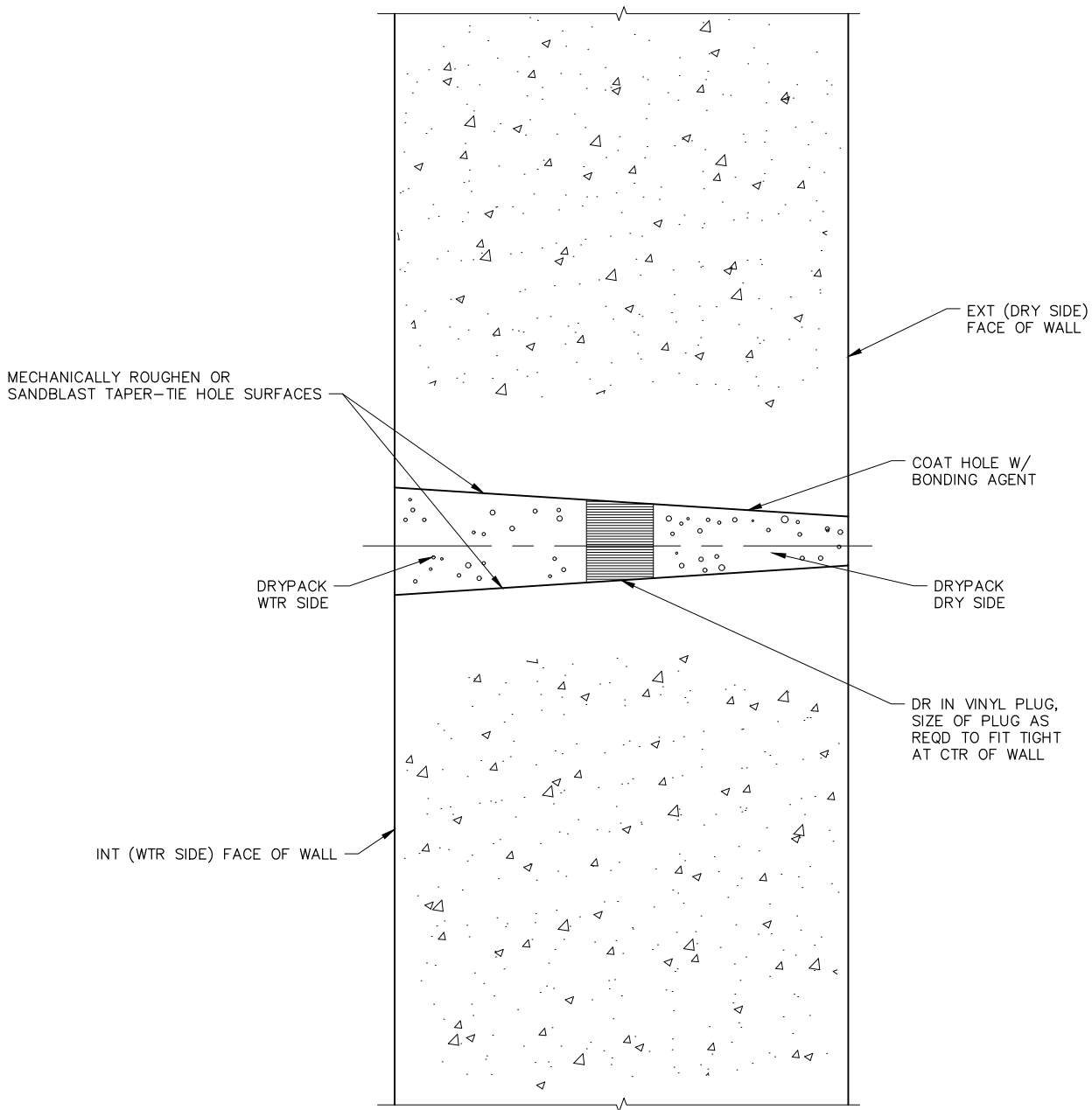
NOTES:

1. PIPE BLOCKOUT NOT TO BE USED WITHOUT WRITTEN APPROVAL OF ENGINEER UNLESS SPECIFICALLY INDICATED ON PLANS.
2. COAT CONCRETE ENCASED PORTION OF PIPE WITH SPECIFIED COATING SYSTEM.
3. REINFORCE AROUND BLOCKOUT OPENING PER (03051).
4. CONTINUE TYPICAL WALL REINFORCING THROUGH BLOCKOUT. FIELD CUT REINFORCING ONLY AS REQUIRED TO CLEAR PIPE.
5. VERIFY PIPE AND WALL REINFORCEMENT BARS ARE NOT ELECTRICALLY CONTINUOUS PRIOR TO CONCRETE PLACEMENT.

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ORIGINATION DATE: JULY 2021
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**03049
PIPE BLOCKOUT**

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NOTE:

MINIMUM HOLE DIAMETER AT EXTERIOR FACE = 1 INCH. TAPER HOLE SO THAT MINIMUM HOLE DIAMETER AT INTERIOR FACE = 1 1/4 INCHES.

CONSTRUCTION STEPS:

1. SANDBLAST OR MECHANICALLY ROUGHEN WITH ELECTRIC EQUIPMENT.
2. DRIVE IN VINYL PLUG.
3. COAT HOLE ON DRY SIDE OF PLUG AND DRYPACK WHILE BONDING AGENT IS TACKY.
4. COAT HOLE ON WATER SIDE OF PLUG AND DRYPACK WHILE BONDING AGENT IS TACKY.
5. USE CATEGORY II, NON-SHRINK GROUT AS SPECIFIED.

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APPD BY: *[Signature]*

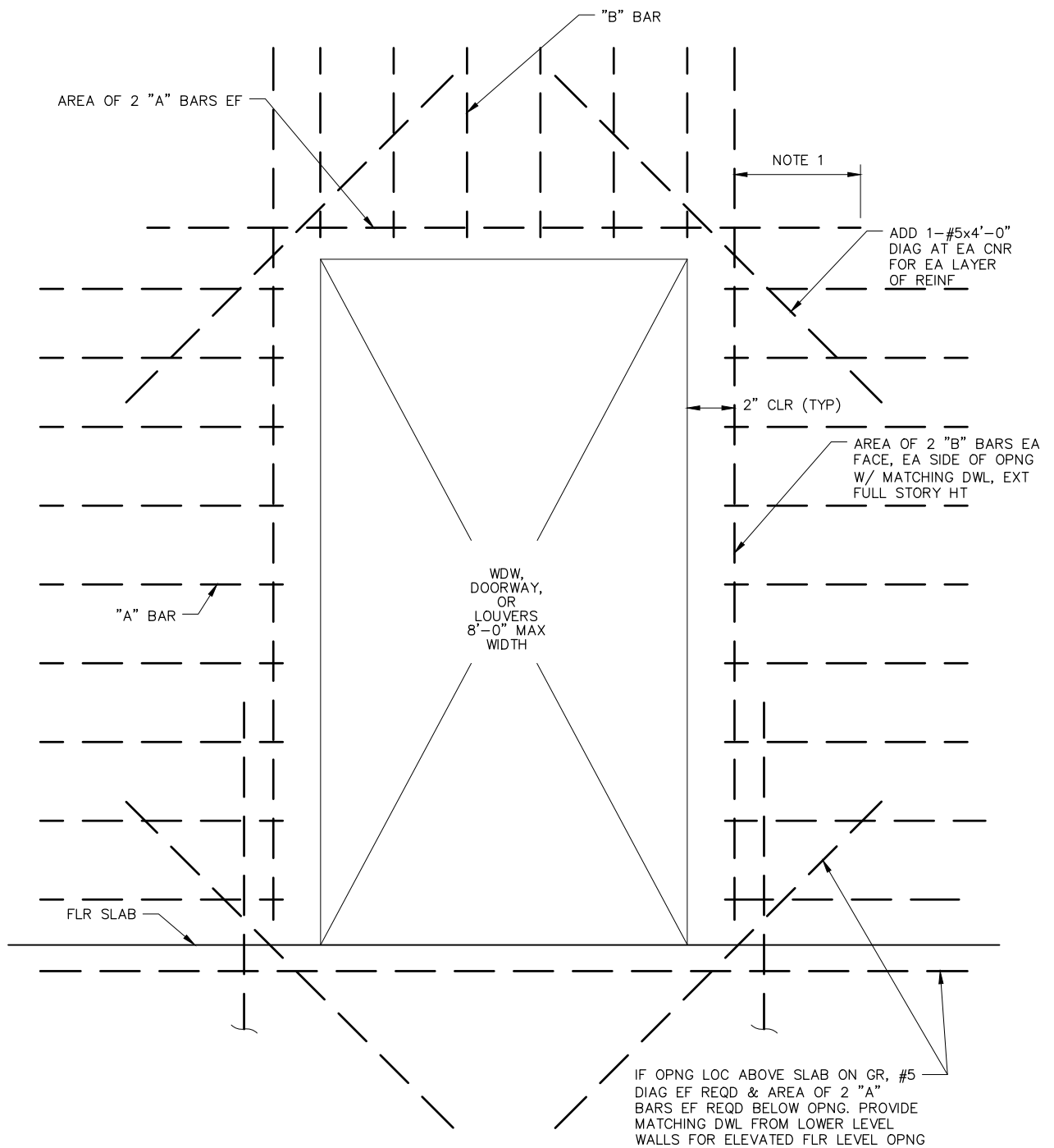
ORIGINATION DATE: JULY 2021

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03050
ALTERNATE FORM
TIE-THRU BOLT



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ELEVATION

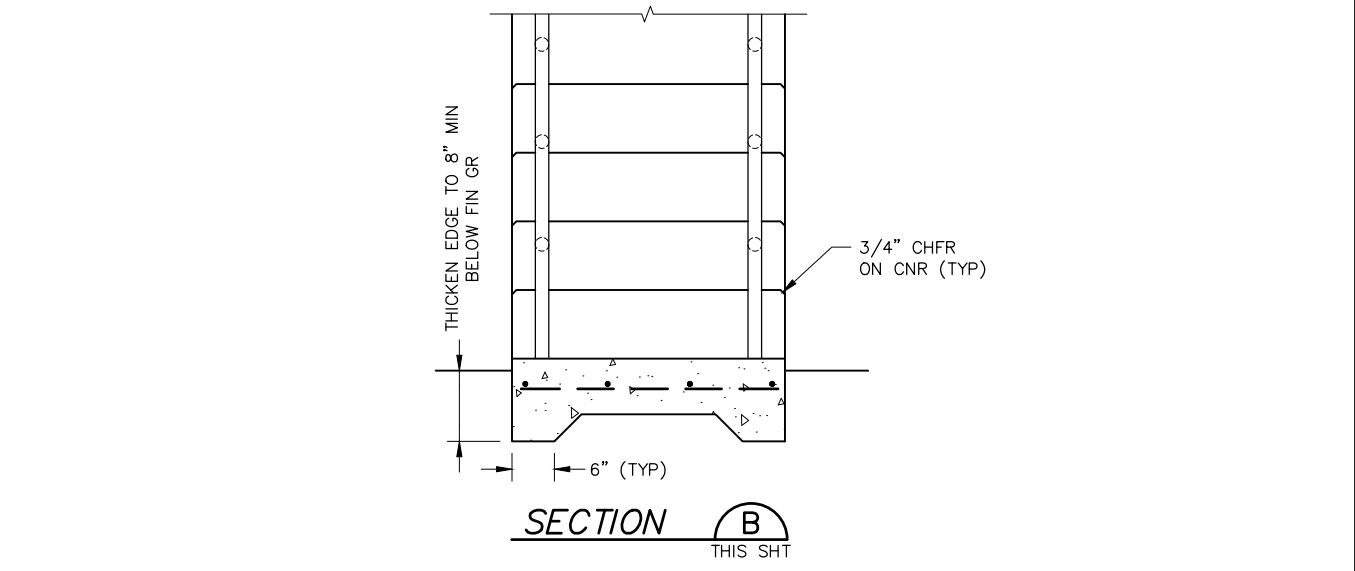
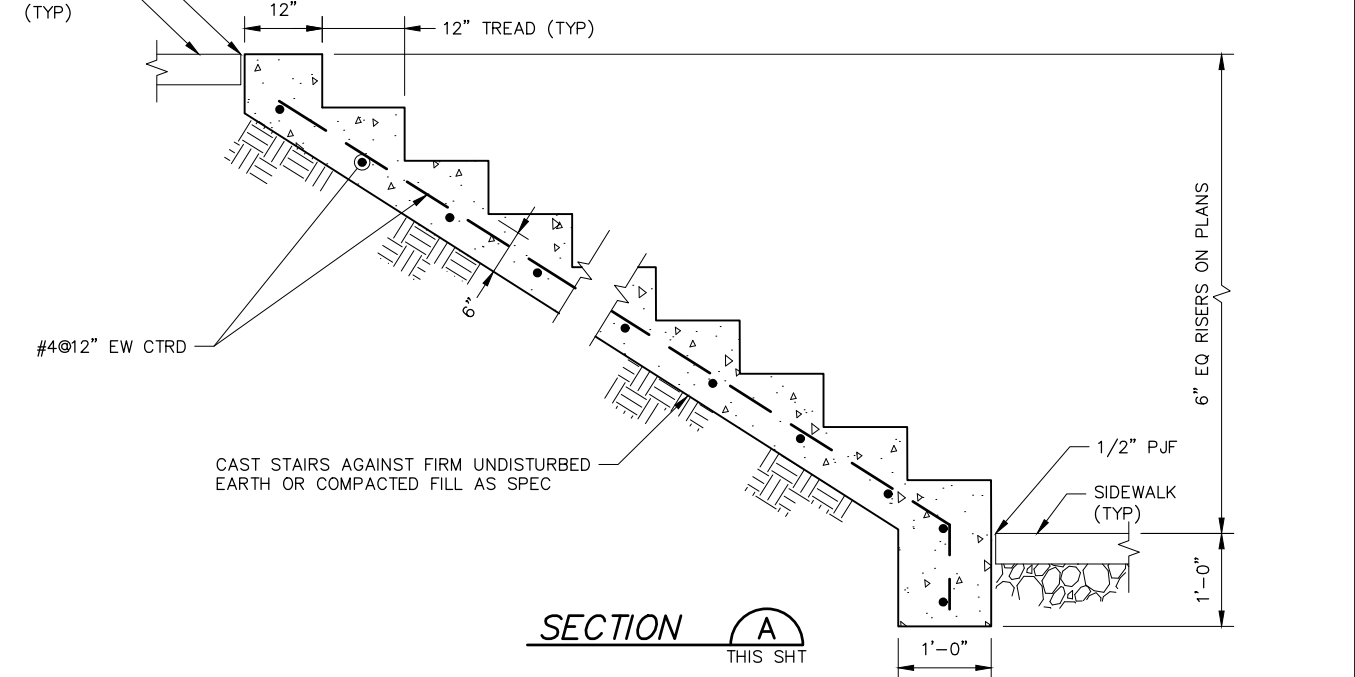
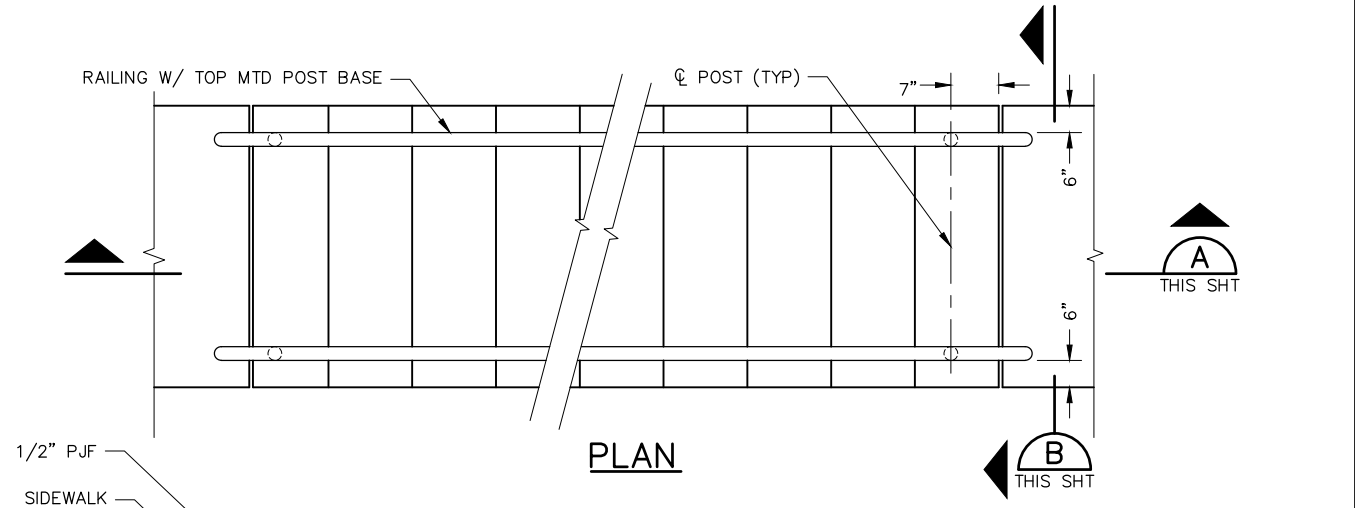
NOTES:

1. PROVIDE MINIMUM LAP.
2. TYPICAL FOR ALL OPENINGS IN ABOVE GROUND BUILDING CONCRETE WALLS UNLESS INDICATED OTHERWISE ON PLANS.
3. DO NOT WELD REINFORCEMENT TO PIPE SLEEVES AND INSERTS.

DRAWN BY: <i>IVERY</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**03051
OPENING REINFORCEMENT**

D DENVER WATER
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 F: 303.628.6199
 denverwater.org

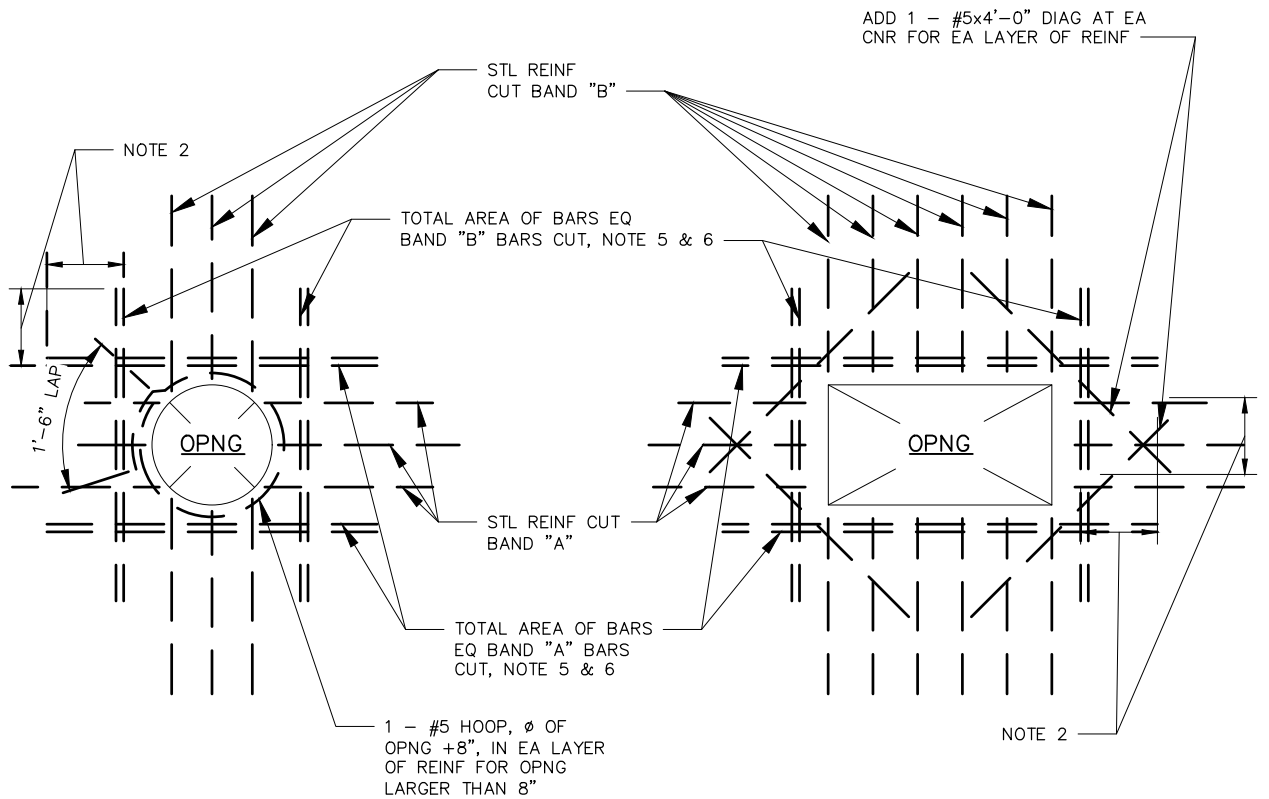


DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

03052
CONCRETE STAIR ON GRADE

D DENVER WATER

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NOTES:

1. TYPICAL FOR ALL OPENINGS IN CONCRETE WALLS OF BELOW GRADE AND HYDRAULIC STRUCTURES AND ALL STRUCTURAL CONCRETE SLABS UNLESS INDICATED OTHERWISE ON PLANS.
2. EXTEND CLASS 'B' LAP SPLICE BEYOND OPENING.
3. DO NOT WELD REINFORCEMENT TO PIPE SLEEVES AND INSERTS..
4. FOR OPENINGS LARGER THAN 8 FEET, REINFORCE SAME AS FOR 8 FEET OPENINGS.
5. SPACE AT 3 BAR DIAMETERS (OR 3 INCH MINIMUM) ON CENTER. LOCATE HALF OF TOTAL AREA ON EACH SIDE OF OPENING, 2 BARS MINIMUM.
6. AT OPENINGS WITHIN 12 INCH OF AN INTERSECTING WALL OR SLAB, PROVIDE ONLY THE EXTRA REINFORCEMENT WHICH WILL FIT, AT THE BAR SPACING IN NOTE 6.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

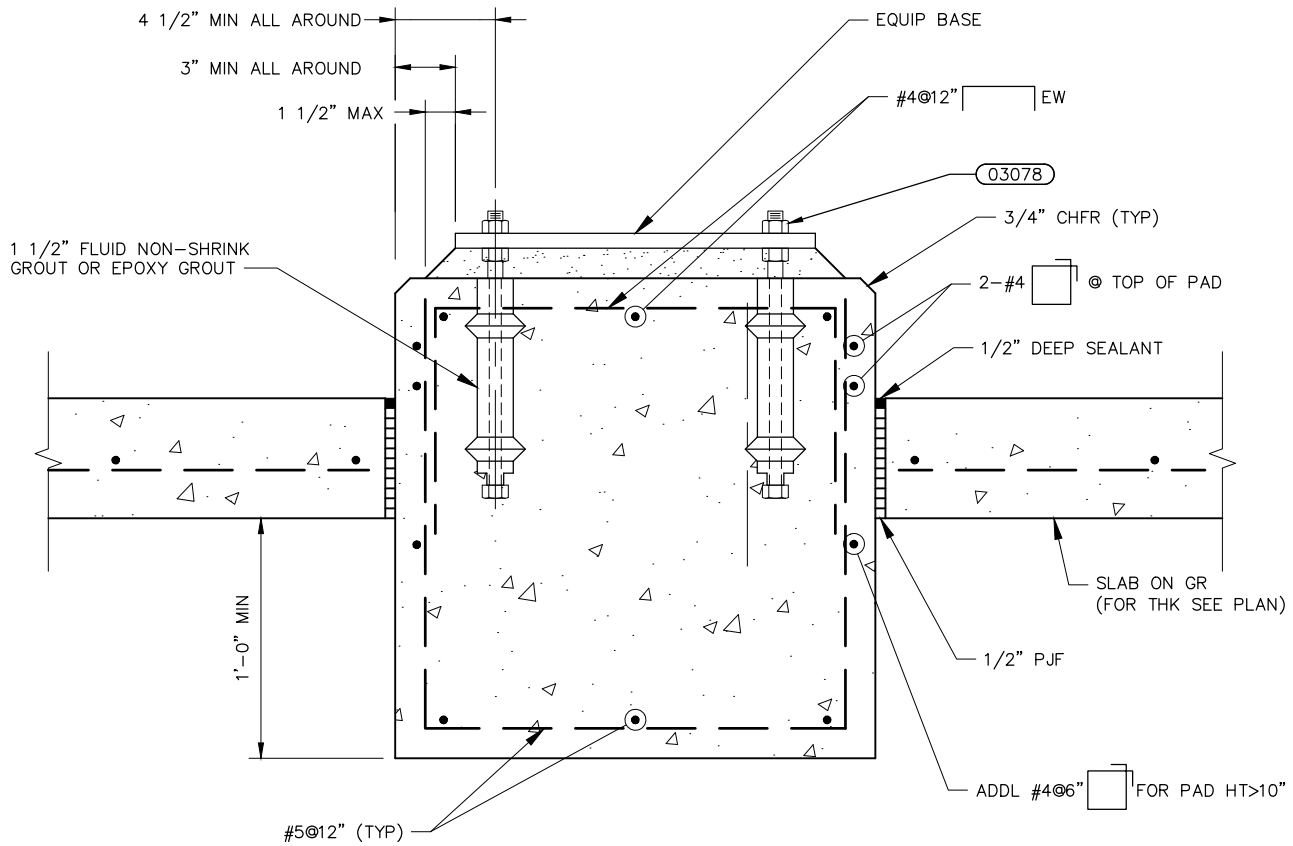
ORIGINATION DATE: JULY 2021

REVISION DATE:

03060
OPENING REINFORCEMENT



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DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

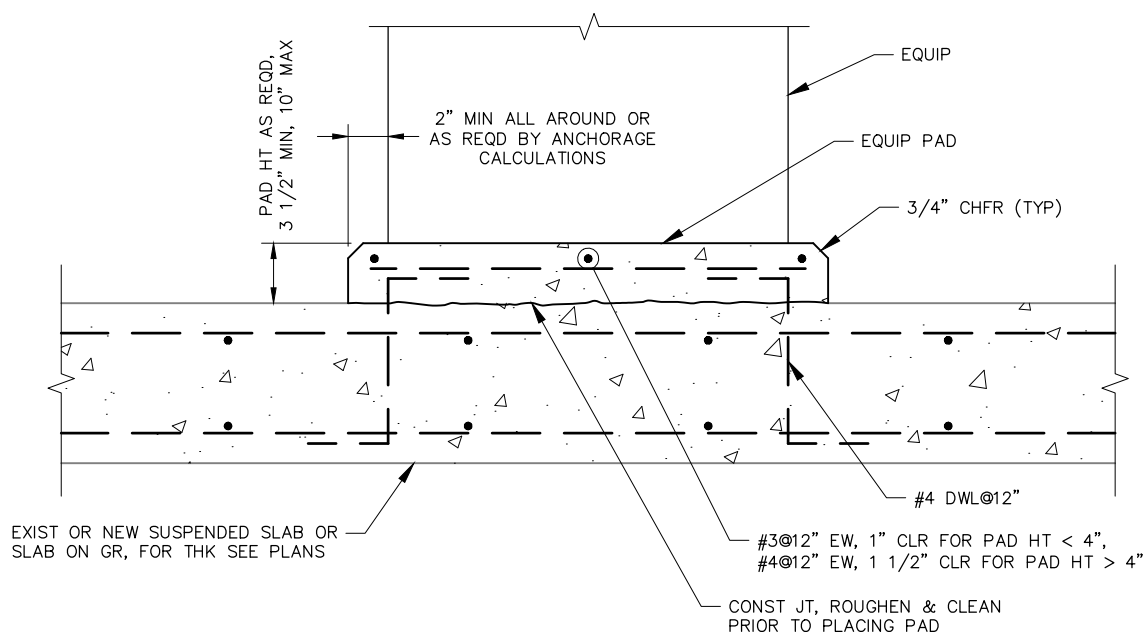
ORIGINATION DATE: JULY 2021

REVISION DATE:

03070
 CONCRETE EQUIPMENT
 PAD - TYPE 'D'



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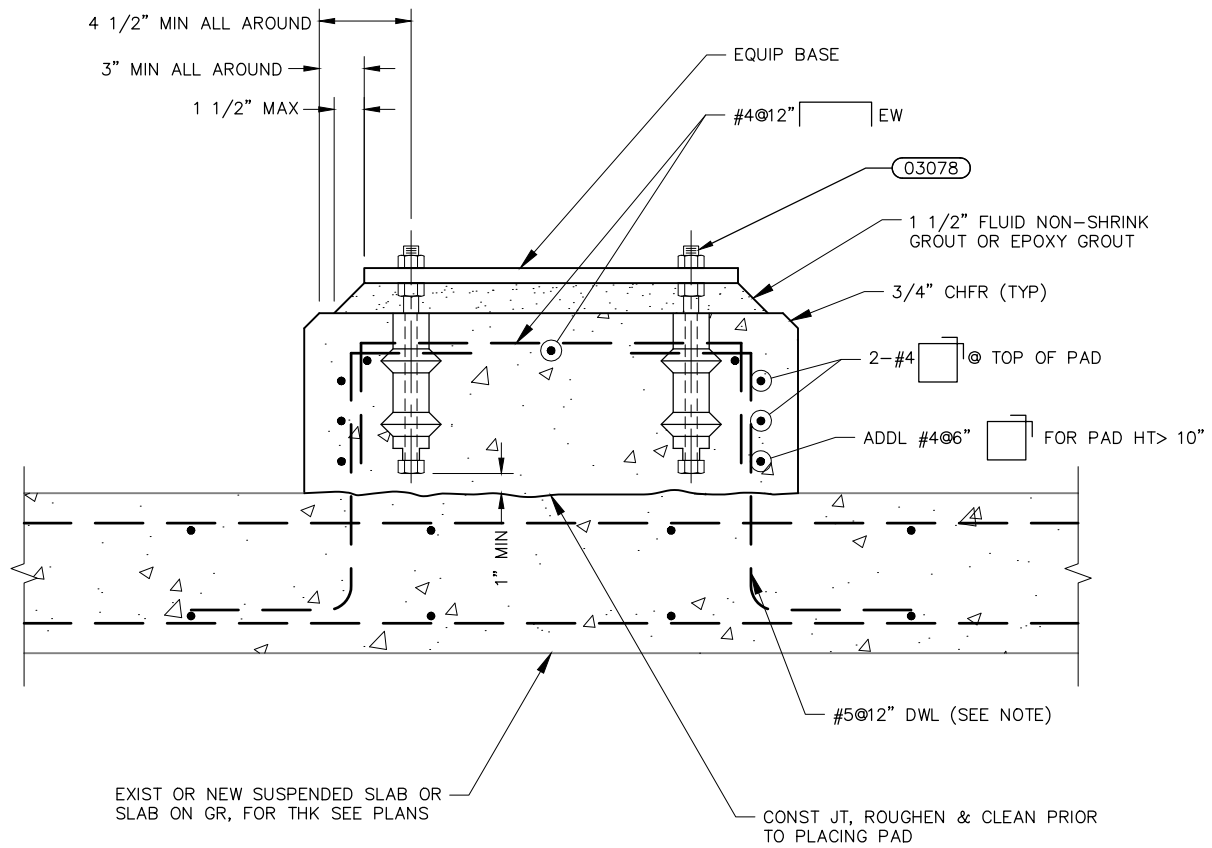
NOTES:

1. WHEN ANCHORAGE OF EQUIPMENT TO PAD IS REQUIRED, USE CONCRETE ANCHORS SPECIFIED.
2. CONCRETE PADS FOR ELECTRICAL EQUIPMENT SHALL BE 3 1/2 INCHES UNLESS NOTED OTHERWISE.

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

03071
CONCRETE EQUIPMENT
PAD – TYPE 'E'


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 denverwater.org



NOTE:

STRAIGHT DOWEL BARS MAY BE ADHESIVE ANCHORED INTO THE SLAB WITH 8 INCH MINIMUM CONCRETE EMBEDMENT.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

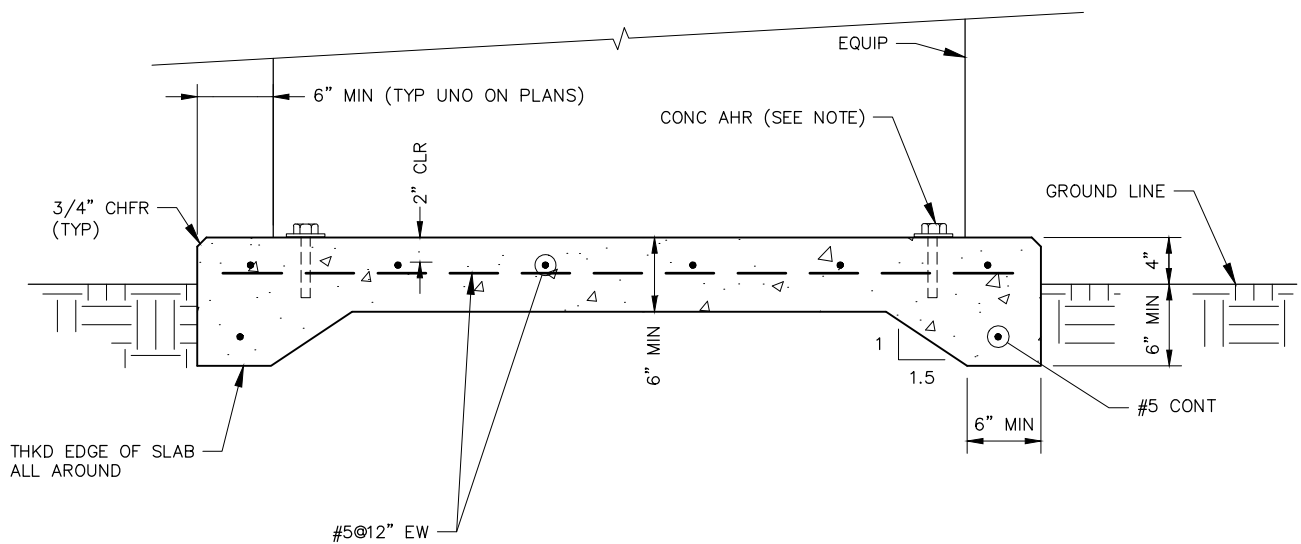
ORIGINATION DATE: JULY 2021

REVISION DATE:

**03072
CONCRETE EQUIPMENT
PAD - TYPE 'F'**



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denverwater.org



NOTE:

WHEN ANCHORAGE OF EQUIPMENT TO PAD IS REQUIRED, USE CONCRETE ANCHORS SPECIFIED.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

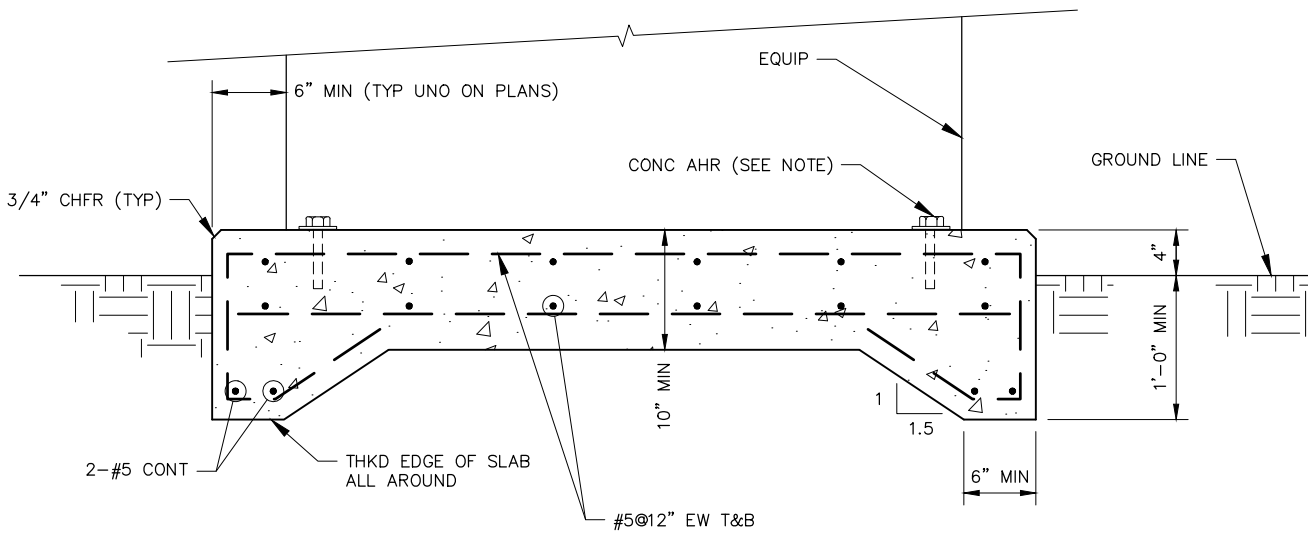
ORIGINATION DATE: JULY 2021

REVISION DATE:

03073
 CONCRETE EQUIPMENT
 PAD - TYPE 'G'



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NOTE:

WHEN ANCHORAGE OF EQUIPMENT TO PAD IS REQUIRED, USE CONCRETE ANCHORS SPECIFIED.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

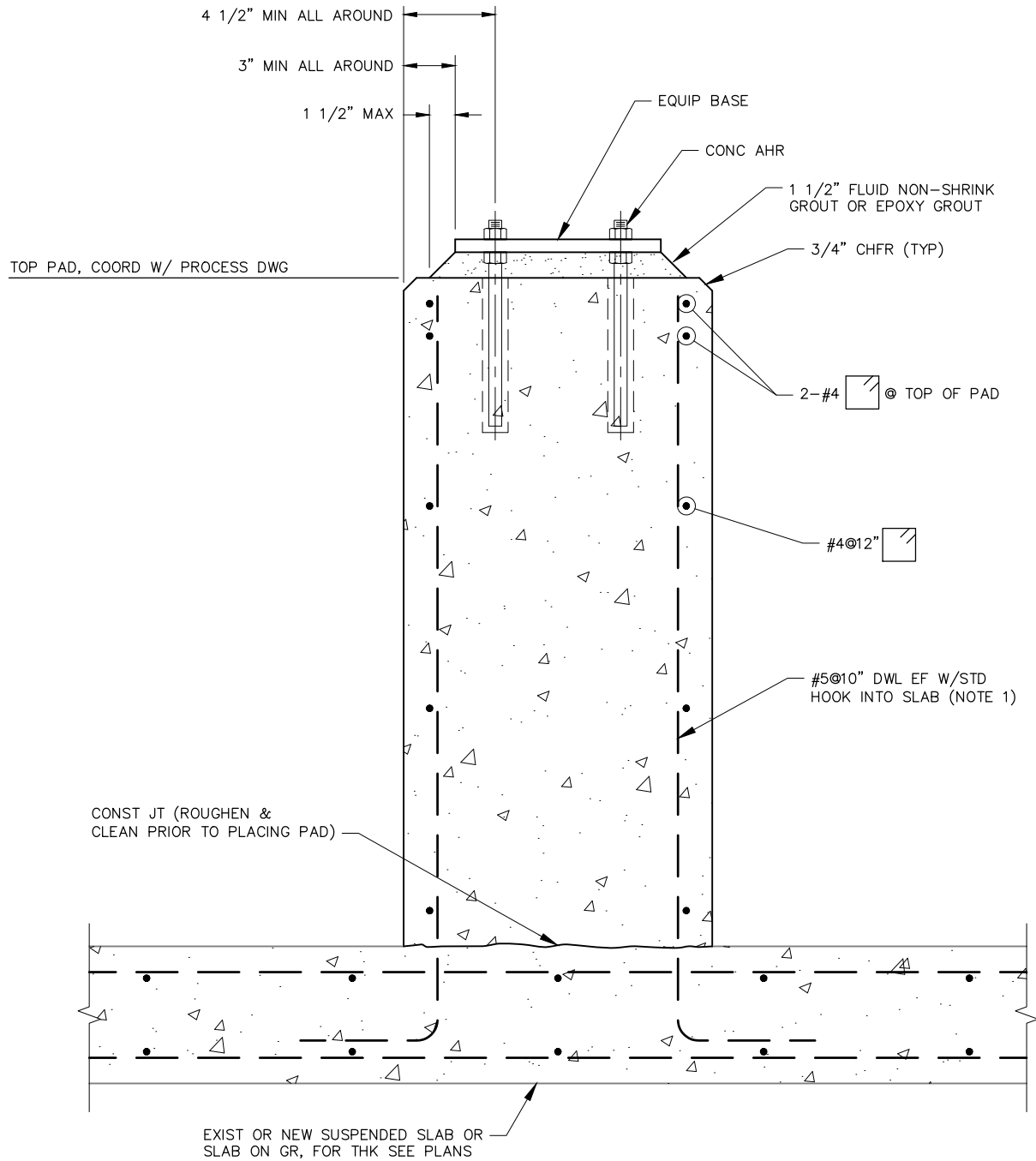
ORIGINATION DATE: JULY 2021

REVISION DATE:

**03074
CONCRETE EQUIPMENT
PAD - TYPE 'H'**



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NOTES:

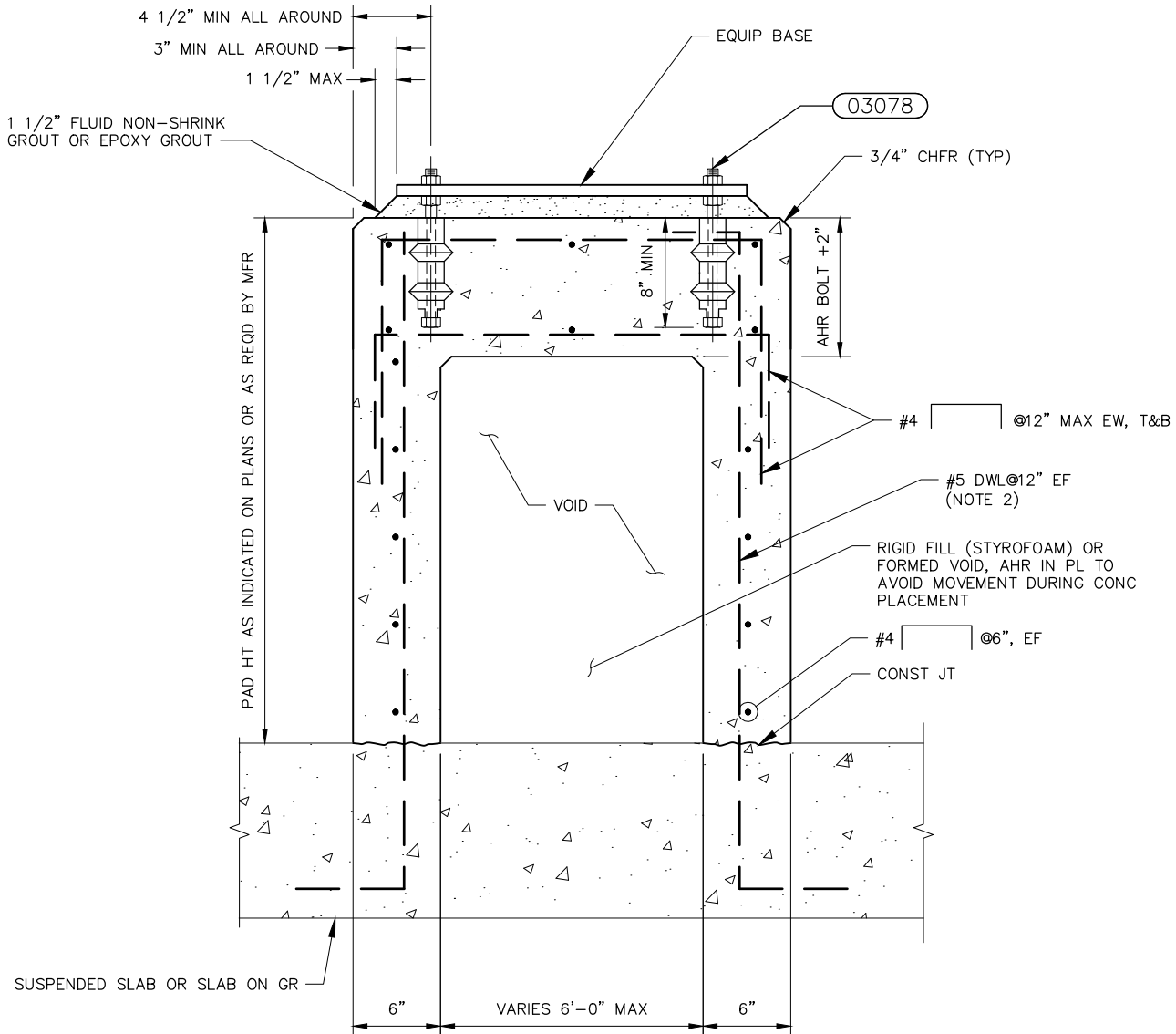
1. STRAIGHT DOWEL BARS MAY BE ADHESIVE ANCHORED INTO THE SLAB WITH 8 INCH MINIMUM CONCRETE EMBEDMENT.
2. ANCHORS SHALL PROJECT AT LEAST 2 BOLT DIAMETERS ABOVE THE TOP OF THE VALVE BEARING PLATE.
3. CAST-IN ANCHORS SHALL BE IN ACCORDANCE WITH (03010), SIMILAR ADHESIVE ANCHORS MAY BE USED WITH 9x ANCHOR DIAMETER MINIMUM CONCRETE EMBEDMENT (6 INCHES MINIMUM).

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**03075
CONCRETE EQUIPMENT
PAD - TYPE 'J'**

D DENVER WATER

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NOTES:

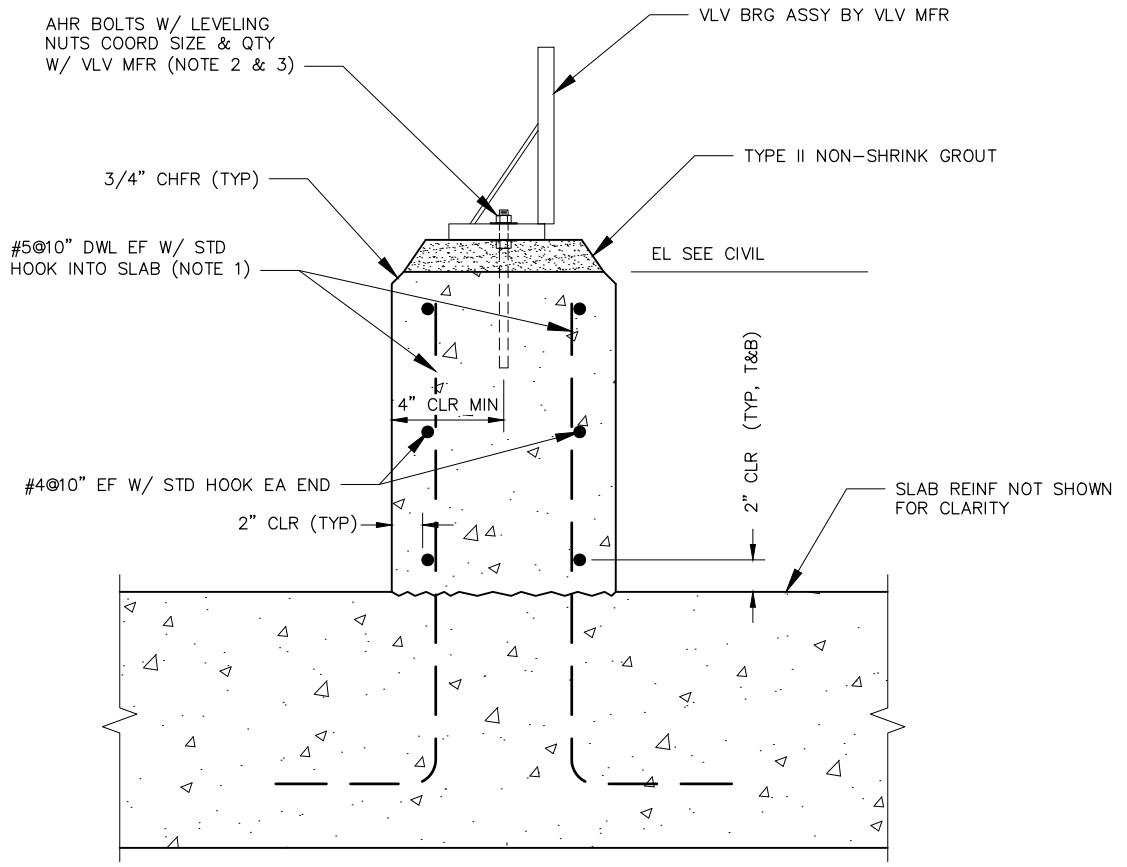
1. DO NOT USE FOR VIBRATORY EQUIPMENT OR FOR EQUIPMENT THAT WEIGHS MORE THAN 2000 POUNDS.
2. STRAIGHT DOWEL BARS MAY BE ADHESIVE ANCHORED INTO THE SLAB WITH 8 INCH MINIMUM CONCRETE EMBEDMENT.

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORINATION DATE: JULY 2021
REVISION DATE:

**03076
 CONCRETE EQUIPMENT
 PAD - TYPE 'K'**

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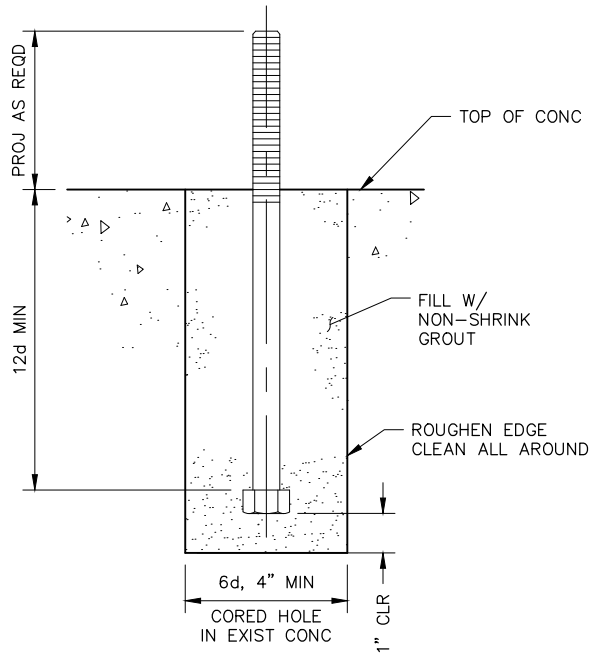
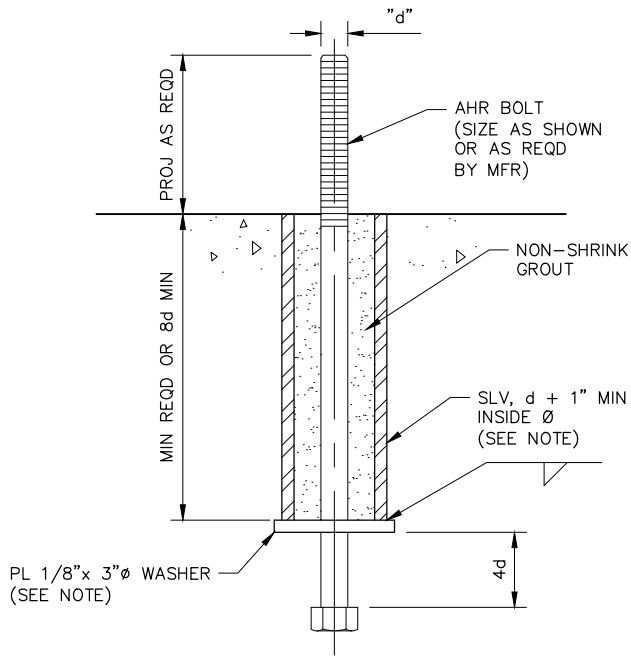
NOTES:

1. STRAIGHT DOWEL BARS MAY BE ADHESIVE ANCHORED INTO THE SLAB WITH 8 INCH MINIMUM CONCRETE EMBEDMENT.
2. ANCHORS SHALL PROJECT AT LEAST 2 BOLT DIAMETERS ABOVE THE TOP OF THE VALVE BEARING PLATE.
3. CAST-IN ANCHORS SHALL BE IN ACCORDANCE WITH (03010), SIMILAR ADHESIVE ANCHORS MAY BE USED WITH 9x ANCHOR DIAMETER MINIMUM CONCRETE EMBEDMENT (6 INCHES MINIMUM).

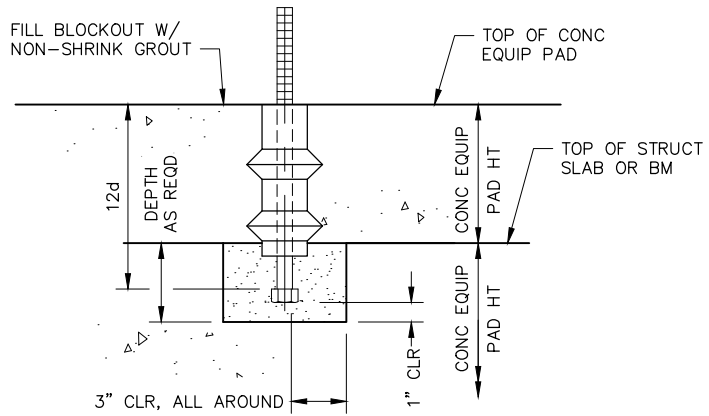
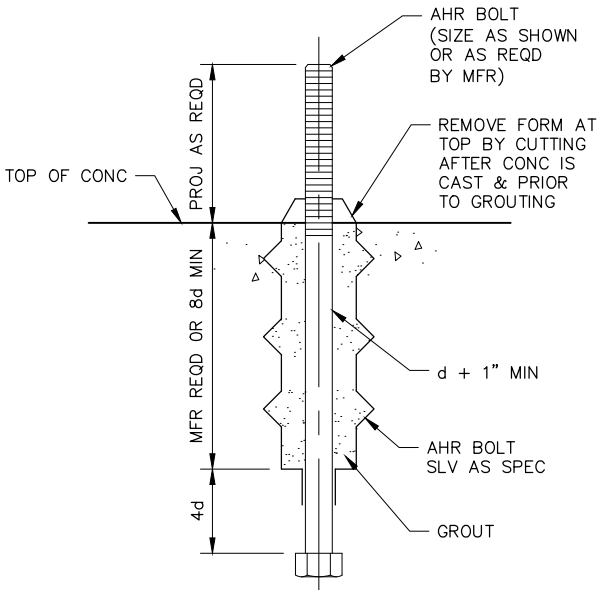
DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**03077
CONCRETE VALVE
SUPPORT PAD**

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 denverwater.org



ANCHOR BOLT RETROFIT



MACHINERY ANCHOR BOLT

ANCHOR BOLT BLOCKOUT

NOTE:

MATERIAL TO MATCH BOLT.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

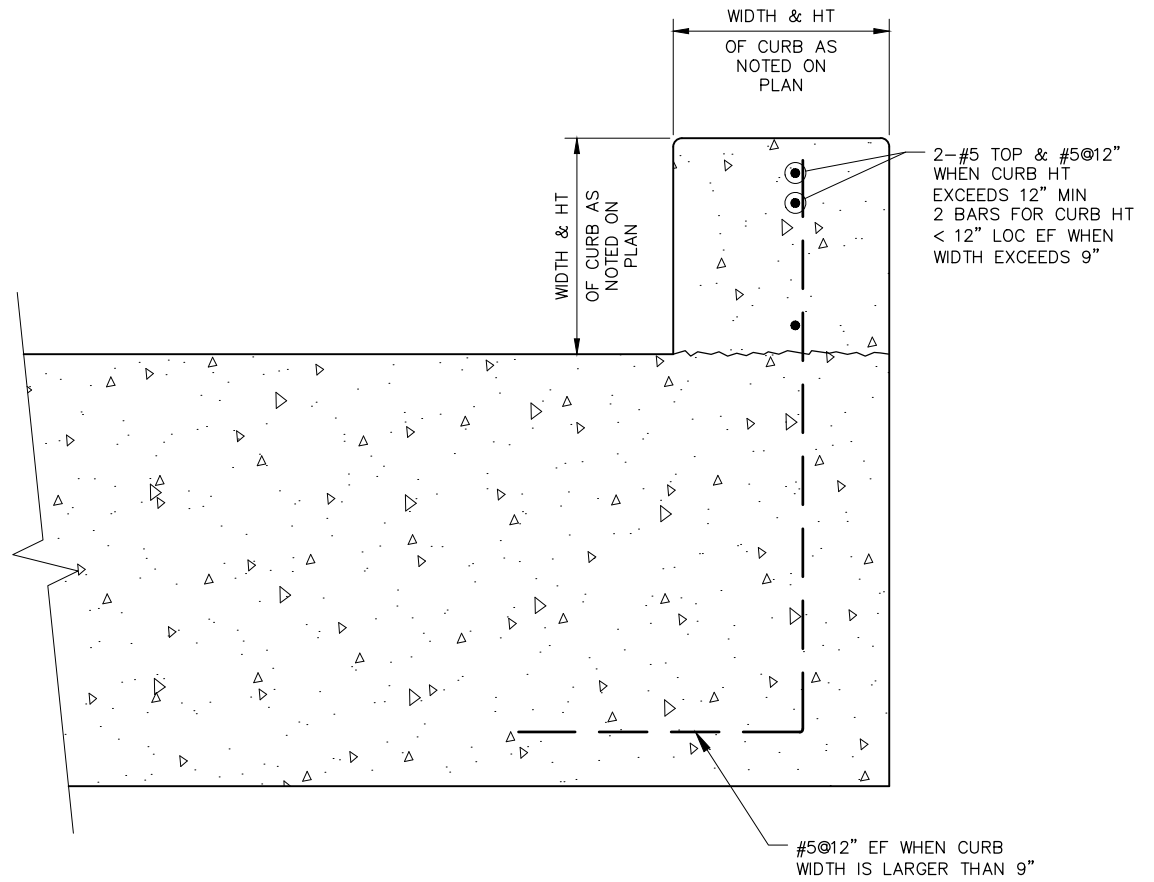
ORIGINATION DATE: JULY 2021

REVISION DATE:

**03078
ANCHOR BOLT DETAILS**



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DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

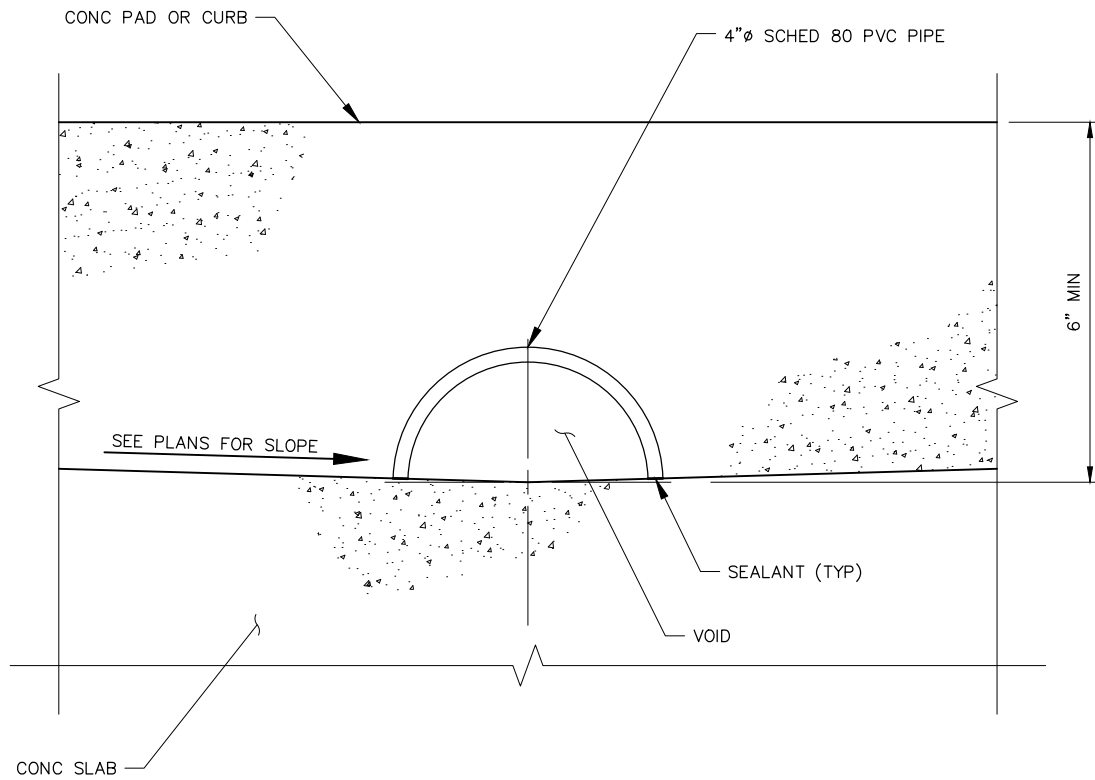
ORIGINATION DATE: JULY 2021

REVISION DATE:

03079
CONCRETE CURB



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NOTE:

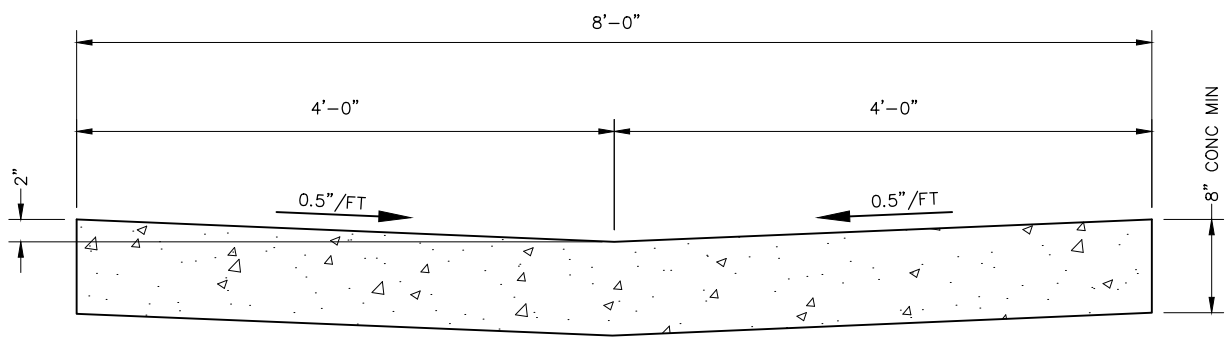
ANCHOR IN PLACE WITH STAINLESS STEEL STRAPPING AND ADHESIVE ANCHORS AS REQUIRED.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**03080
DRAINAGE BLOCKOUT**



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SECTION

NOTE:

VALLEY GUTTER CROSS-PAN REQUIRES FIBERMESH REINFORCEMENT AT MINIMUM 1.5 POUNDS PER CUBIC YARD.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

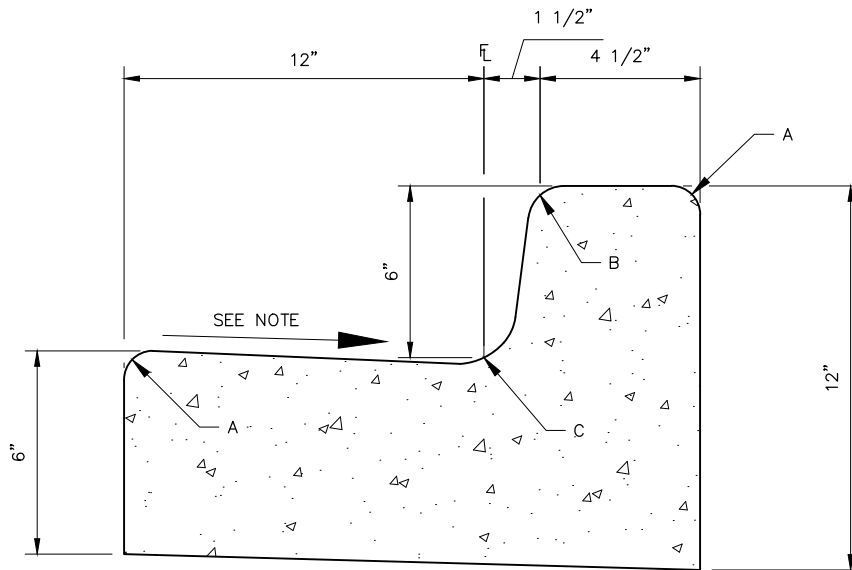
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

03090
CONCRETE VALLEY GUTTER



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SECTION

LEGEND FOR RADII	
A	1/8" TO 1/4"
B	1 1/2"
C	1 1/2" TO 2"

NOTE:

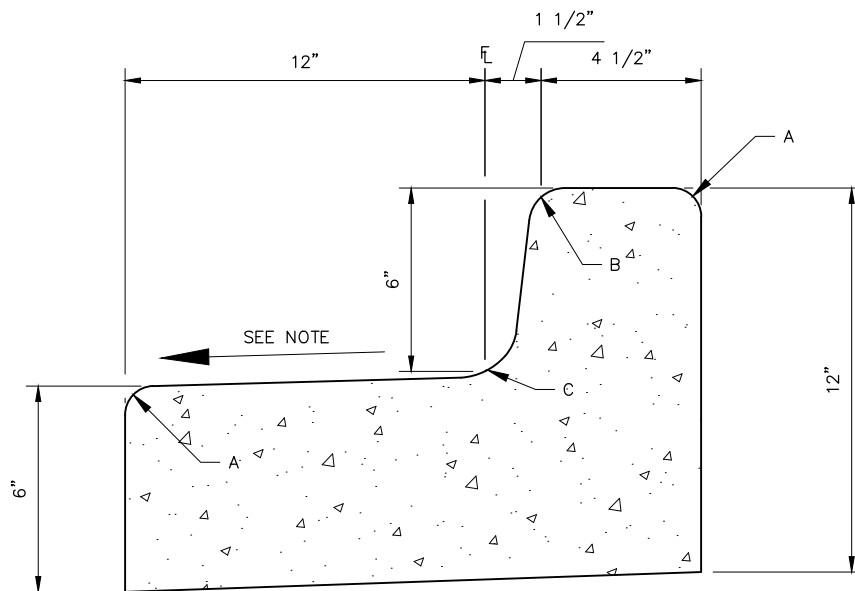
GUTTER CROSS SLOPE SHALL BE 1/2 INCH PER FOOT.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

03091
6" BARRIER CURB AND
GUTTER (CATCH)



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SECTION

LEGEND FOR RADII	
A	1/8" TO 1/4"
B	1 1/2"
C	1 1/2" TO 2"

NOTE:

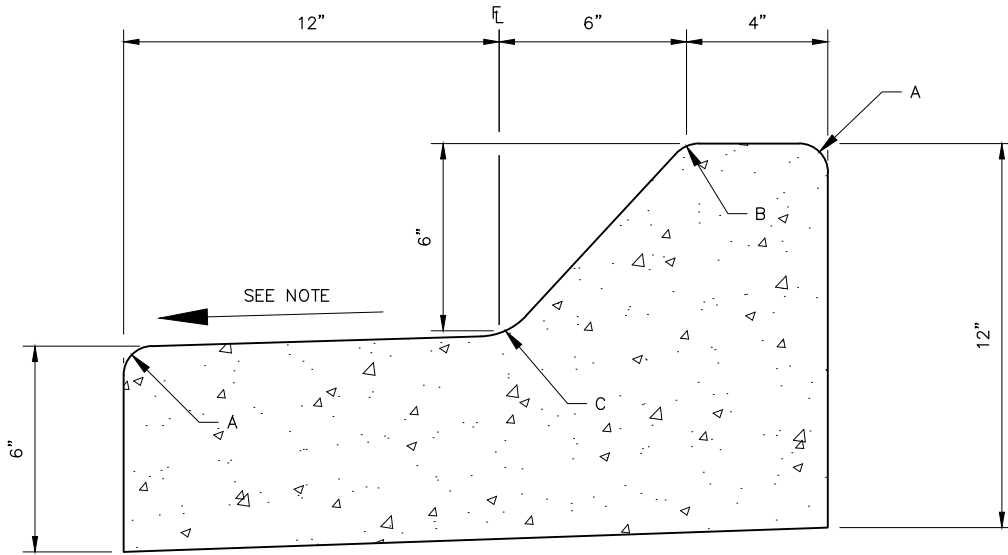
GUTTER CROSS SLOPE SHALL BE 1/2 INCH PER FOOT.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

03092
6" BARRIER CURB
AND GUTTER (SPILL)

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SECTION

LEGEND FOR RADII	
A	1/8" TO 1/4"
B	1 1/2"
C	1 1/2" TO 2"

NOTE:

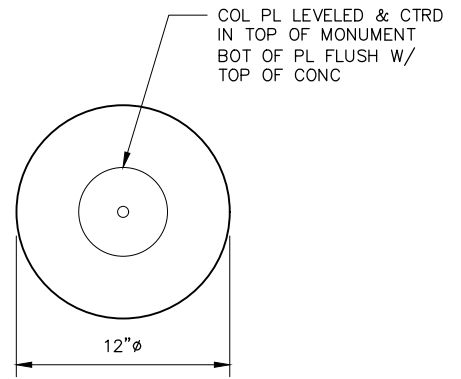
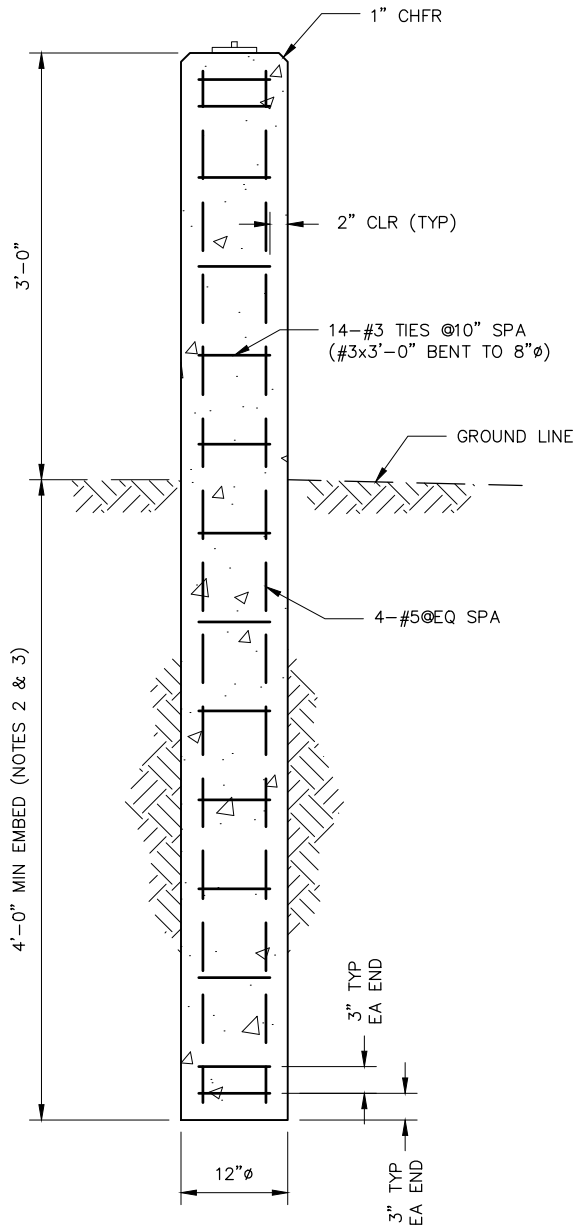
GUTTER CROSS SLOPE SHALL BE 1/2 INCH PER FOOT.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

03093
**6" MOUNTABLE CURB AND
 GUTTER (SPILL)**



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PLAN

ELEVATION

NOTES:

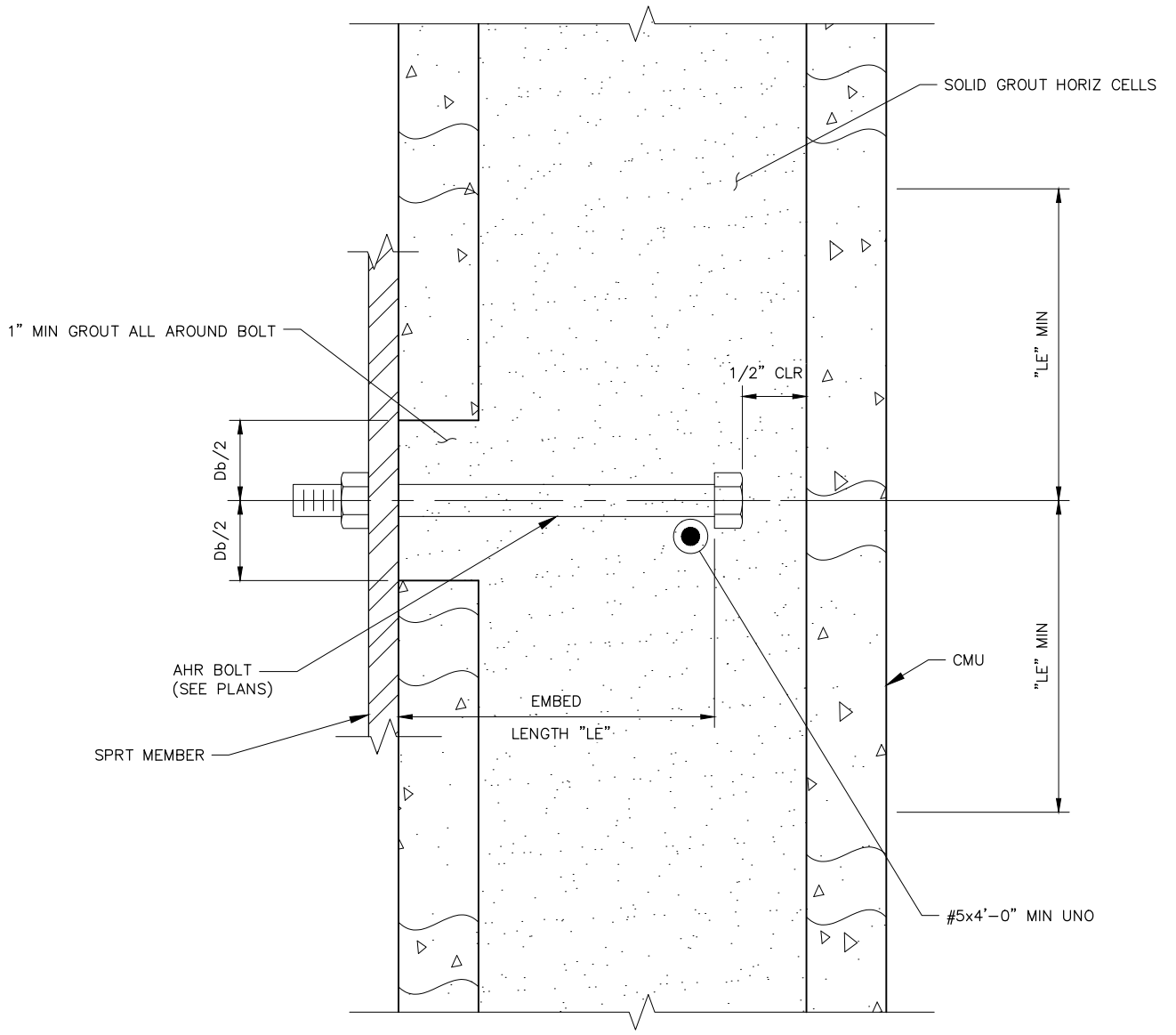
1. PROVIDE 30 INCH LAP SPLICE FOR VERTICAL BARS AS REQUIRED.
2. MINIMUM 12 INCH BELOW LOCAL JURISDICTIONAL FROST DEPTH.
3. IF A BOULDER OR BEDROCK IS ENCOUNTERED, ADHESIVE ANCHOR VERTICAL REINFORCEMENT WITH 8 INCH MINIMUM EMBEDMENT INTO ROCK.
4. CLASS D CONCRETE.
5. COLUMN PLATE: SECO PART# 1 510 001 – COLUMN PLATE.

DRAWN BY: VAICKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**03100
HIGH ACCURACY SURVEY
MONITORING STATION**

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INTENTIONALLY BLANK



NOTE:

Db=DIAMETER OF BOLT.

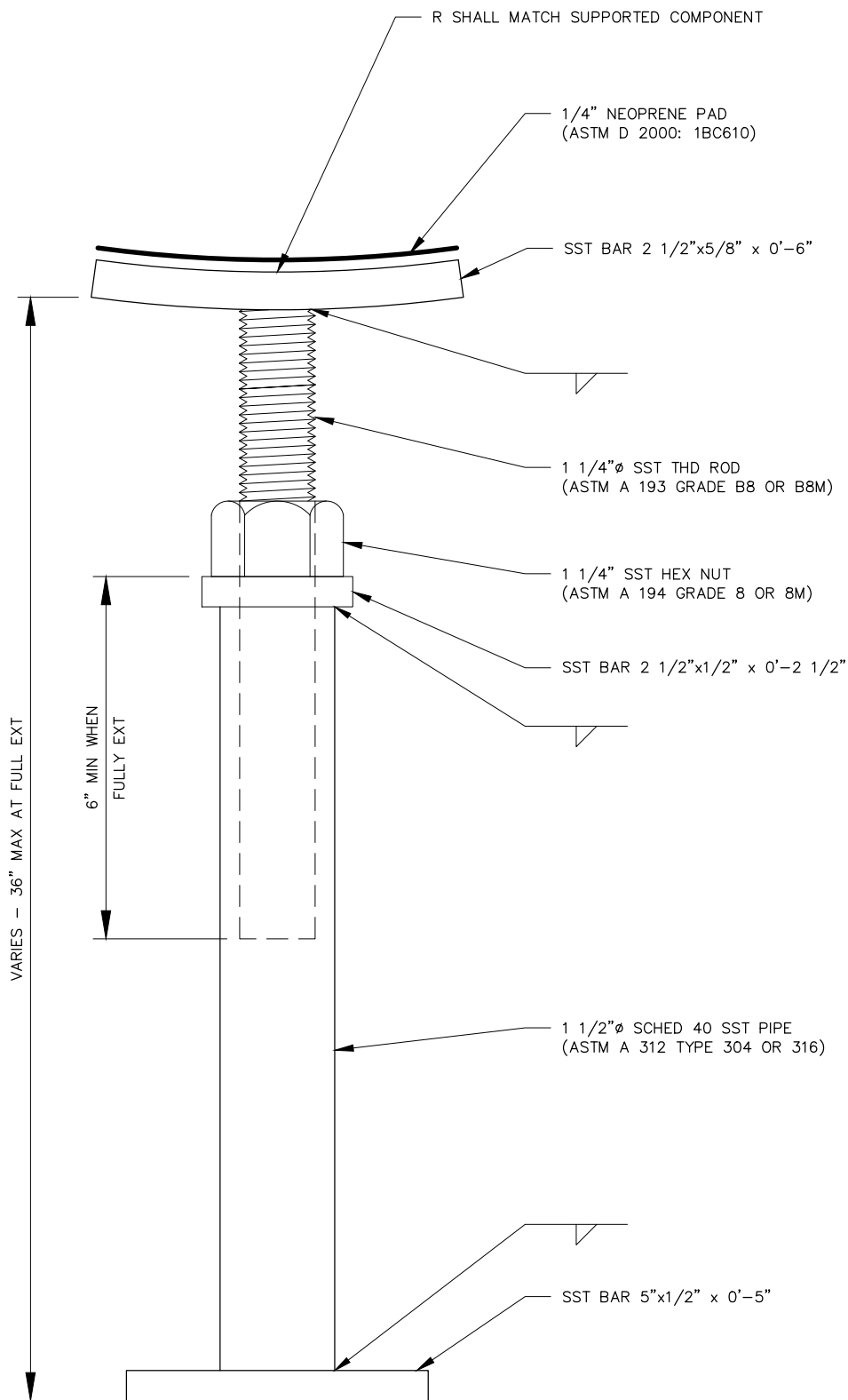
DRAWN BY: <i>BERKNESS</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**04001
MASONRY ANCHOR BOLT**



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INTENTIONALLY BLANK



NOTE:

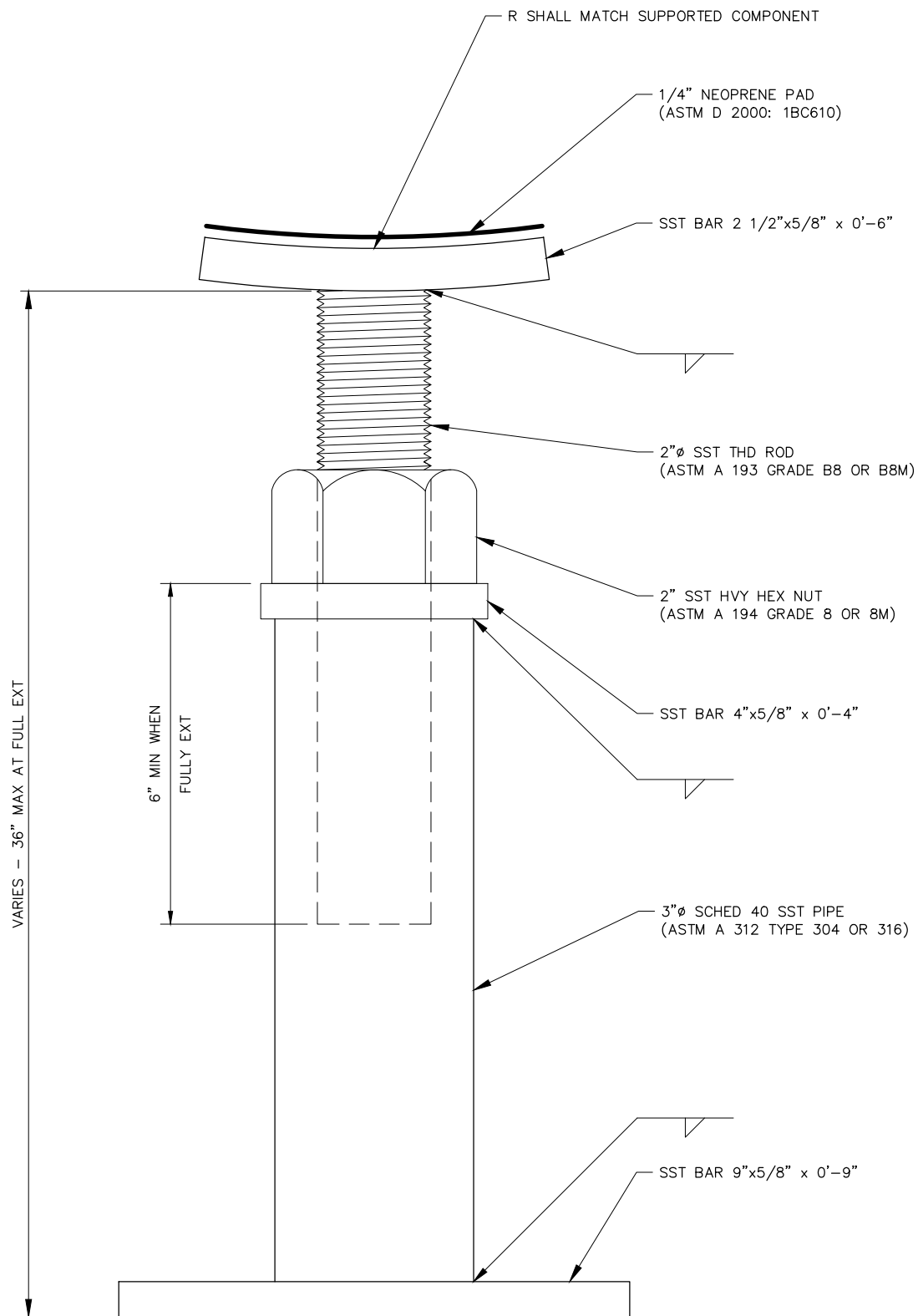
BAR MATERIAL SHALL BE ASTM A 240 TYPE 304 OR TYPE 316 (Fy = 30 KSI MINIMUM).

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**05001
STANDARD
ADJUSTABLE SUPPORT**

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NOTE:

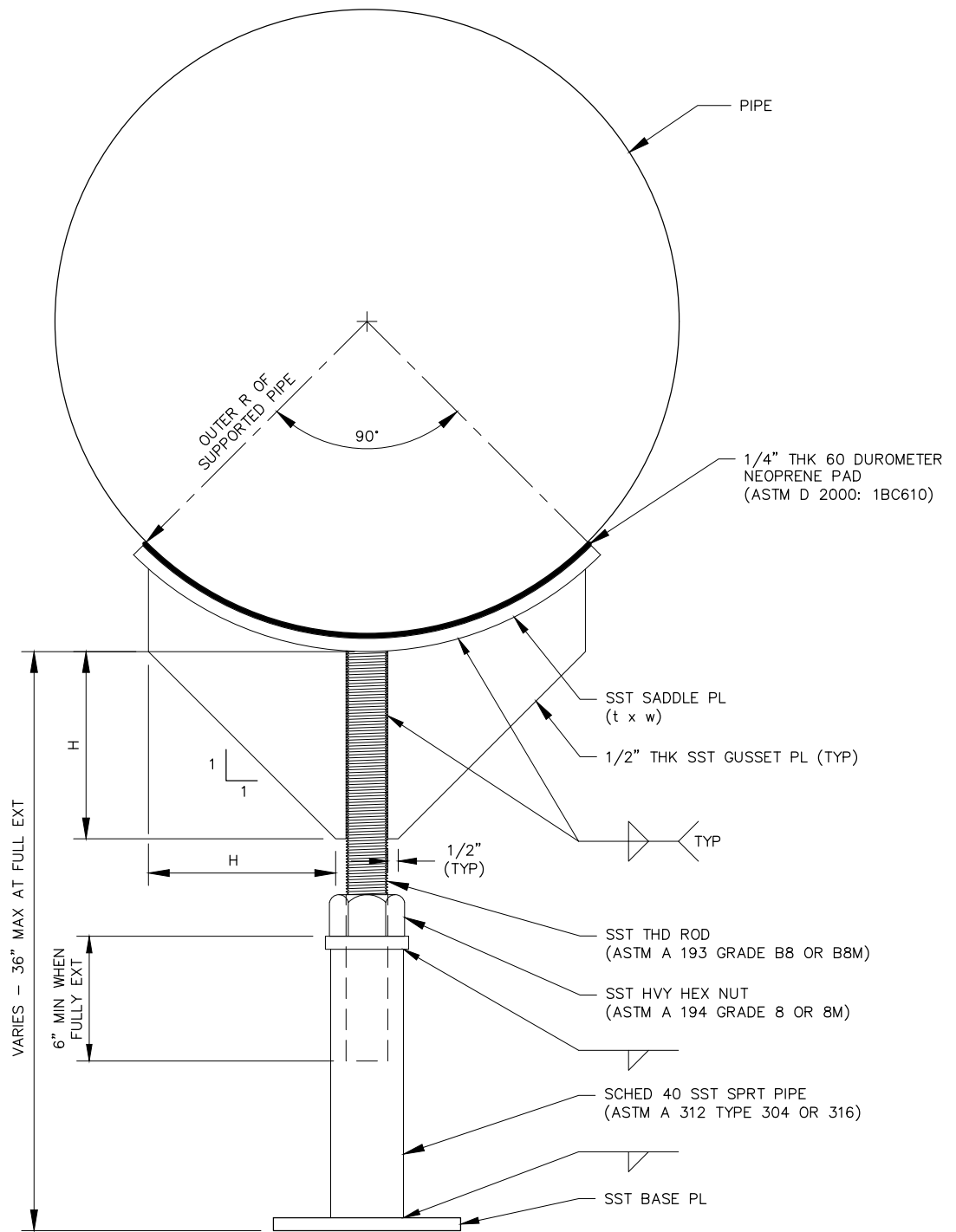
BAR MATERIAL SHALL BE ASTM A 240
TYPE 304 OR TYPE 316 ($F_y = 30$ KSI MINIMUM).

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**05002
HEAVY DUTY
ADJUSTABLE SUPPORT**

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PIPE ϕ	SADDLE PL THK (t)	SADDLE PL WIDTH (w)	GUSSET PL HEIGHT (H)	THD ROD ϕ	SPRT PIPE ϕ	BASE PL DIM
$\phi \leq 12"$	1/2"	2 1/2"	N/A	1 1/4"	1 1/2"	1/2"x5" x 5"
12" < $\phi \leq 20"$	5/8"	4"	4"	2"	3"	5/8"x9" x 9"
20" < $\phi \leq 30"$	5/8"	6"	6"	2"	3"	5/8"x9" x 9"

NOTE:

BAR AND PLATE MATERIAL SHALL BE ASTM A 240 TYPE 304 OR TYPE 316 ($F_y = 30$ KSI MINIMUM).

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

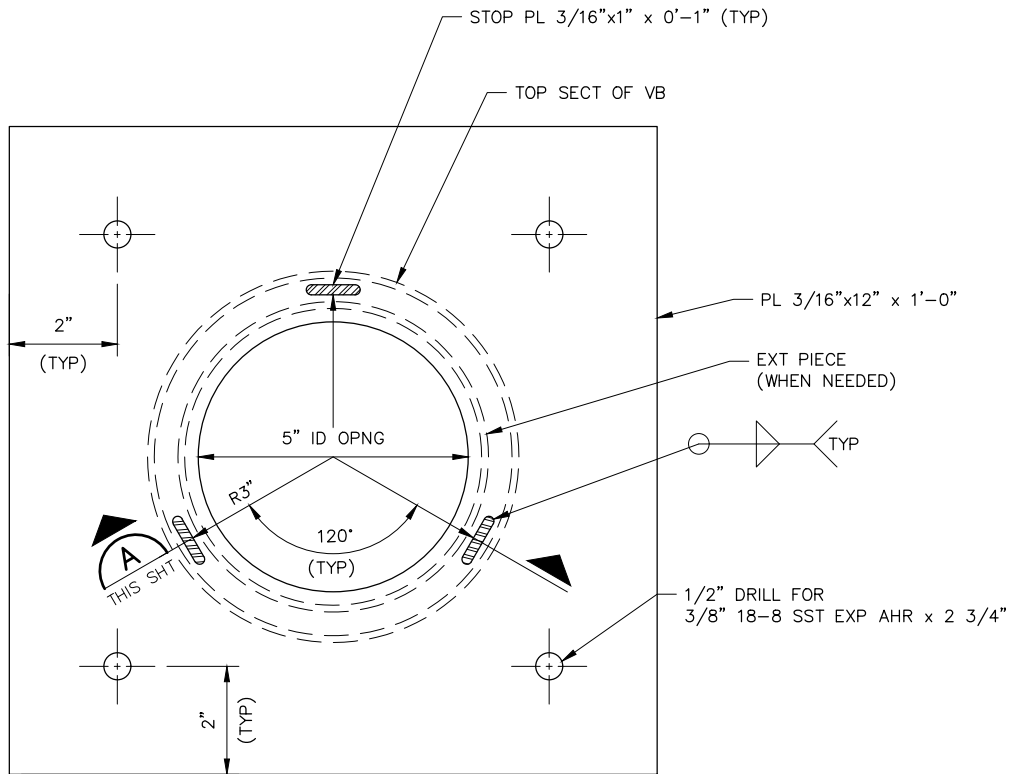
ORIGINATION DATE: JULY 2021

REVISION DATE:

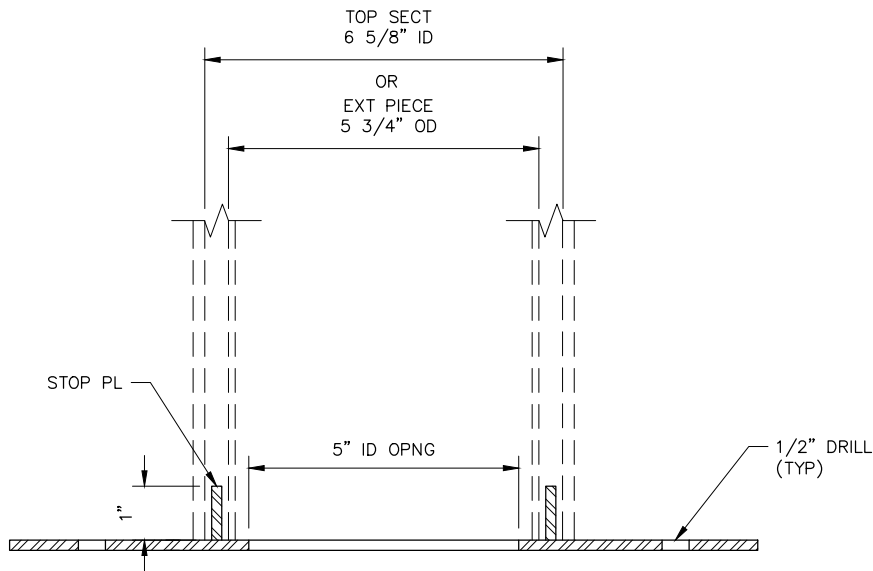
**05003
PIPE BODY
ADJUSTABLE SUPPORT**



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VALVE BOX SUPPORT PLATE PLAN



SECTION A
THIS SHT

NOTES:

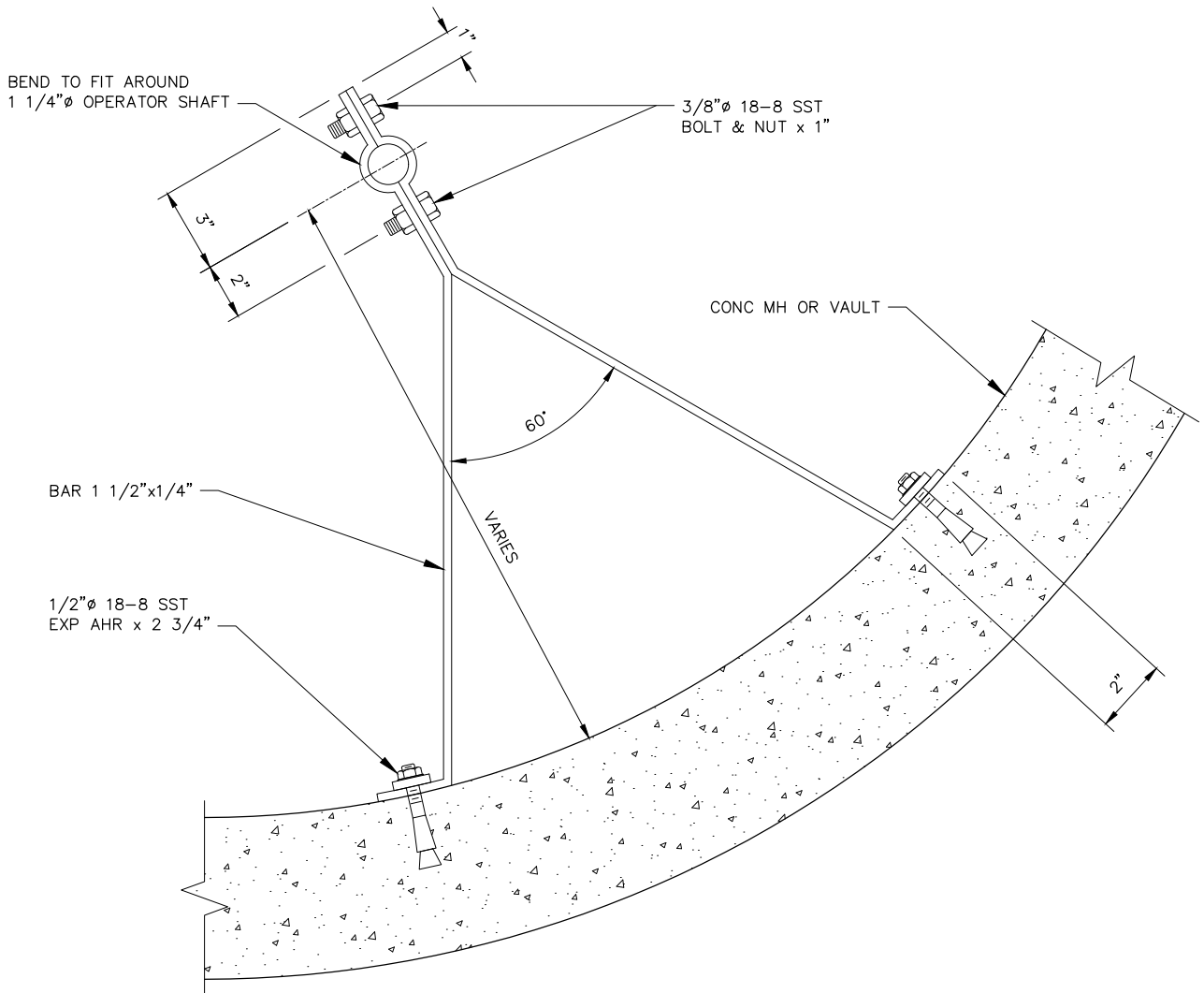
1. PLATE SHALL BE ASTM A 36.
2. PLATE SHALL BE COATED WITH LIQUID EPOXY, 16 MILS DRY FILM THICKNESS IN ACCORDANCE WITH AWWA C210. COLOR: BLACK SHEEN: FLAT.

DRAWN BY: MCMILLEN
CHKD BY: K ROSS <i>KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**05010
VALVE BOX
SUPPORT PLATE**



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NOTES:

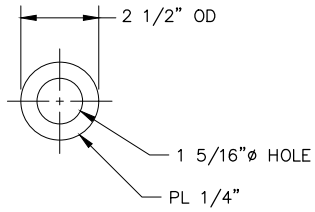
1. BAR SHALL BE ASTM A 36.
2. BAR SHALL BE COATED WITH LIQUID EPOXY, 16 MILS DRY FILM THICKNESS IN ACCORDANCE WITH AWWA C210. COLOR: BLACK SHEEN: FLAT.

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

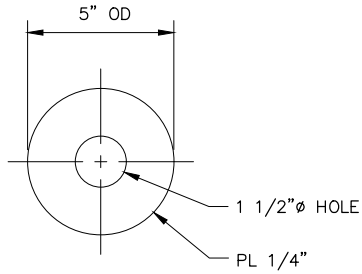
**05011
VALVE OPERATOR GUIDE**

D DENVER WATER

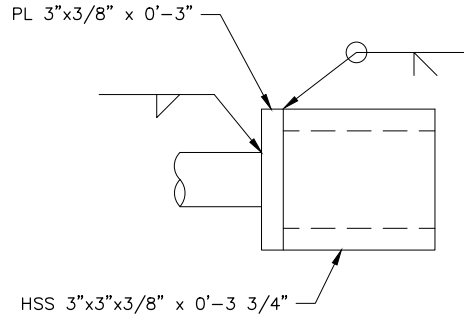
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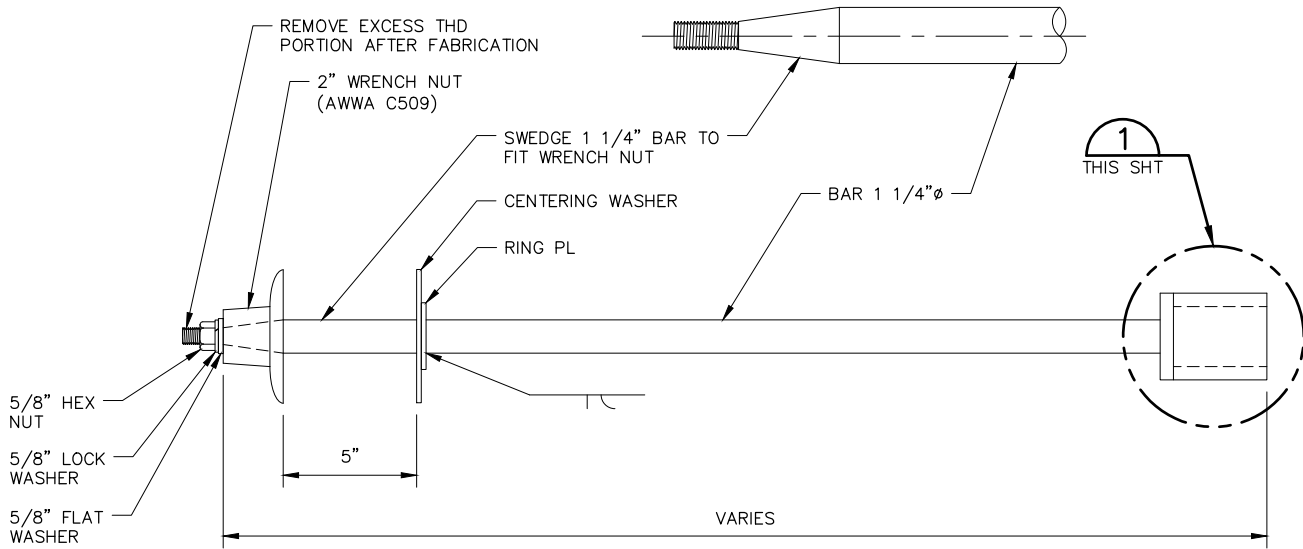
RING PLATE



CENTERING WASHER



DETAIL 1
THIS SHT



VALVE OPERATOR EXTENSION

NOTES:

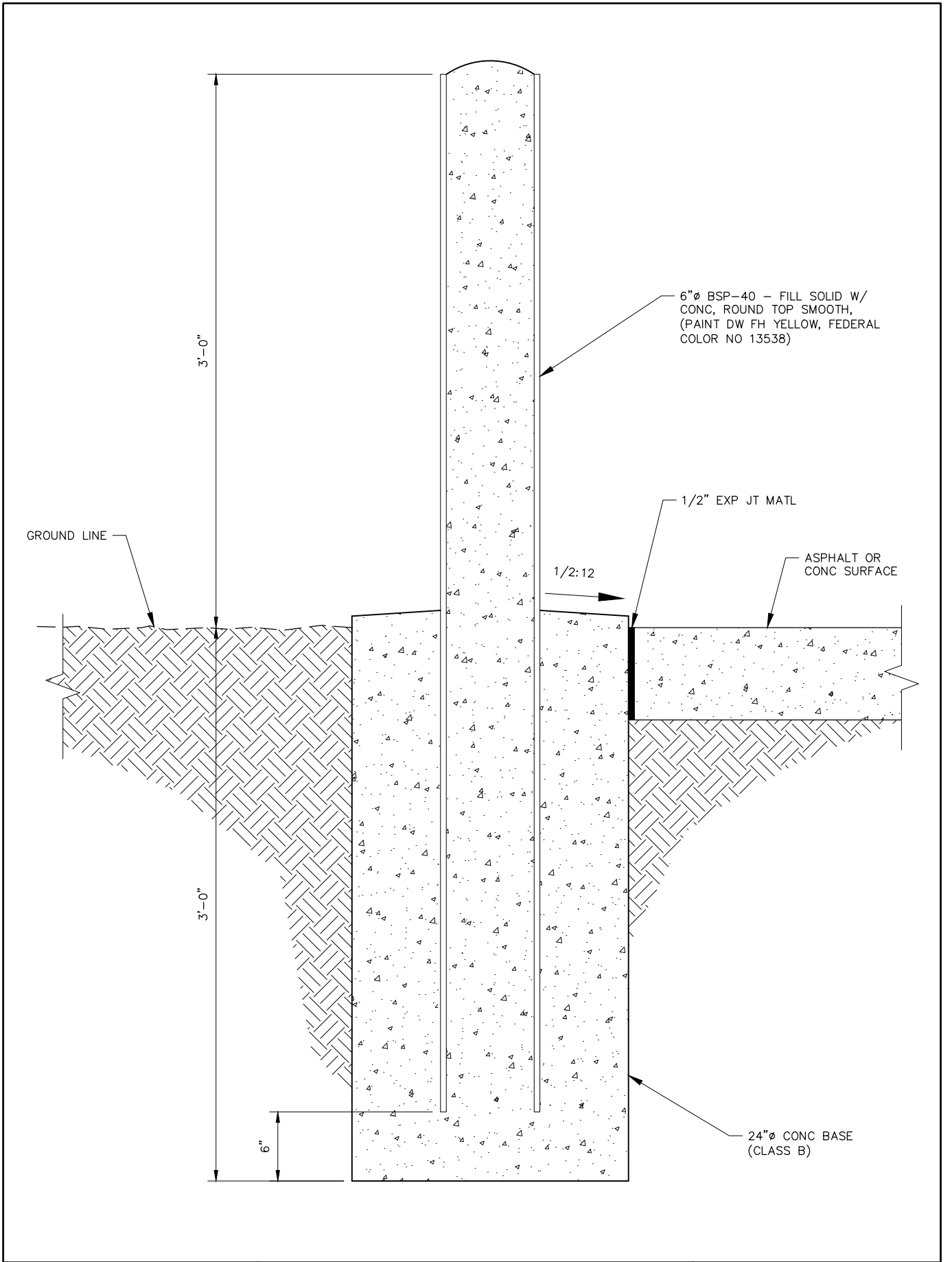
1. BAR AND PLATE SHALL BE ASTM A 36.
2. HOLLOW STRUCTURAL SECTION SHALL BE ASTM A 500 GRADE B.
3. ASSEMBLY SHALL BE COATED WITH LIQUID EPOXY, 16 MILS DRY FILM THICKNESS IN ACCORDANCE WITH AWWA C210. COLOR: BLACK SHEEN: FLAT

DRAWN BY: MCMILLEN
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05012
VALVE OPERATOR EXTENSION



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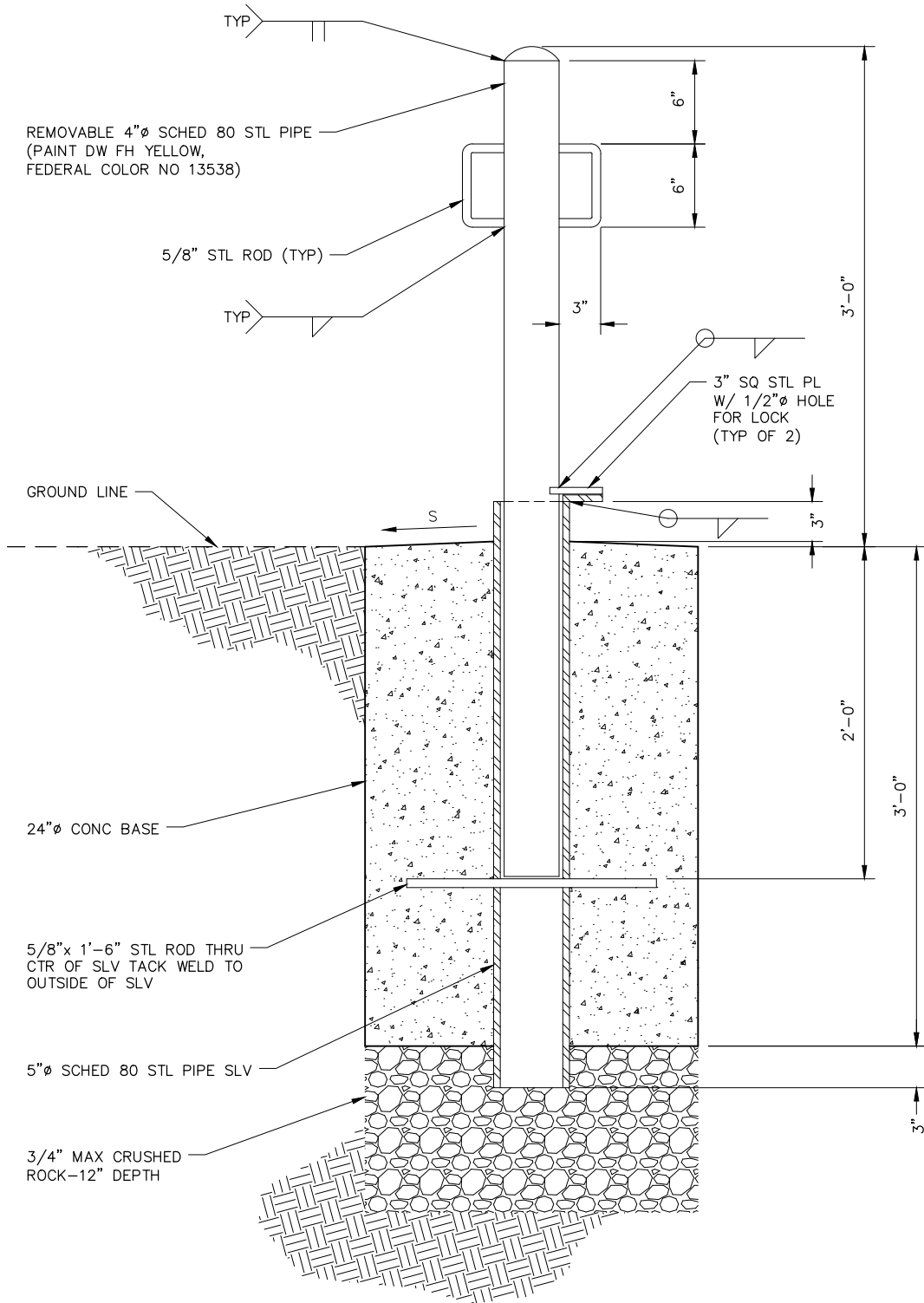


DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**05020
TRAFFIC IMPEDIMENT
BOLLARD**

D DENVER WATER

1600 West 12th Ave
Denver, Colorado 80204-3412
T: 303.628.6000
F: 303.628.6199
denverwater.org



DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

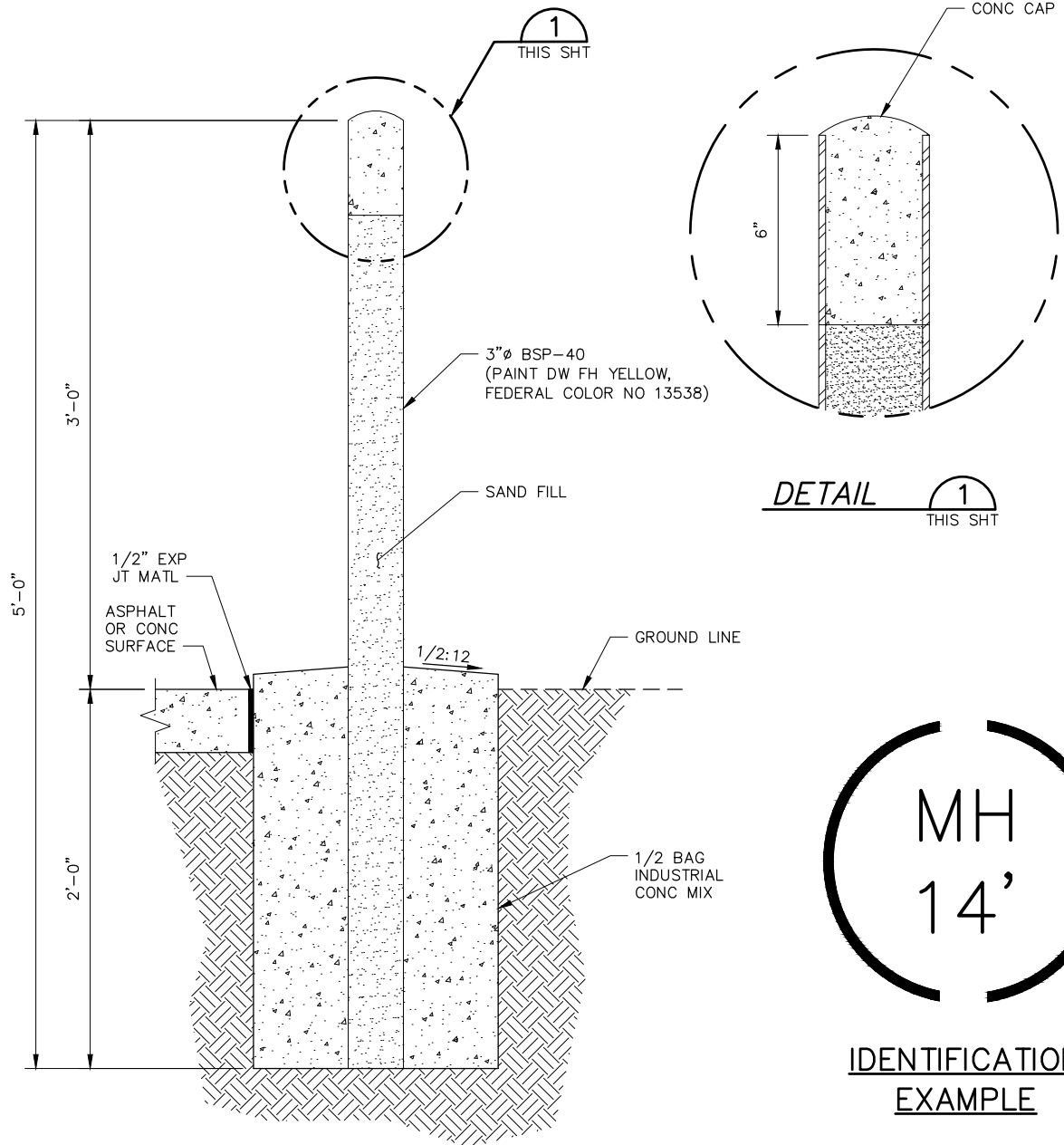
ORIGINATION DATE: JULY 2021

REVISION DATE:

05021
**REMOVABLE TRAFFIC
 IMPEDIMENT BOLLARD**



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 denverwater.org



NOTE:

IDENTIFICATION MARKS ON POSTS SHALL BE 3-INCH DIAMETER CIRCLES BROKEN IN VERTICAL CENTER () POINTING TO APPURTENANCE, WITH 1-INCH STENCILS INSIDE CIRCLE INDICATING TYPE OF APPURTENANCE (MANHOLE, 12-INCH GATE VALVE, 6-INCH BLOW OFF, AIR VALVE, ETC) AND THE DISTANCE IN FEET AND INCHES FROM THE POST.

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

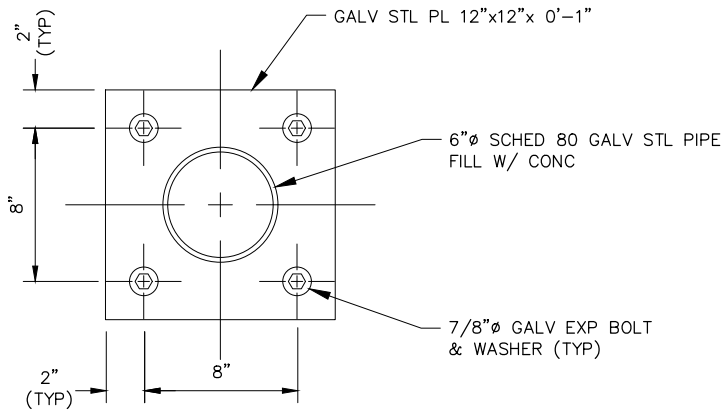
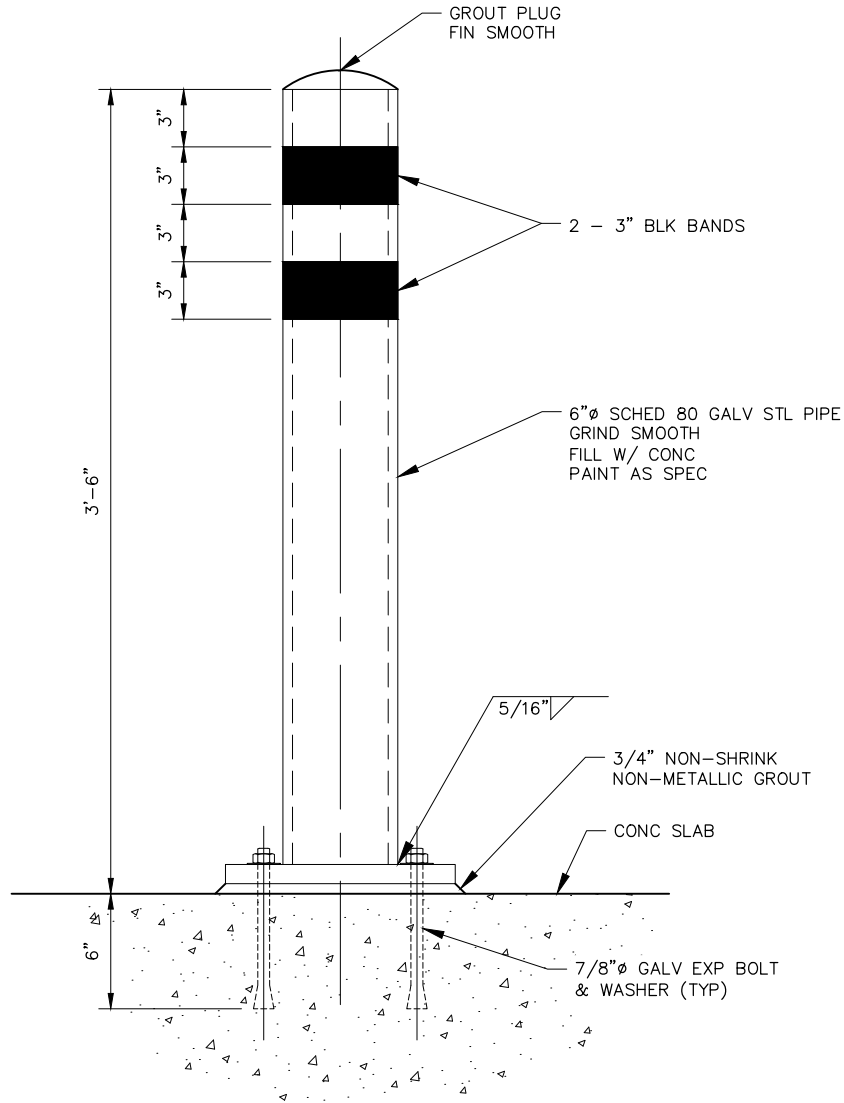
ORIGINATION DATE: JULY 2021

REVISION DATE:

05022
REFERENCE POST

D DENVER WATER

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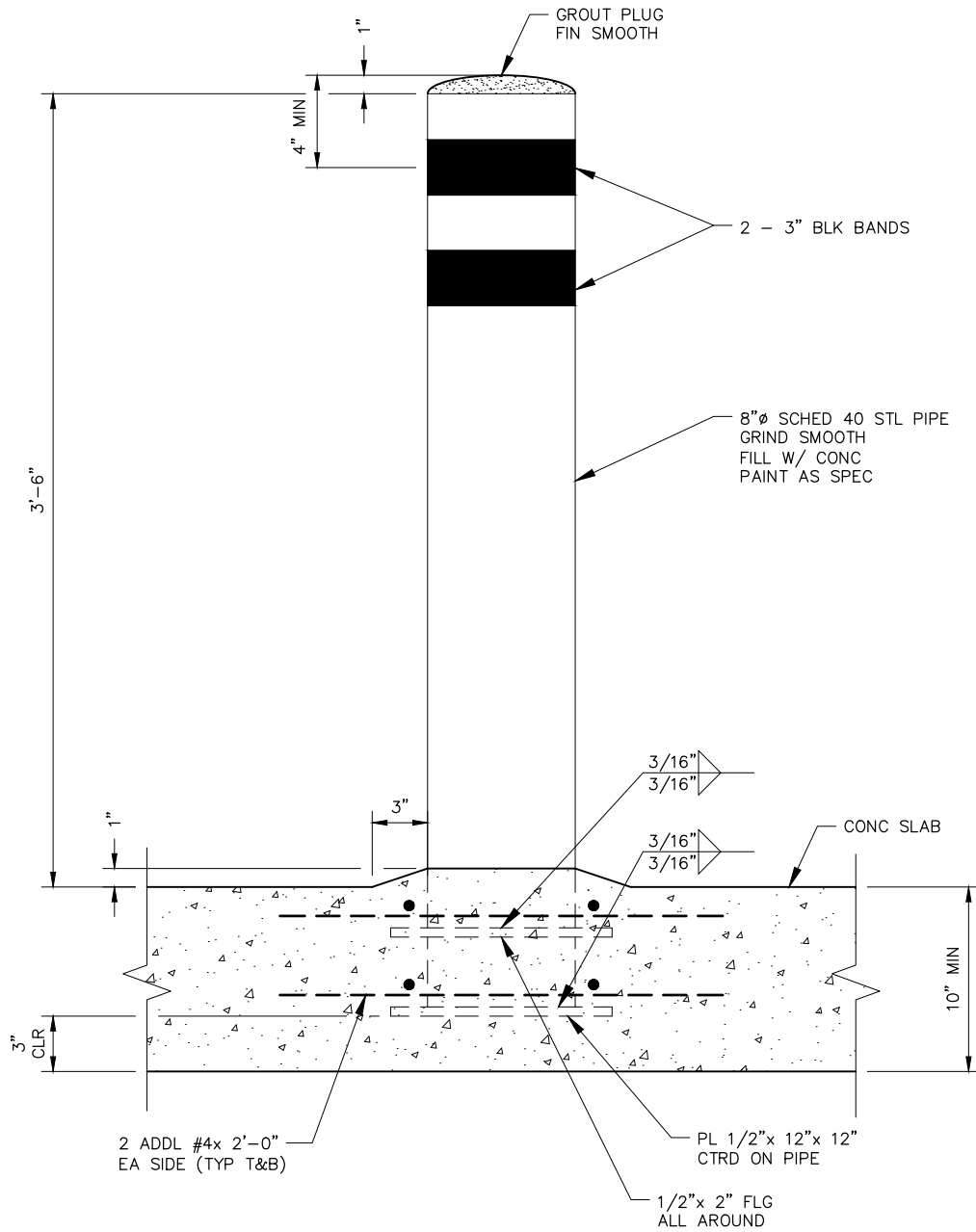
PLAN

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**05023
FIXED BOLLARD – POST
INSTALLATION**



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denverwater.org



NOTE:

HOT DIPPED GALVANIZE AFTER FABRICATION.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

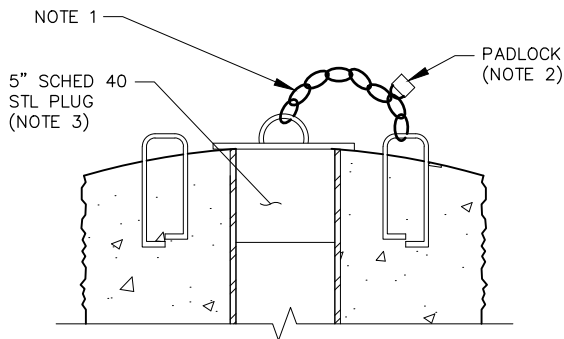
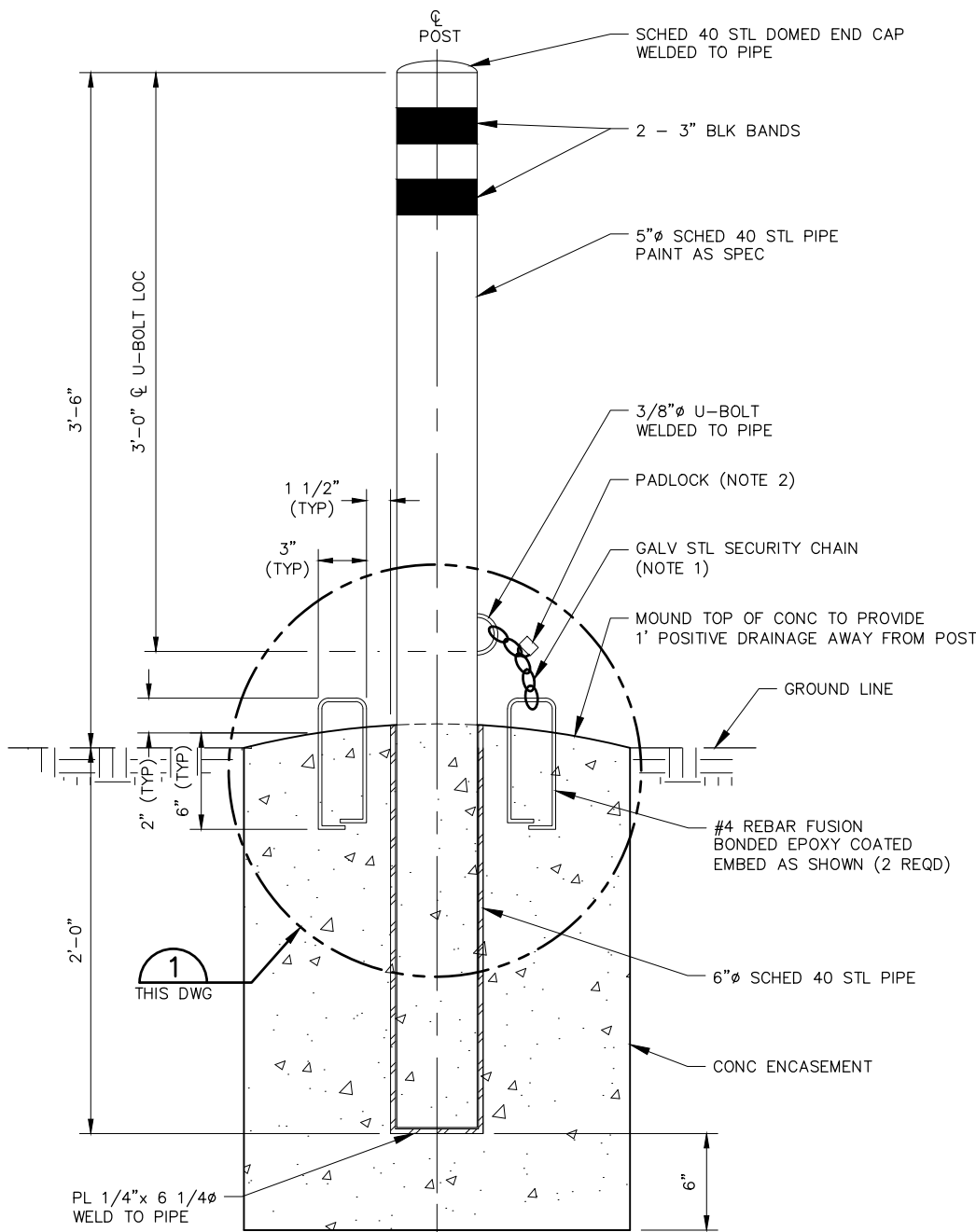
ORIGINATION DATE: JULY 2021

REVISION DATE:

05024
 GUARD POST-INTERIOR



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 denverwater.org



DETAIL 1
THIS SHT

NOTES:

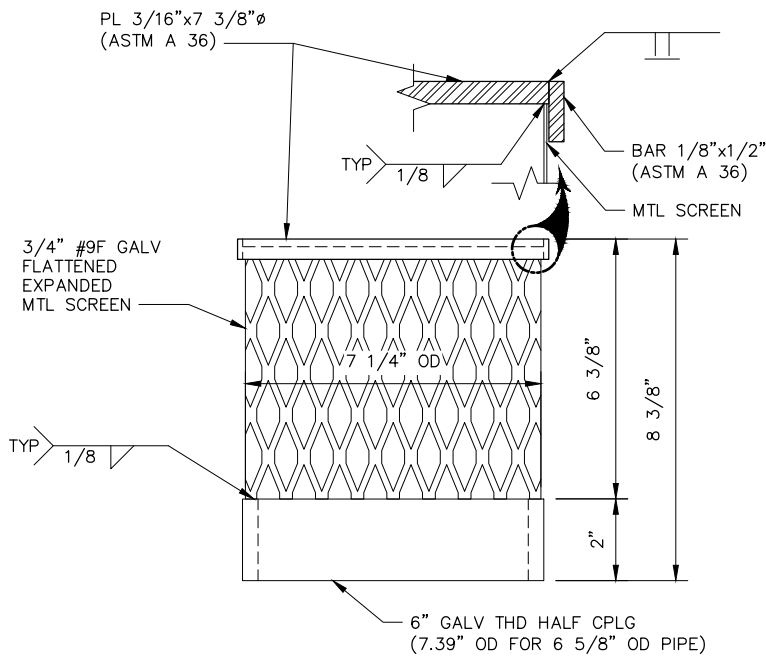
1. 500 POUND MINIMUM RATED SECURITY CHAIN WITH A 1/2 INCH MINIMUM LINK DIAMETER.
2. HEAVY DUTY TYPE PADLOCK AS SPECIFIED, KEY SHALL BE DW KEY A-436.
3. PROVIDE SEPARATE HOT DIP GALVANIZED STEEL PLUG AS SHOWN.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

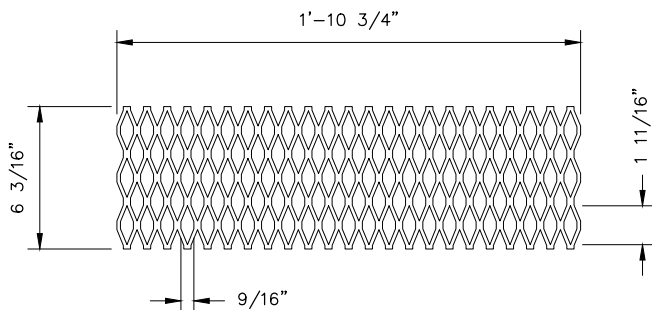
**05025
REMOVABLE
BOLLARD - EXTERIOR**

D DENVER WATER

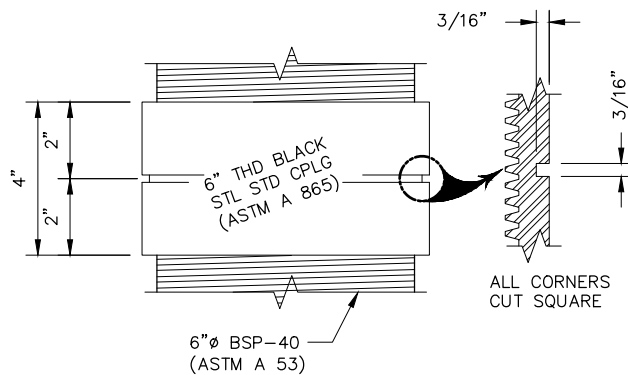
1600 West 12th Ave
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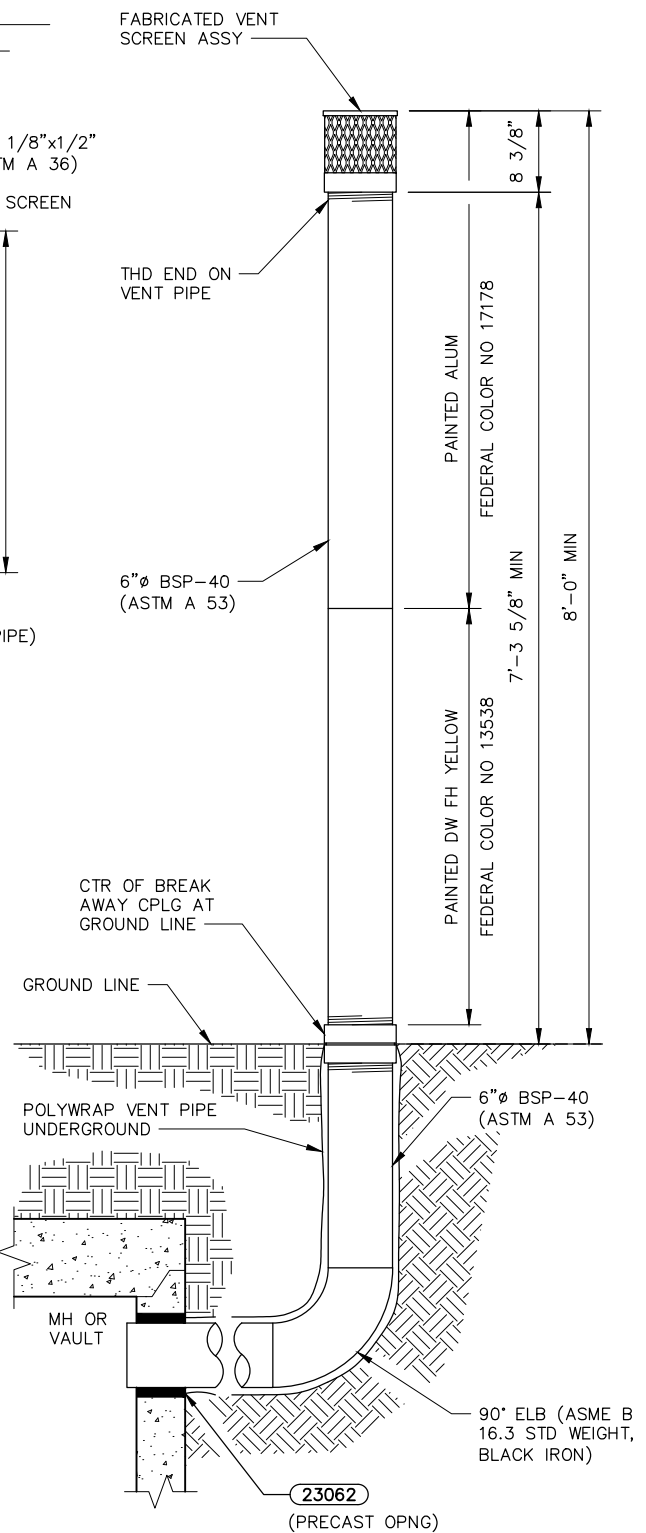
VENT SCREEN ASSEMBLY



METAL SCREEN



BREAK AWAY COUPLING



VENT PIPE ELEVATION

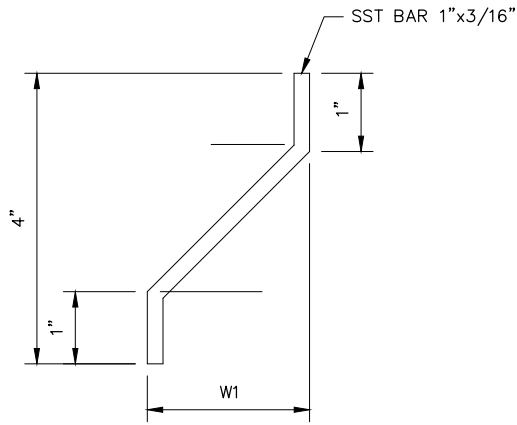
NOTES:

1. VENT PIPES SHALL BE LOCATED IN THE FIELD.
2. TOUCH UP AREAS DAMAGED BY WELDING WITH SILVER COLORED ZINC RICH PAINT.

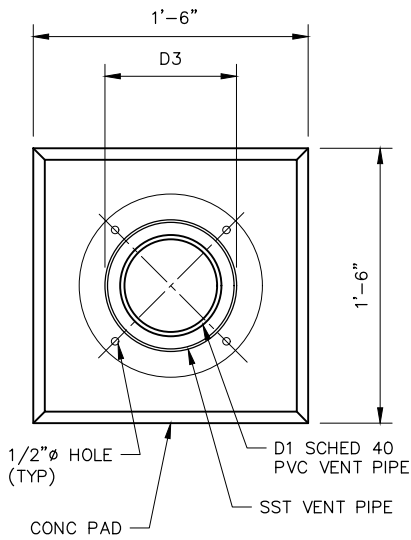
DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

05030
6" φ INDUSTRIAL
VENT PIPE AND SCREEN

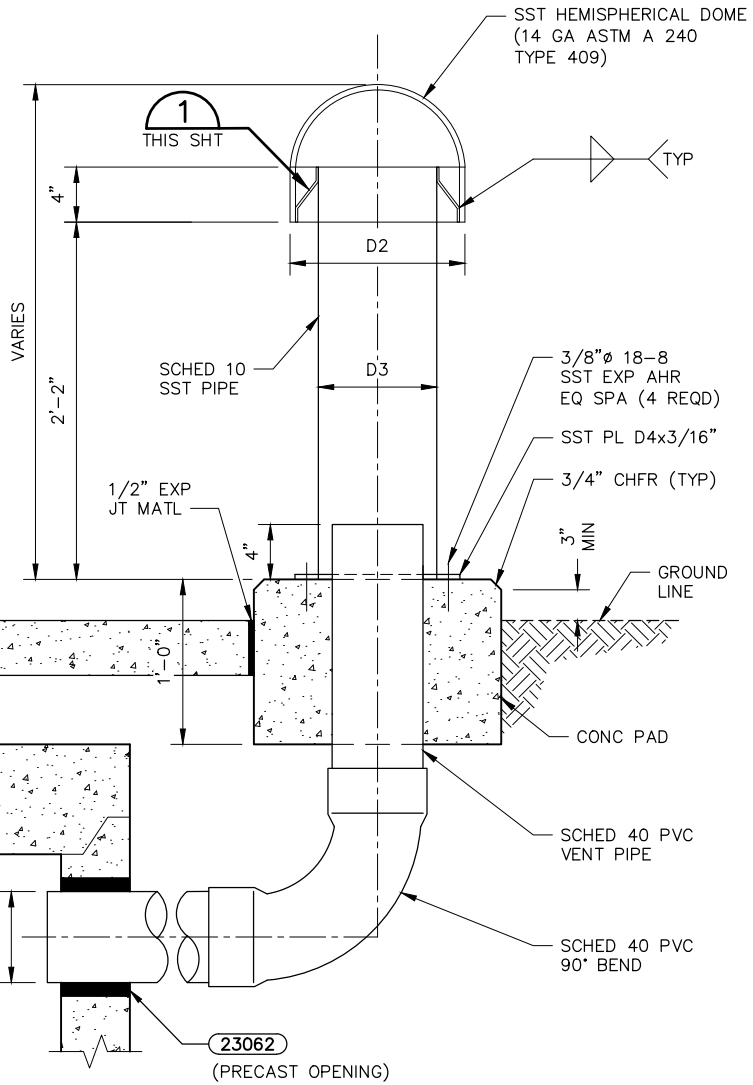
DENVER WATER
1600 West 12th Ave
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denverwater.org



DETAIL
4 REQD THIS SHT



BASE PLAN



SECTIONAL VIEW

VENT PIPE Ø IN VAULT	CAP Ø	VENT CAP PIPE NOMINAL Ø	FLANGE Ø	BRACKET WIDTH
D1	D2	D3	D4	W1
6"	14"	8"	12"	2 5/8"
8"	18"	10"	14"	3 5/8"
10"	24"	12"	16"	5 5/8"
12"	24"	14"	18"	5"

NOTE:

COAT ASSEMBLY WITH EPOXY, 8 MILS MINIMUM.
COLOR: BLACK SHEEN: FLAT.

DRAWN BY: MCMILLEN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

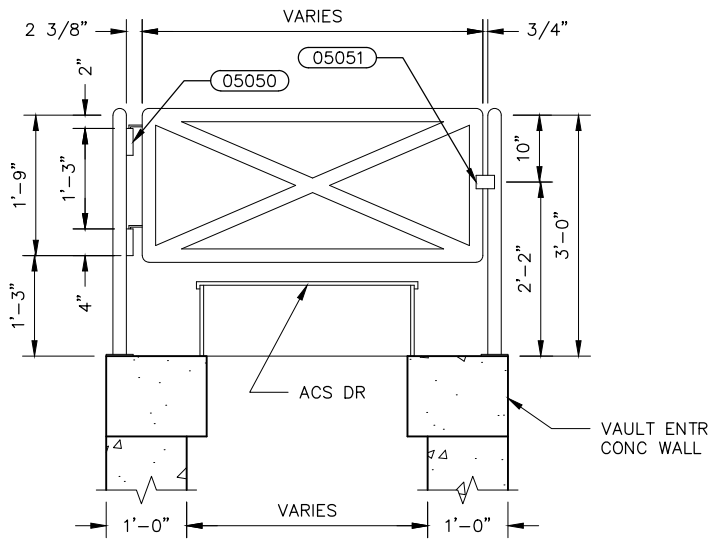
ORIGINATION DATE: JULY 2021

REVISION DATE:

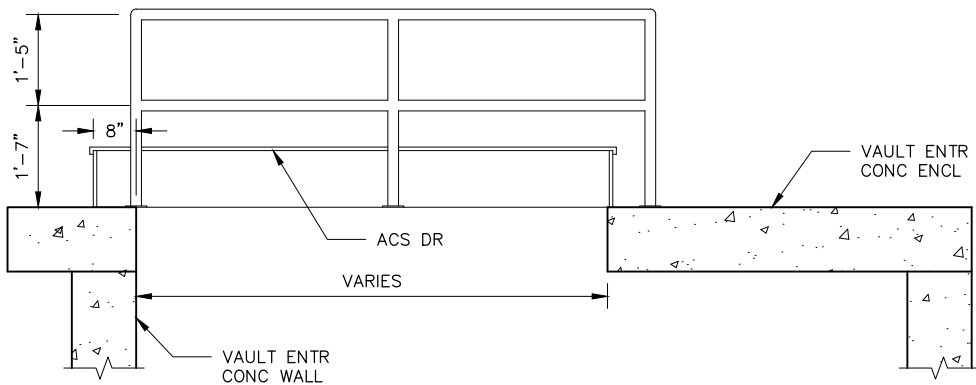
05031
6"Ø RESIDENTIAL VENT PIPE



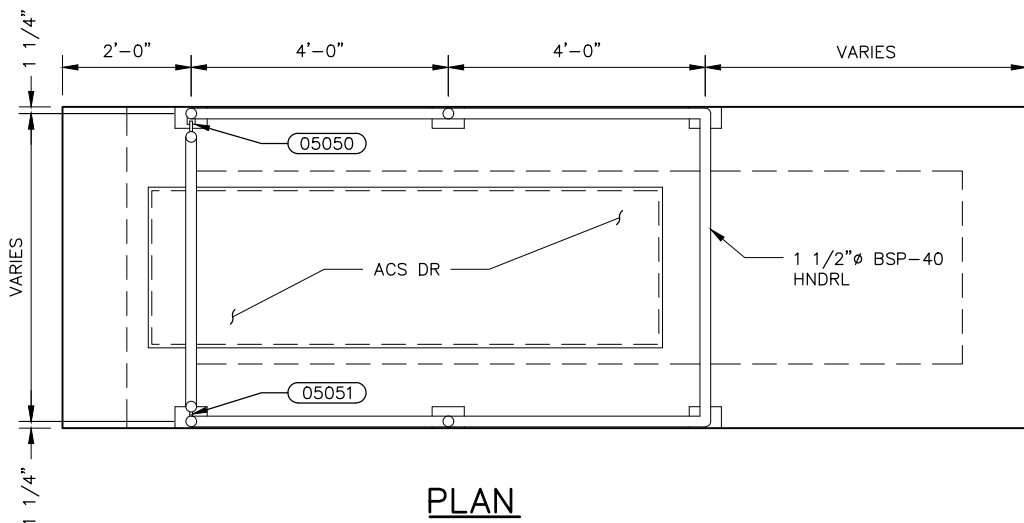
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SECTION AT GATE



SECTION



PLAN

NOTE:

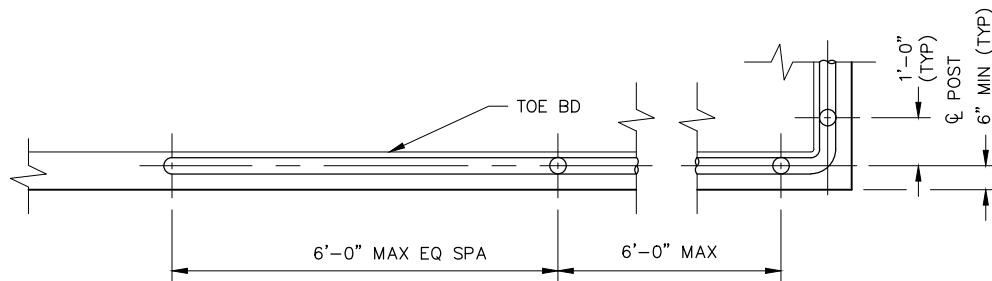
HOT DIP GALVANIZE HANDRAIL AND APPURTENANCES AFTER FABRICATION.

DRAWN BY: VAICIKASKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

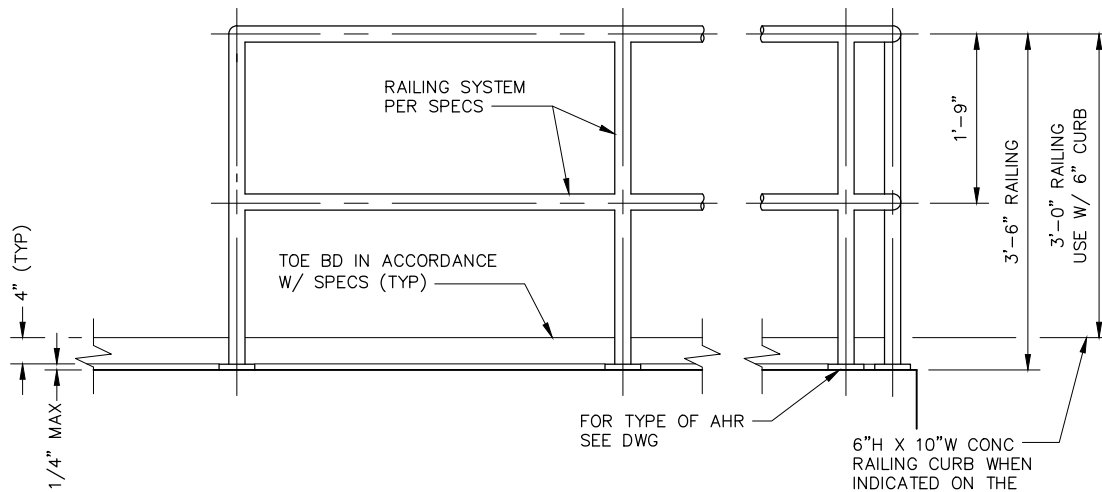
**05040
HANDRAIL ASSEMBLY
FOR ACCESS DOOR**



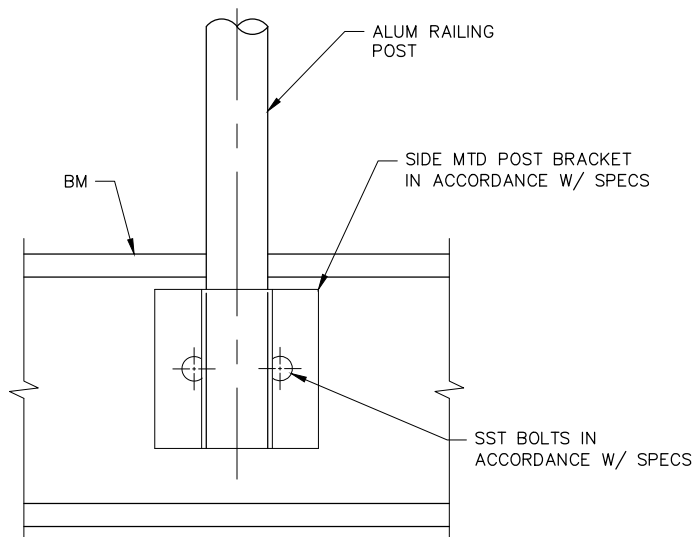
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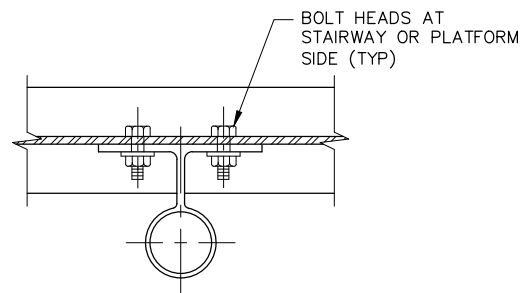
PLAN



ELEVATION



ELEVATION



PLAN

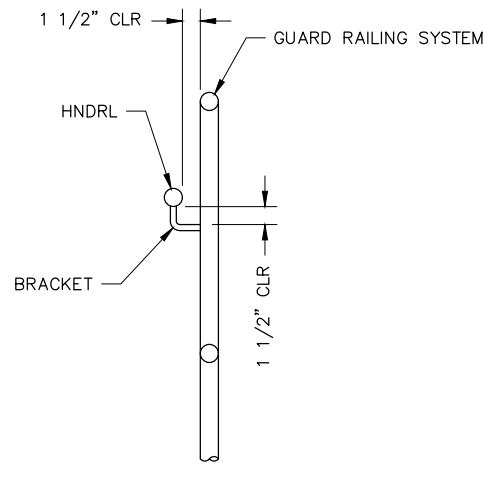
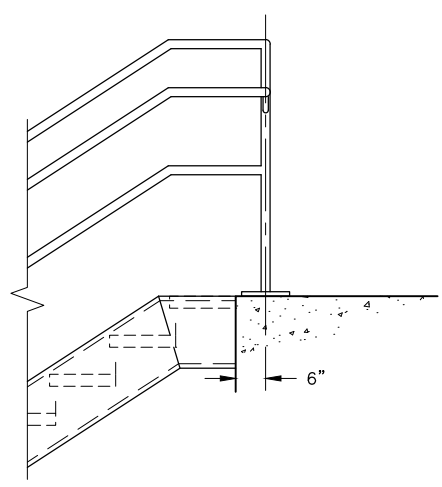
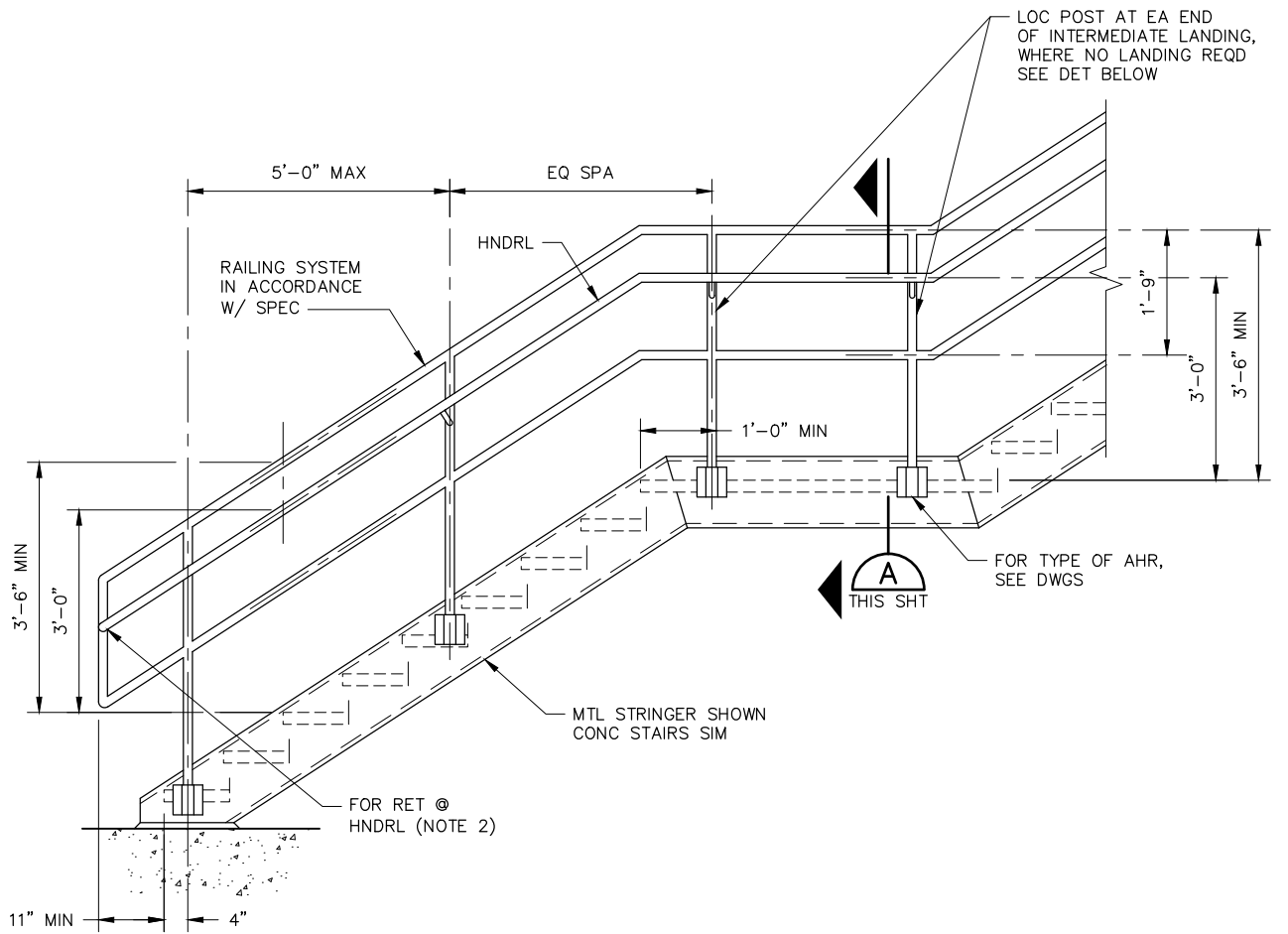
NOTES:

1. FIELD VERIFY DIMENSIONS AND CONFIGURATIONS OF EXISTING RAILING. NEW RAILING SHALL MATCH CONFIGURATION OF EXISTING RAILING.
2. NOTIFY THE ENGINEER OF ANY DISCREPANCIES. RAILING SYSTEM SHALL MATCH EXISTING SYSTEM TO REMAIN WHERE APPLICABLE.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**05041
2 RAIL AND
RAILING POST-ALUMINUM**

D DENVER WATER
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 F: 303.628.6199
 denverwater.org



RAILING DETAIL WITHOUT LANDING

RAILING SECTION A
THIS DWG

NOTES:

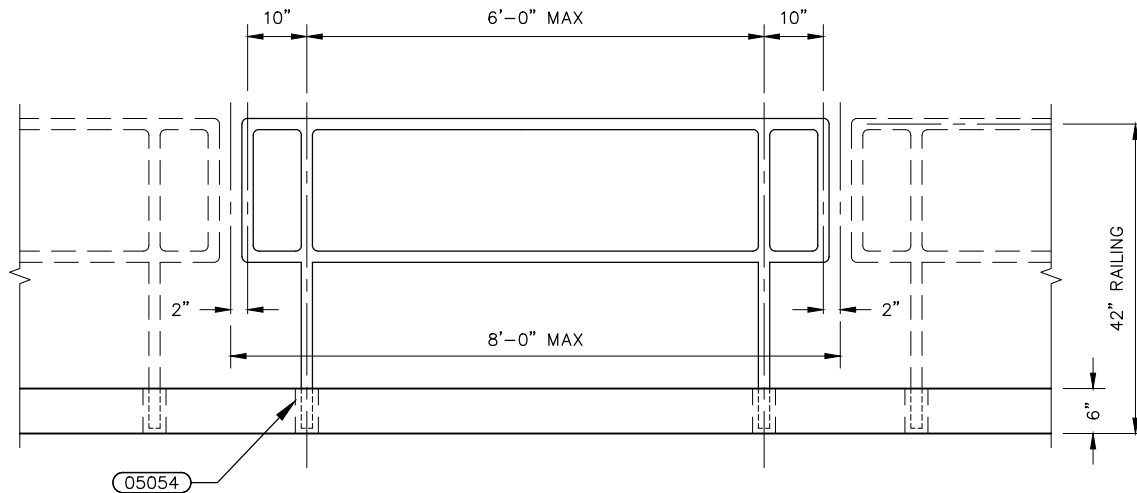
1. PROVIDE TOE BOARD AT LANDING WHERE REQUIRED.
2. RETURN ENDS OF HANDRAIL TO GUARD AT BOTH ENDS.

DRAWN BY: VAICIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05042
RAILING - 2 RAIL STAIR -
ALUMINUM (IBC)

DENVER WATER

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NOTES:

1. DETAIL SHOWN AT CURBED OPENING. WHERE NO CURB, PROVIDE 6-INCH EDGE DISTANCE AND STIFFENED KICK PLATE ATTACHED TO REMOVABLE RAILING.
2. FABRICATE REMOVABLE RAILING IN MAXIMUM 8- FEET SECTIONS WITH TWO POSTS EACH SECTION.

DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

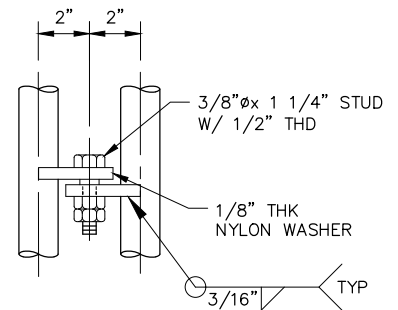
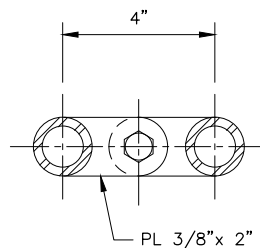
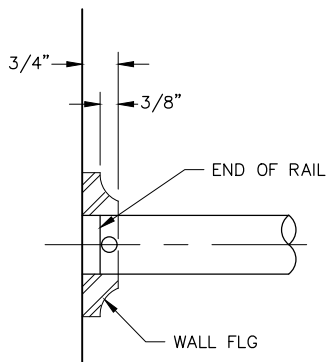
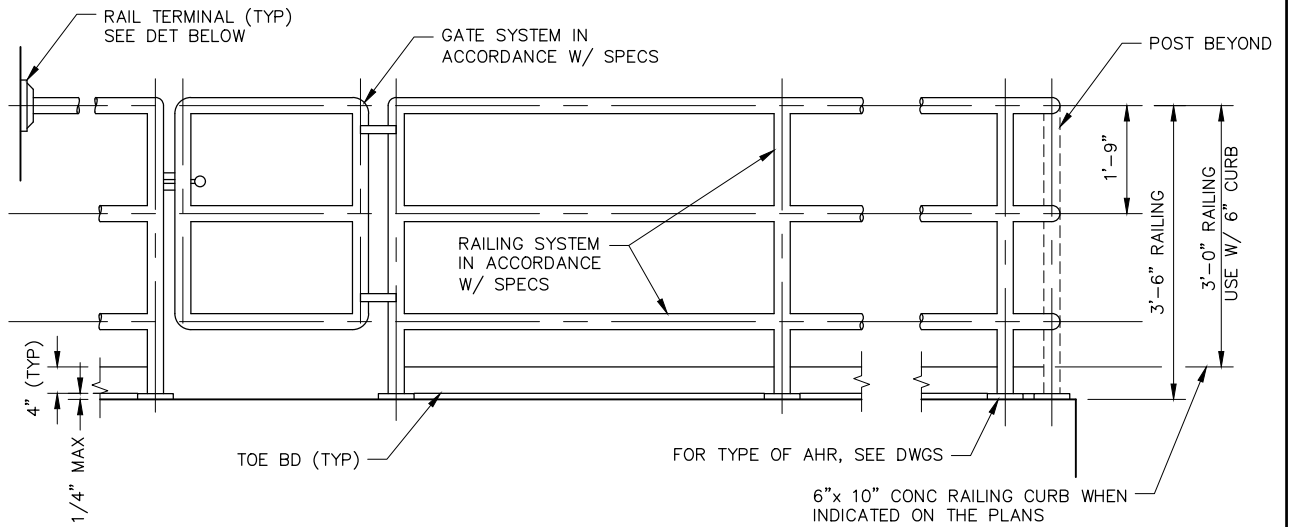
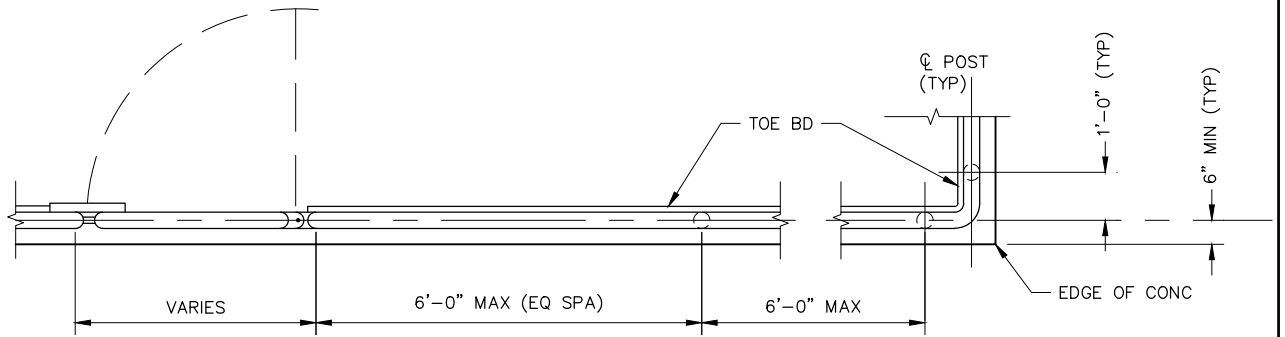
ORIGINATION DATE: JULY 2021

REVISION DATE:

05043
RAILING – REMOVABLE
2 RAIL – ALUMINUM



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 denverwater.org



RAIL TERMINAL

HINGE PLAN

HINGE ELEVATION

NOTES:

1. FASTEN RAIL TO WALL FLANGE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
2. WALL FLANGE SHALL BE MOUNTED TO WALL WITH TWO 3/8-INCH DIAMETER STAINLESS STEEL WEDGE ANCHORS.
3. FABRICATE HINGES OR PROVIDE OTHER HINGES IN ACCORDANCE WITH SPECIFICATIONS. ANODIZE FINISH AFTER ALL WELDING IN ACCORDANCE WITH SPECIFICATIONS.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

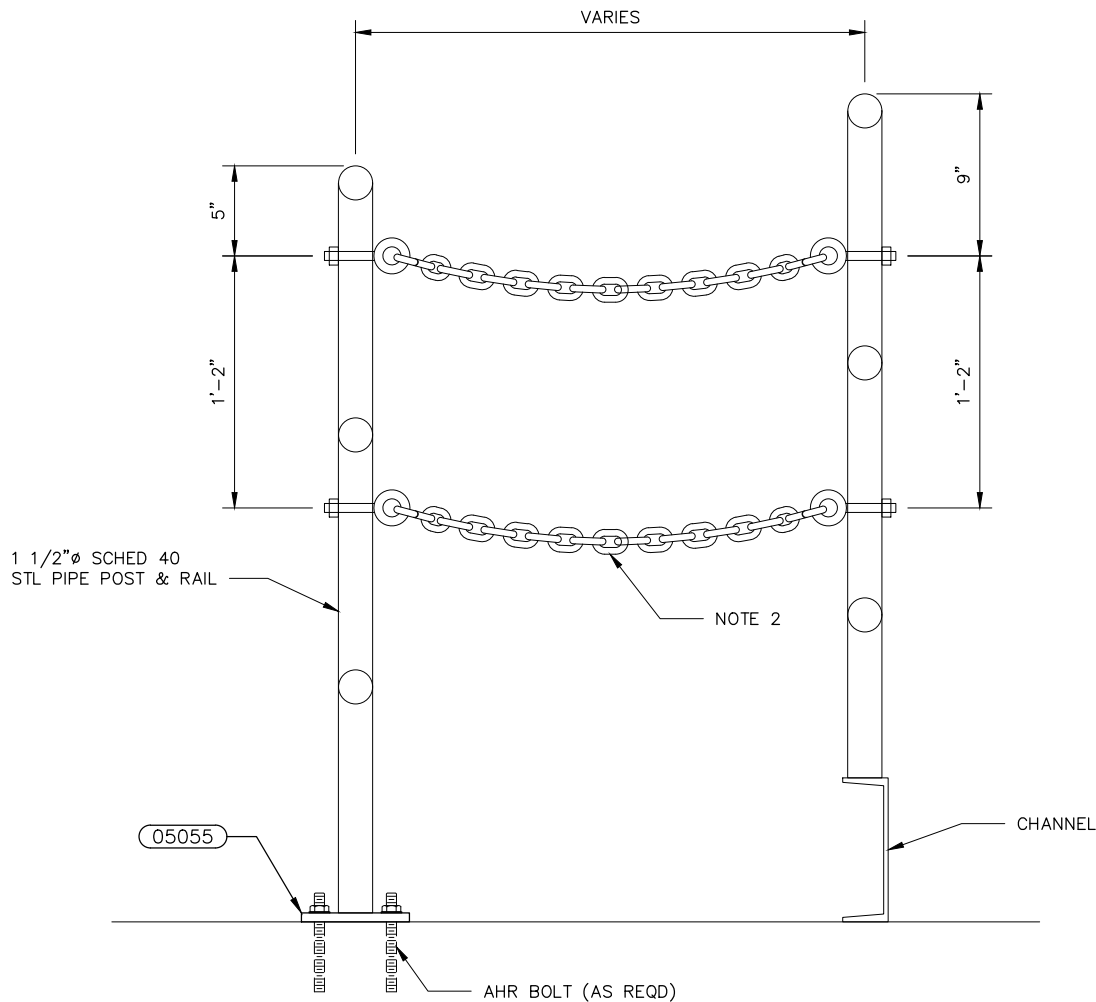
ORIGINATION DATE: JULY 2021

REVISION DATE:

05044
RAILING - 3 RAIL -
ALUMINUM

D DENVER WATER

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BASEPLATE

CHANNEL

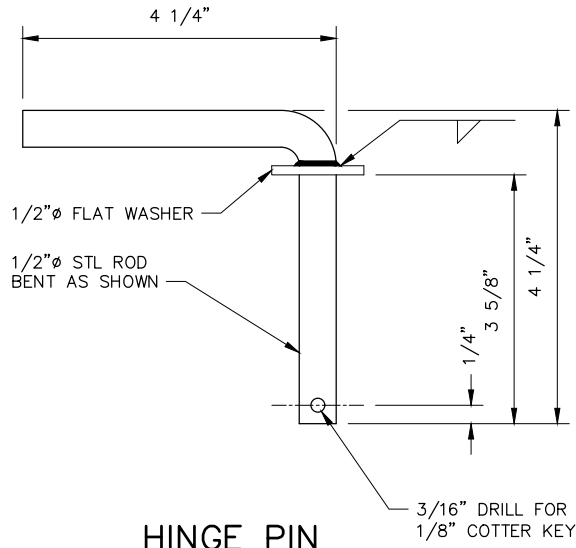
NOTES:

1. ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
2. PROVIDE TWO 3/8-INCH GALVANIZED STEEL CHAINS BETWEEN 1/2-INCH GALVANIZED STEEL EYE BOLTS THRU-BOLTED TO POSTS. CONNECT CHAINS TO EYE BOLTS WITH 1/4-INCH BY 2 1/4-INCH GALVANIZED STEEL EYE-SNAPS AT EACH END.

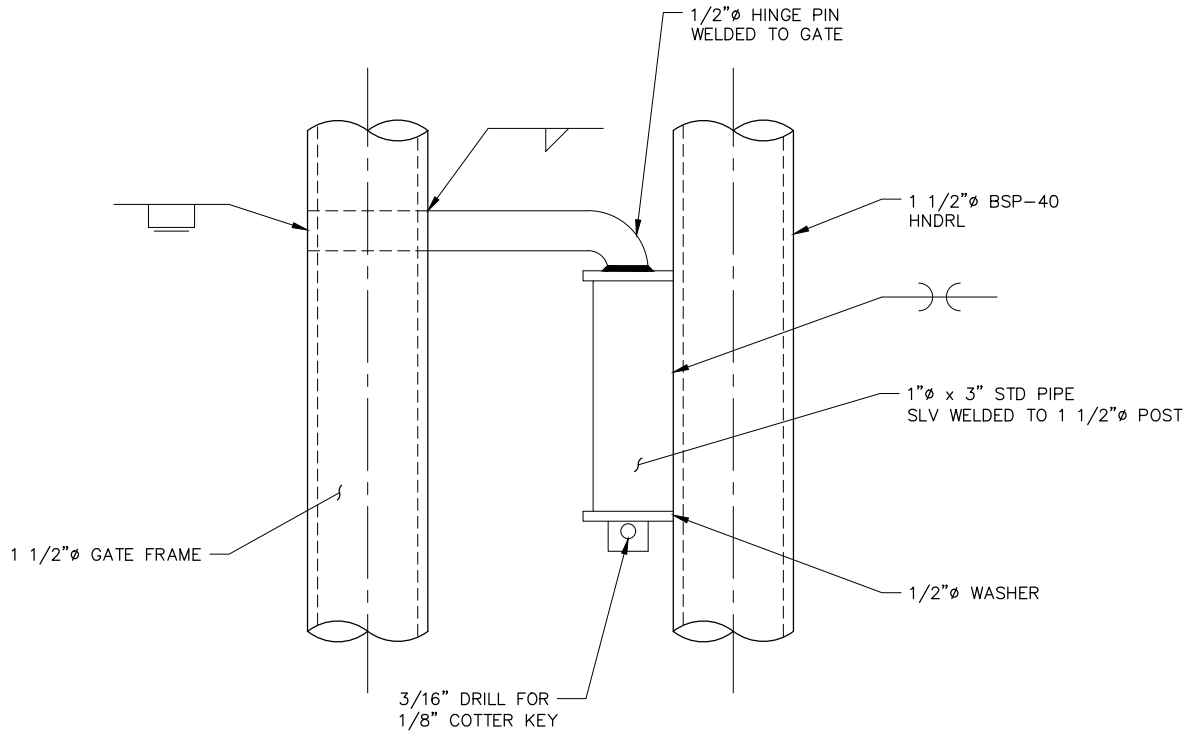
DRAWN BY: VAICIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**05045
SAFETY CHAIN AT BREAK
IN HANDRAIL**

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HINGE PIN
2 REQD



HINGE INSTALLATION
PLACED AS SHOWN

NOTE:

HOT DIP GALVANIZE ASSEMBLY
AFTER FABRICATION.

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

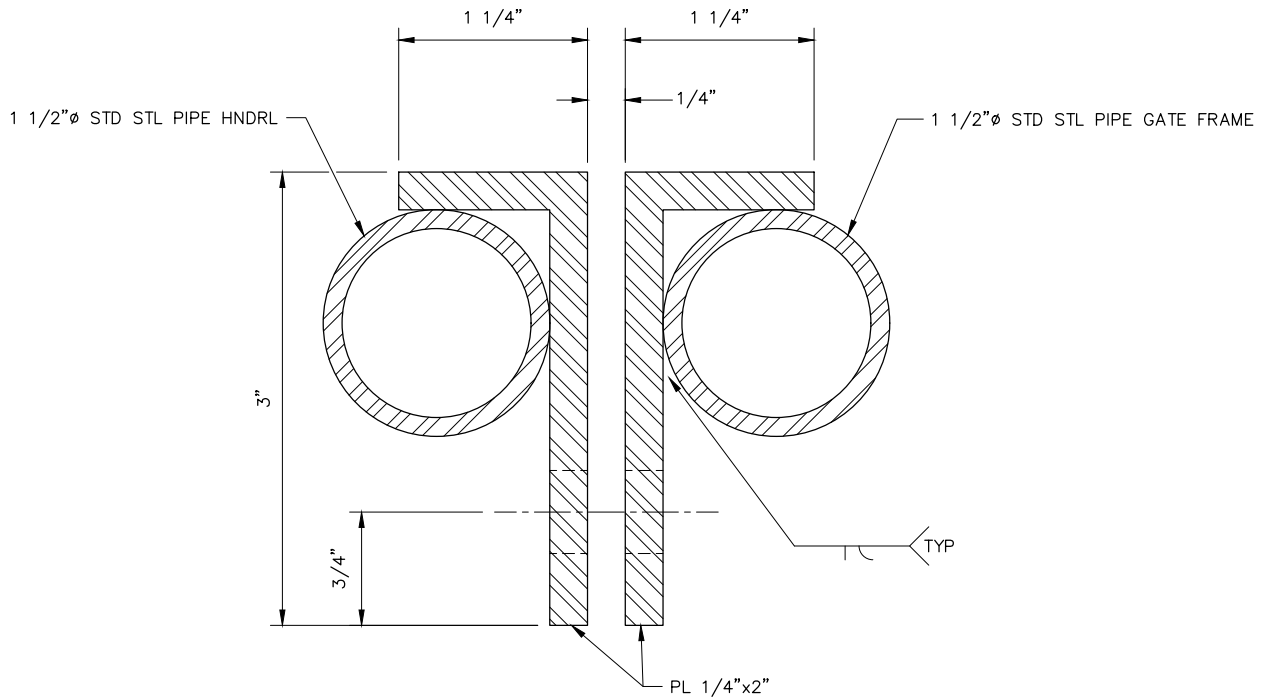
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

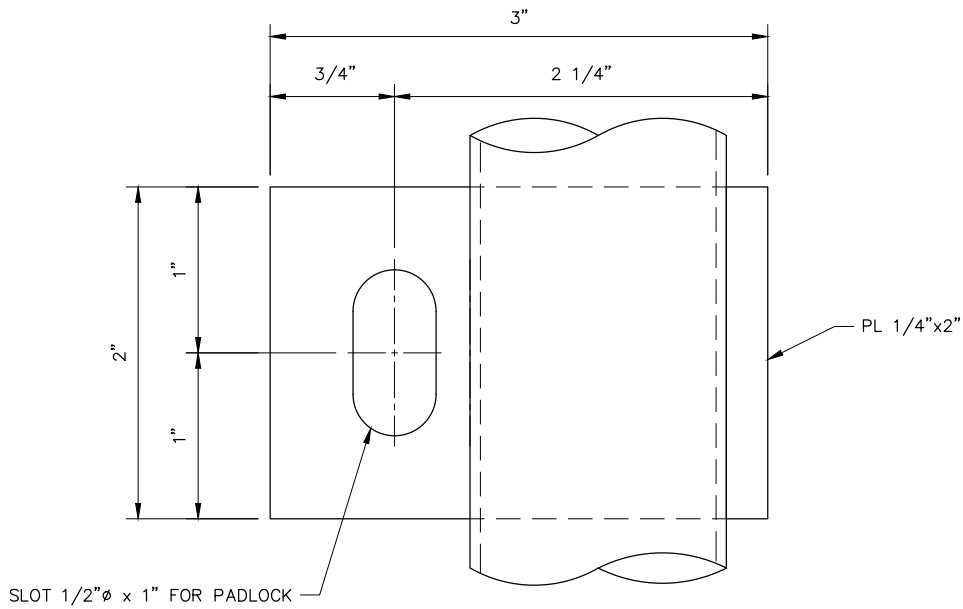
05050
GATE HINGE ASSEMBLY



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PLAN



SIDE VIEW
2 REQD

NOTE:

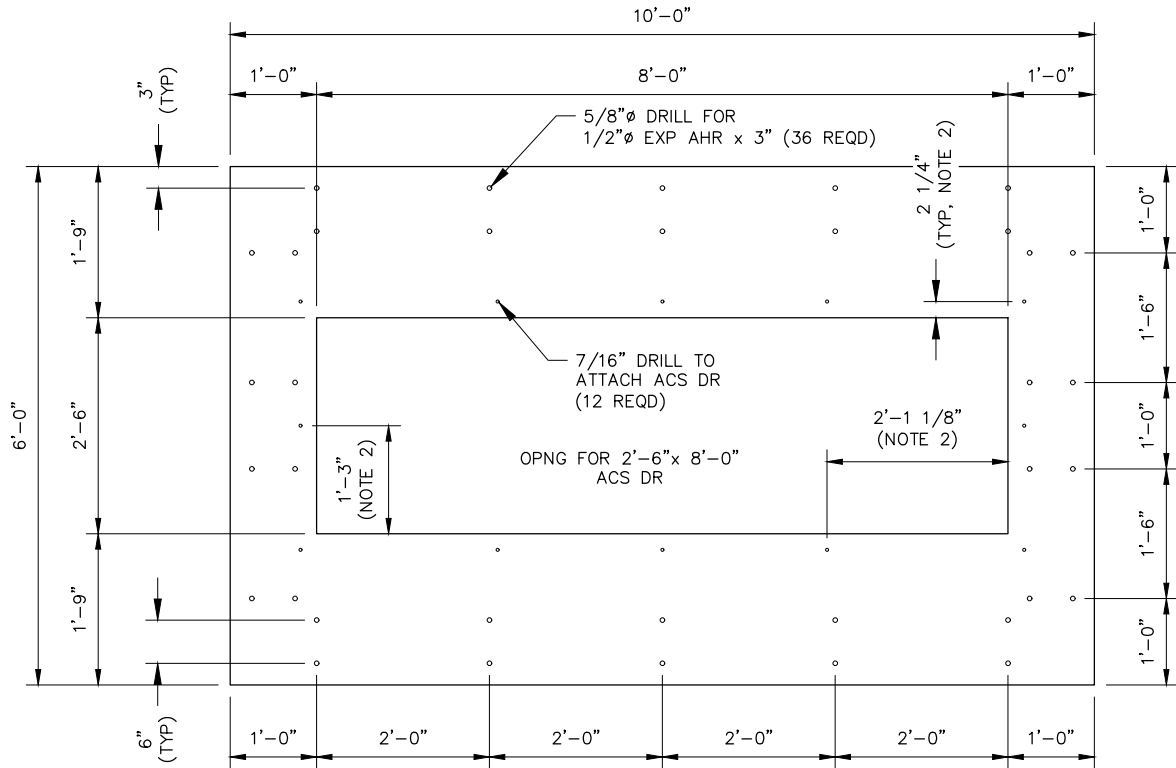
HOT DIP GALVANIZE ASSEMBLY
AFTER FABRICATION.

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

05051
GATE LOCK ASSEMBLY



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PLAN

NOTES:

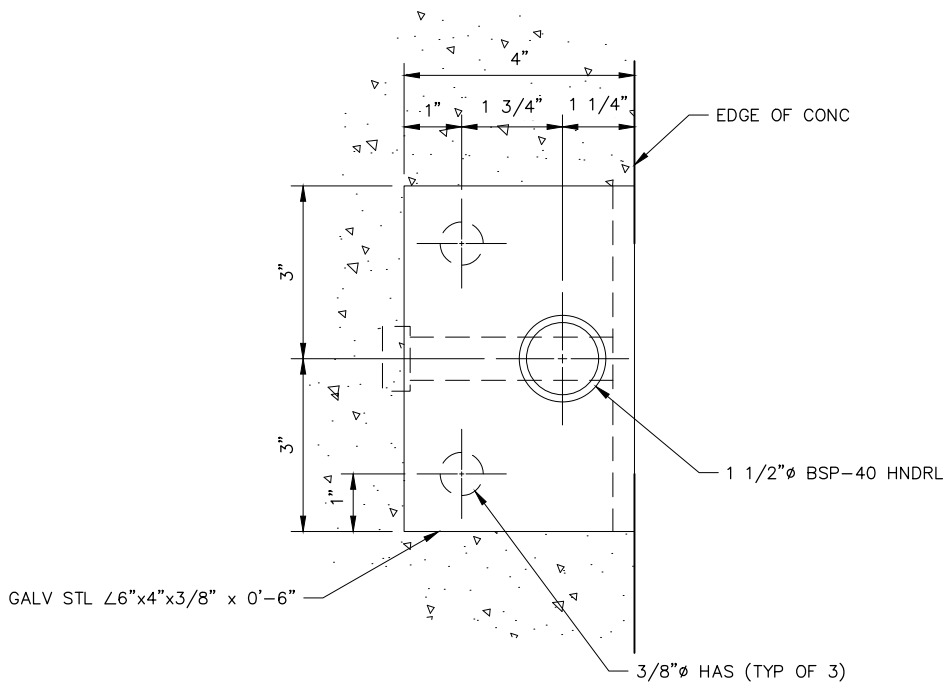
1. HOT DIP GALVANIZE PLATE AFTER FABRICATION.
2. VERIFY HOLE LOCATIONS FOR ACCESS DOOR PRIOR TO DRILLING.

DRAWN BY: MCMILLEN
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

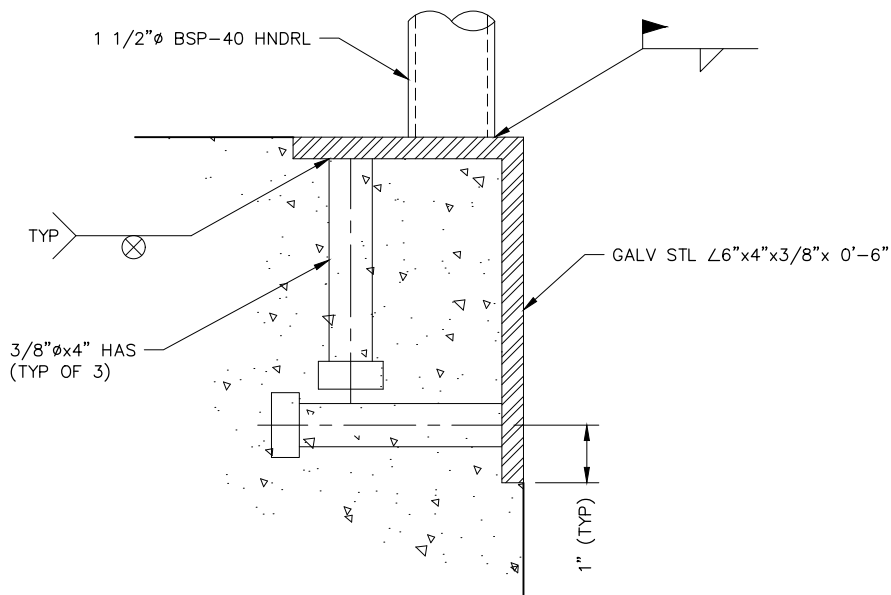
05052
**3/8" STEEL PLATE FOR
 ACCESS DOOR ATTACHMENT**

D DENVER WATER

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PLAN



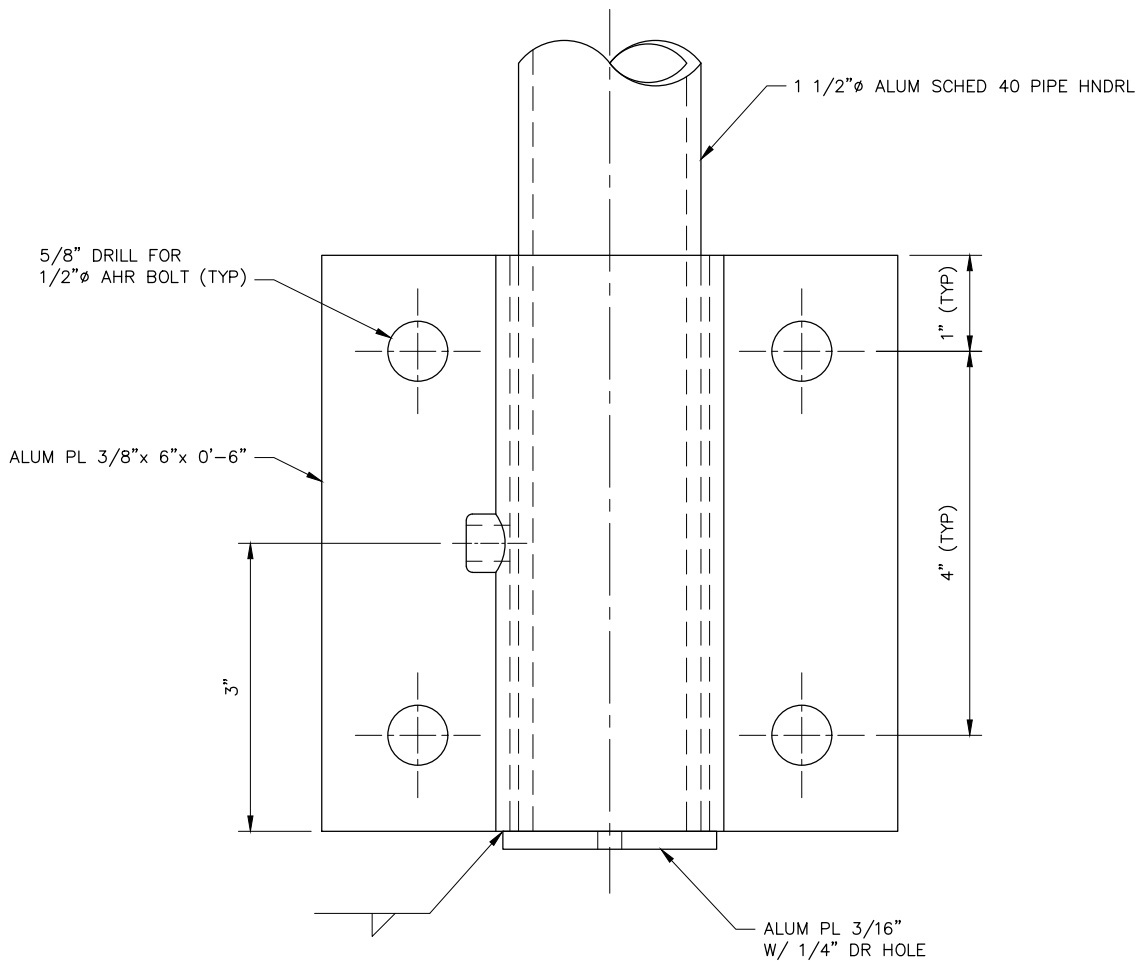
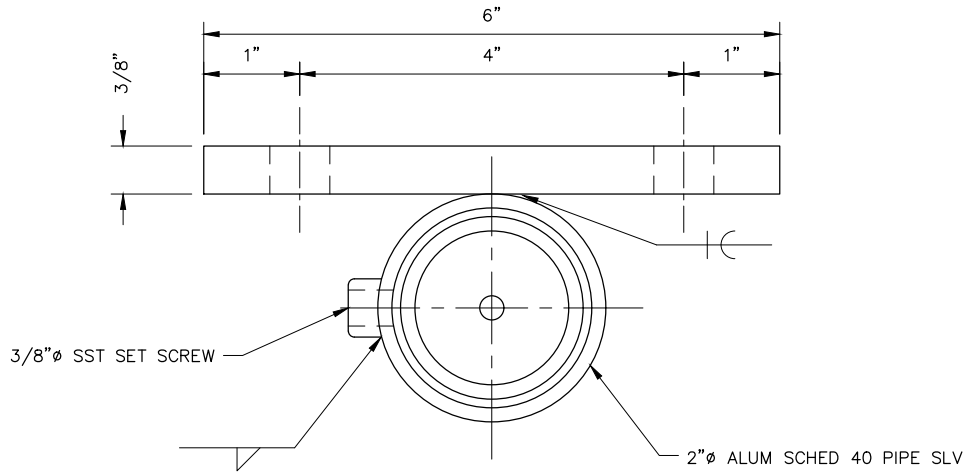
SECTION

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05053
HANDRAIL CONNECTION
PLATE



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F: 303.628.6199
denverwater.org



NOTE:

MOUNTING HARDWARE SHALL BE 18-8 STAINLESS STEEL.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

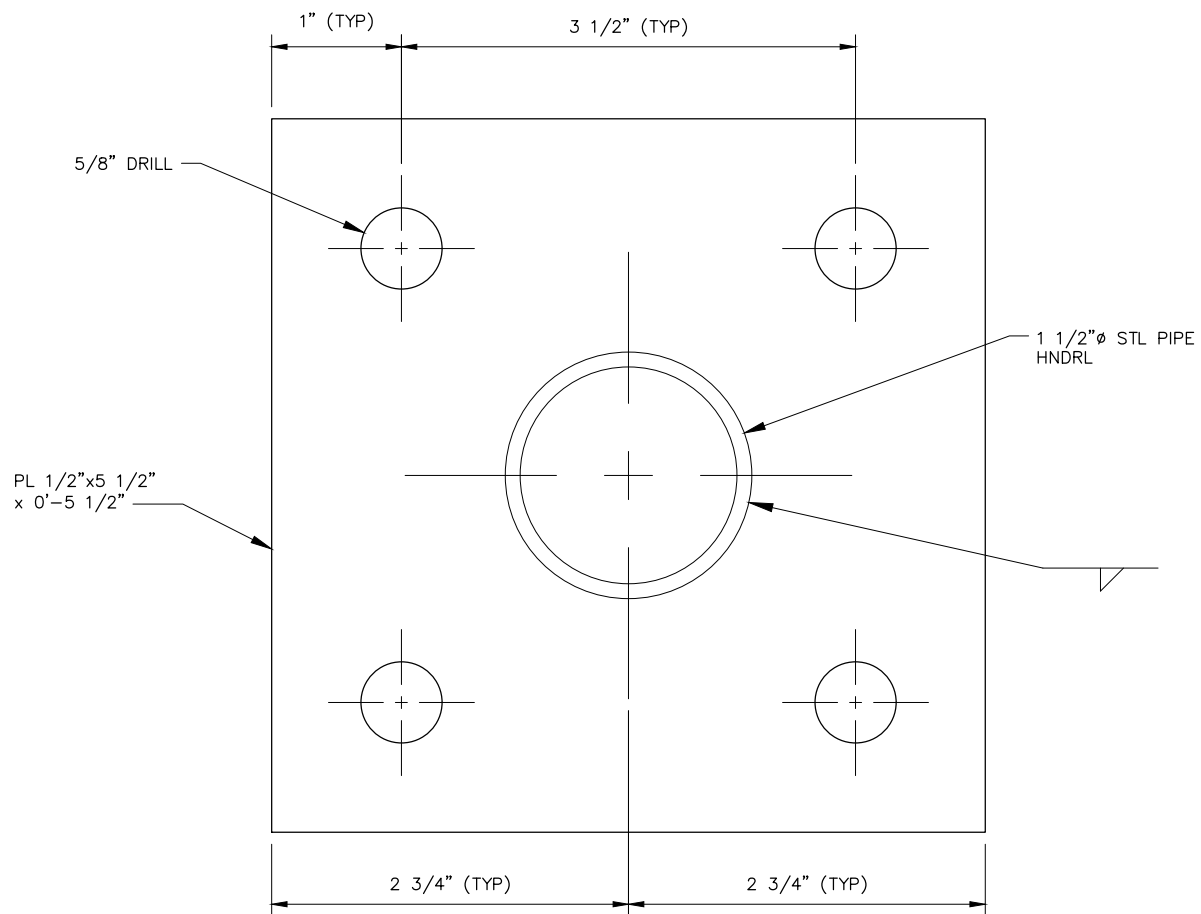
ORIGINATION DATE: JULY 2021

REVISION DATE:

**05054
ANCHOR PLATE FOR
REMOVABLE HANDRAIL**



1600 West 12th Ave
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DRAWN BY: DITTERLINE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

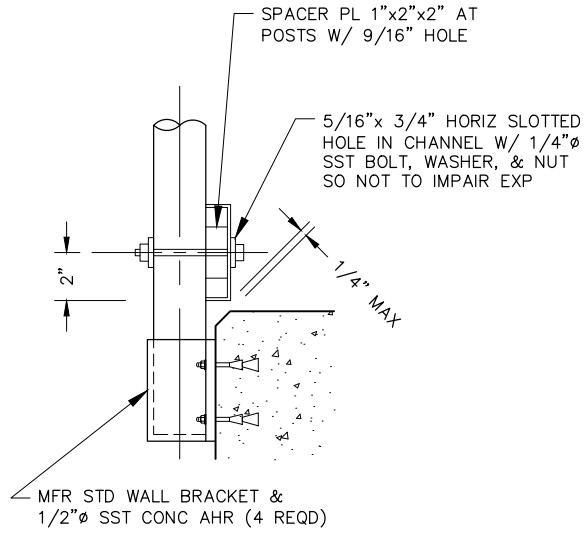
ORIGINATION DATE: JULY 2021

REVISION DATE:

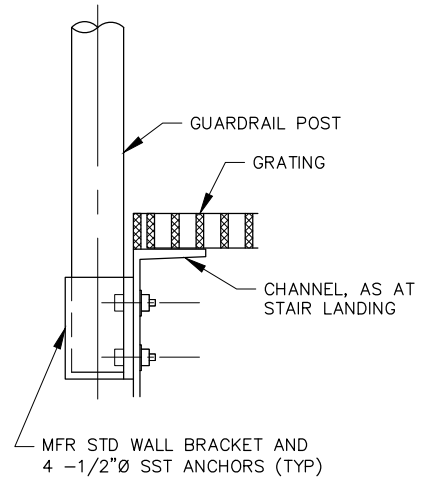
05055
HANDRAIL BASE PLATE



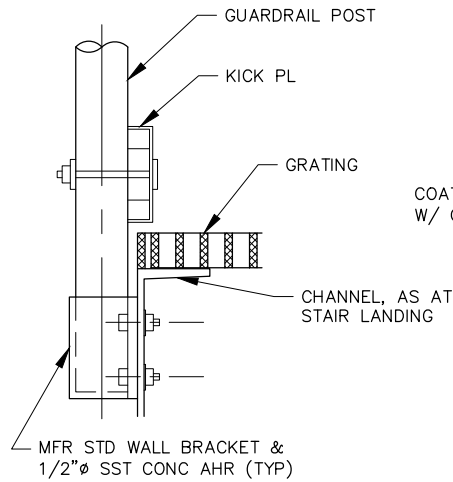
1600 West 12th Ave
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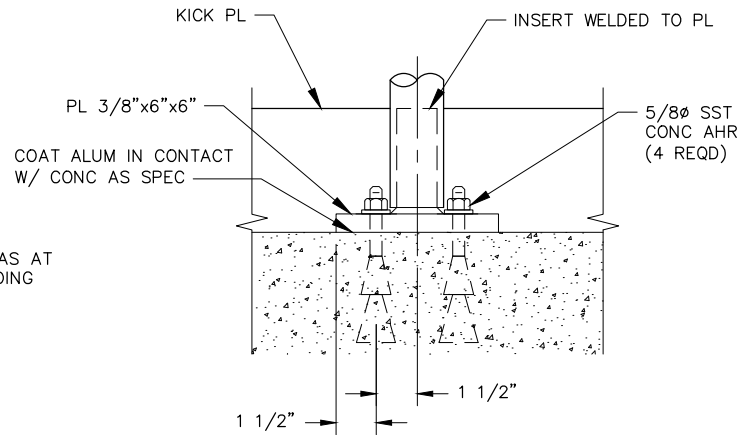
A-SIDE MOUNTED POST



C-MOUNTED REMOVABLE POST



B-CHANNEL SIDE MOUNTED POST



D-TOP MOUNTED POST

NOTE:

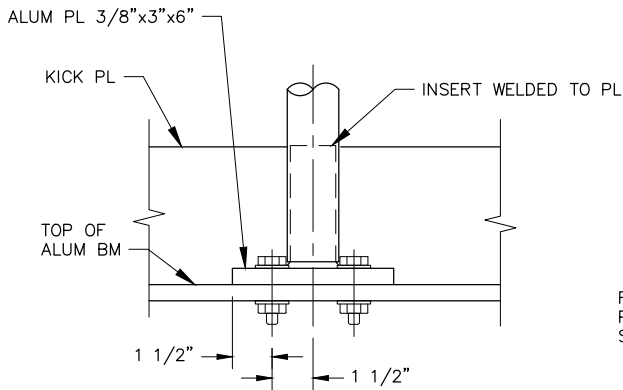
COAT ALUMINUM SURFACES IN CONTACT WITH CONCRETE OR DISSIMILAR METALS AS SPECIFIED.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

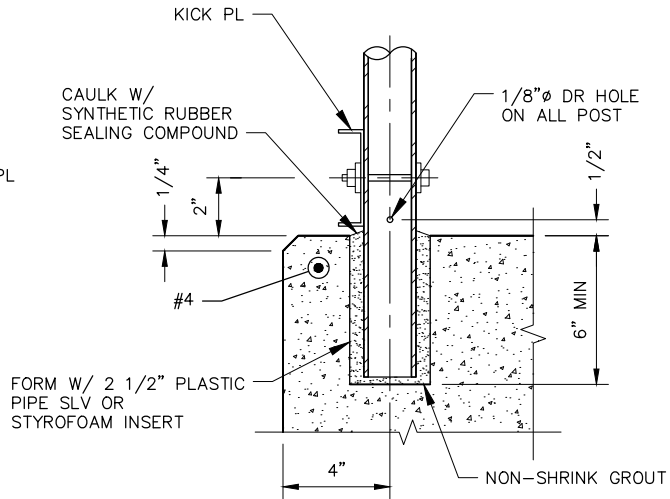
05056
POST BASE CONNECTIONS

D DENVER WATER

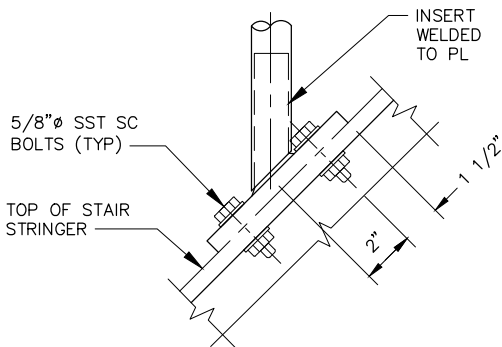
1600 West 12th Ave
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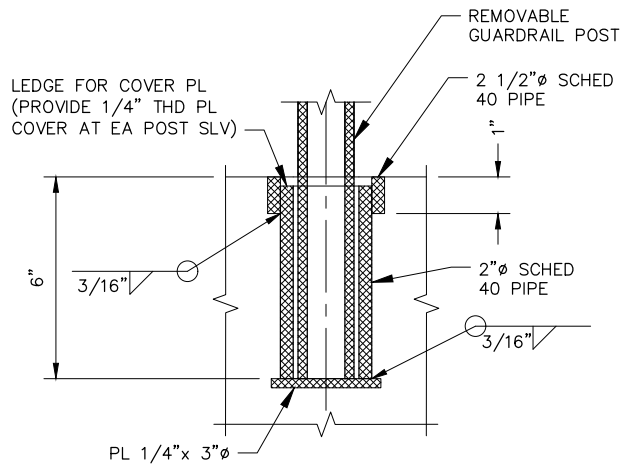
E-BEAM MOUNTED POST



G-EMBEDDED POST



F-STRINGER MOUNTED POST



H-EMBEDDED POST REMOVABLE

NOTE:

COAT ALUMINUM SURFACES IN CONTACT WITH CONCRETE OR DISSIMILAR METALS AS SPECIFIED.

DRAWN BY: BAIREs

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

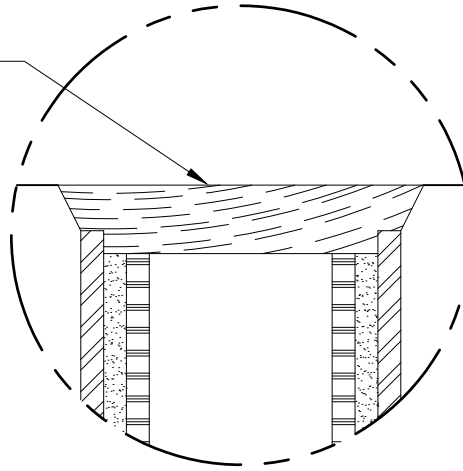
REVISION DATE:

05057
POST BASE CONNECTIONS

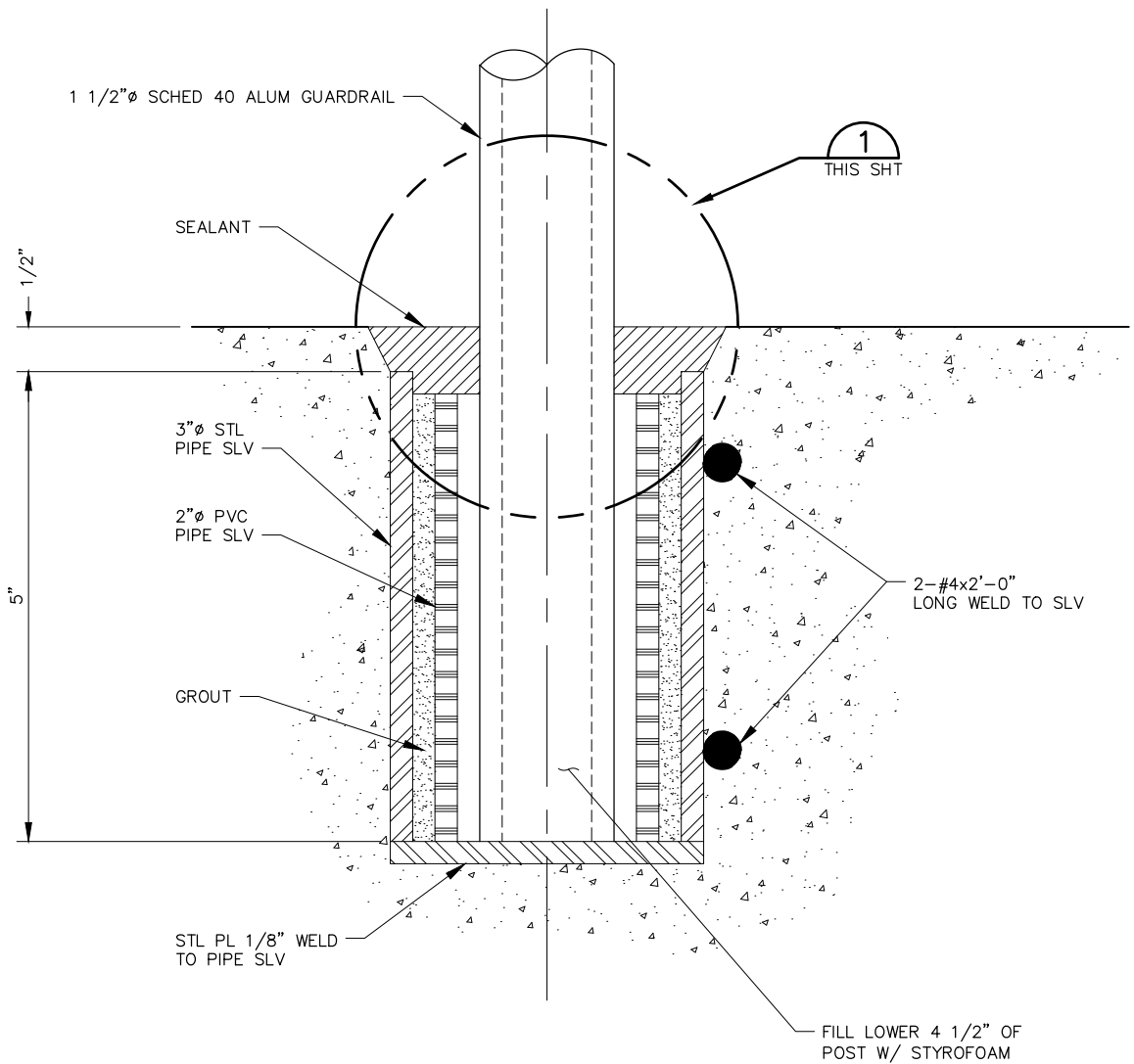
D DENVER WATER

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denverwater.org

TEMP WOOD PLUG COVER SHALL
BE SET FLUSH W/ TOP OF CONC
(REMOVE AFTER CONC HAS
CURED & FILL W/ SEALANT)



DETAIL 1
THIS SHT



DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

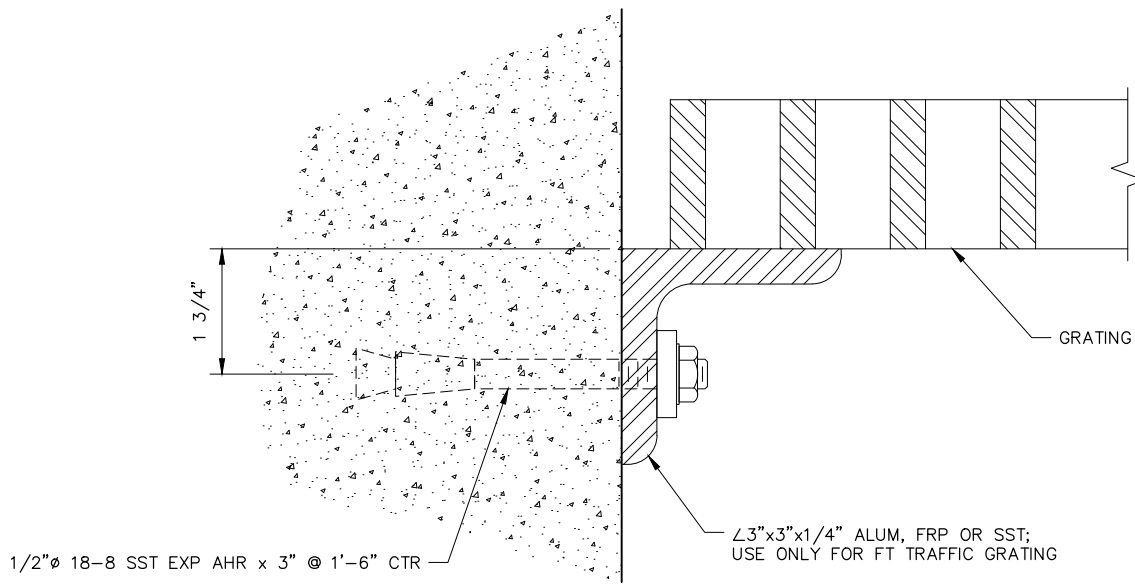
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

05058
REMOVABLE GUARDRAIL
POST SETTING



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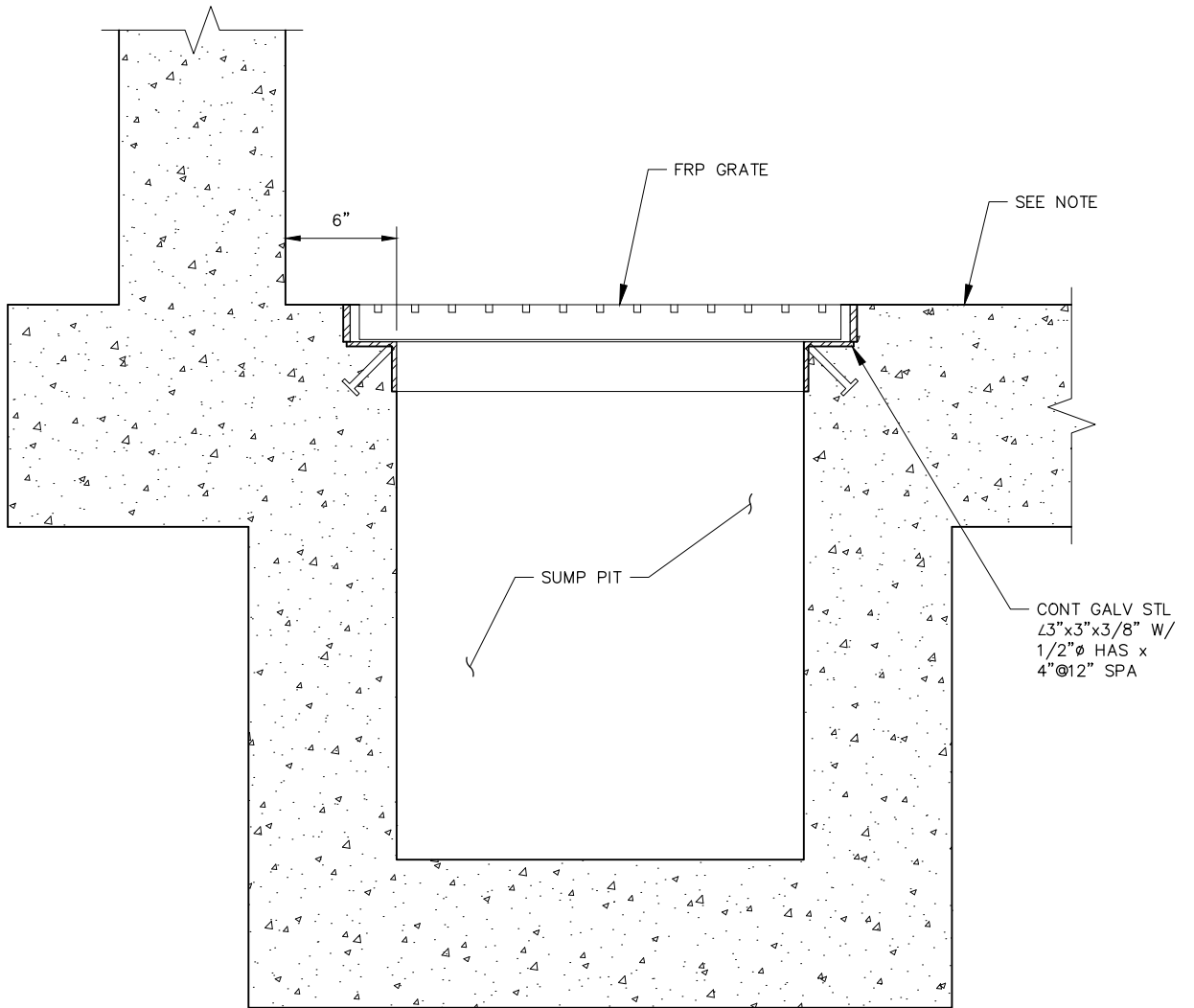


SECTION

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

05060
SUMP GRATE SUPPORT

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NOTE:

COORDINATE DIMENSION WITH THICKNESS OF GRATING.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

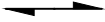
REVISION DATE:

05061
SUMP GRATE SUPPORT



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NOTES:

1. GRATING SHALL BE LIGHT DUTY GRATING UNLESS OTHERWISE NOTED ON DRAWINGS.
2. GRATING SPAN IS INDICATED BY  ON PLANS.
3. INDIVIDUAL GRATING SECTIONS SHALL NOT EXCEED 3 FEET IN WIDTH OR WEIGH MORE THAN 150 POUNDS, UNLESS INDICATED OTHERWISE, FOR TYPES 'A' AND 'B' GRATING.
4. SHOP DRAWINGS BASED ON FIELD DIMENSIONS SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO FABRICATION.
5. MATERIAL FOR SUPPORTS OF STEEL AND ALUMINUM GRATING SHALL BE SAME AS GRATING, EXCEPT METAL SUPPORTS THAT ARE TO BE EMBEDDED IN CONCRETE SHALL BE TYPE 316 STAINLESS STEEL.
6. UNLESS NOTED OTHERWISE ON PLANS, GRATING THICKNESS SHALL BE AS TABULATED IN "GRATING THICKNESS TABLE" FOR APPLICABLE GRATING TYPE.
7. FOR SERRATED BEARING BARS, INCREASE GRATING THICKNESS SHOWN IN TABLES BY 1/4 INCH.
8. BEARING BAR THICKNESS FOR GRATING TO BE 3/16 INCH MINIMUM. SEE SPECIFICATIONS FOR SPACING OF BEARING AND CROSS BARS.
9. BAND ALL EDGES. MATCH DEPTH OF BEARING BAR.
10. TYPE OF MATERIAL USED SHALL BE AS SHOWN ON PLANS OR AS SPECIFIED. THIS STANDARD DETAIL INCLUDES TWO TYPES, ALTHOUGH BOTH MAY NOT BE INCLUDED IN PROJECT.
11. THE HORIZONTAL CLEARANCE BETWEEN THE GRATING AND GRATING SUPPORTS SHALL NOT BE LESS THAN 1/4 INCH NOR GREATER THAN 1/2 INCH AND AS SPECIFIED.
12. MINIMUM BEARING HORIZONTAL DIMENSION EQUALS 1 INCH FOR GRATING DEPTH 2 1/4 INCHES OR LESS. MINIMUM BEARING HORIZONTAL DIMENSION EQUALS 2 INCH FOR GRATING DEPTH GREATER THAN 2 1/4 INCHES.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: 

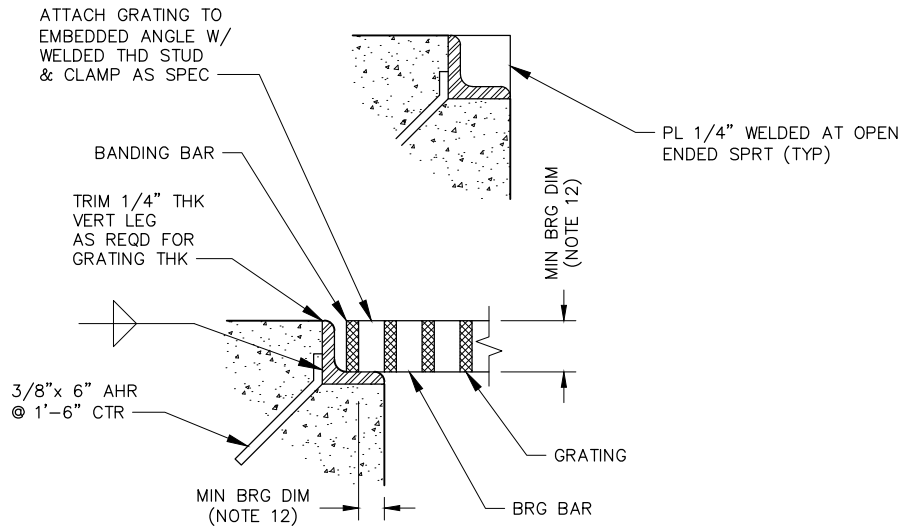
ORIGINATION DATE: JULY 2021

REVISION DATE:

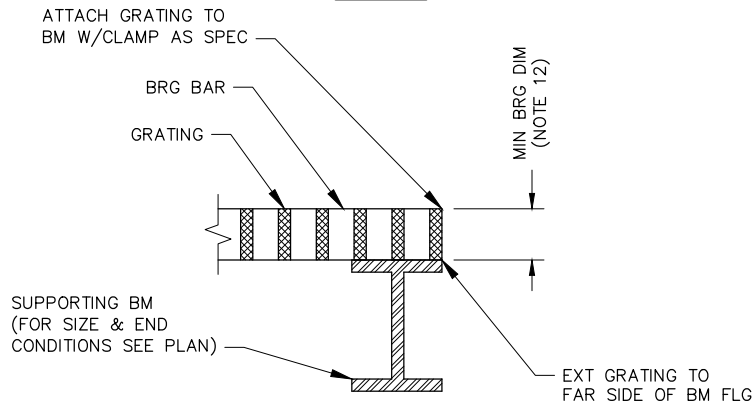
05062
STANDARD GRATING NOTES



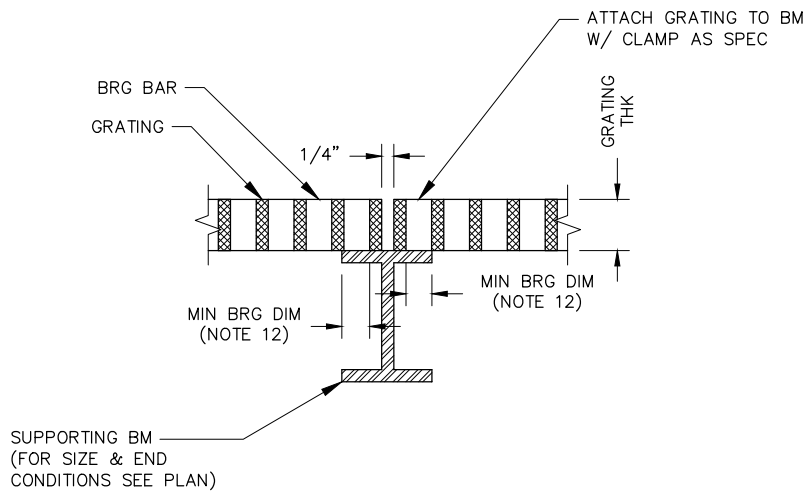
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GS-1



GS-2-ONE SIDED

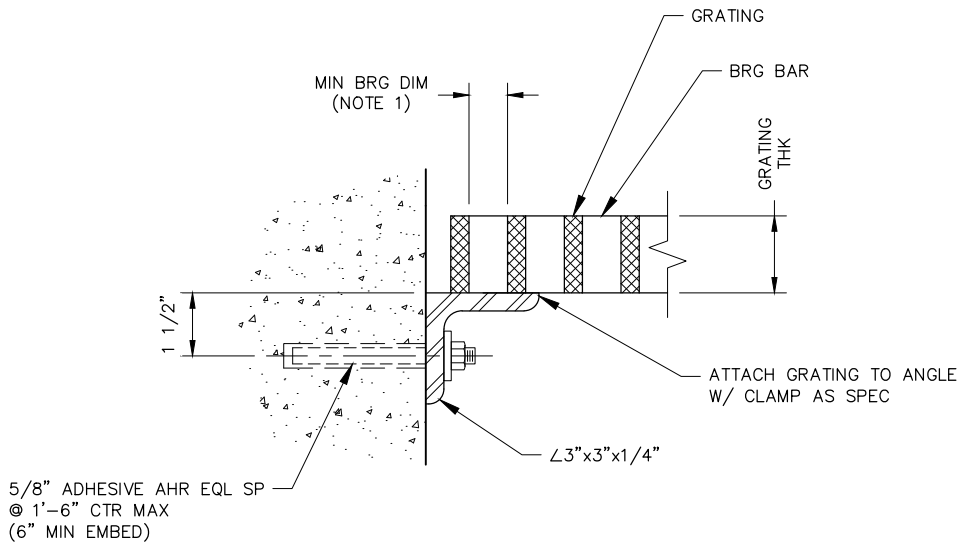


GS-2-TWO SIDED

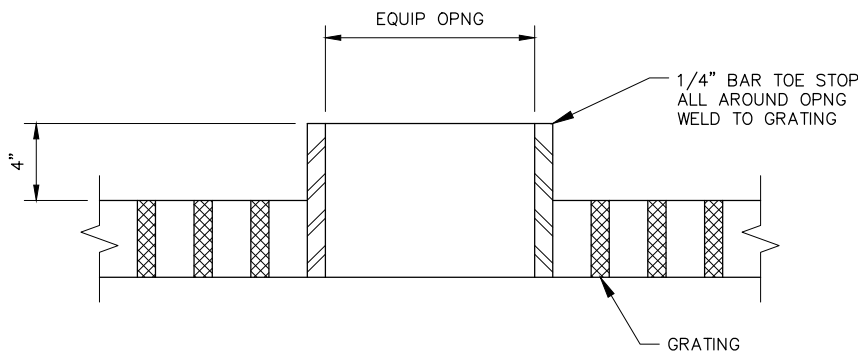
DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**05063
STANDARD GRATING - A**

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GS-3



EQUIPMENT OPENING

NOTES:

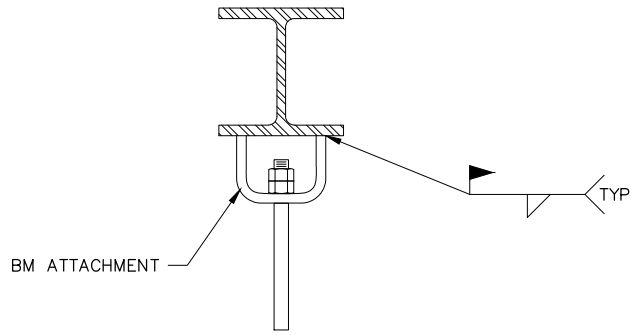
1. USE GS-3 ONLY FOR LIGHT DUTY GRATING, TYPE 'A'.
2. INSTALL ANCHORS MAXIMUM 4 INCHES FROM EACH END.
3. WHEN ANCHOR IS WITHIN 4 INCHES OF A CONCRETE EDGE, UTILIZE MANUFACTURER LOW-TORQUE INSTALLATION PROCEDURES.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

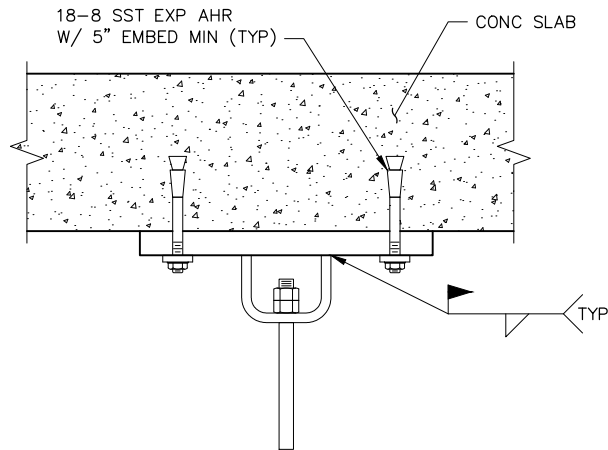
**05064
STANDARD GRATING - B**



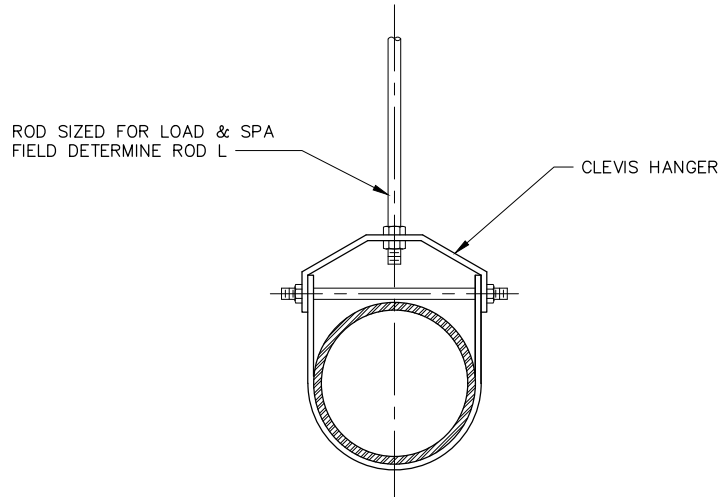
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**HANGER ROD
CONNECTION FOR BEAMS**



**HANGER ROD CONNECTION
FOR OVERHEAD CONC SLABS**



**HANGER ROD
AND CLEVIS**

NOTE:

EXPANSION ANCHORS SHALL BE DESIGNED FOR OVERHEAD USE.

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

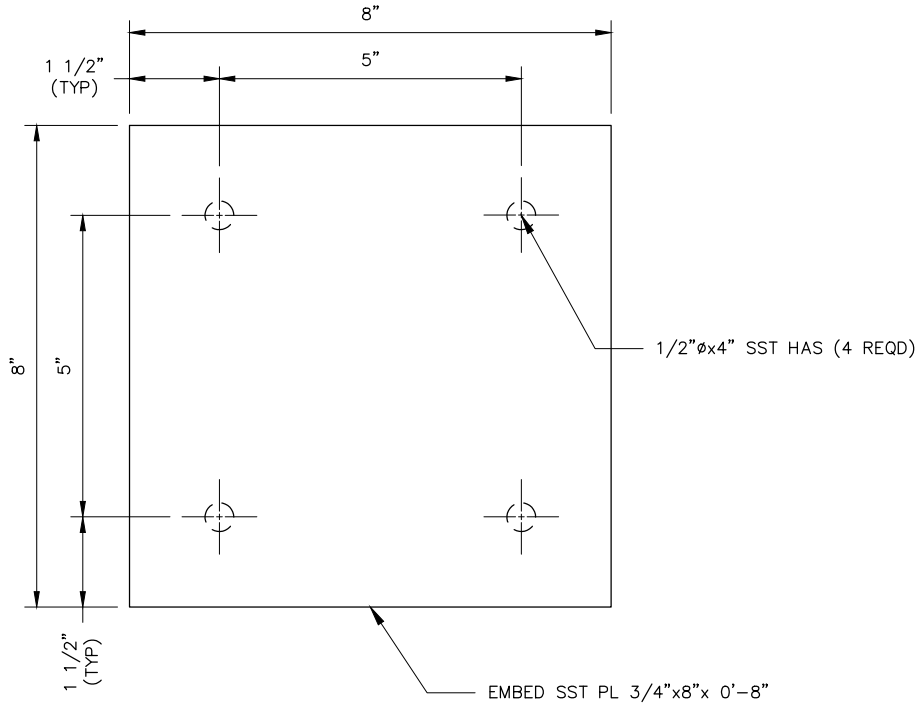
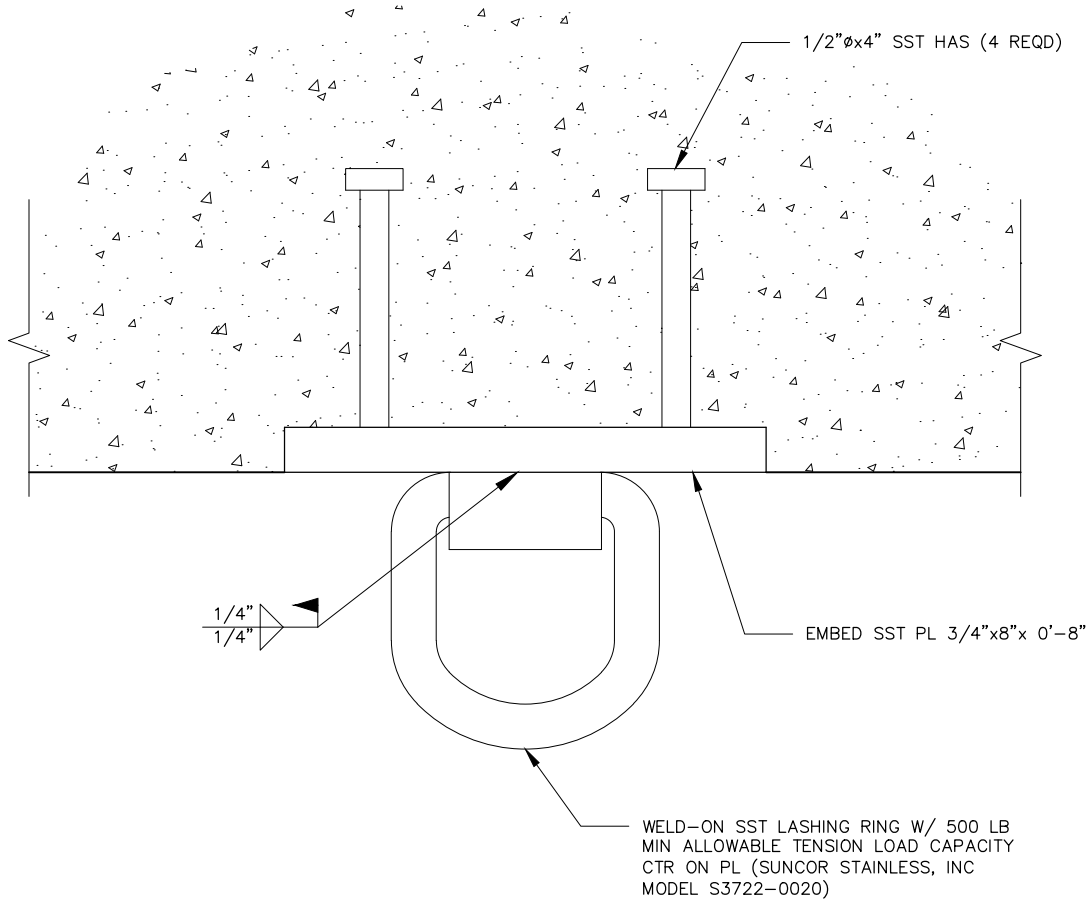
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

***05070
PIPE HANGER***



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DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

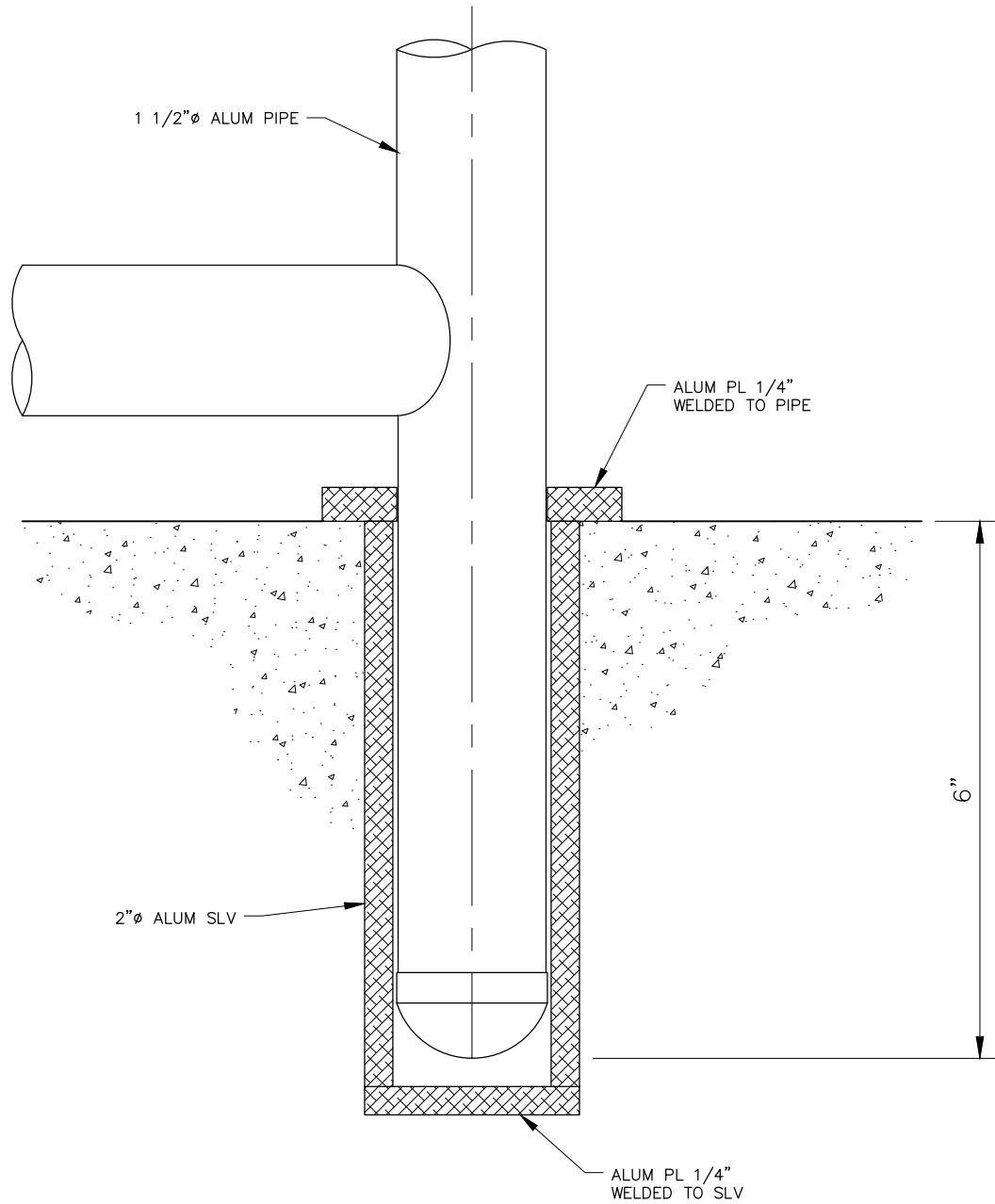
ORIGINATION DATE: JULY 2021

REVISION DATE:

05071 LASHING RING



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NOTE:

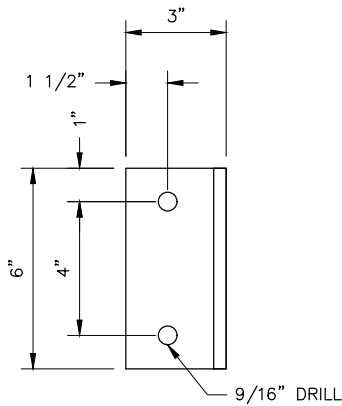
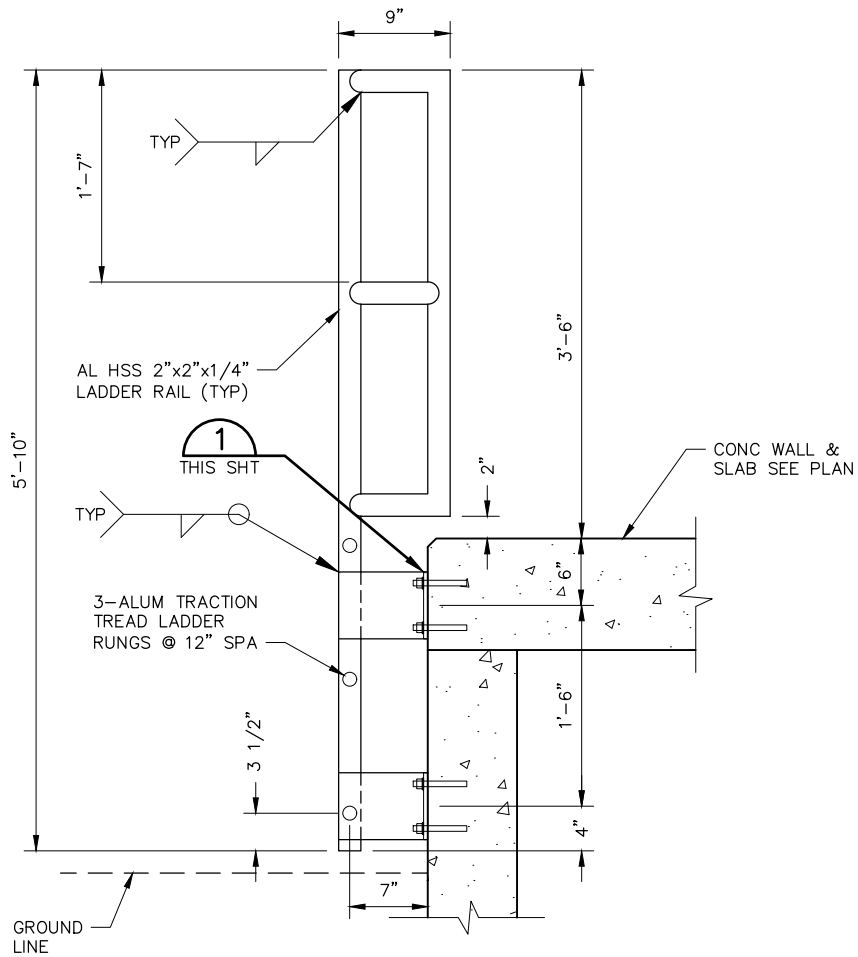
APPLY BITUMINOUS COATING TO ALUMINUM SURFACES IN CONTACT WITH CONCRETE.

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

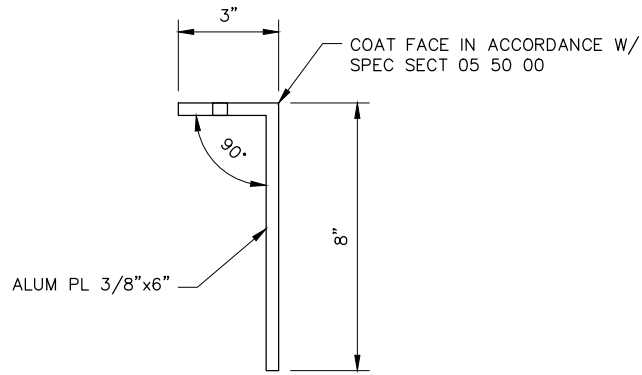
**05080
REMOVABLE LADDER POST**



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FRONT



TOP

BRACKET 1
THIS SHT

NOTES:

1. PROVIDE 2 INCHES CLEAR FROM LADDER RAIL TO EDGE OF ADJACENT HANDRAIL.
2. LOCATE LADDER TO ALLOW 4 INCHES FROM CENTER OF BRACKET ANCHOR TO EDGE OF WALL.
3. ANCHOR BRACKETS TO WALL WITH TWO 1/2-INCH DIAMETER STAINLESS STEEL EXPANSION ANCHORS WITH 3 1/2 INCH CONCRETE EMBEDMENT.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

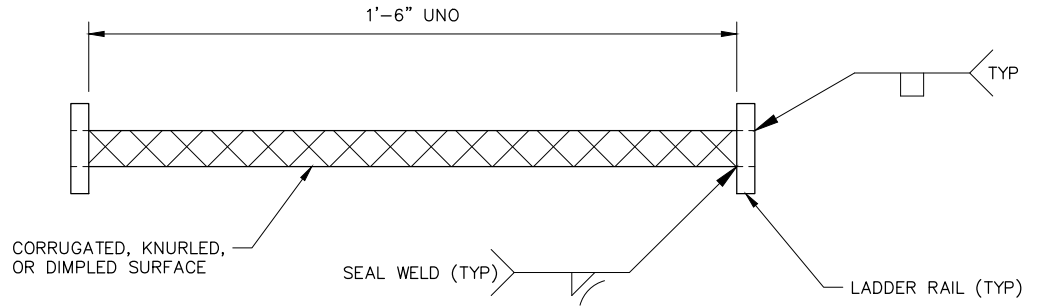
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

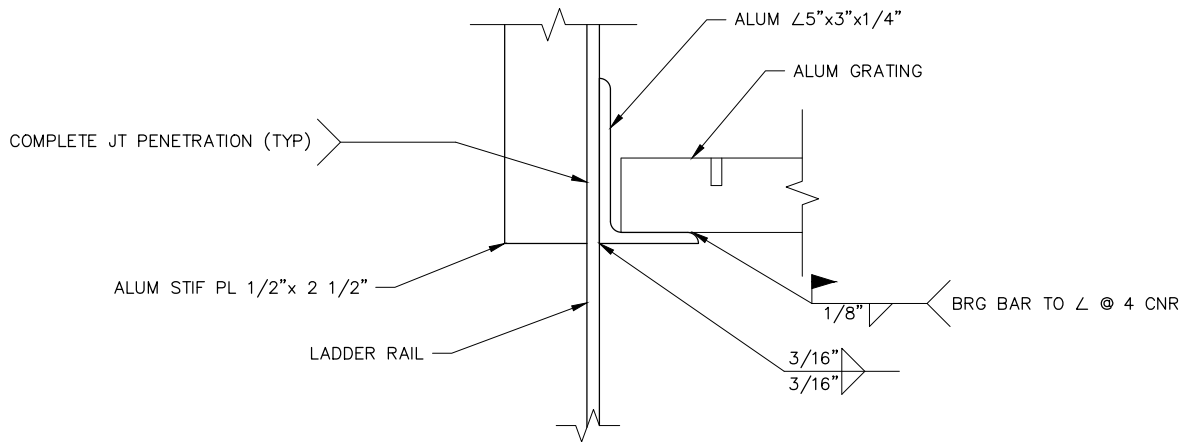
05081
ALUMINUM LADDER



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RUNG



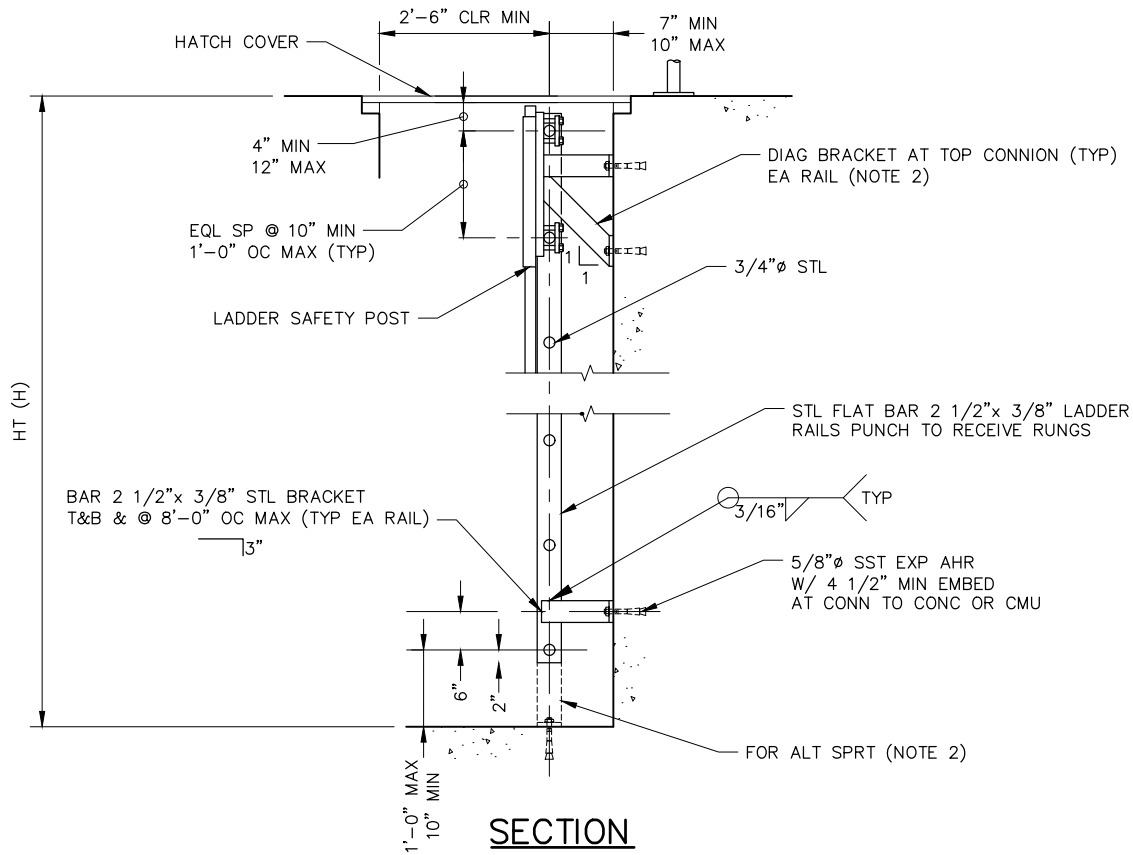
GRATE CONNECTION

DRAWN BY: <i>IVERY</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

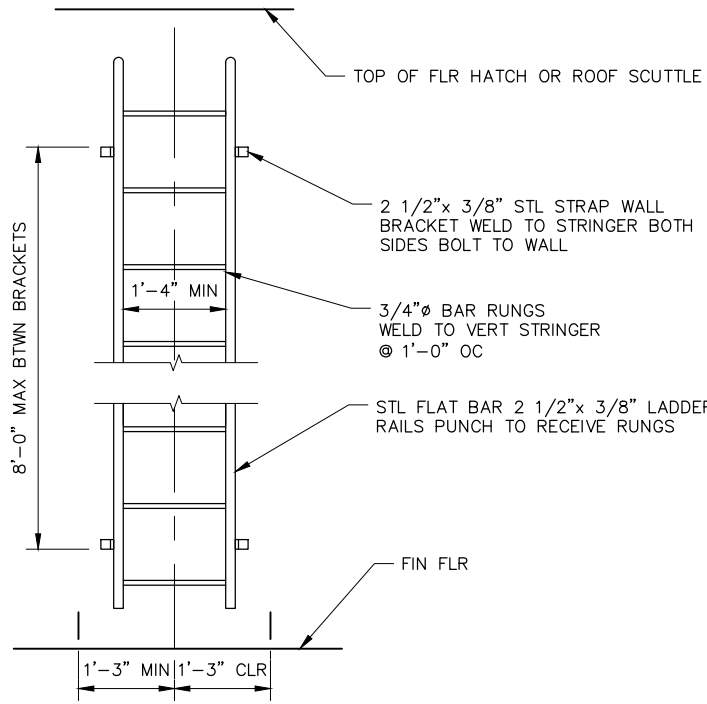
05083
FLAT BAR LADDER
DETAILS—ALUMINUM

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SECTION



ELEVATION

NOTES:

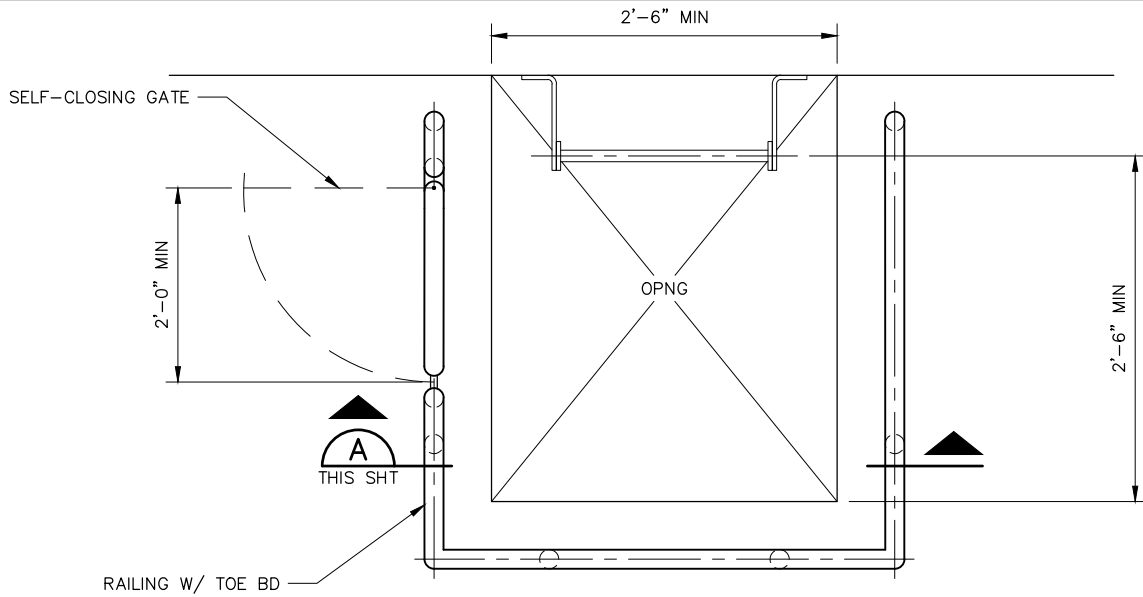
1. HOT DIP GALVANIZE STEEL AFTER FABRICATION, UNLESS NOTED OTHERWISE.
2. AT INTERIOR DRY AREAS, EXTEND RAILS AND BEND 3 INCHES AT FLOOR. SECURE WITH 5/8-INCH STAINLESS STEEL CONCRETE ANCHORS. DIAGONAL BRACKET NOT REQUIRED IF BASE OF LADDER EXTENDS TO SLAB BELOW.

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

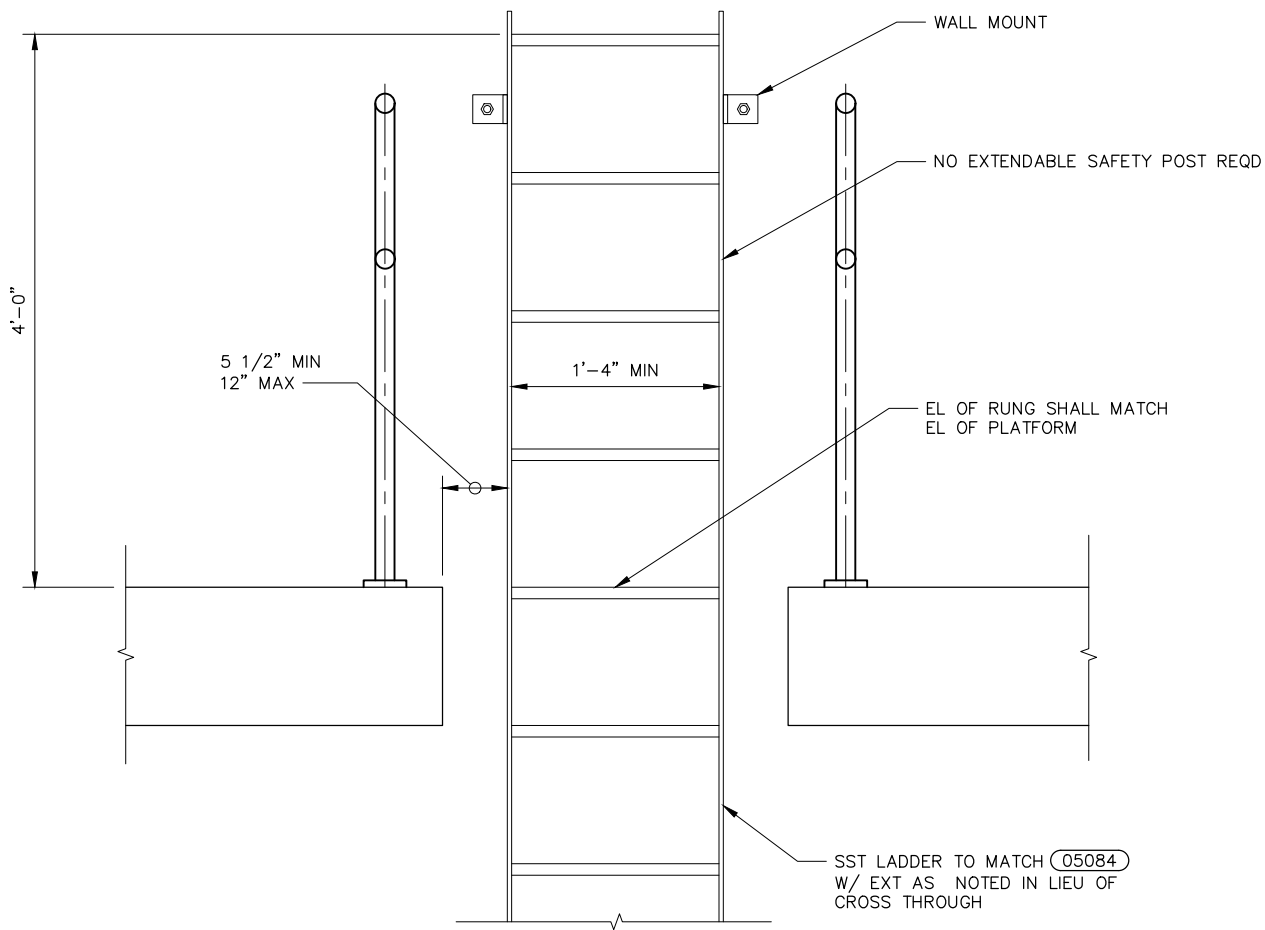
05084
FLAT BAR LADDER TYPE 'A'
ELEVATION AND SECTION



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PLAN



SECTION

A

THIS SHT

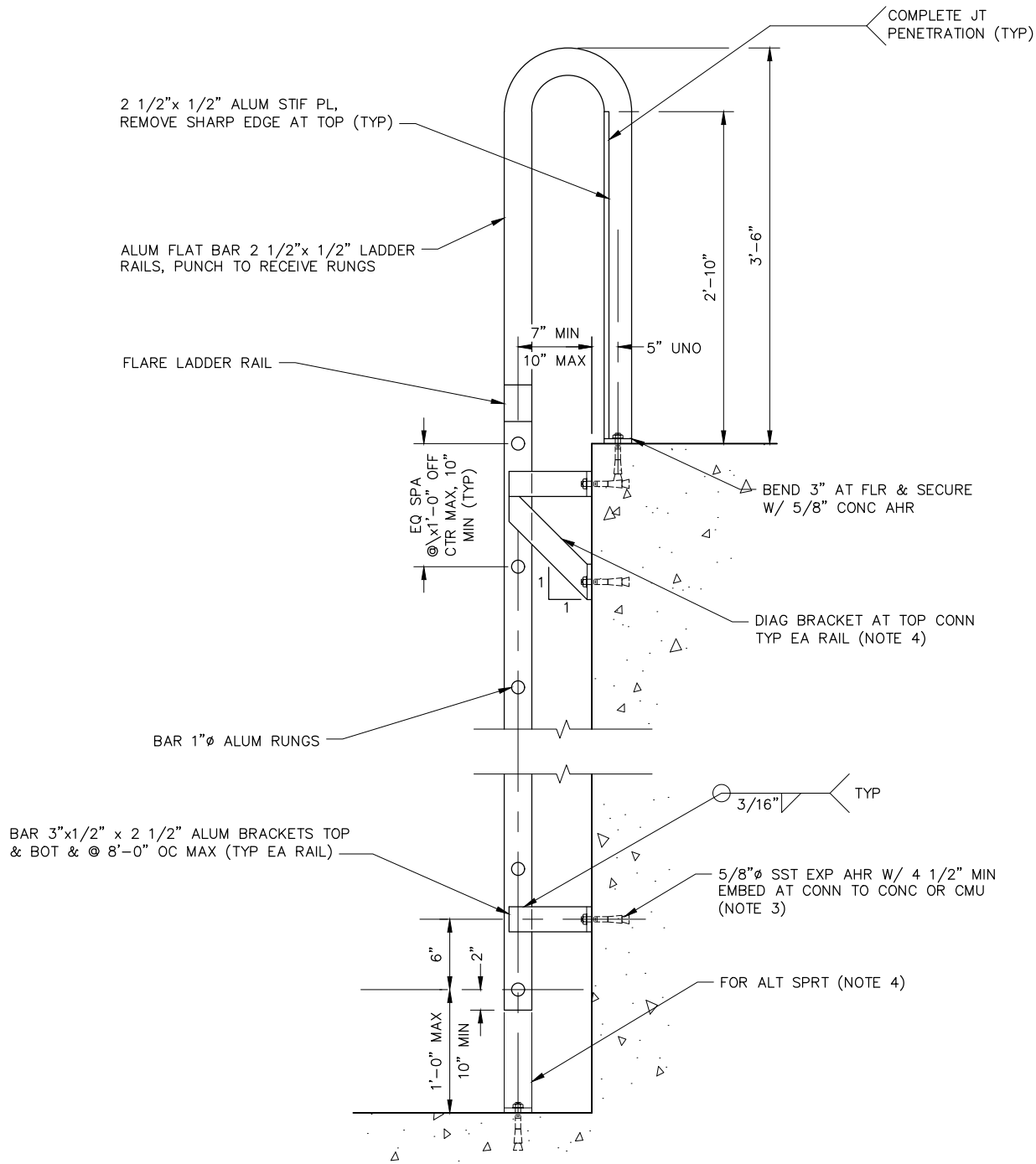
NOTE:
FOR NOTES AND DIMENSIONS NOT SHOWN, SEE 05084 .

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

05085
FLATBAR LADDER TYPE 'A'
PLAN AND SECTION

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NOTES:

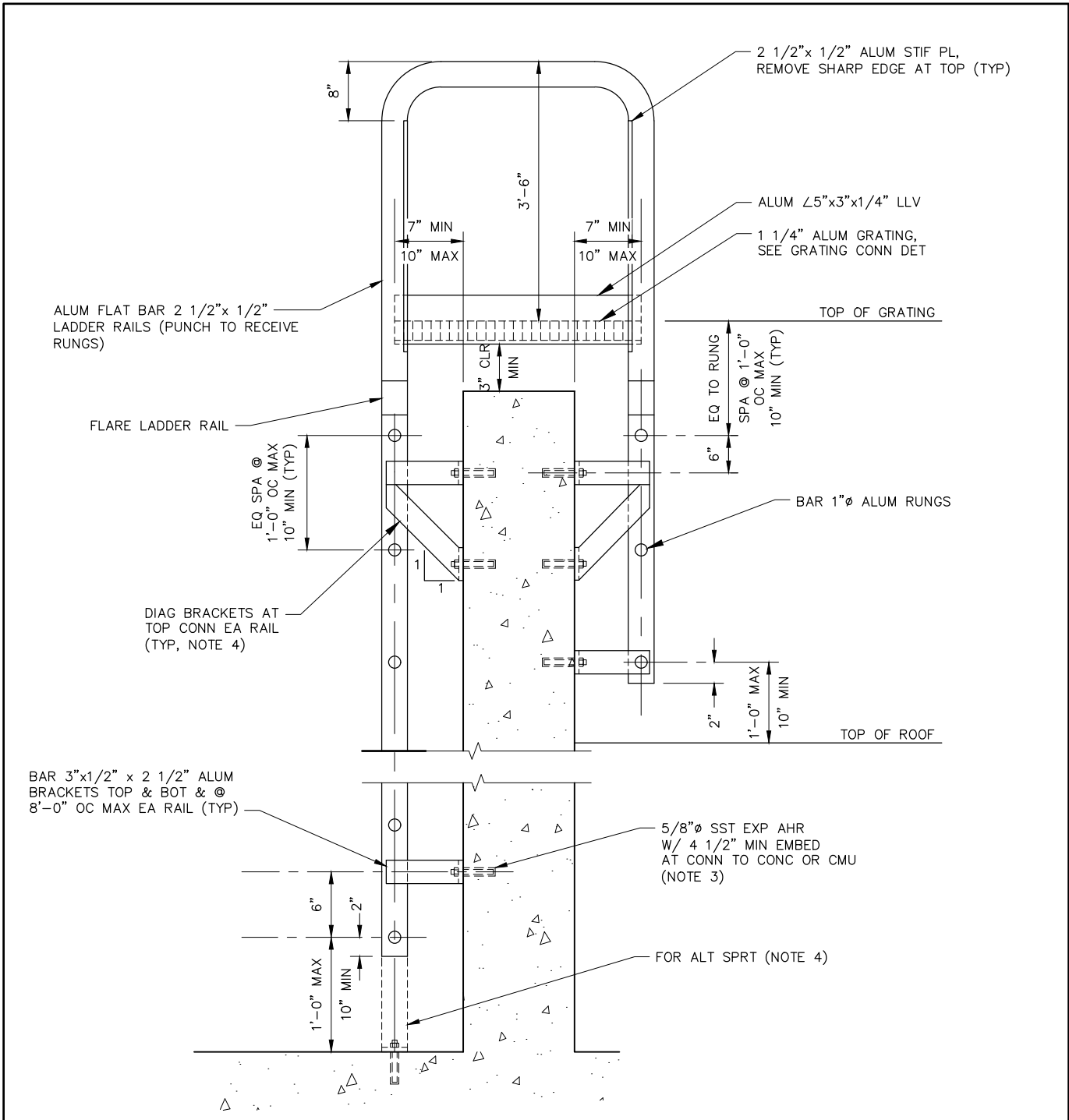
1. PROVIDE PROTECTION FOR ALUMINUM IN CONTACT WITH CONCRETE IN ACCORDANCE WITH SPECIFICATIONS.
2. PRE-ENGINEERED PIPE LADDER AS SPECIFIED MAY BE USED IN LIEU OF FLAT BAR LADDERS.
3. PROVIDE STAINLESS STEEL EXPANSION ANCHORS LOCATED BELOW MAXIMUM WATER SURFACE.
4. FOR INTERIOR, DRY AREAS, EXTEND RAILS AND BEND 3 INCHES AT FLOOR. SECURE WITH 5/8-INCH CONCRETE ANCHORS. DIAGONAL BRACKET NOT REQUIRED IF ALTERNATE SUPPORT PROVIDED.

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05086
FLAT BAR LADDER WITH
EXTENSION TYPE
'B'-ALUMINUM



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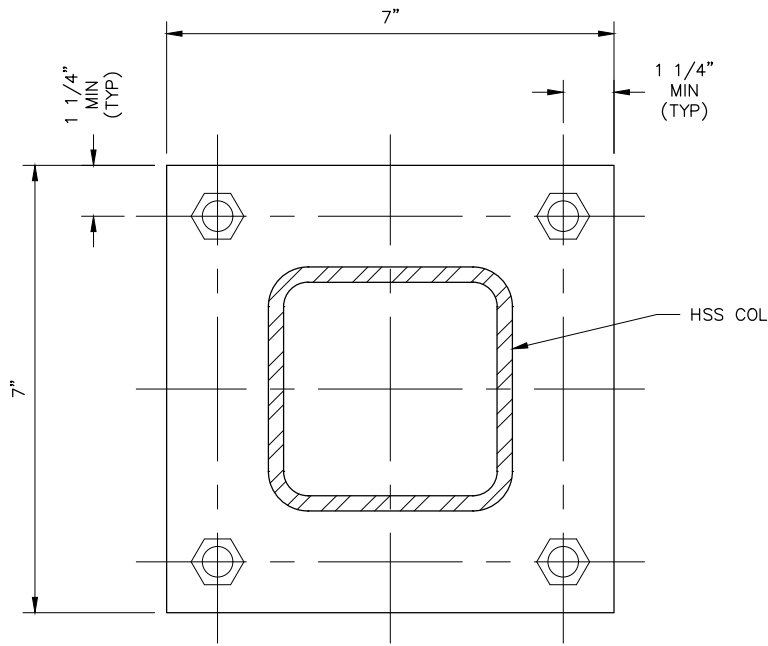
NOTES:

1. PROVIDE PROTECTION FOR ALUMINUM IN CONTACT WITH CONCRETE IN ACCORDANCE WITH SPECIFICATIONS.
2. AT CONTRACTOR'S OPTION, PRE-ENGINEERED PIPE LADDER AS SPECIFIED MAY BE USED IN LIEU OF FLAT BAR LADDERS.
3. PROVIDE STAINLESS STEEL EXPANSION ANCHORS LOCATED BELOW MAXIMUM WATER SURFACE.
4. FOR INTERIOR, DRY AREAS, EXTEND RAILS AND BEND 3 INCHES AT FLOOR. SECURE WITH 5/8-INCH CONCRETE ANCHORS. DIAGONAL BRACKET NOT REQUIRED IF ALTERNATE SUPPORT PROVIDED.

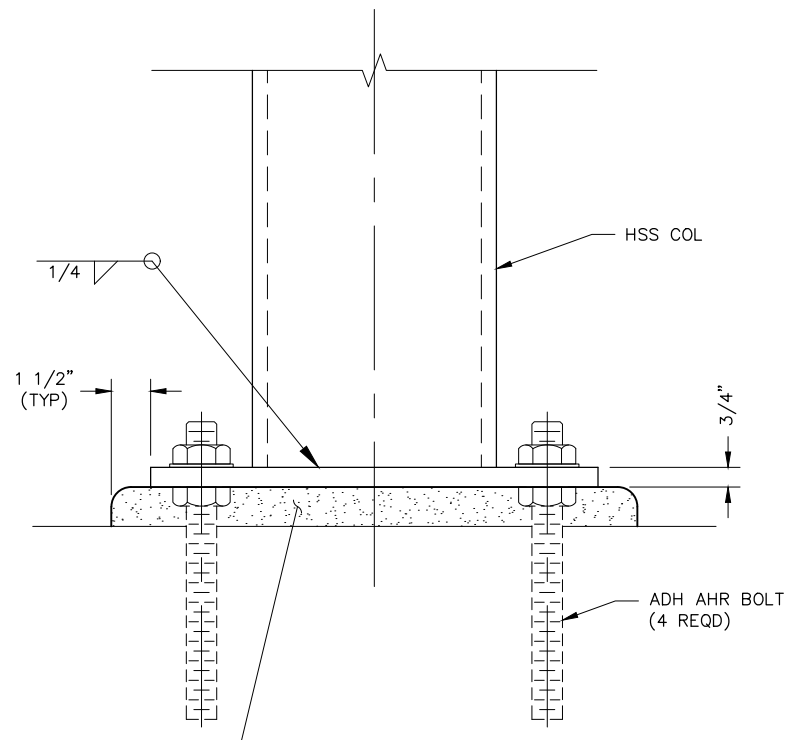
DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05087
FLAT BAR LADDER UP AND
OVER TYPE 'C'-ALUMINUM


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PLAN



1 1/2" NON-SHRINK GROUT
AS SPEC, RND CNR W/
3/4" R TOOL

ELEVATION

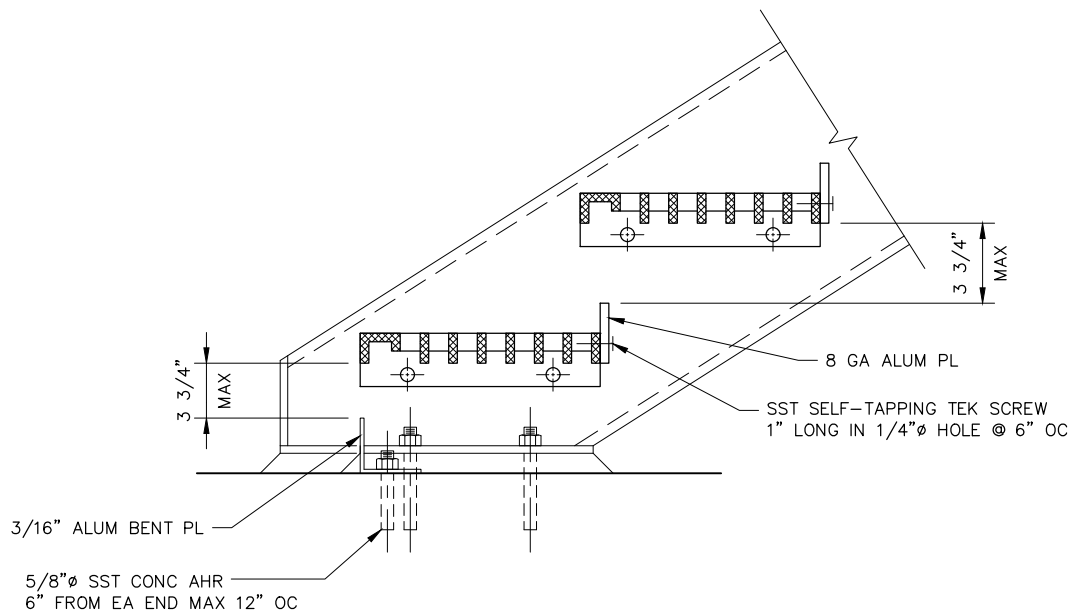
NOTES:

ANCHOR BOLTS SHALL BE STAINLESS STEEL 3/4 INCH DIAMETER IF REQUIRED WITH LEVELING NUTS AND 6 INCH MINIMUM EMBEDMENT AND BASEPLATES SHALL BE CENTERED ON COLUMN.

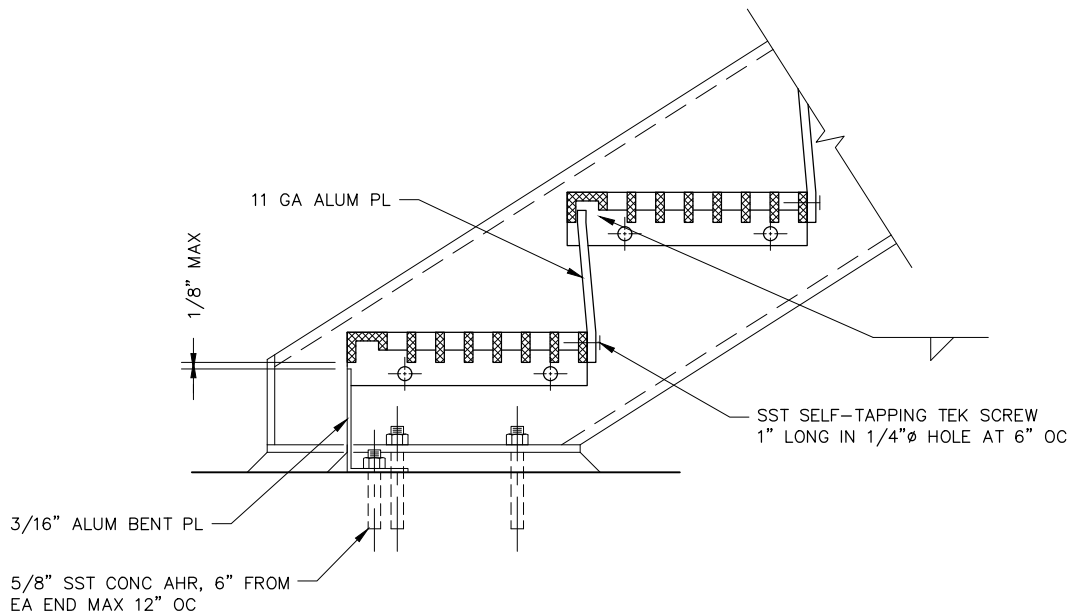
DRAWN BY: <i>DITTERLINE</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**05090
COLUMN BASE**

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PARTIAL RISER PLATE



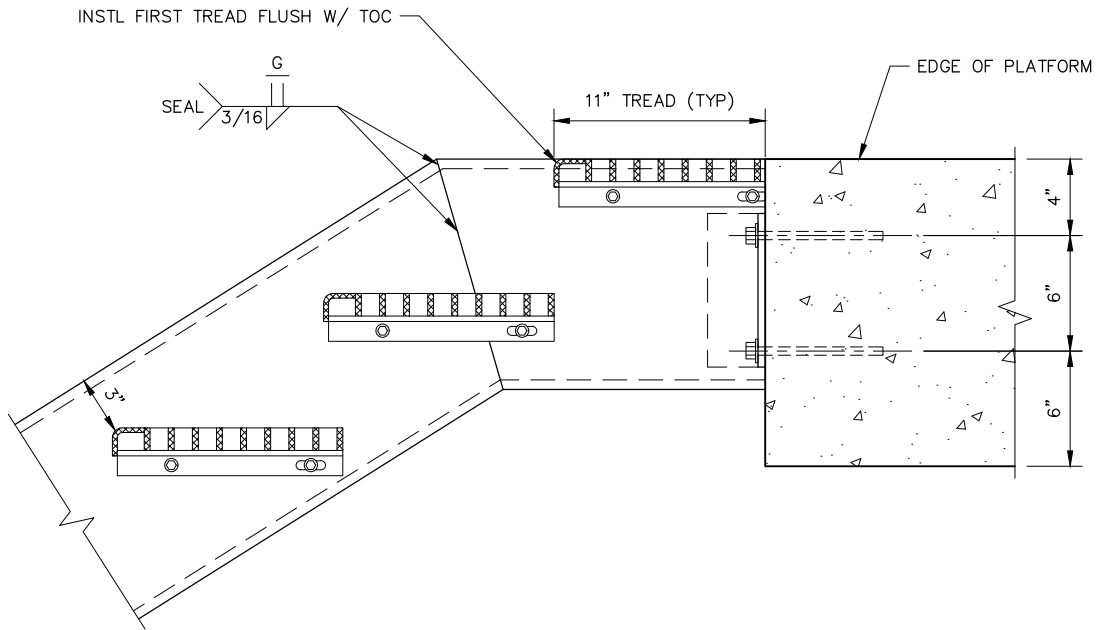
FULL RISER PLATE

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05100
STAIR DETAILS—ALUMINUM



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NOTE:

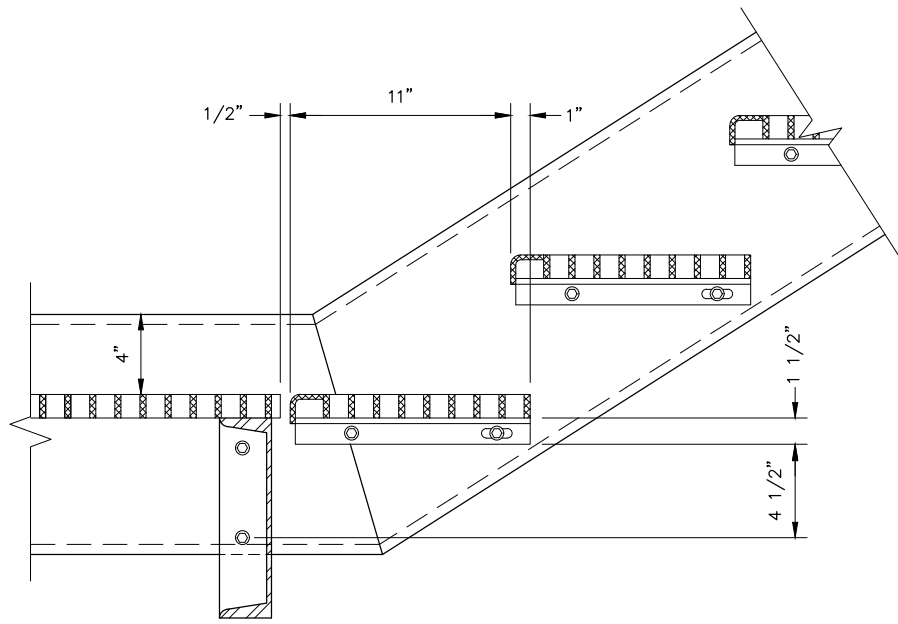
HANDRAIL AND GUARDRAIL NOT SHOWN FOR CLARITY.

DRAWN BY: VA/CIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

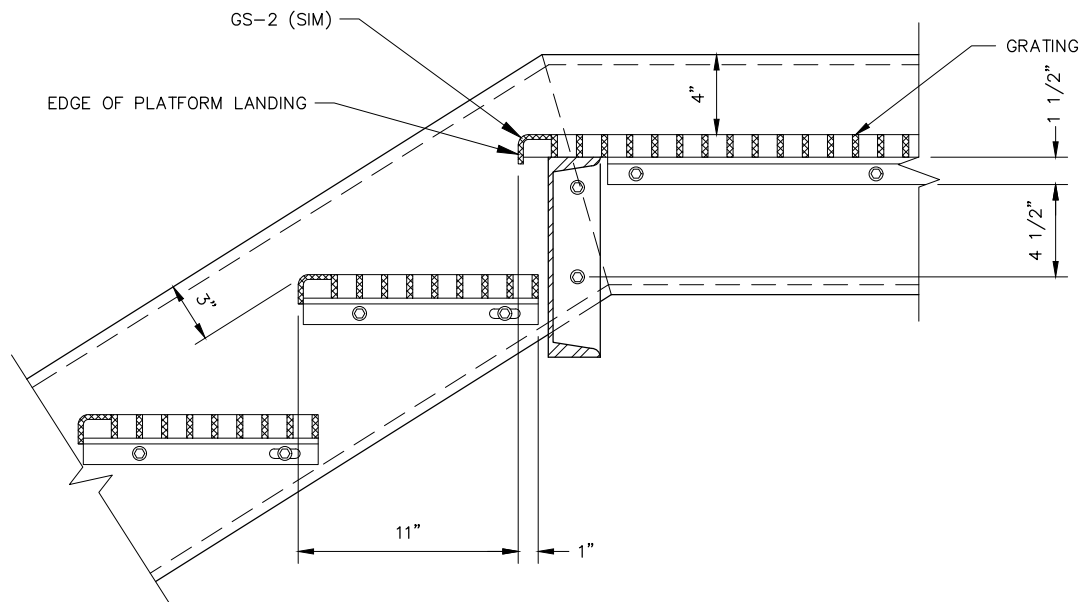
**05101
STAIR DETAILS
STEEL TO CONCRETE**



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BENT STRINGER UP



BENT STRINGER DOWN

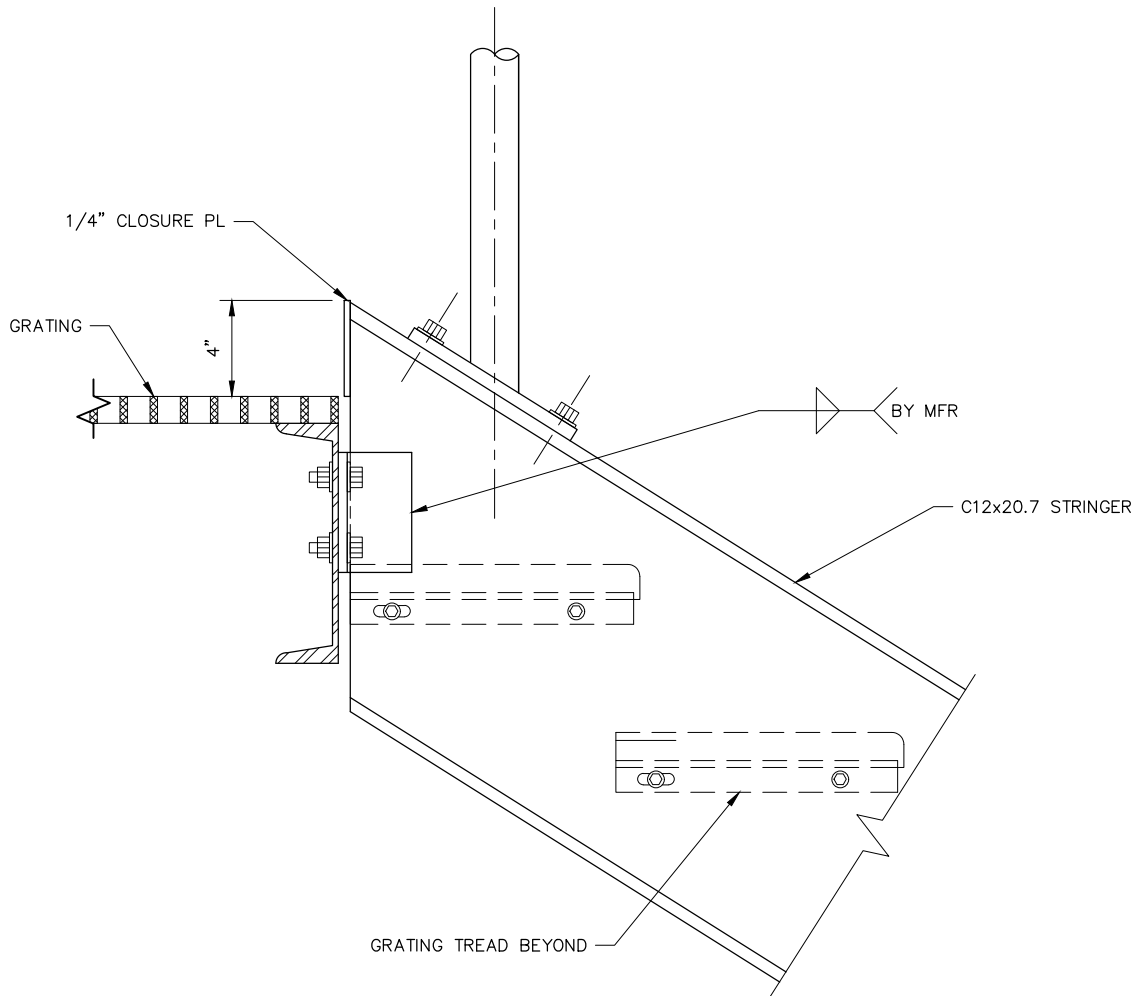
NOTE:

HANDRAIL AND GUARDRAIL NOT SHOWN FOR CLARITY.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

05102
STAIR CONNECTION AT
LANDING-BENT STRINGERS

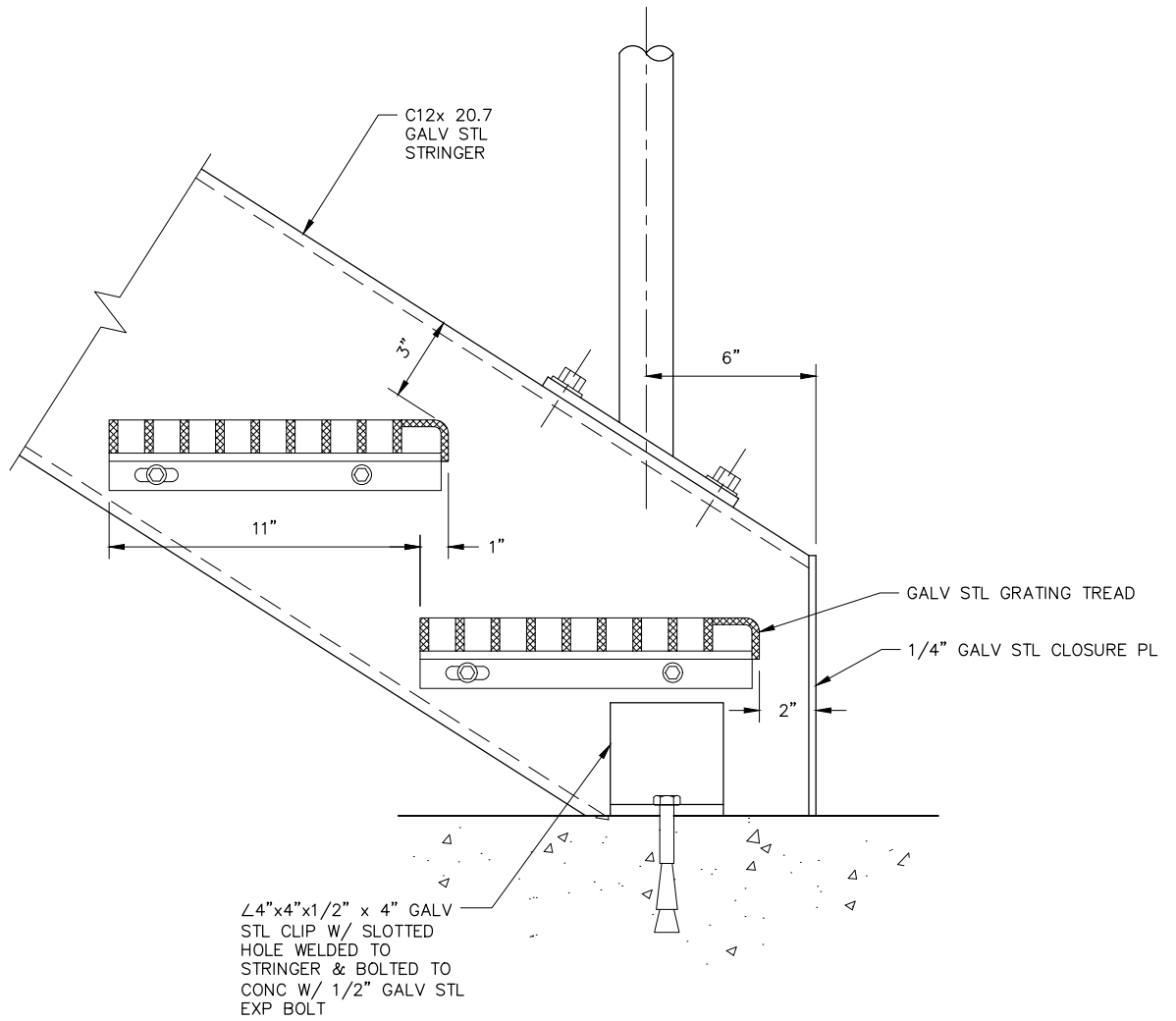
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DRAWN BY: SCHULTE
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

05103
 STAIR CONNECTION AT
 LANDING - DOWN
 STRINGER - STEEL

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DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

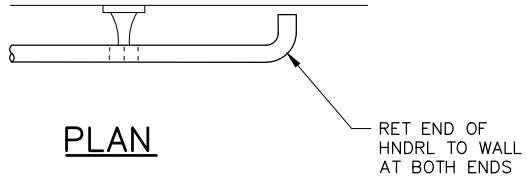
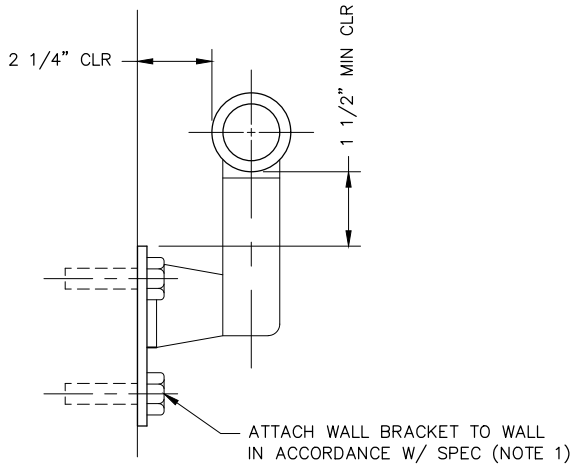
ORIGINATION DATE: JULY 2021

REVISION DATE:

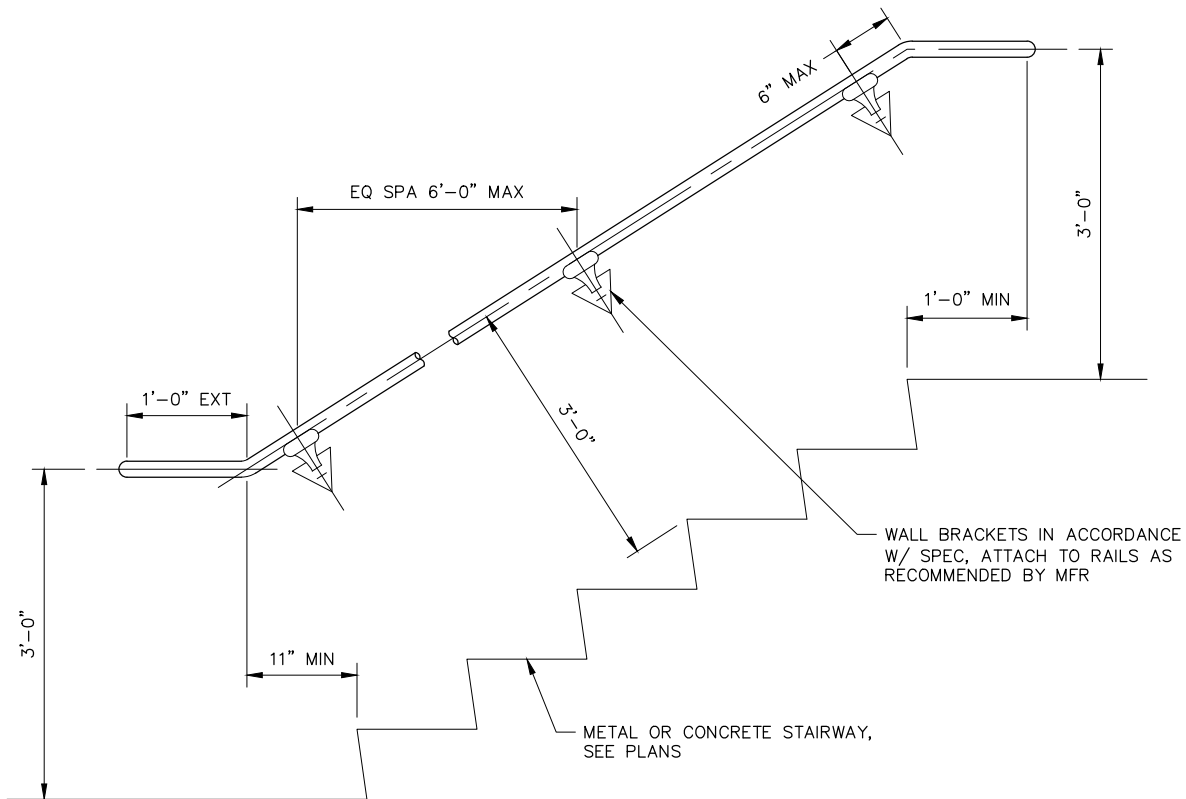
05104
STAIR CONNECTION
AT BOTTOM – STEEL



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WALL BRACKET



NOTES:

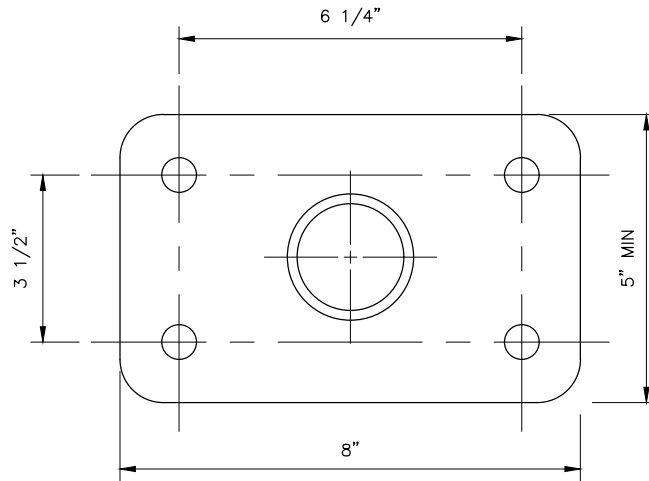
1. FOR ANCHORAGE TO WOOD OR METAL STUD FRAMING, PROVIDE SOLID BLOCKING.
2. PROVIDE PROTECTION FOR DISSIMILAR METALS AND FOR ALUMINUM IN CONTACT WITH CONCRETE IN ACCORDANCE WITH SPECIFICATIONS.

DRAWN BY: VAICIAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

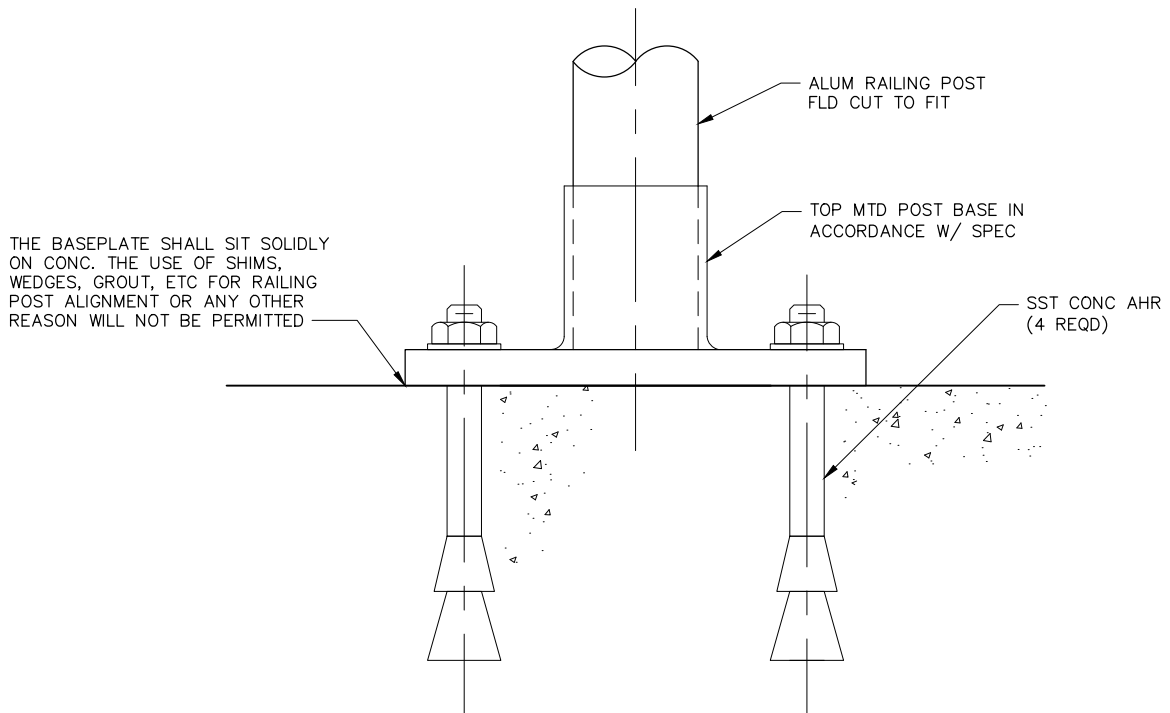
05110
WALL HANDRAIL WITH
EXTENSION - ALUMINUM



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PLAN



ELEVATION

NOTE:

PROVIDE PROTECTION FOR DISSIMILAR METALS AND FOR ALUMINUM IN CONTACT WITH CONCRETE IN ACCORDANCE WITH SPECIFICATIONS.

DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

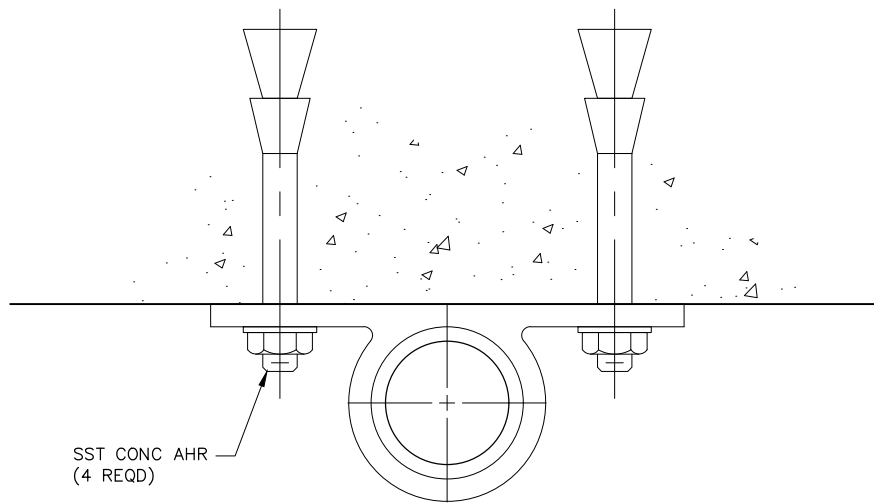
ORIGINATION DATE: JULY 2021

REVISION DATE:

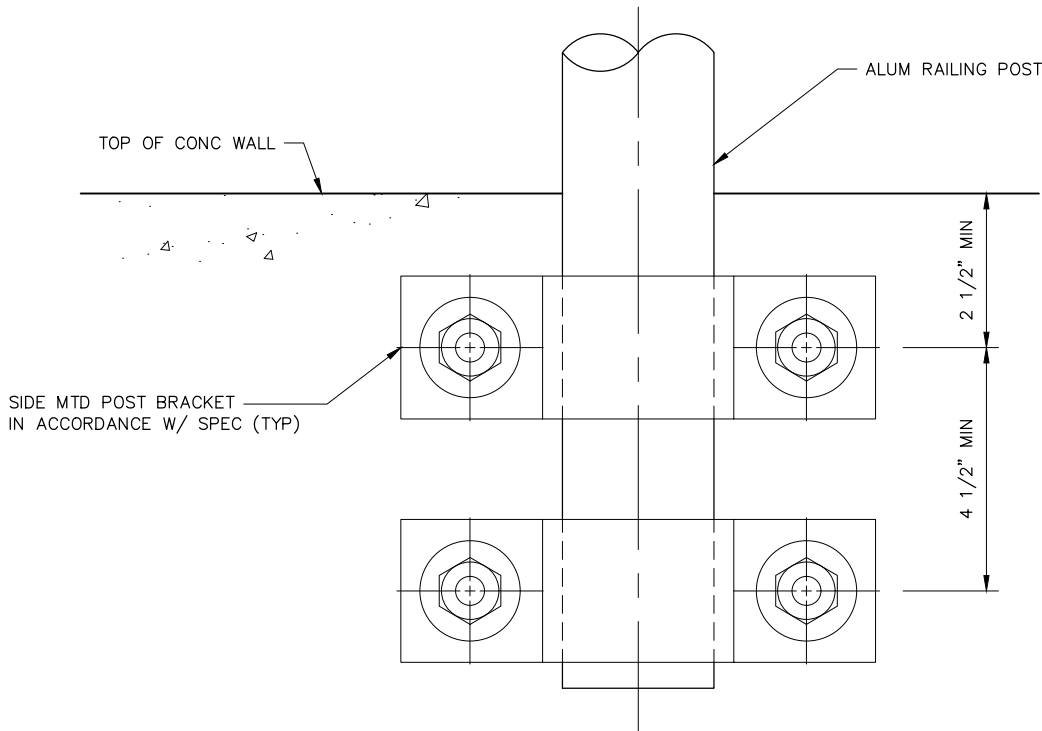
05111
RAILING POST ANCHORAGE
TYPE "A" – ALUMINUM



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PLAN



ELEVATION

NOTES:

1. PROVIDE PROTECTION FOR DISSIMILAR METALS AND FOR ALUMINUM IN CONTACT WITH CONCRETE IN ACCORDANCE WITH SPECIFICATIONS.
2. USE SIDE MOUNTED POST BRACKET AS A TEMPLATE FOR THE ANCHOR BOLTS.

DRAWN BY: VAICIKASKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

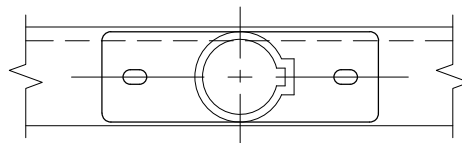
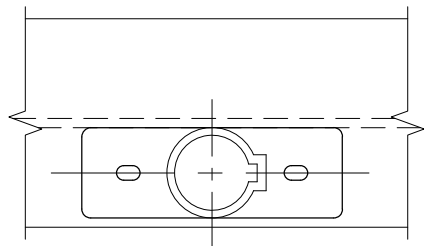
ORIGINATION DATE: JULY 2021

REVISION DATE:

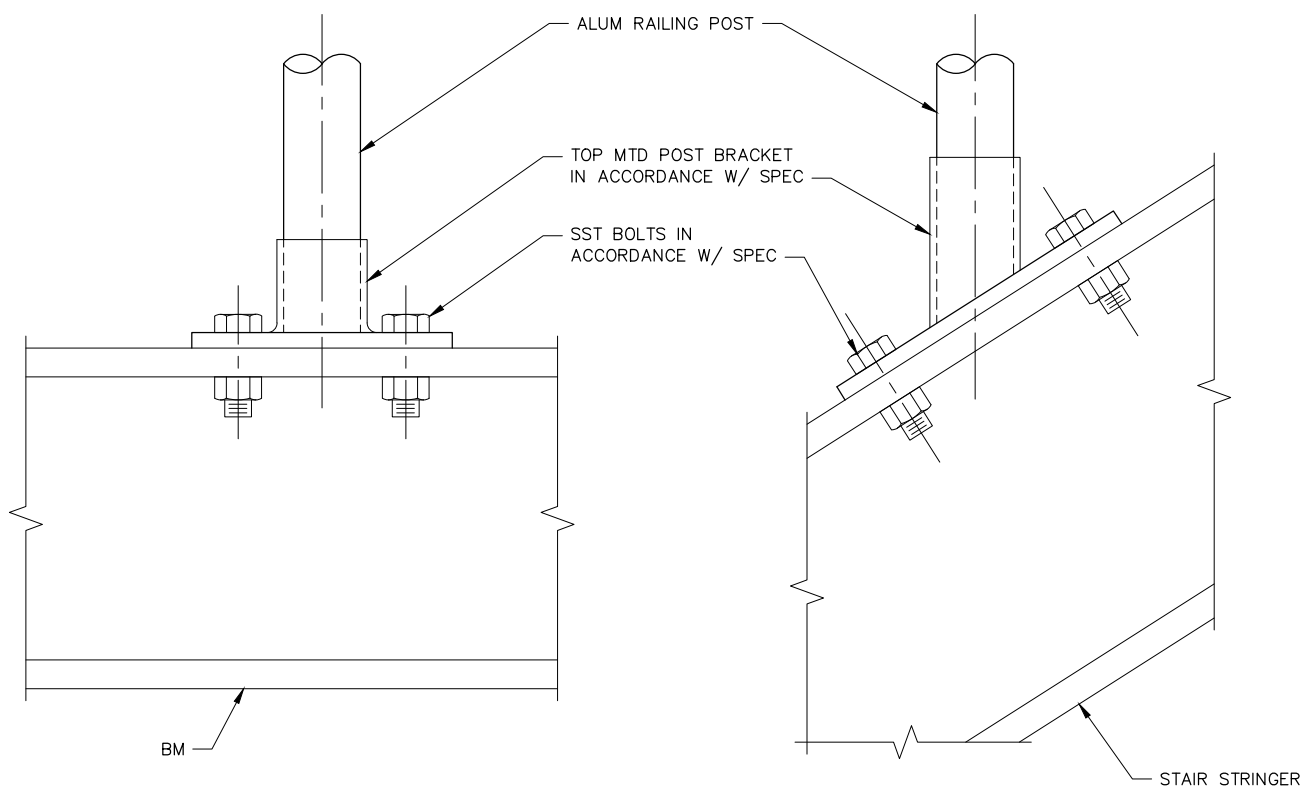
05112
RAILING POST ANCHORAGE
TYPE "B" – ALUMINUM



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PLAN



ELEVATION

NOTE:

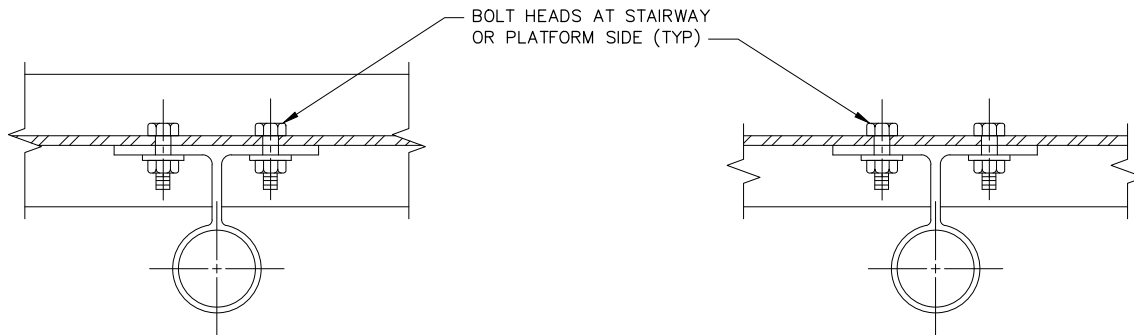
PROVIDE PROTECTION FOR DISSIMILAR METALS
IN ACCORDANCE WITH SPECIFICATIONS.

DRAWN BY: VAICIKAIUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

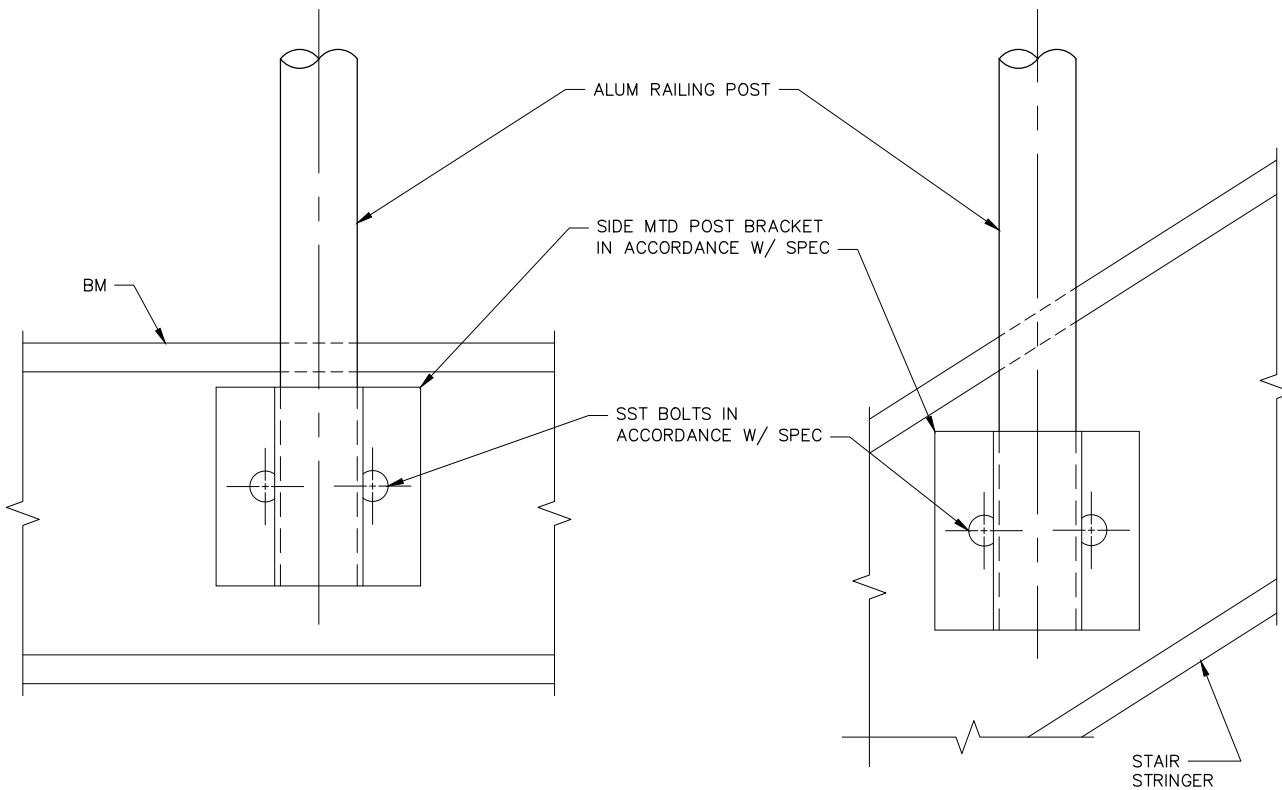
05113
RAILING POST ANCHORAGE
TYPE "C" – ALUMINUM



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PLAN



ELEVATION

NOTE:

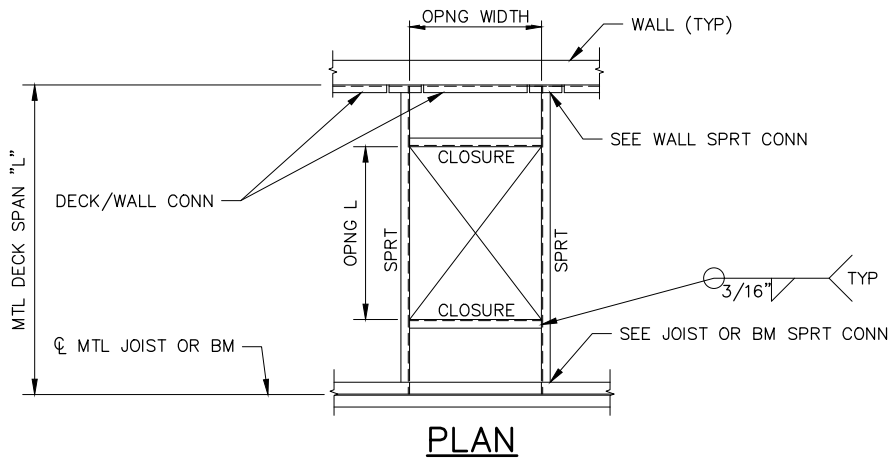
PROVIDE PROTECTION FOR DISSIMILAR METALS
IN ACCORDANCE WITH SPECIFICATIONS.

DRAWN BY: VAICIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05114
RAILING POST ANCHORAGE
TYPE "D" – ALUMINUM

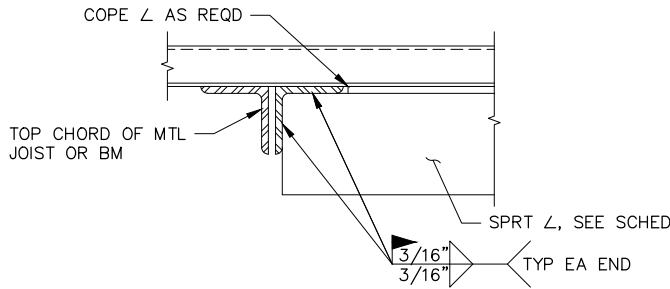


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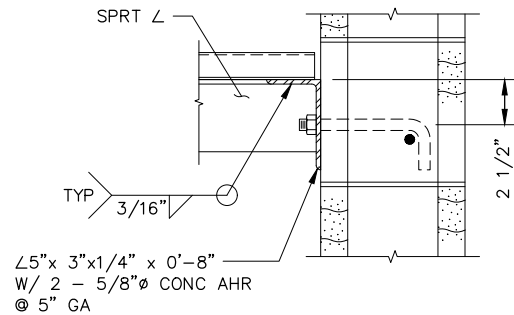


OPENING	CLOSURE	DECK SPAN	SUPPORT
2'-0" < W ≤ 4'-0"	∠3"x3"x1/4"	L ≤ 6'-0"	∠4"x3"x1/4"
4'-0" < W ≤ 6'-0"	∠4"x3"x1/4" (LLV)	6'-0" < L ≤ 7'-6"	∠5"x3"x1/4" (LLV)
6'-0" < W	N/A	7'-6" < L	N/A

OPENINGS 2'-1" TO 6'-0"

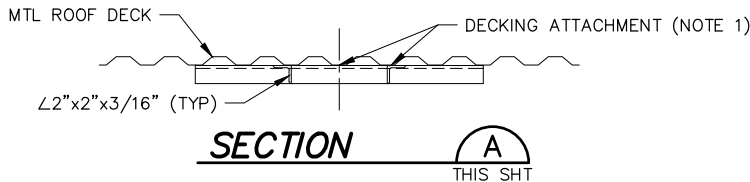
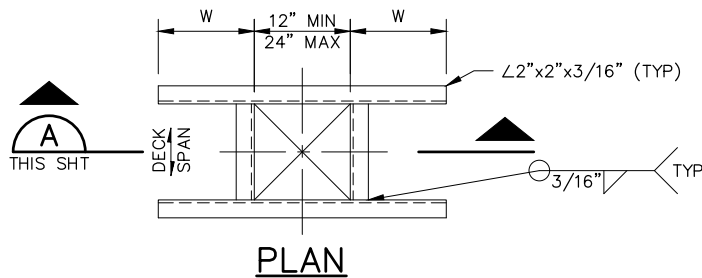


JOIST OR BEAM SUPPORT



WALL SUPPORT

FRAMING CONNECTIONS



NOTES:

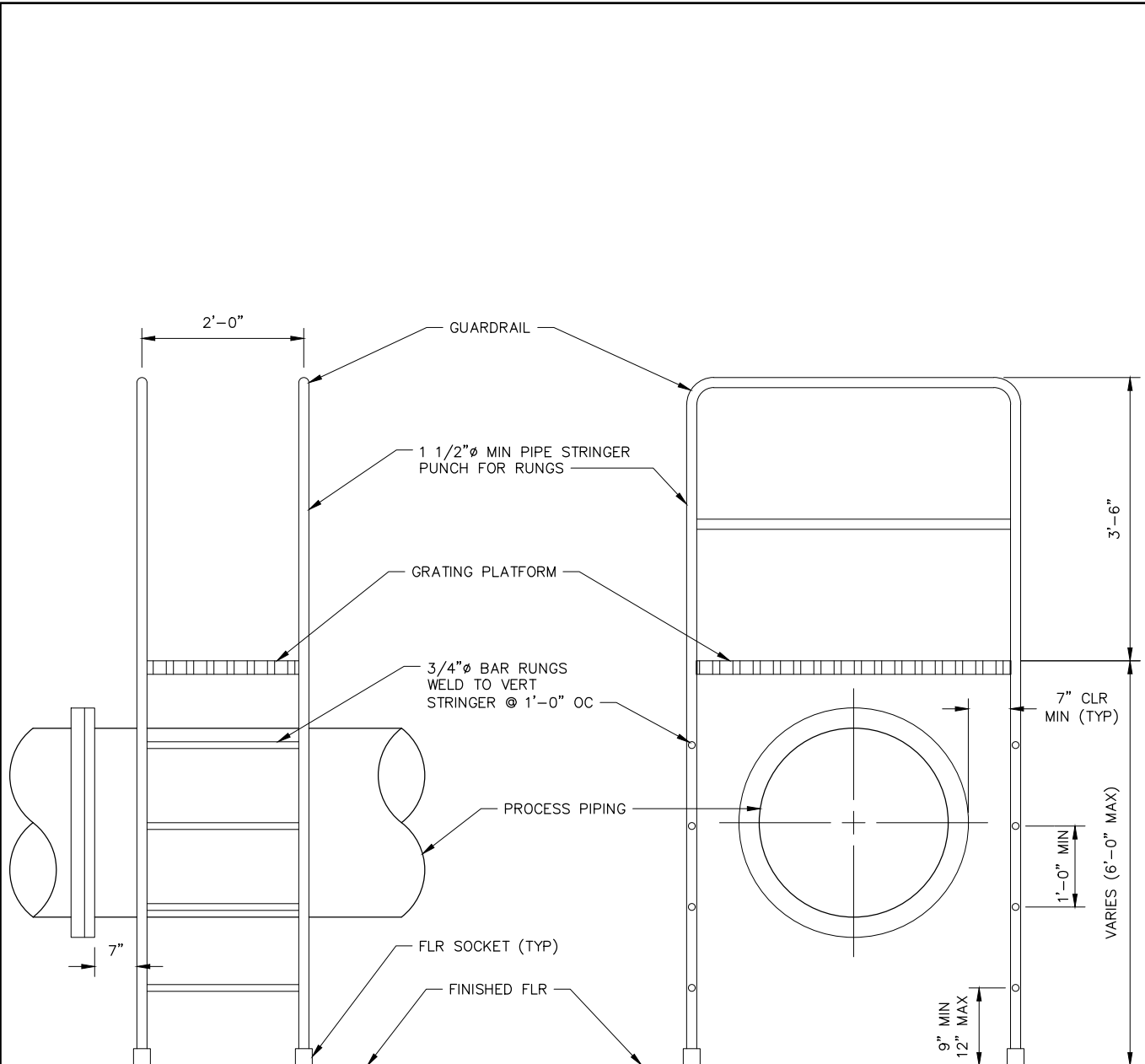
OPENINGS 1'-0" TO 2'-0"

- ATTACH METAL DECKING TO ALL SUPPORTS PERPENDICULAR TO DECKING SPAN WITH SPECIFIED FASTENERS AT EACH VALLEY OF DECKING. ATTACH METAL DECKING TO SUPPORTS PARALLEL TO SPAN AT 6 INCHES ON CENTER. WHERE VALLEY OF DECKING DOES NOT FALL AT SUPPORTS PARALLEL TO DECK SPAN, PROVIDE FILLER PIECES FOR EQUAL ATTACHMENTS.
- REFER TO SPECIFICATIONS FOR SMALLER DECK OPENING REINFORCEMENT.

DRAWN BY: IVERY
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APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

05120
ROOF DECK OPENING

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ELEVATION

SECTION

NOTES:

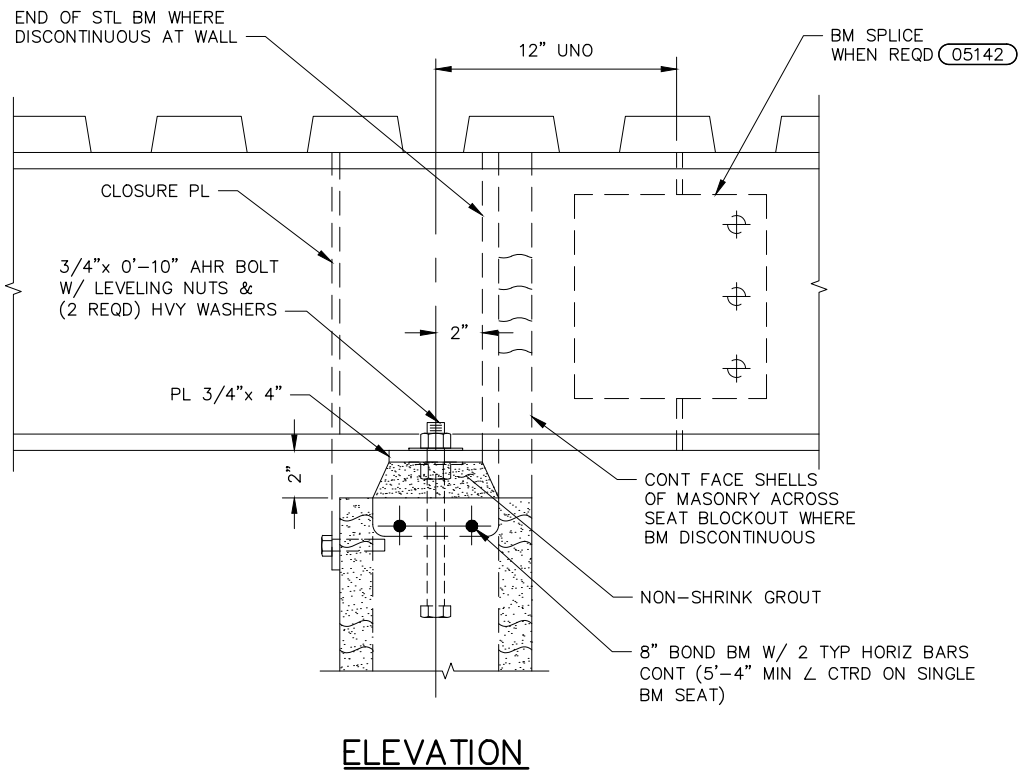
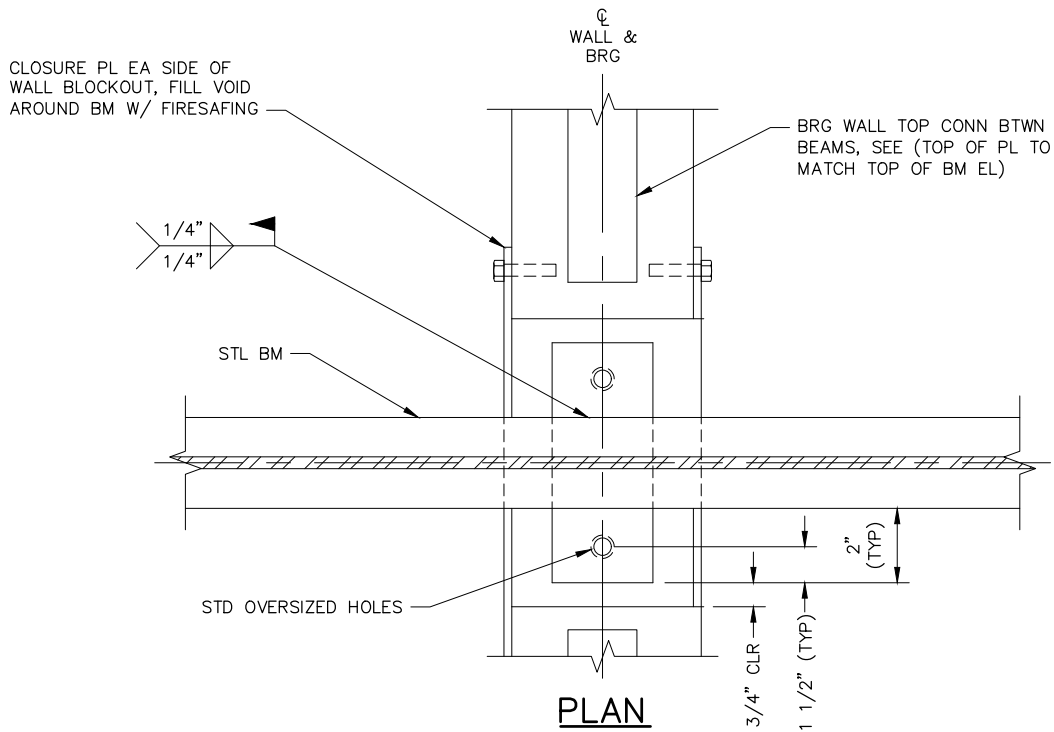
1. RUNG TO BE HOT DIP GALVANIZED UNLESS OTHERWISE NOTED AND SHALL HAVE CORRUGATED, KNURLED, OR DIMPLED SURFACE ON TOP OF RUNG.
2. ALL STEEL SHALL BE HOT DIP GALVANIZED UNLESS OTHERWISE NOTED.

DRAWN BY: VAICIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05130
CROSSOVER STEEL PLATFORM



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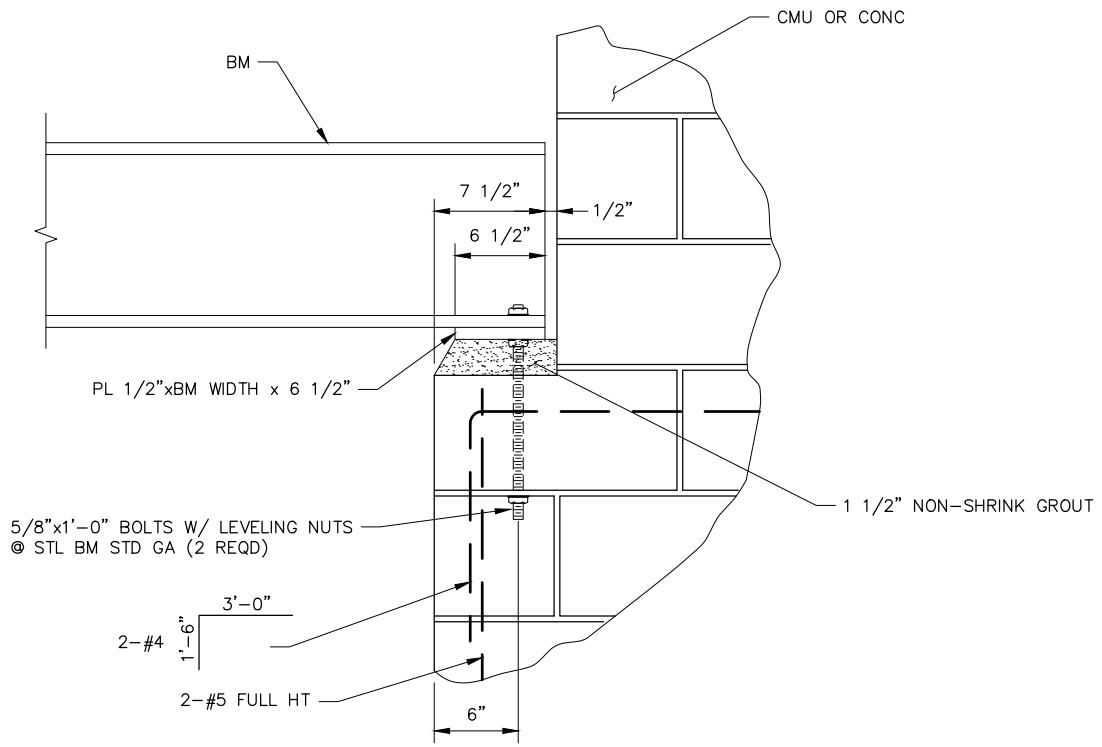


DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

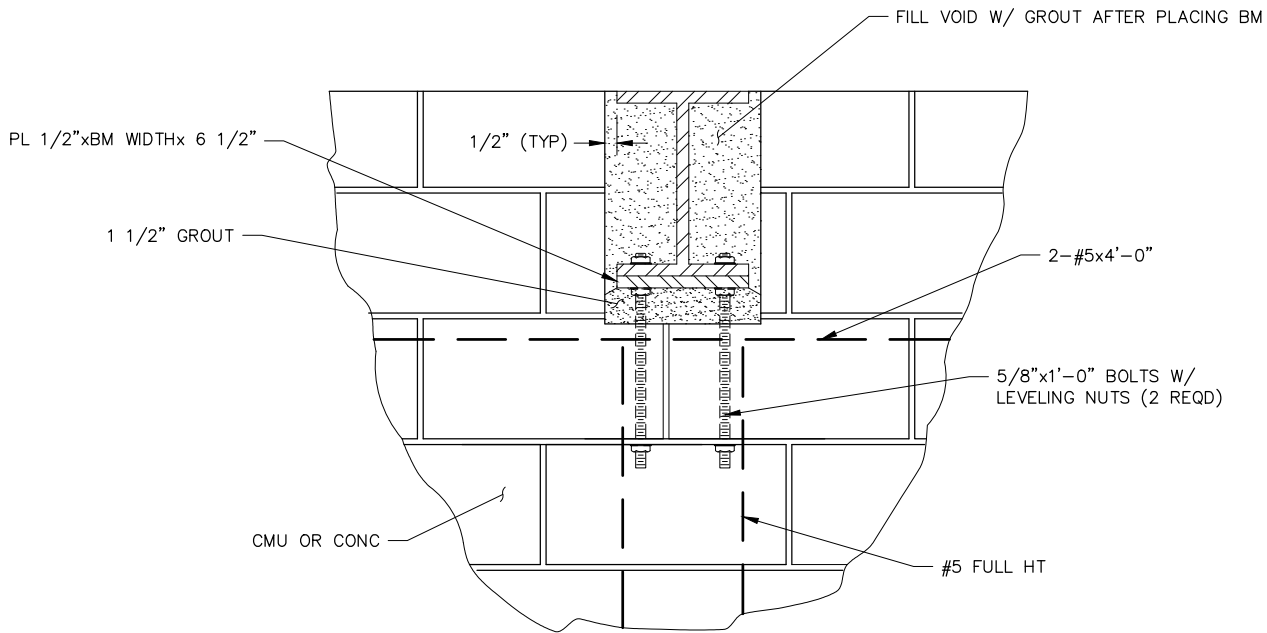
05140
**BEAM SEAT/INTERIOR
 WALL - STEEL**

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PARALLEL TO WALL



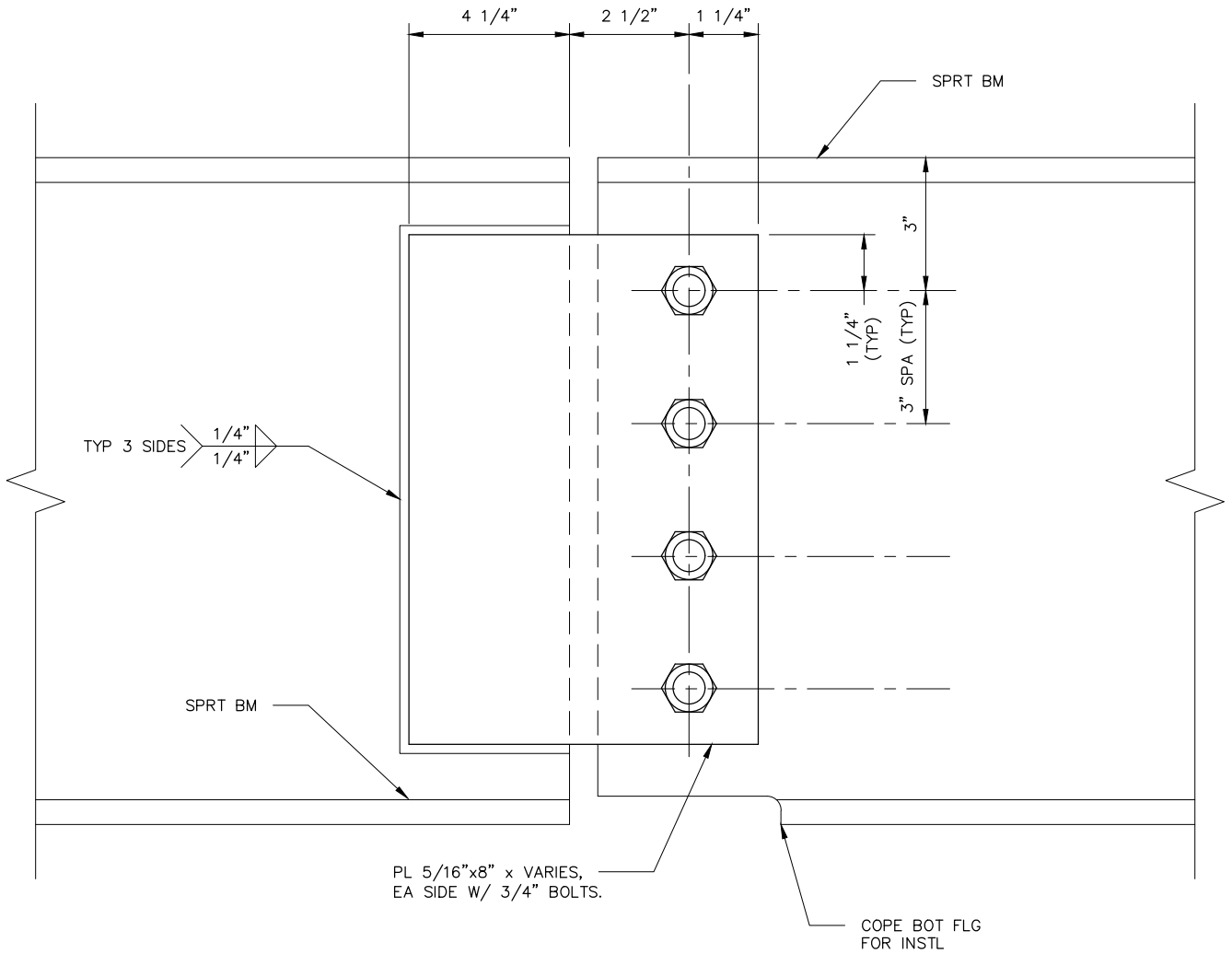
PERPENDICULAR TO WALL

DRAWN BY: IVERY
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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

05141
BEAM SEAT - STEEL



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NOTE:

PROVIDE SHIM PLATES AS REQUIRED.

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

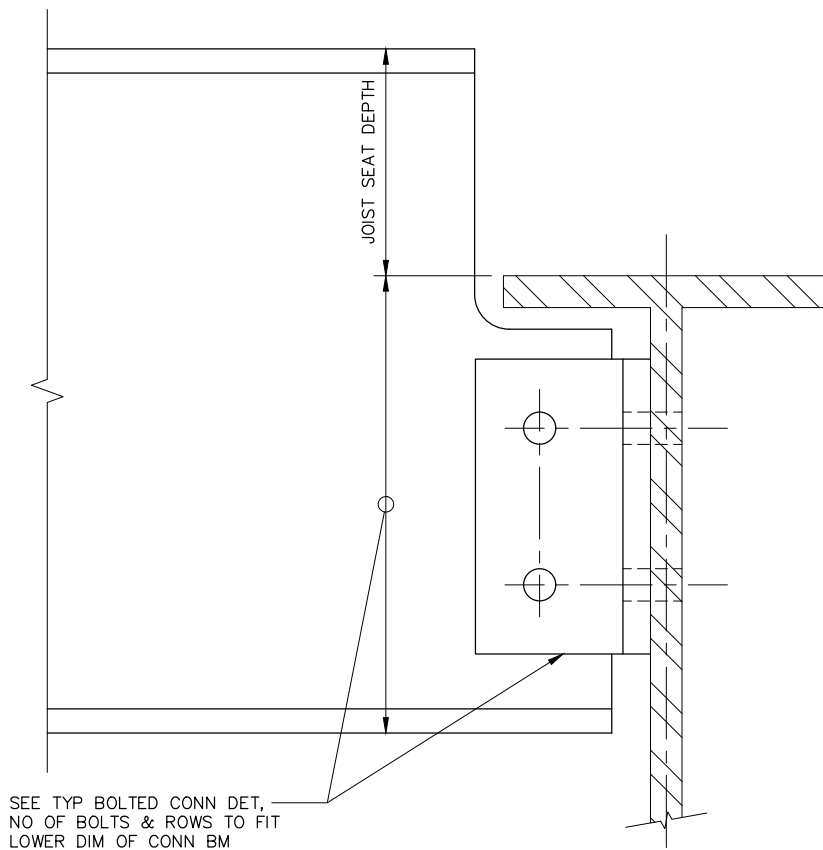
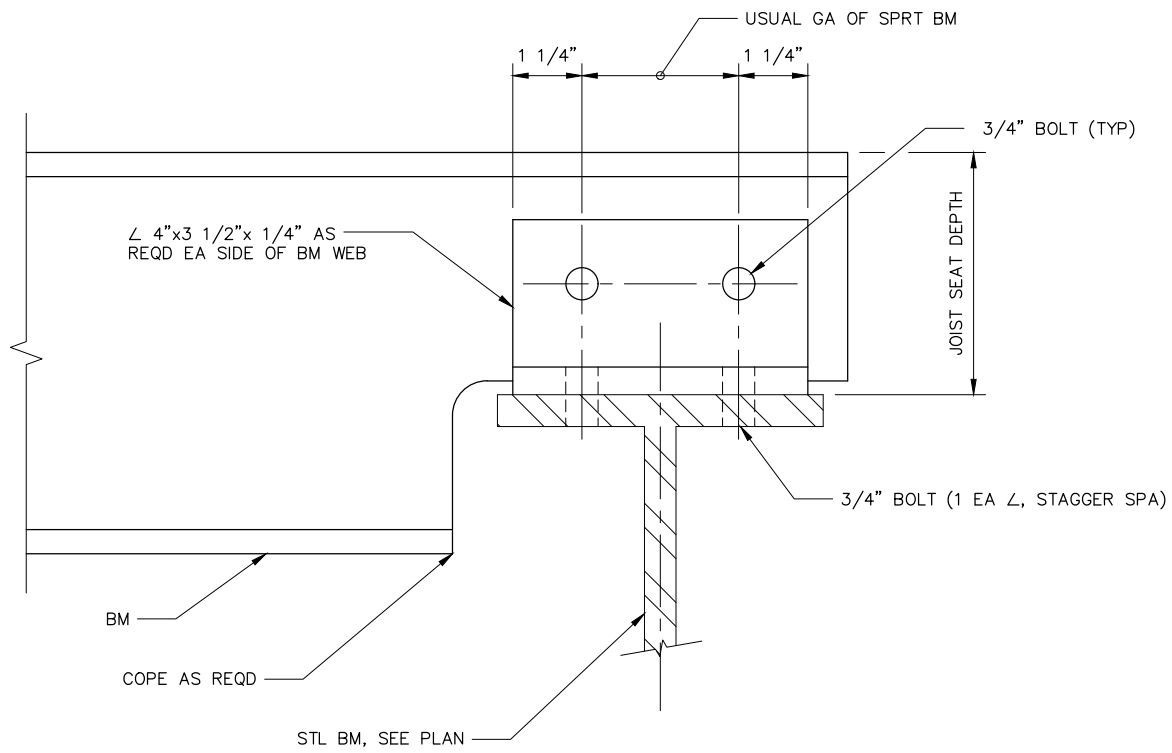
ORIGINATION DATE: JULY 2021

REVISION DATE:

**05142
BEAM SPLICE – STEEL**



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NOTE:

HOT DIPPED GALVANIZE AFTER FABRICATION.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

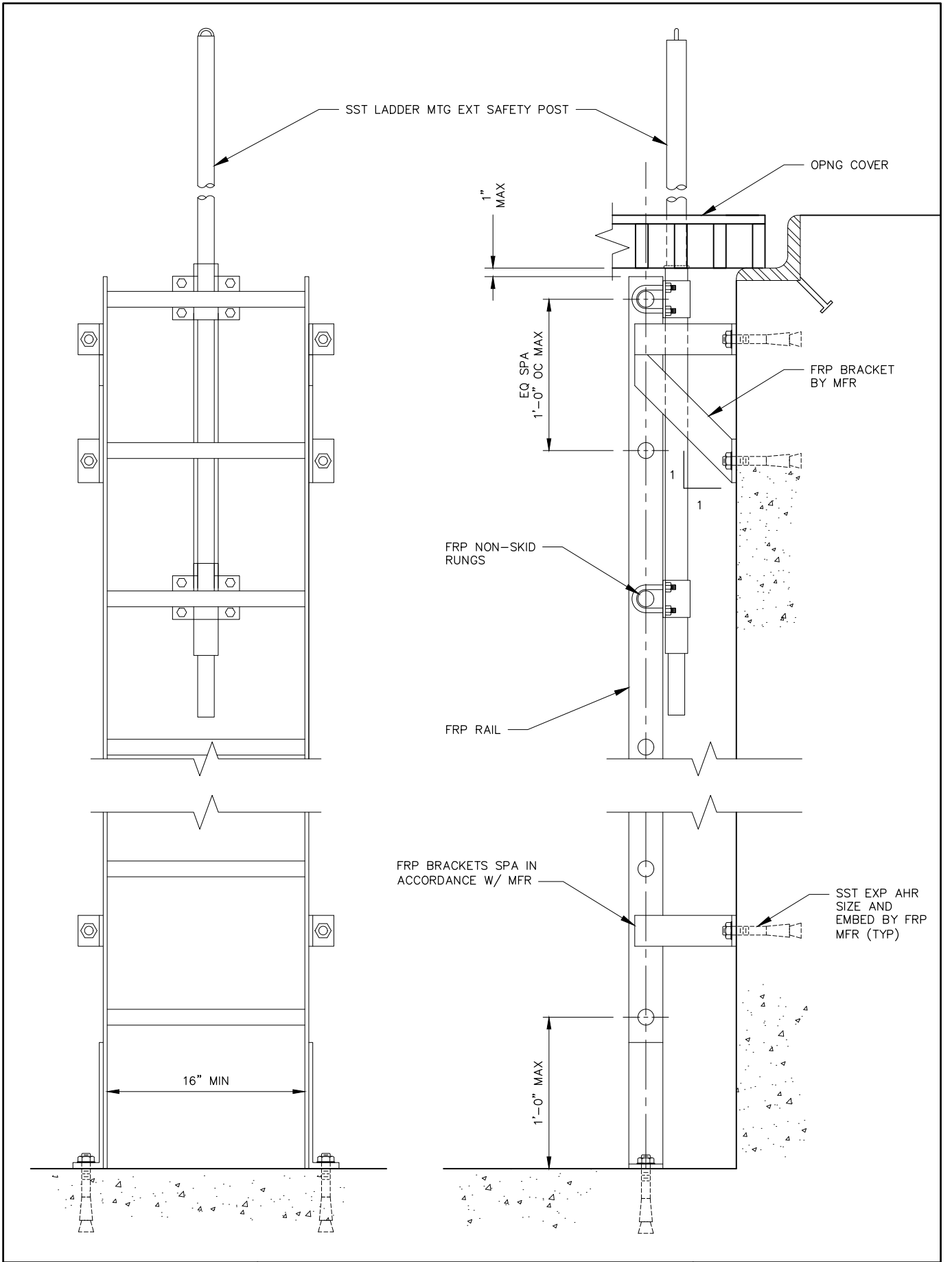
ORIGINATION DATE: JULY 2021

REVISION DATE:

**05143
COPED BEAM
CONNECTION - STEEL**



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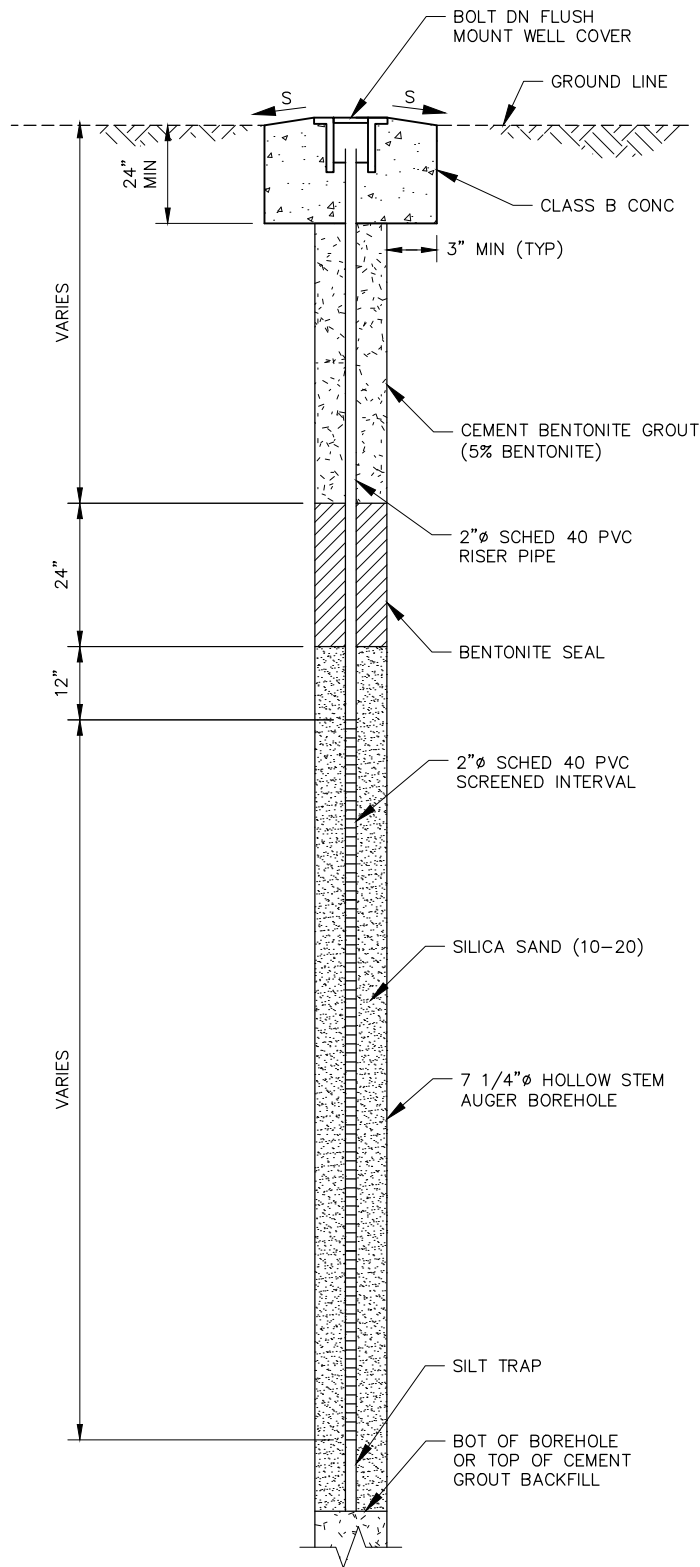
DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

06001
FIBERGLASS REINFORCED
PLASTIC LADDER

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INTENTIONALLY BLANK



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APPD BY: [Signature]

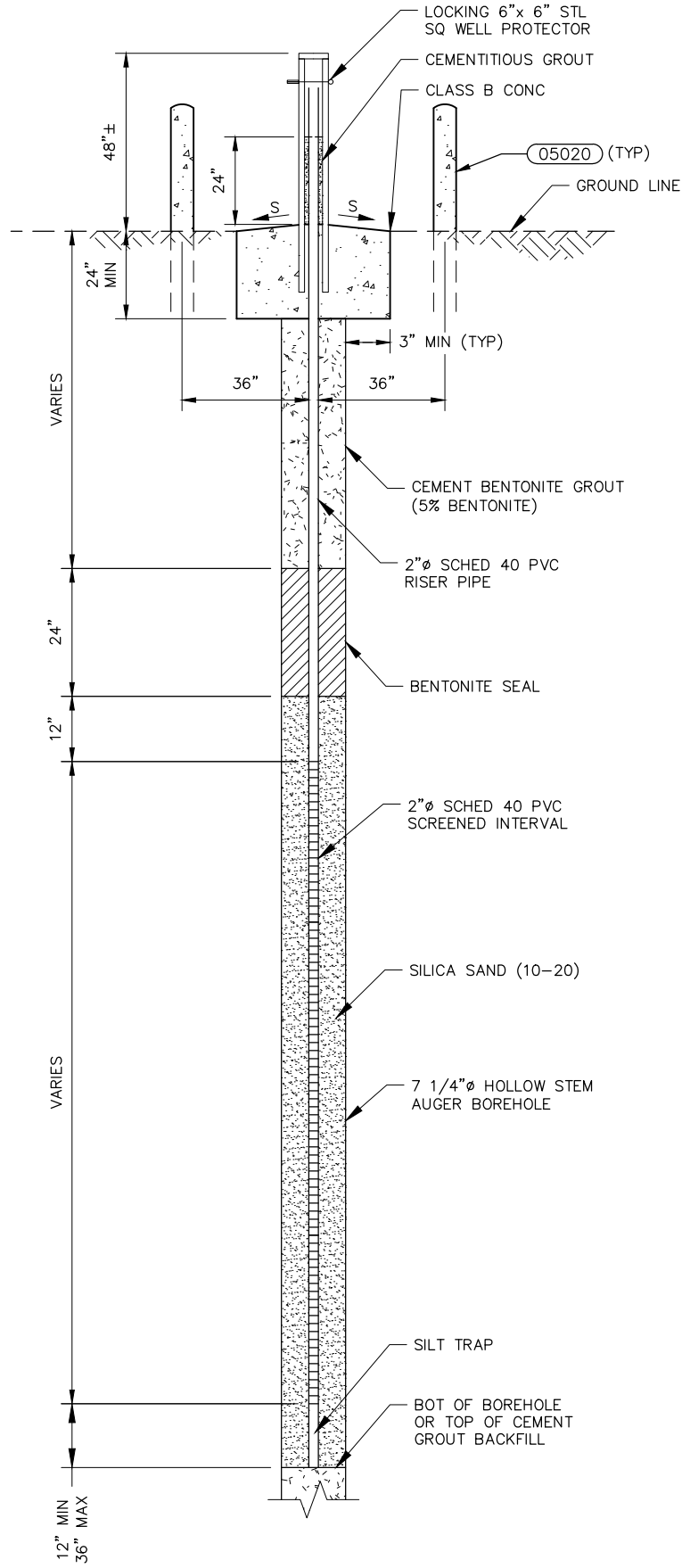
ORIGINATION DATE: JULY 2021

REVISION DATE:

**13001
SINGLE-LEVEL PIEZOMETER
FLUSH MOUNT**



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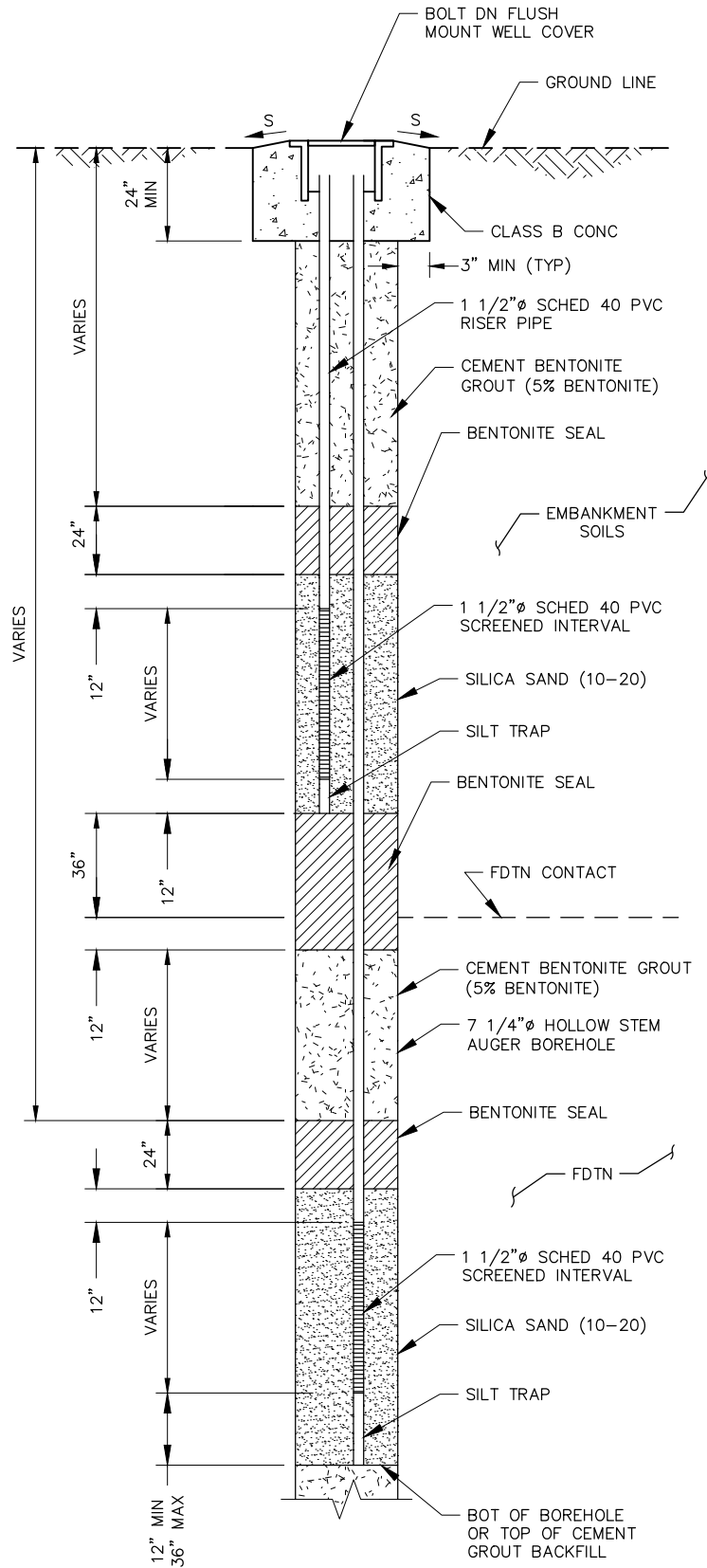


DRAWN BY: BERKNESS
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

13002
 SINGLE-LEVEL PIEZOMETER
 STICK UP MOUNT



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CHKD BY: K ROSS/KLR

APPD BY: [Signature]

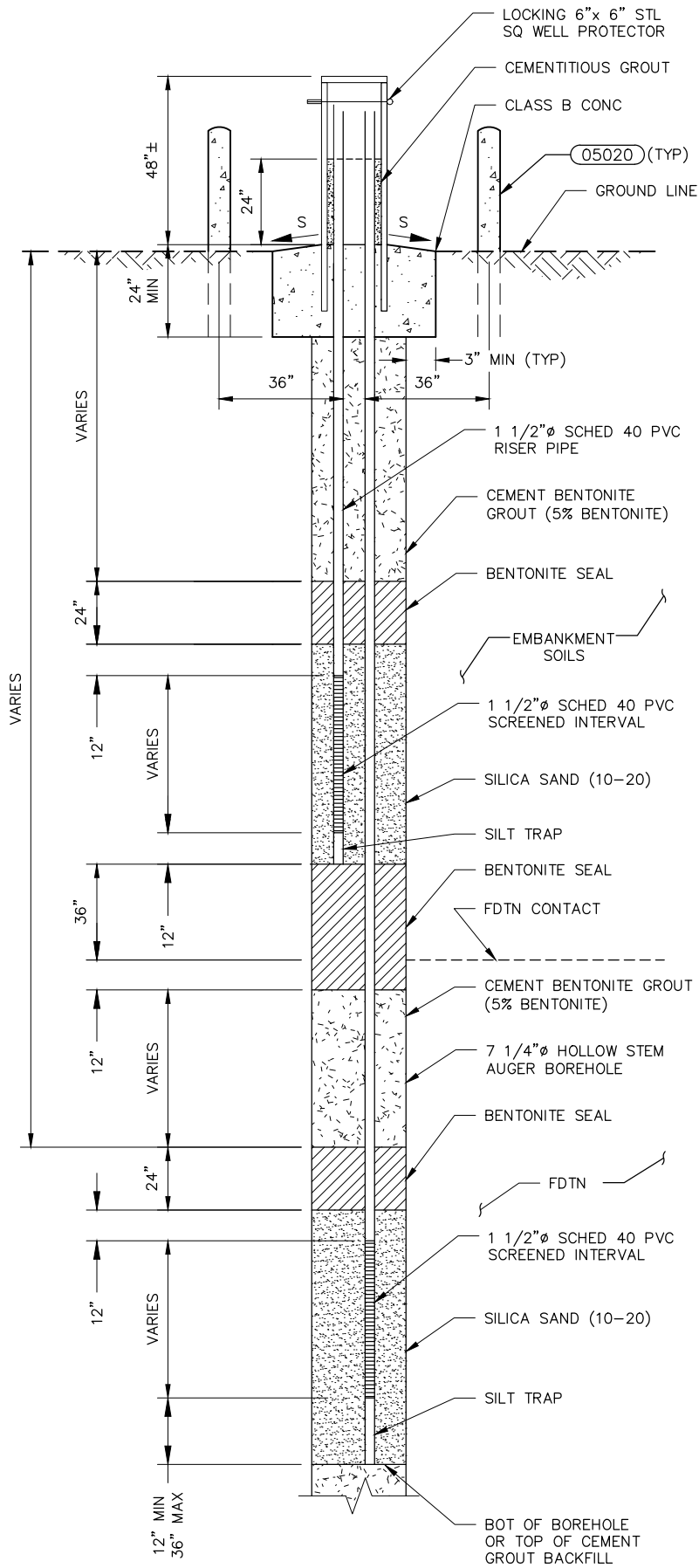
ORIGINATION DATE: JULY 2021

REVISION DATE:

13003
**DUAL-LEVEL PIEZOMETER
 FLUSH MOUNT**



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

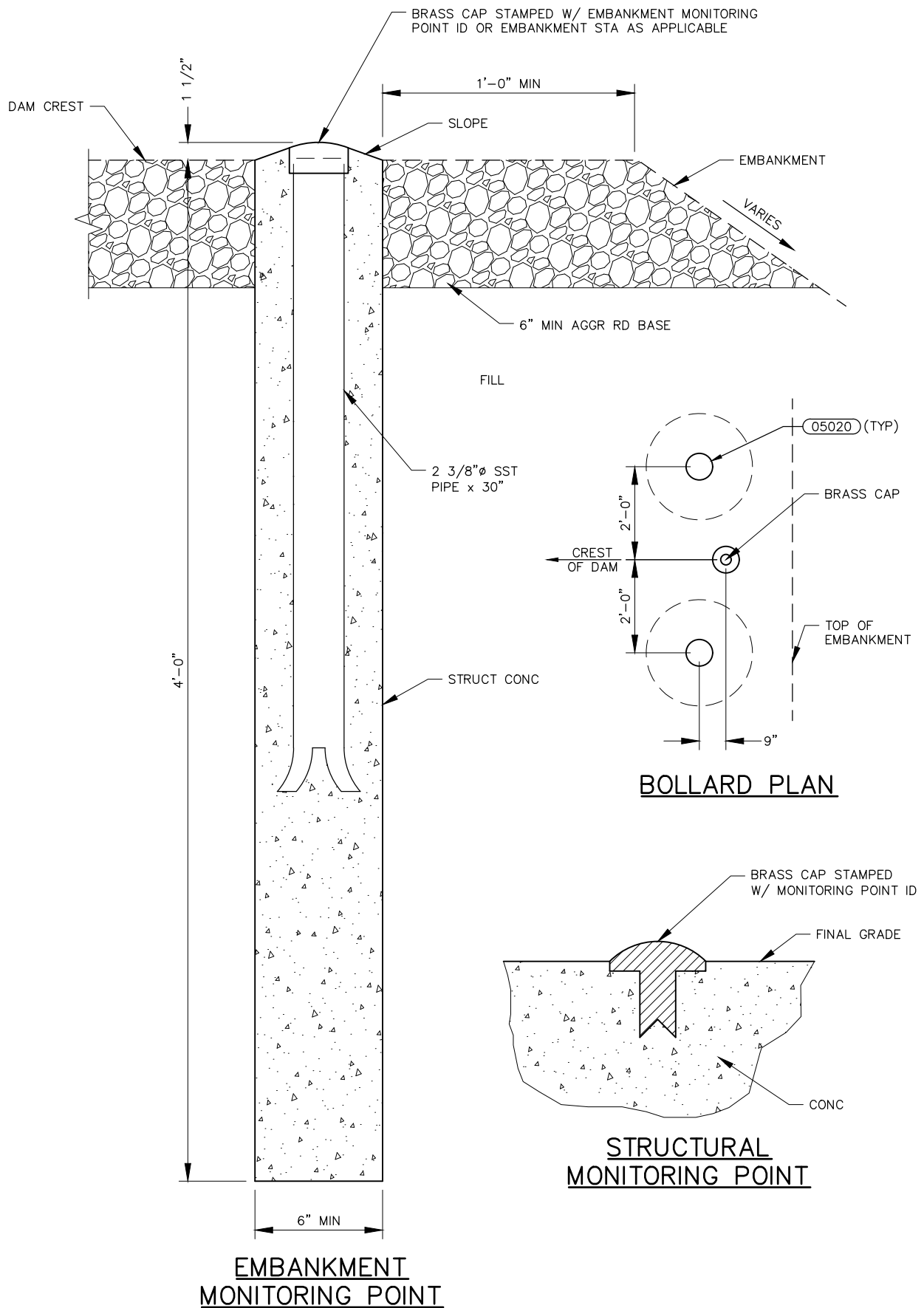
ORIGINATION DATE: JULY 2021

REVISION DATE:

13004
**DUAL-LEVEL PIEZOMETER
 STICK UP MOUNT**

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APPD BY: [Signature]

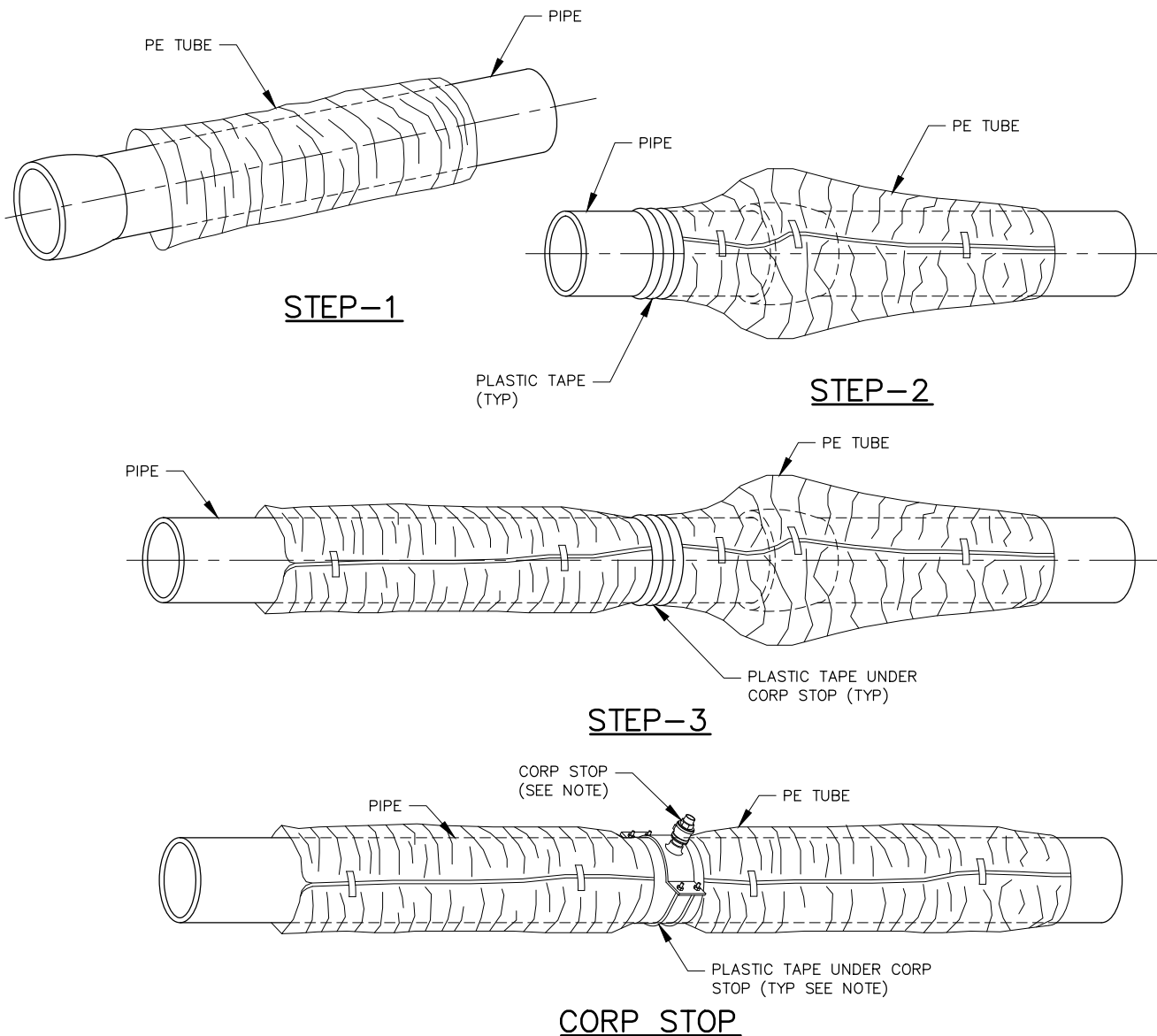
ORIGINATION DATE: JULY 2021

REVISION DATE:

13005
MONITORING POINT/
STATION MARKER



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FIELD INSTALLATION – POLYETHYLENE WRAP

STEP-1 PLACE THE TUBE OF POLYETHYLENE MATERIAL AROUND THE PIPE PRIOR TO LOWERING IT INTO THE TRENCH.

STEP-2 PULL THE TUBE OVER THE LENGTH OF THE PIPE. TAPE THE TUBE TO THE PIPE AT THE JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH THREE CIRCUMFERENTIAL TURNS OF 2 INCH WIDE PLASTIC TAPE TO HOLD PLASTIC TUBE AROUND SPIGOT END.

STEP-3 ADJACENT TUBE OVERLAPS FIRST TUBE AND SECURED WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE WILL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED INTO AN OVERLAP ON TOP OF THE PIPE, AND HELD IN PLACE BY MEANS OF PIECES OF PLASTIC TAPE AT APPROXIMATELY 3 FOOT INTERVALS.

NOTES:

1. AT LOCATION OF TAP, APPLY FOUR WRAPS OF PLASTIC TAPE AROUND THE PIPE FOR A WIDTH THAT WILL PROVIDE PROTECTION OF THE POLYETHYLENE WRAP FROM THE TAPPING MACHINE.
2. APPLIES TO STANDARD AND V-BIO POLYETHYLENE WRAP INSTALLATIONS.

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

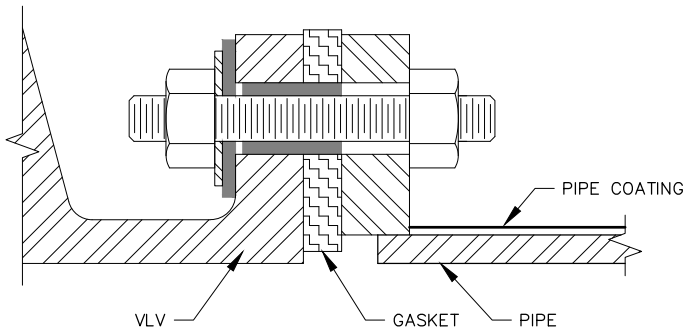
ORIGINATION DATE: JULY 2021

REVISION DATE:

13020 FIELD INSTALLATION – POLYETHYLENE WRAP

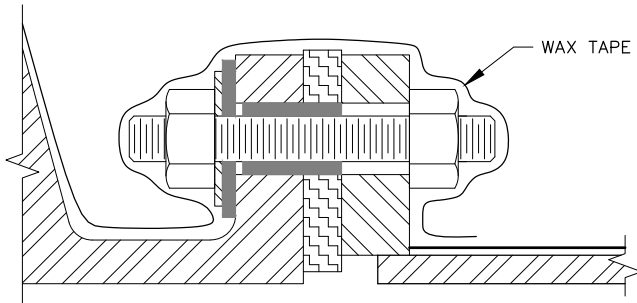


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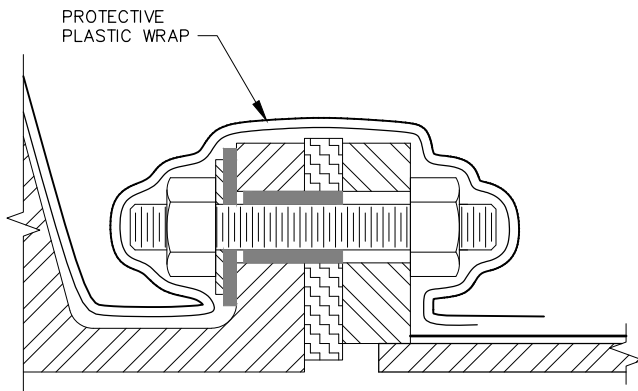
STEP-1

CLEAN TO REMOVE ALL FOREIGN MATTER AND EXCESS MOISTURE. ACHIEVE SSPC-SP2. APPLY 3 MILS OF PRIMER TO FLANGED JOINT AND VALVE.



STEP-2

CUT, FIT, FORM, AND WRAP WAX TAPE AROUND FLANGED JOINT AND VALVE TO PROVIDE MINIMUM THICKNESS OF 70 MILS. OVERLAPS SHALL BE 1 INCH MINIMUM. OVERLAP ON PIPE COATING SHALL BE 2 INCH MINIMUM.



STEP-3

CIRCUMFERENTIALLY INSTALL PROTECTIVE PLASTIC WRAP 1.5 MILS MINIMUM THICKNESS OVER WAX TAPE. OVERLAPS SHALL BE 1 INCH MINIMUM.

NOTES:

1. FOR GATE VALVES, INSTALL WAX TAPE SYSTEM UP TO VALVE STEM. FOR BUTTERFLY VALVES, INSTALL WAX TAPE SYSTEM ON ACTUATOR TO MANHOLE PENETRATION.
2. INSULATED VALVE FLANGE CONNECTION SHOWN. DETAIL APPLIES TO ANY FLANGE CONNECTION.

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CHKD BY: K ROSS/KLR

APPD BY: [Signature]

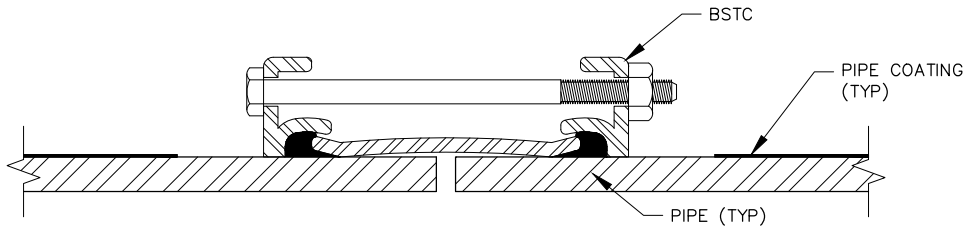
ORIGINATION DATE: JULY 2021

REVISION DATE:

**13021
FIELD INSTALLATION WAX TAPE
(FLANGED CONNECTION)**

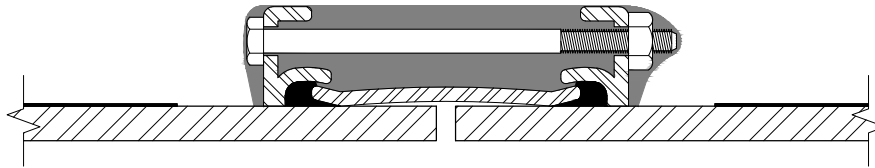


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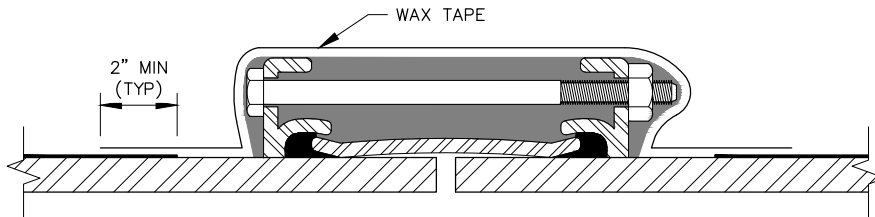
STEP-1

CLEAN TO REMOVE ALL FOREIGN MATTER AND EXCESS MOISTURE. ACHIEVE SSPC-SP2. APPLY 3 MILS OF PRIMER TO UNCOATED PIPE, COUPLING SURFACES, AND PIPE COATING WHERE WAX TAPE AND WRAP WILL LAP.



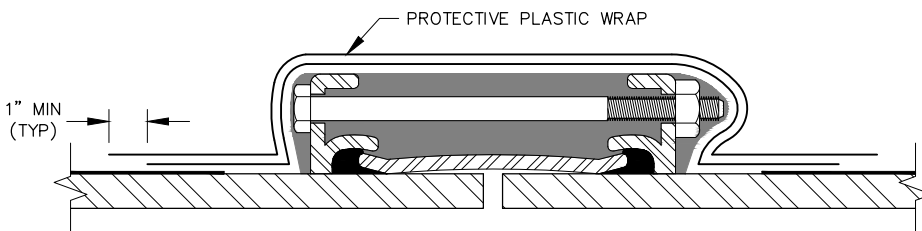
STEP-2

APPLY FILL MASTIC IN SHADED AREA TO PROVIDE A UNIFORM SURFACE TO WHICH WAX TAPE CAN BE APPLIED WITHOUT BRIDGING OR VOIDS.



STEP-3

CIRCUMFERENTIALLY INSTALL WAX TAPE AROUND PIPE AND COUPLING TO PROVIDE A MINIMUM THICKNESS OF 70 MILS. OVERLAPS SHALL BE 1 INCH MINIMUM. OVERLAP ON PIPE COATING SHALL BE 2 INCH MINIMUM.



STEP-4

CIRCUMFERENTIALLY INSTALL PROTECTIVE PLASTIC WRAP 1.5 MILS MINIMUM THICKNESS OVER WAX TAPE. OVERLAPS SHALL BE 1 INCH MINIMUM.

NOTE:

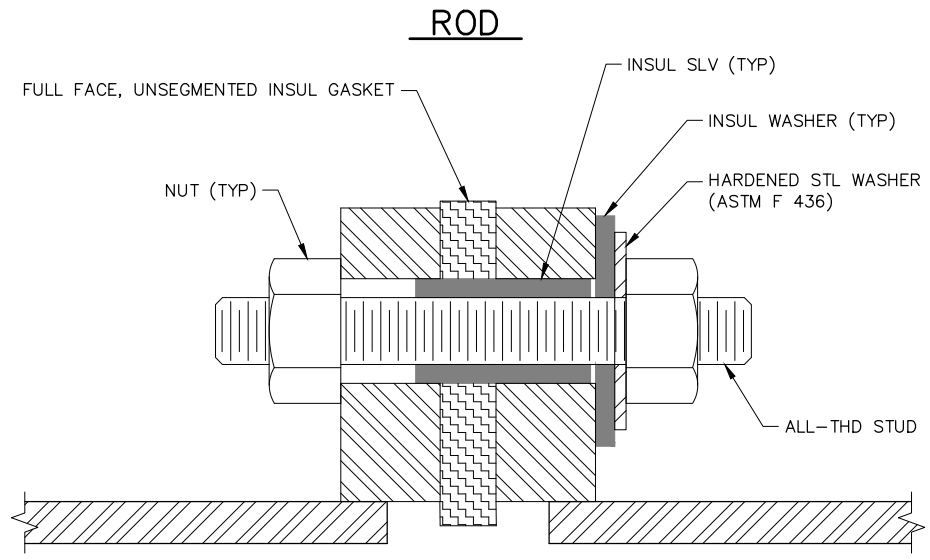
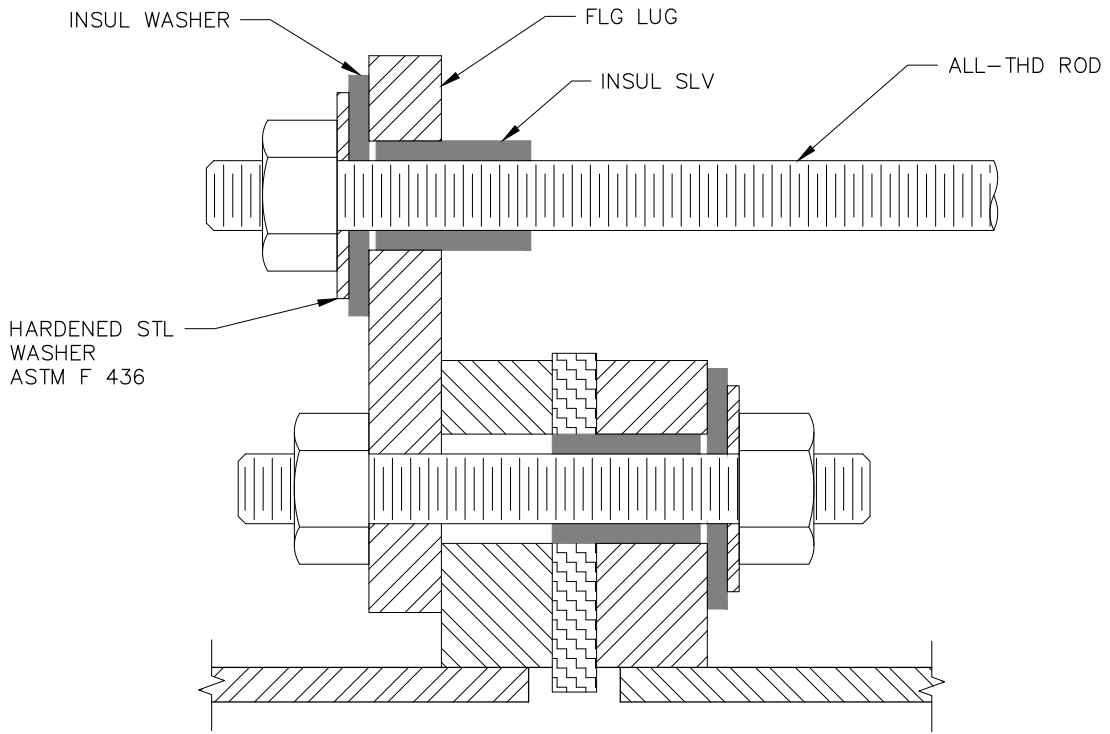
NON-INSULATED BOLTED SLEEVE TYPE COUPLING CONNECTION SHOWN. DETAIL APPLIES TO ANY BURIED BOLTED SLEEVE TYPE COUPLING CONNECTION.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

13022
FIELD INSTALLATION WAX TAPE
(BOLTED SLEEVE TYPE
COUPLING CONNECTION)



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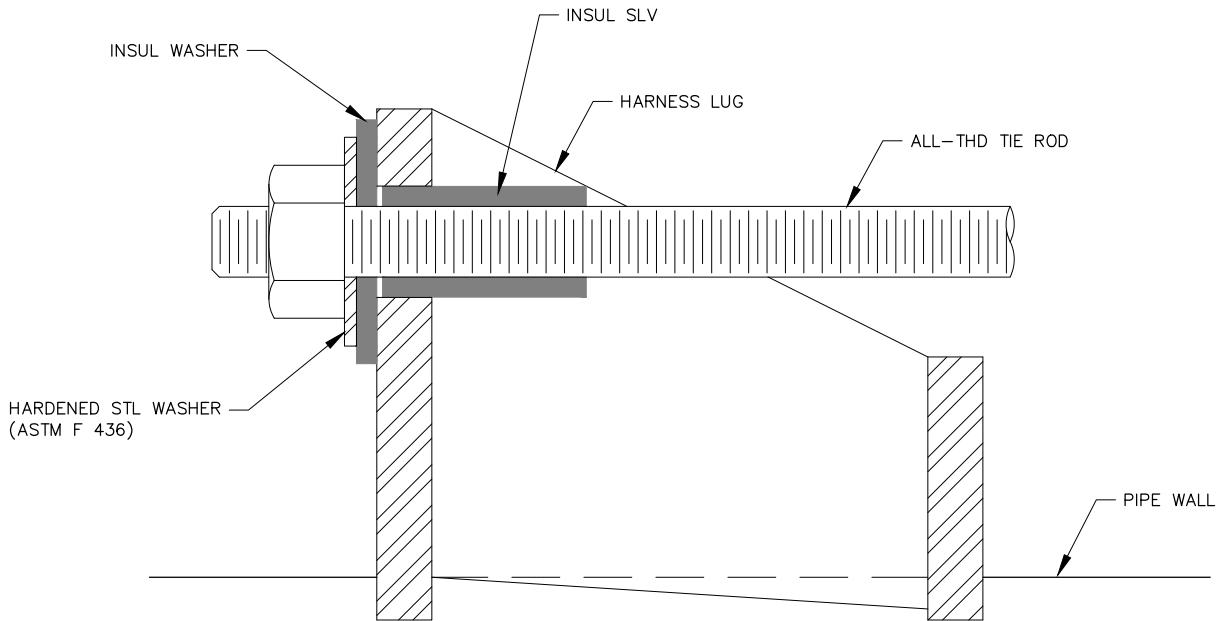
FLANGED JOINT

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

13023
INSULATED FLANGED JOINT
AND RODS

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NOTE:

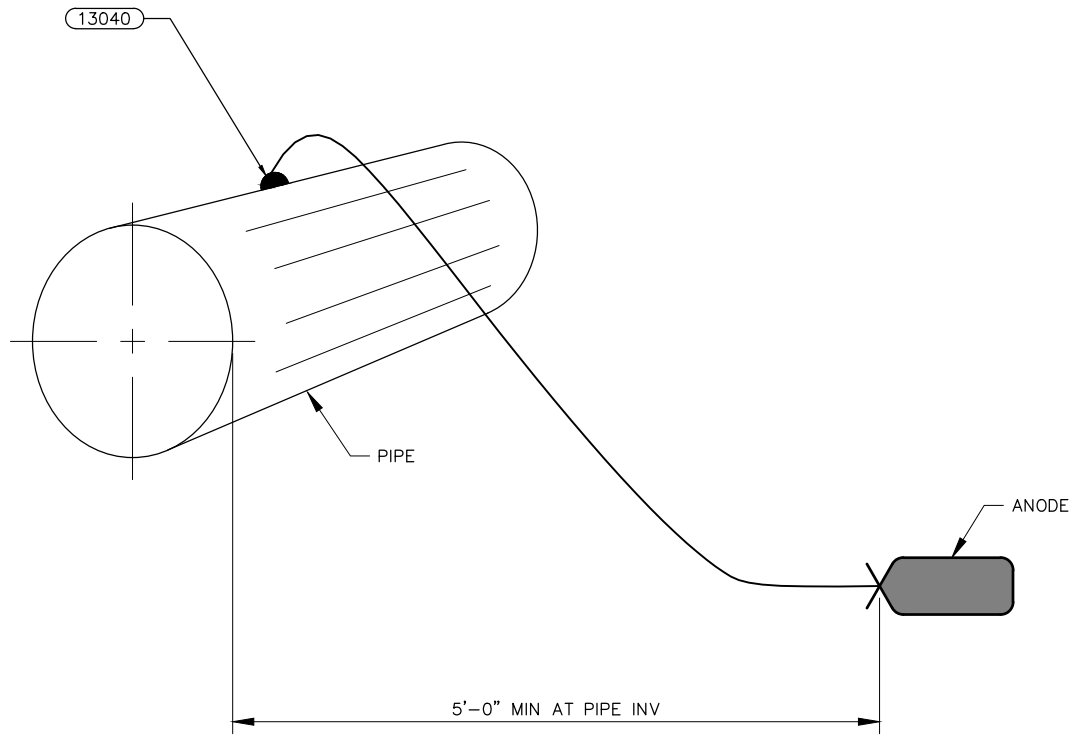
INSULATING HARNESS LUGS SHALL HAVE BOLT HOLES
1/4 INCH DIAMETER LARGER THAN ROD DIAMETER.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13024
INSULATED ROD ON
HARNESS LUG**



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NOTE:

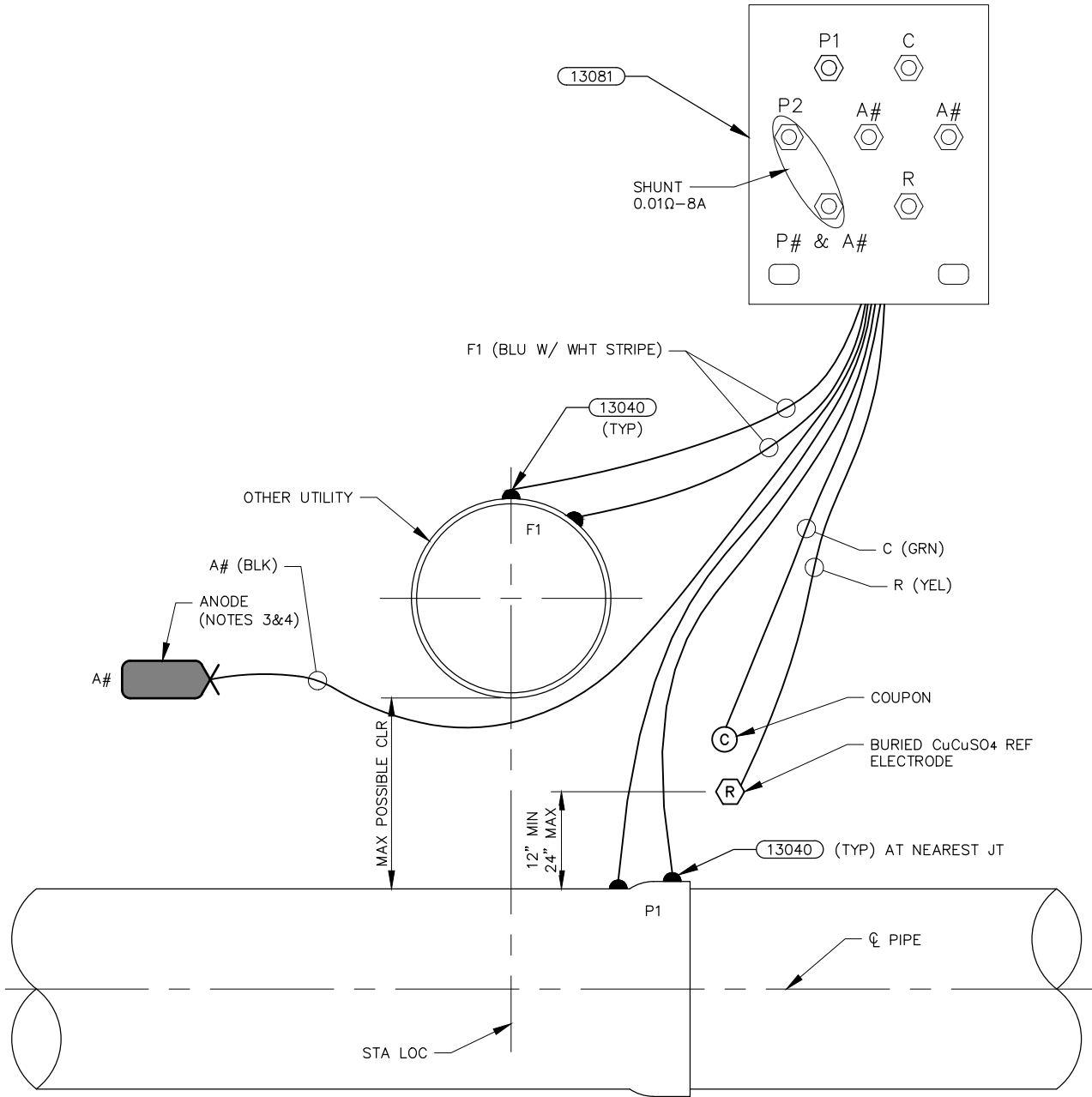
NUMBER OF ANODES, MATERIAL, AND SIZE MAY VARY.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
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**13025
ANODE INSTALLATION**



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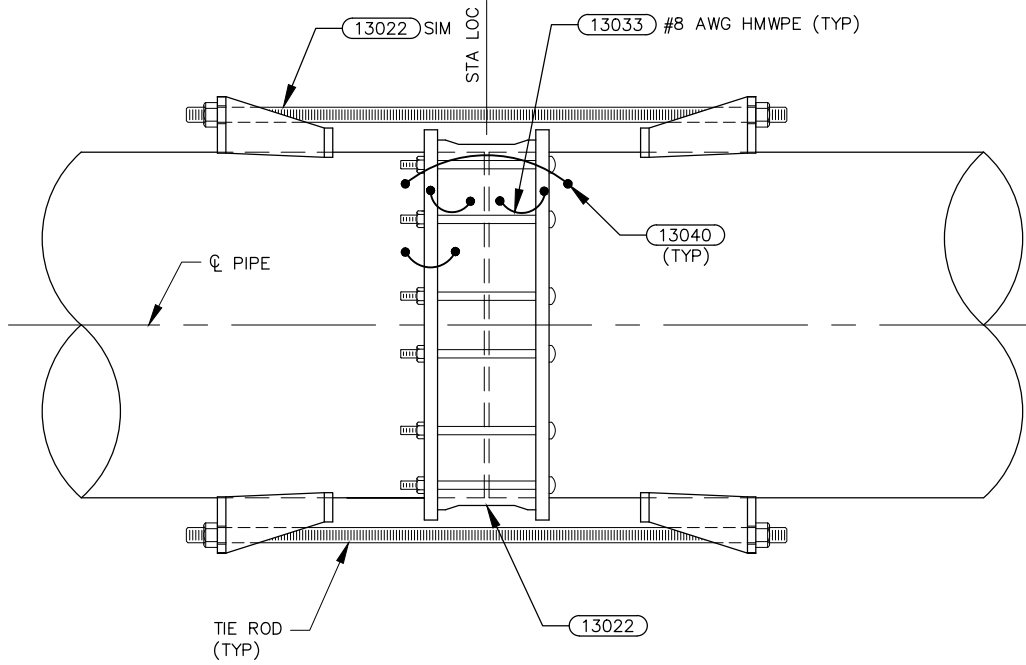
NOTES:

1. OBTAIN PERMISSION FROM OTHER UTILITY OWNER PRIOR TO INSTALLING TEST LEAD ON THEIR LINE.
2. COORDINATE CONNECTION OF WIRE F1 FOR STRAY CURRENT MITIGATION WITH OTHER UTILITY.
3. INSTALLATION MAY NOT CONTAIN ANODES. MULTIPLE ANODES ARE POSSIBLE.
4. ANODE MATERIAL MAY VARY.

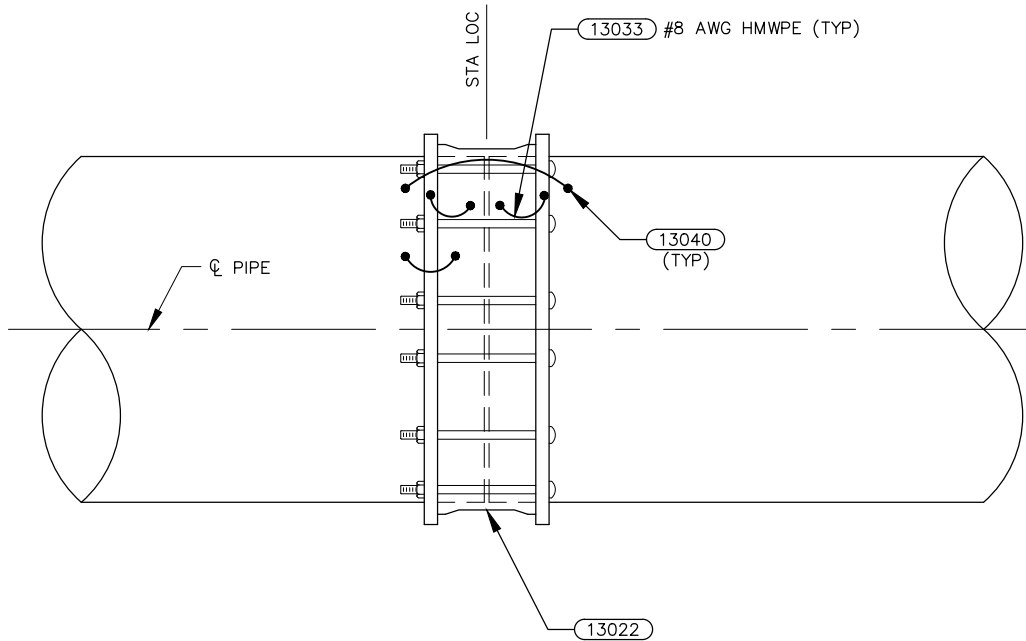
DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13030
INTERFERENCE PROTECTION**

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RESTRAINED SINGLE NON-INSULATED COUPLING



NON-RESTRAINED SINGLE NON-INSULATED COUPLING

NOTE:

FOR BURIED LOCATIONS OR LOCATIONS SUSCEPTIBLE TO SUBMERSION, SEE (13022).

DRAWN BY: BERKNES

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

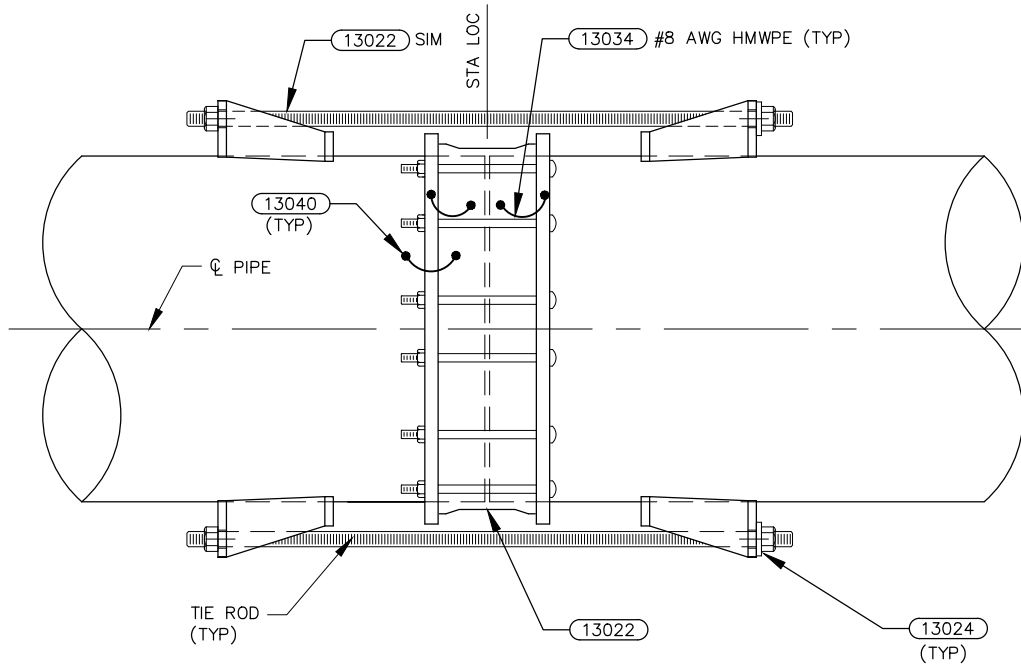
ORIGINATION DATE: JULY 2021

REVISION DATE:

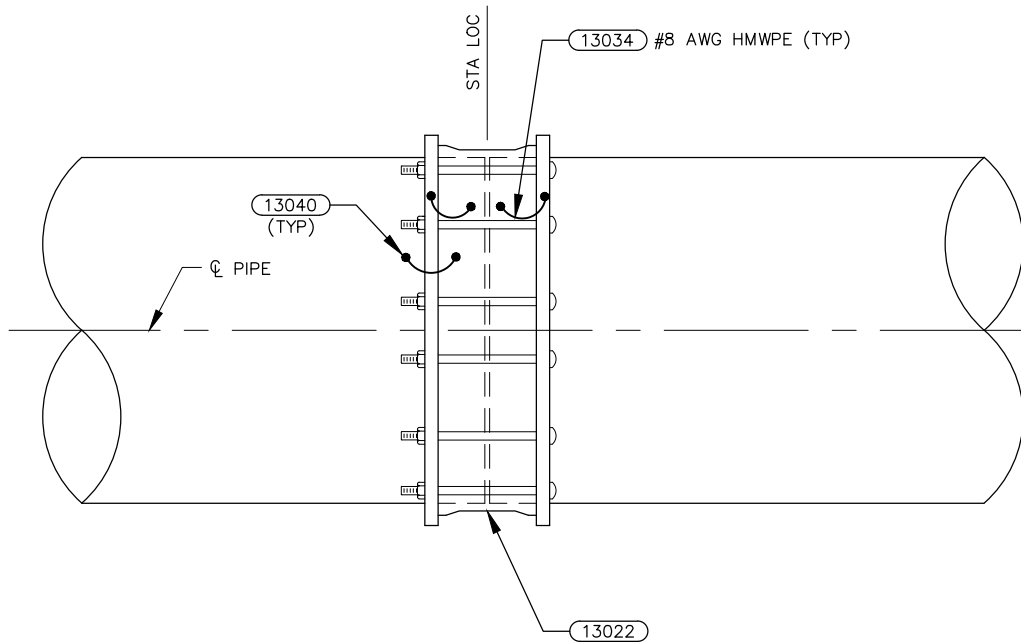
**13031
BOLTED SLEEVE TYPE
COUPLING BONDING
NON-INSULATED**



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RESTRAINED SINGLE INSULATED COUPLING



NON-RESTRAINED SINGLE INSULATED COUPLING

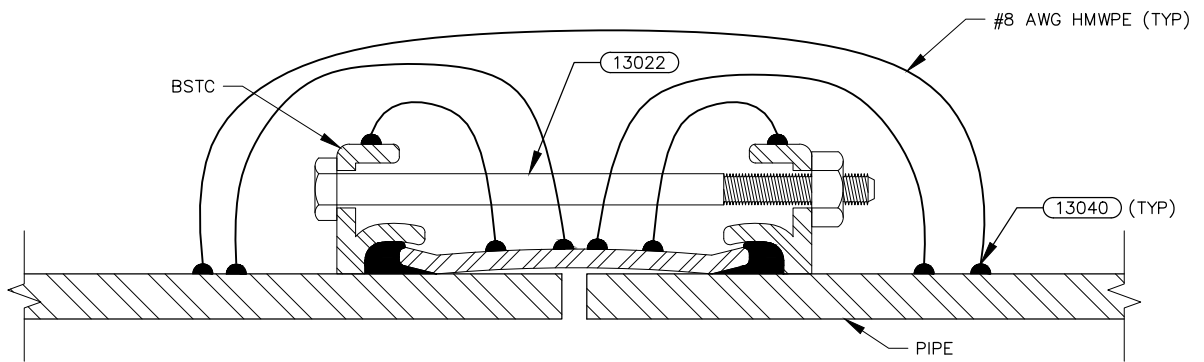
NOTE:

FOR BURIED LOCATIONS OR LOCATIONS SUSCEPTIBLE TO SUBMERSION. SEE (13022).

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13032
BOLTED SLEEVE TYPE
COUPLING BONDING
INSULATED**

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 denverwater.org



SINGLE NON-INSULATED COUPLING

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

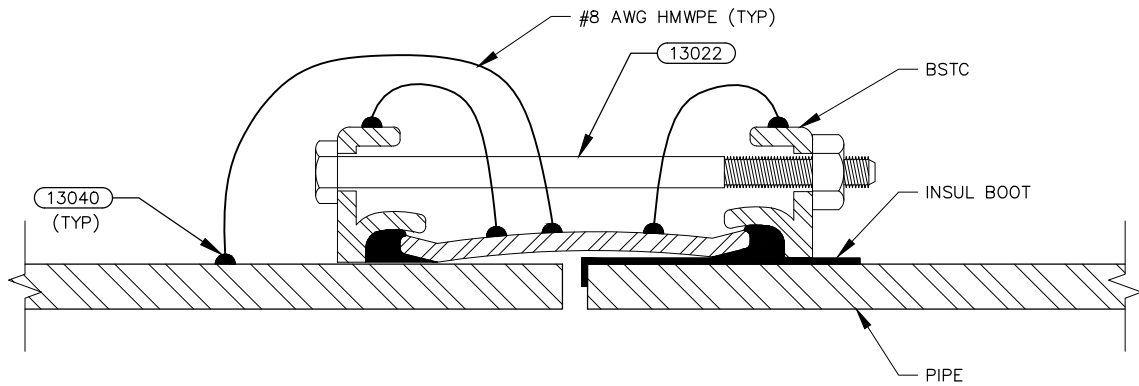
ORIGINATION DATE: JULY 2021

REVISION DATE:

13033
BOLTED SLEEVE TYPE
COUPLING BONDING
NON-INSULATED



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SINGLE INSULATED COUPLING

NOTES:

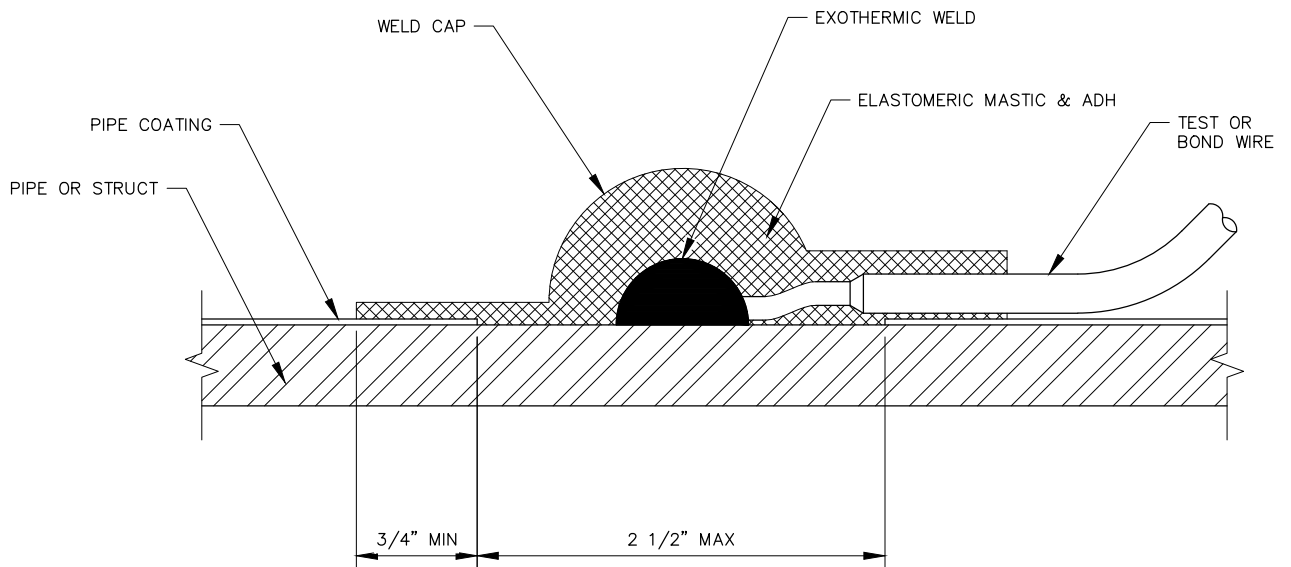
1. INSULATED SLEEVES AND WASHERS SHALL BE INSTALLED FROM THE SAME SIDE OF UNPROTECTED FLANGE.
2. BOLT HOLES SHALL BE 1/4 INCH DIAMETER LARGER THAN BOLT DIAMETER AT INSULATED SLEEVES.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

13034
BOLTED SLEEVE TYPE
COUPLING BONDING
INSULATED

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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

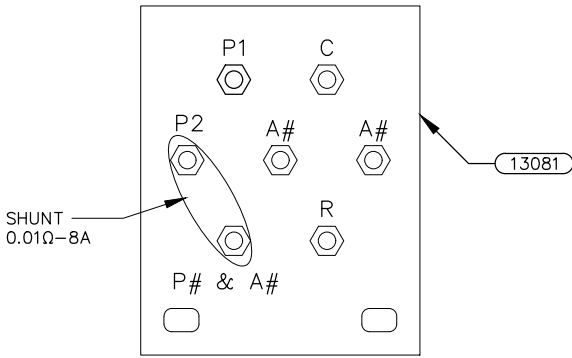
ORIGINATION DATE: JULY 2021

REVISION DATE:

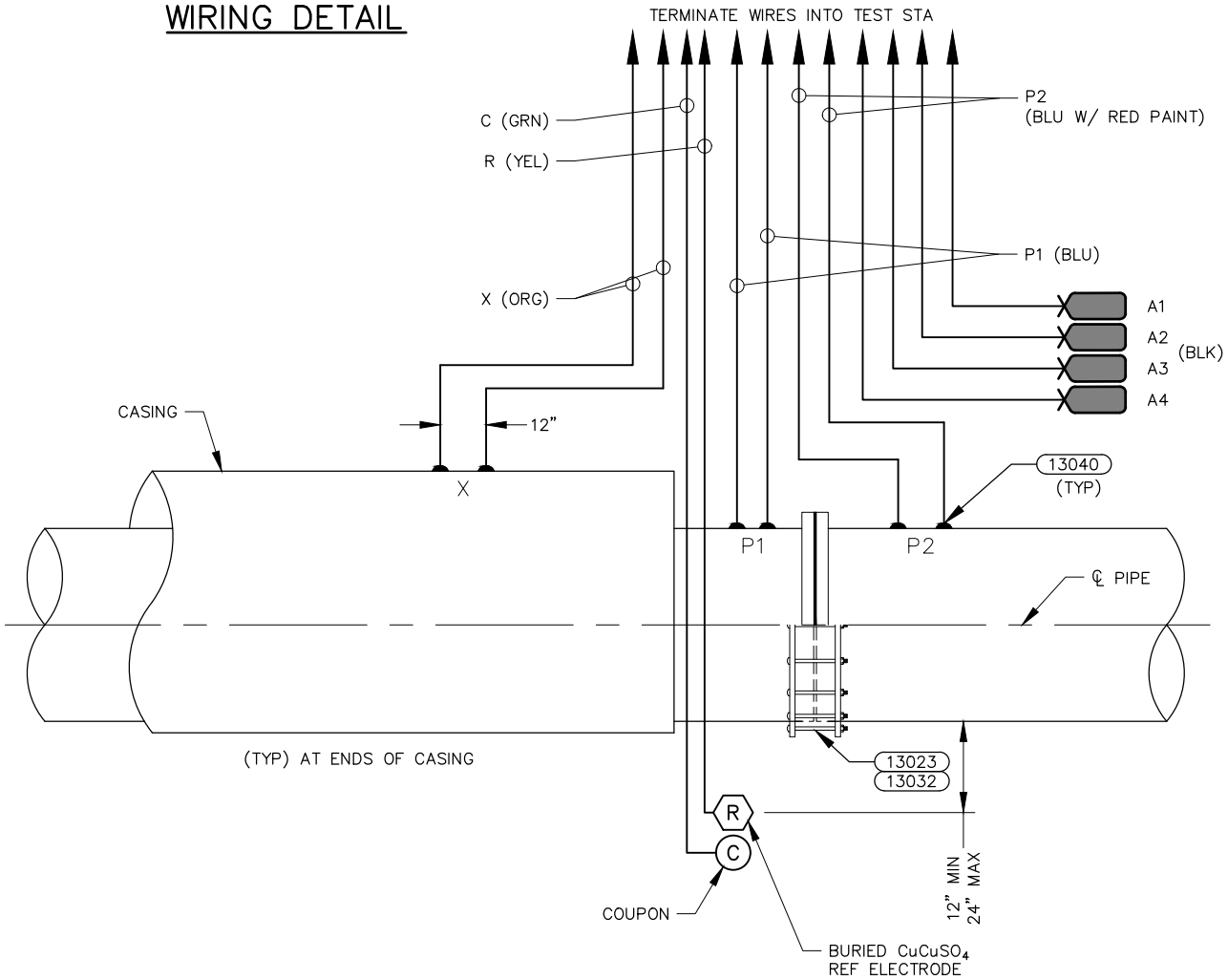
13040
EXOTHERMIC WELD
CONNECTION



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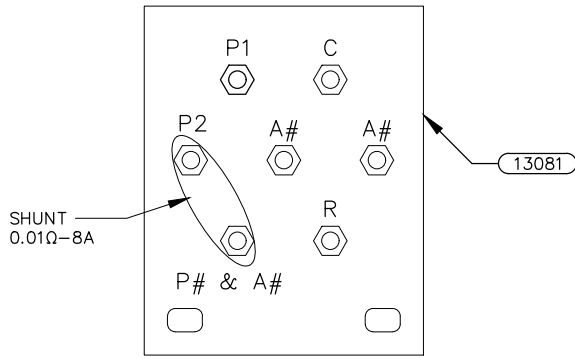
**TERMINAL BOARD
WIRING DETAIL**



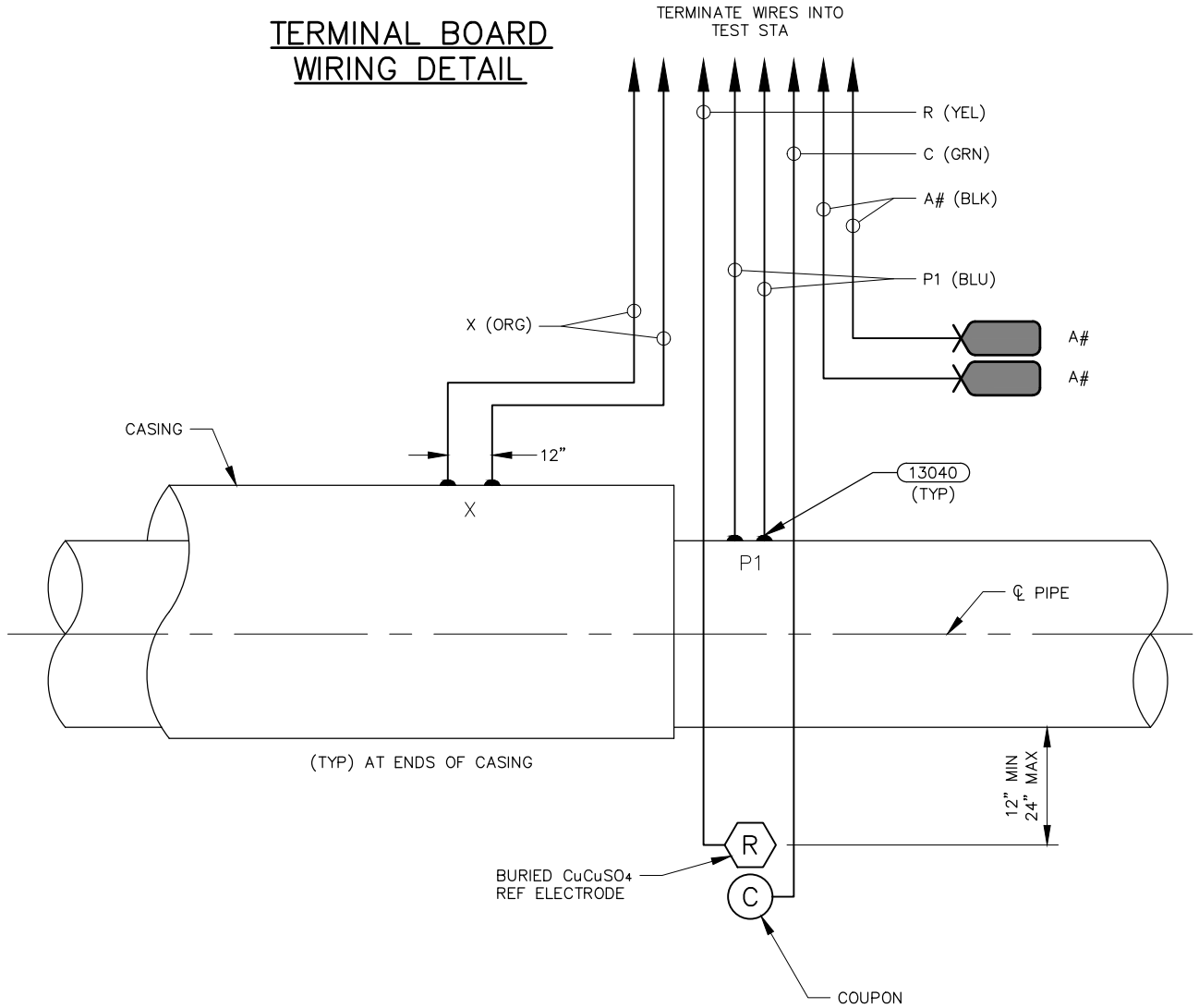
DRAWN BY: BERKNESS
 CHKD BY: K ROSS/ KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

**13041
 CASING TEST STATION
 (INSULATED FLANGE
 OR COUPLING)**

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**TERMINAL BOARD
WIRING DETAIL**

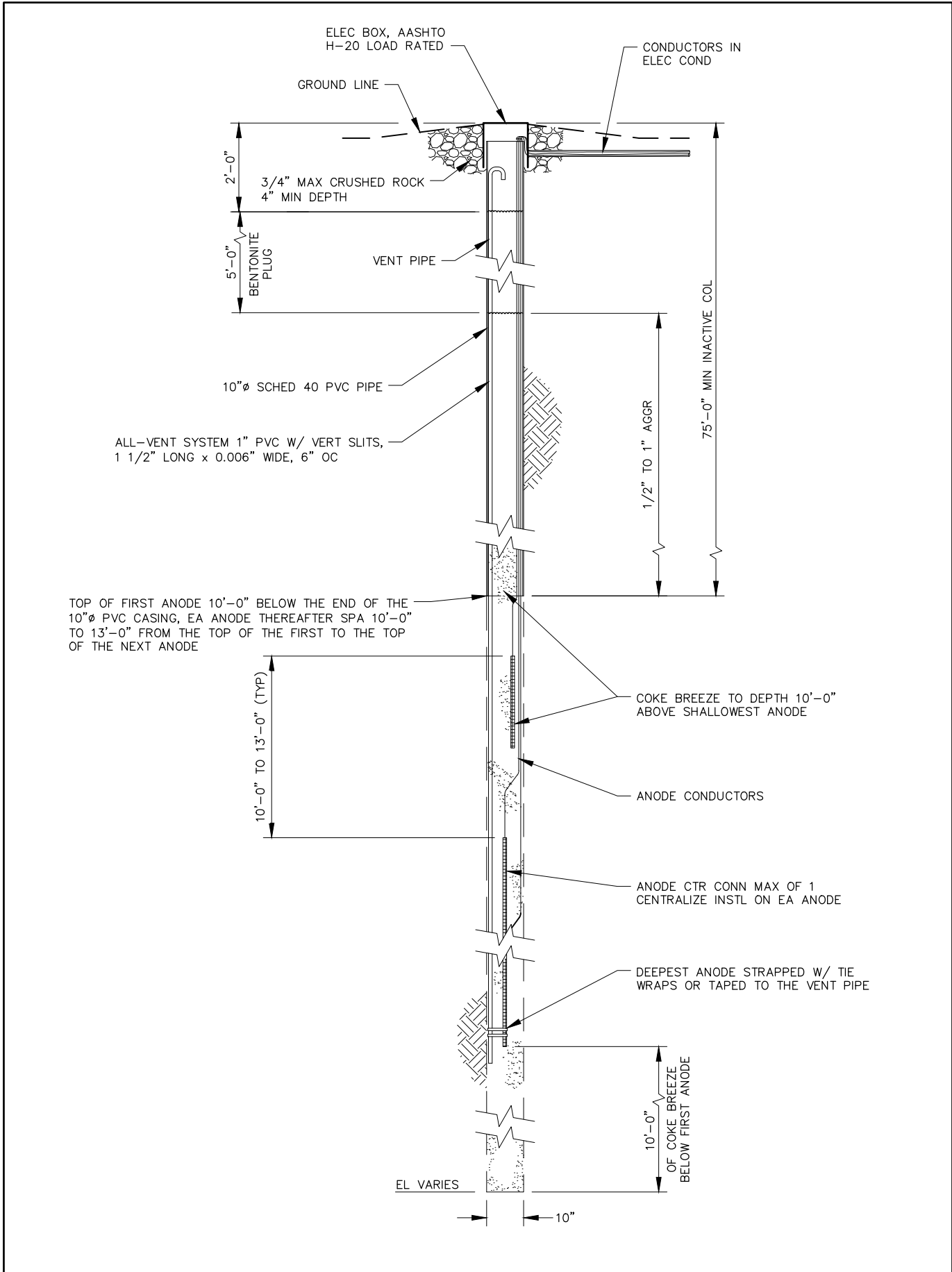


DRAWN BY: BERKNESS
CHKD BY: K ROSS <i>KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13042
CASING TEST STATION
(NON-INSULATED FLANGE
OR COUPLING)**

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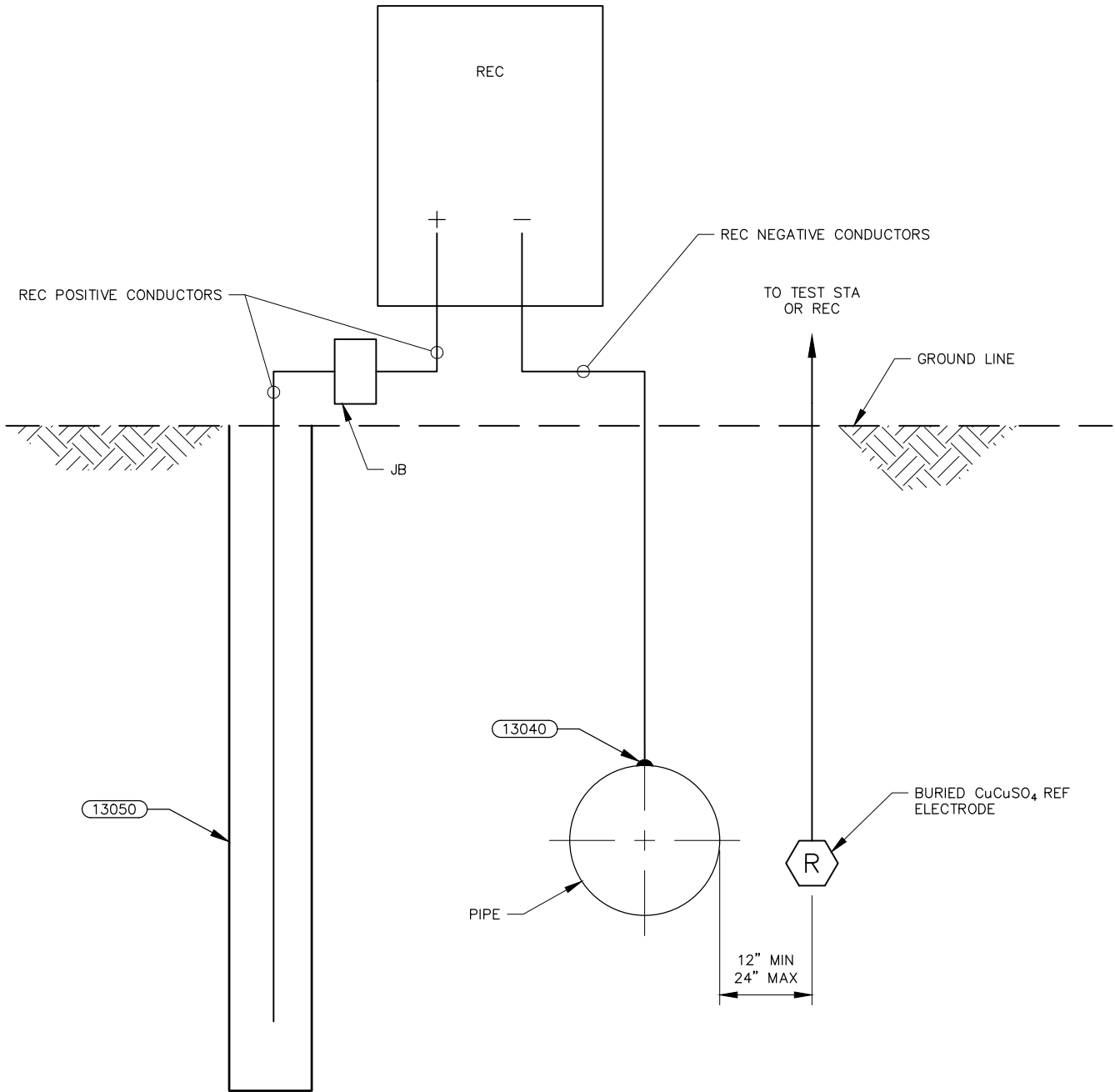


DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13050
DEEP WELL GROUND BED**

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NOTE:

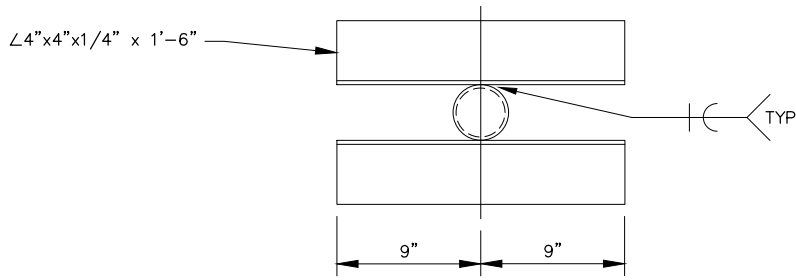
SIZE OF RECTIFIER, JUNCTION BOX, AND NUMBER OF TERMINALS MAY VARY.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

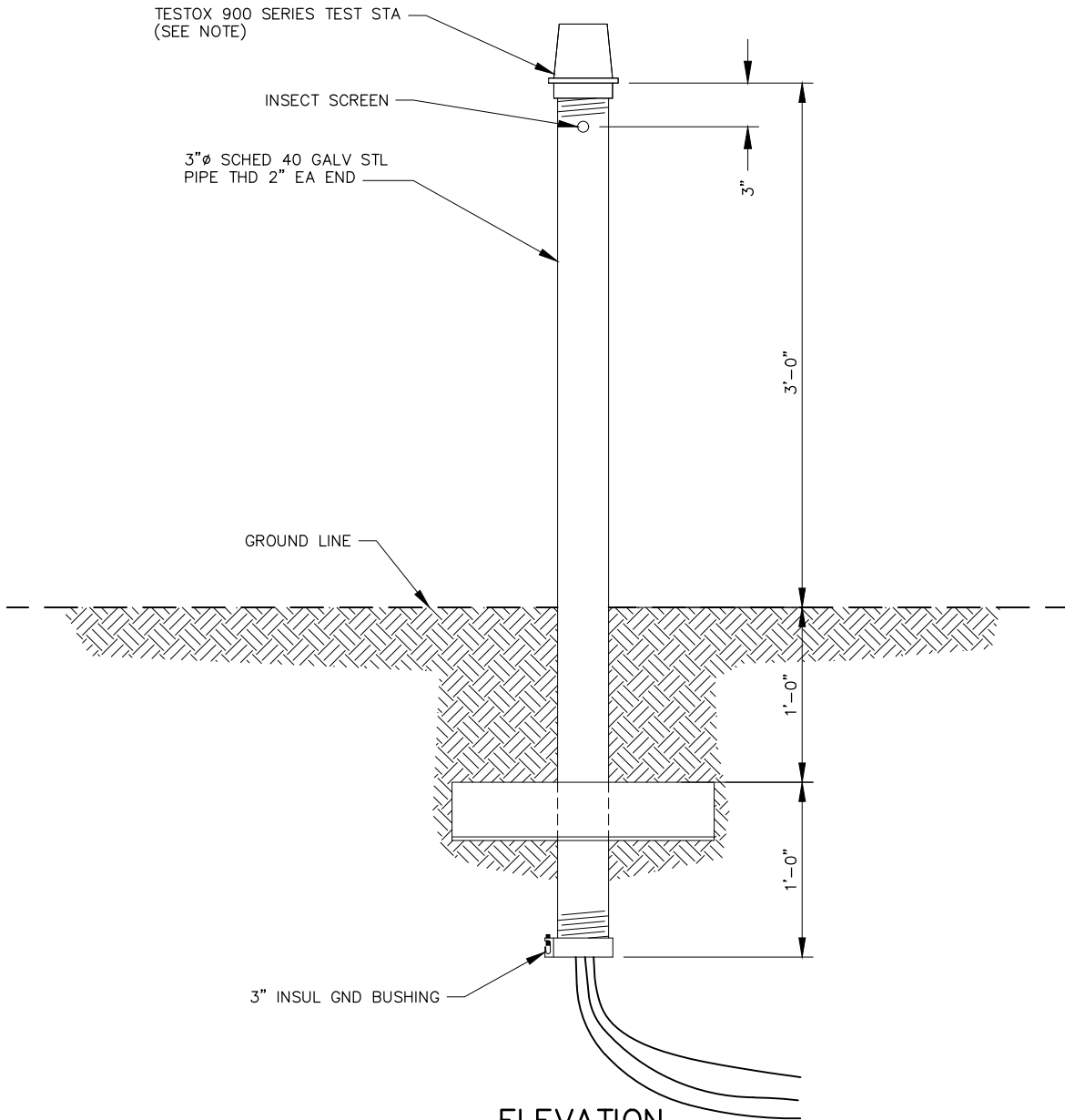
**13051
RECTIFIER CONNECTION
ONE-LINE**

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PLAN



ELEVATION

NOTE:

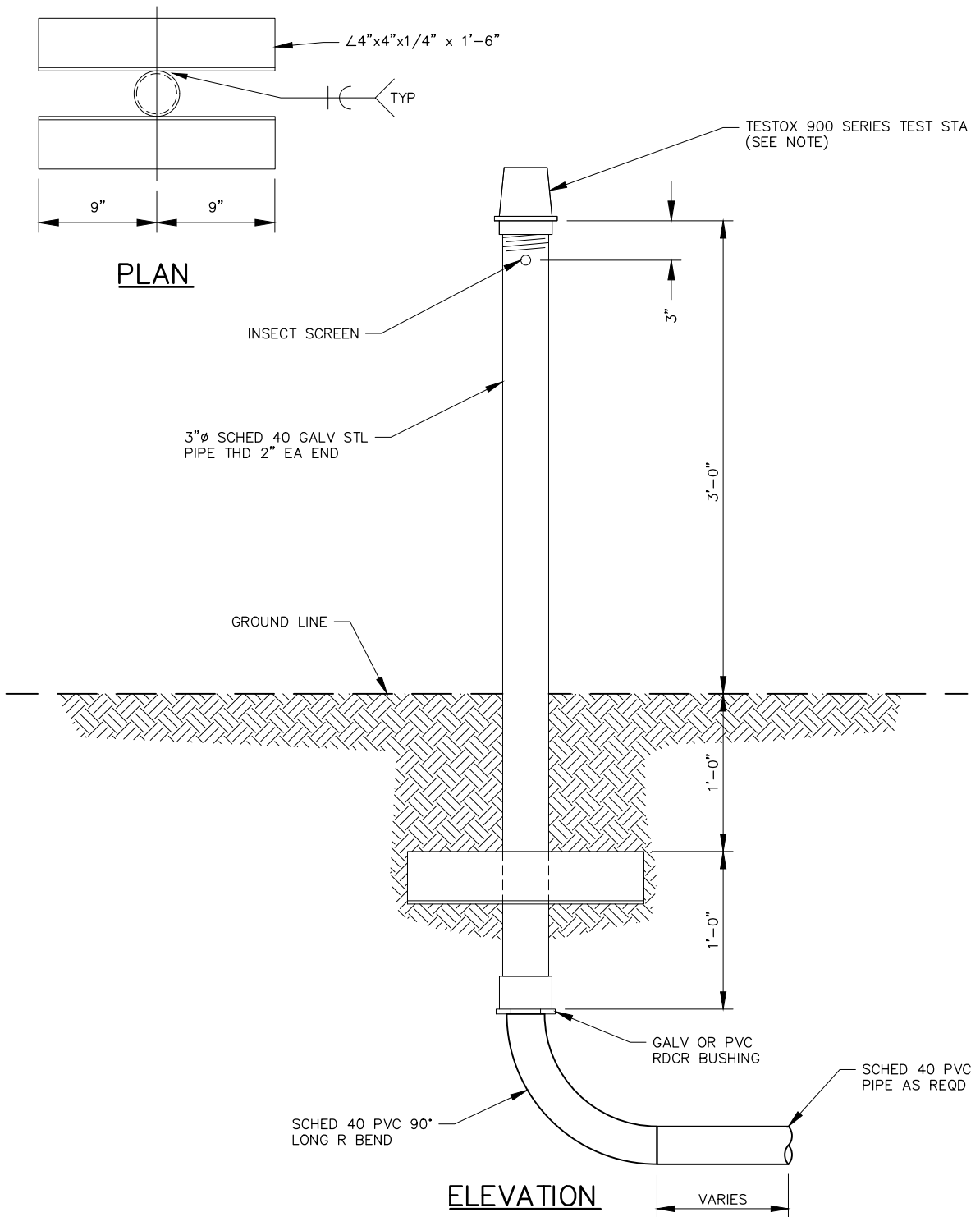
ENGRAVE T_#### ON TESTOX 900 LID.

DRAWN BY: BERKNESS
CHKD BY: K ROSS <i>KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13060
TEST STATION
ABOVE GRADE**



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NOTE:

ENGRAVE T_#### ON TESTOX 900 LID.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

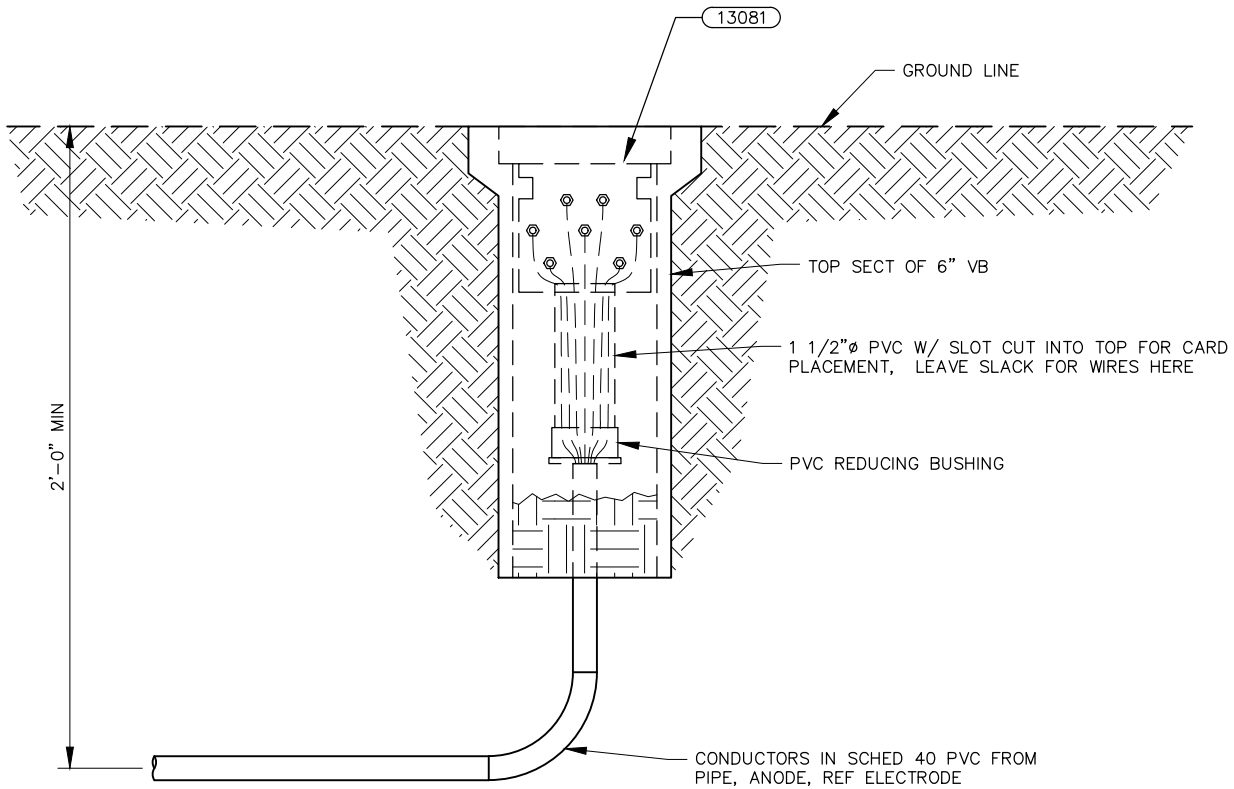
ORIGINATION DATE: JULY 2021

REVISION DATE:

**13061
TEST STATION ABOVE
GRADE WITH CONDUIT**



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NOTE:

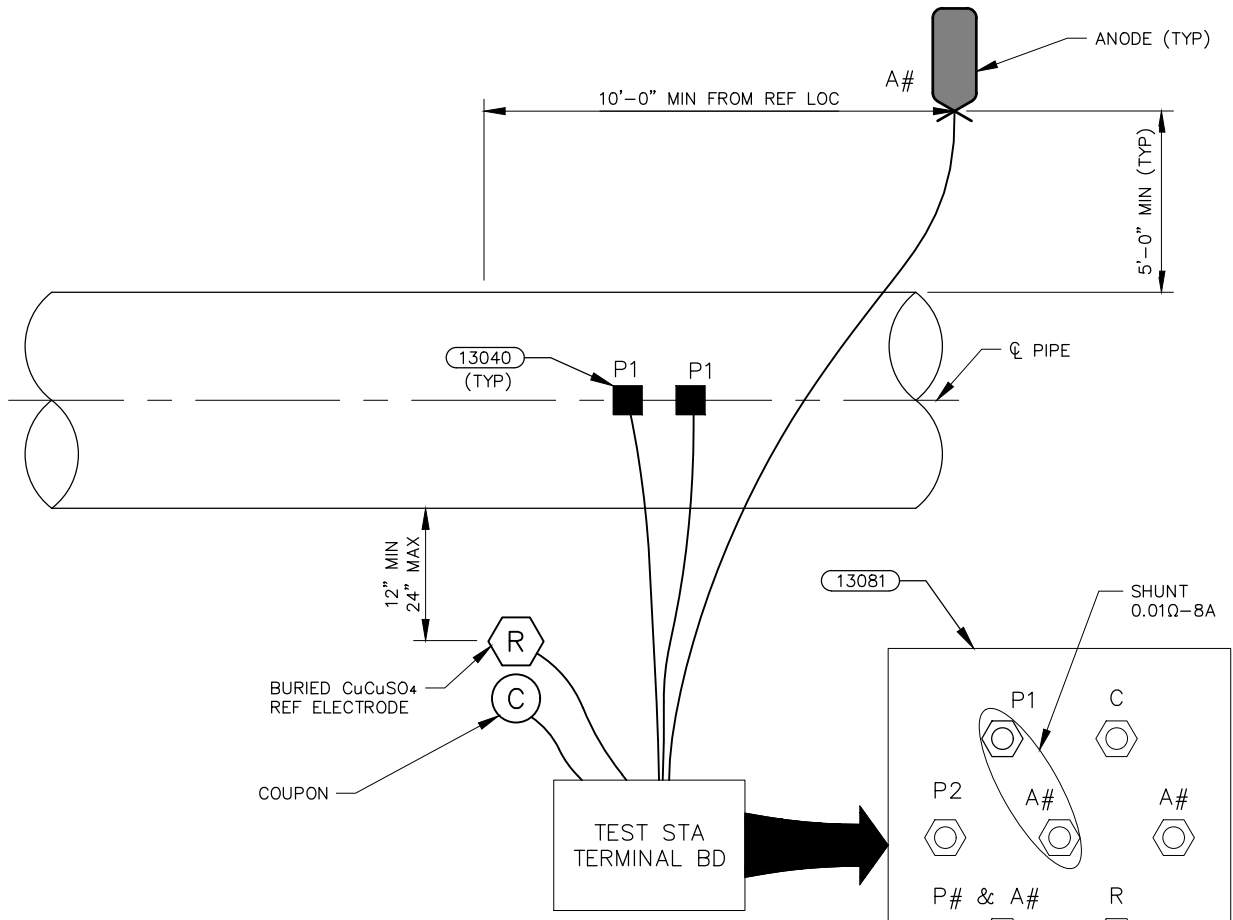
AT GRADE TEST STATION SHALL BE USED WHERE 13061 IS NOT POSSIBLE.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

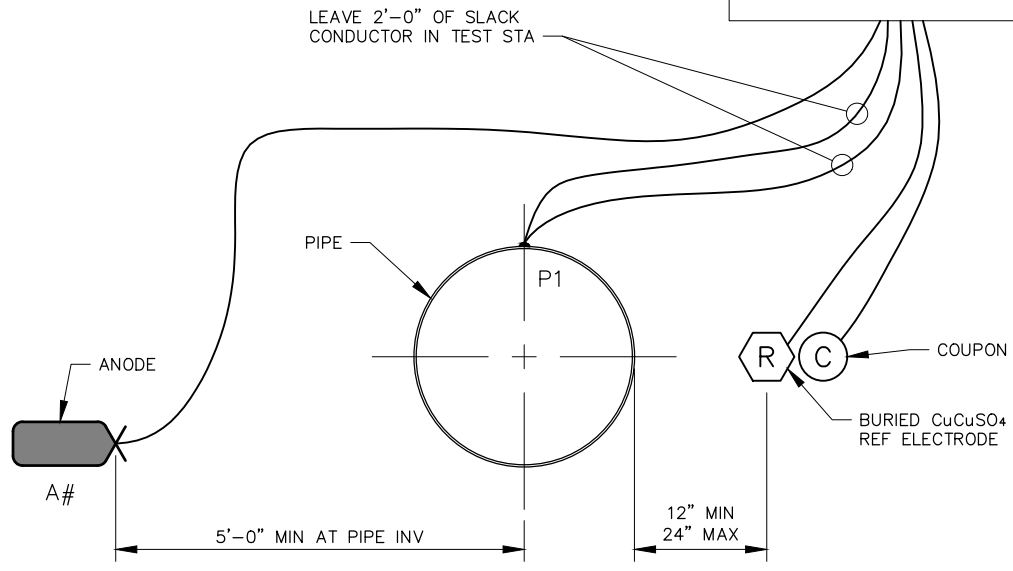
13062
TEST STATION AT GRADE
WITH CONDUIT

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PLAN



ELEVATION

NOTE:

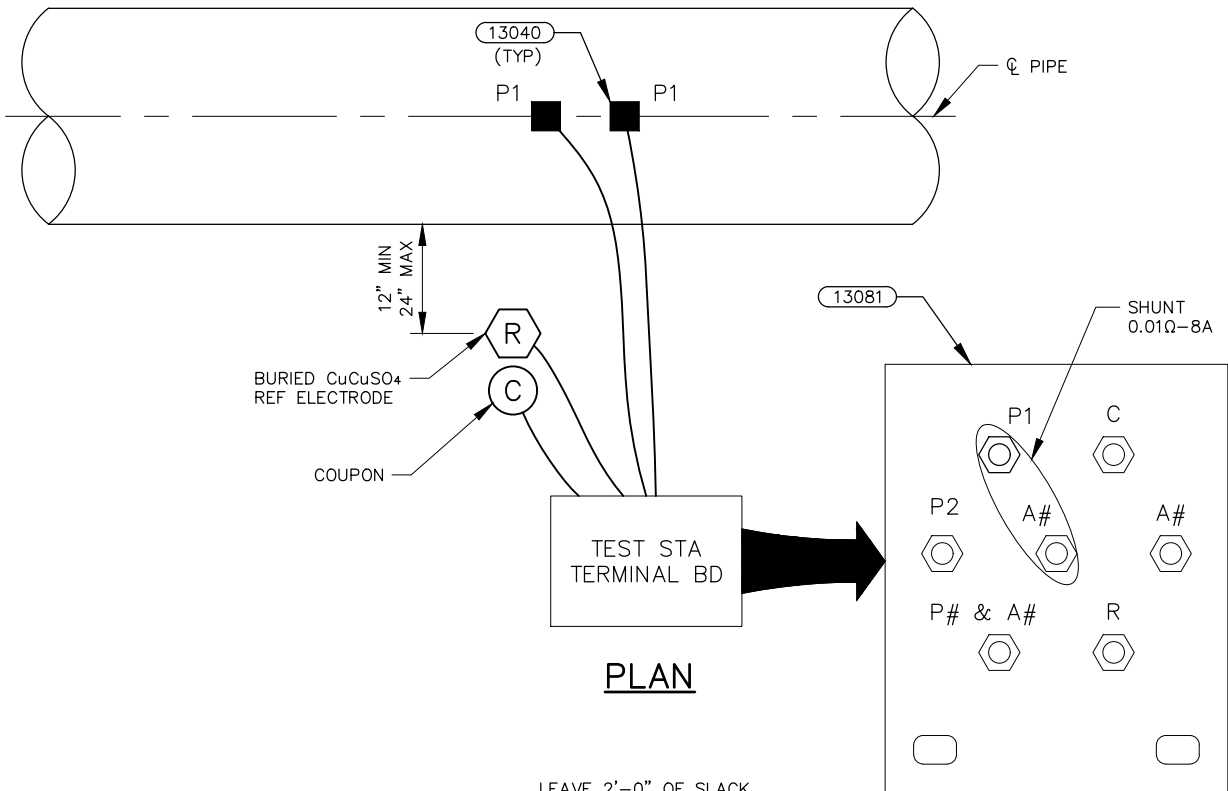
NUMBER OF ANODES MAY VARY.

DRAWN BY: BERKNES
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13063
TYPICAL CATHODIC
PROTECTION TEST STATION**

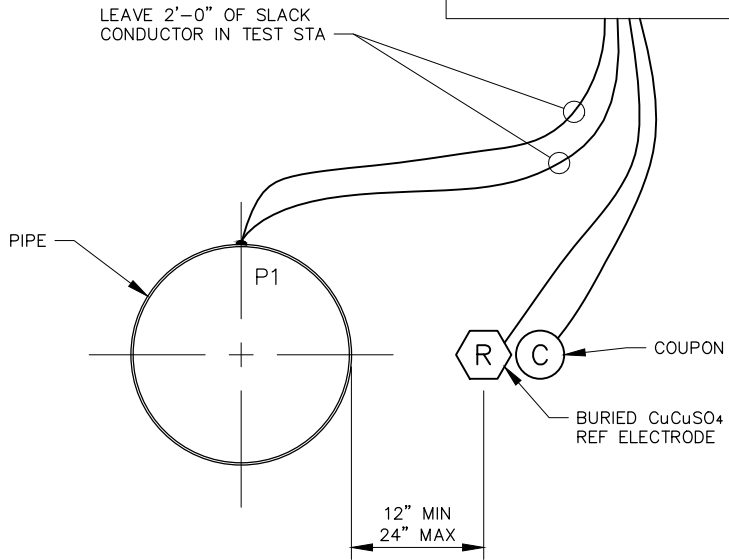
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PLAN

LEAVE 2'-0" OF SLACK CONDUCTOR IN TEST STA



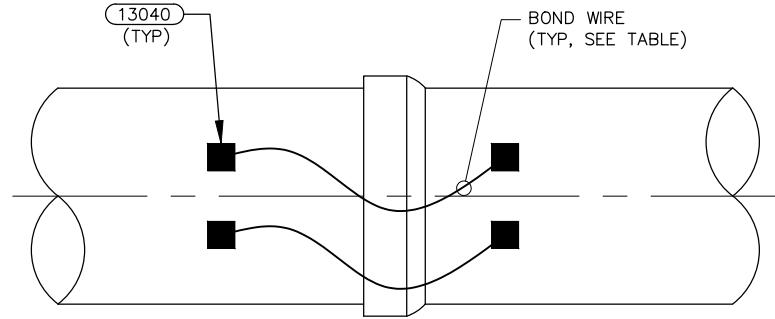
ELEVATION

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**13064
TYPICAL CATHODIC
PROTECTION TEST STATION
WITHOUT ANODE**

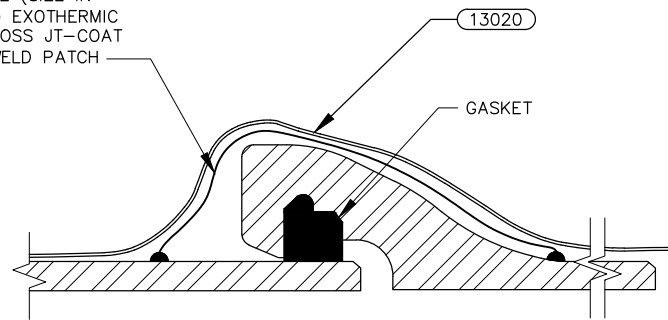


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PLAN

INSUL STRANDED Cu WIRE (SIZE IN ACCORDANCE W/ TABLE) EXOTHERMIC WELD TO BARE MTL ACROSS JT-COAT W/ APPD EXOTHERMIC WELD PATCH



SECTION

NOMINAL PIPE ϕ	WIRE SIZE AND TYPE (AWG)
4" - 12"	#8 HMWPE
16" - 20"	#4 HMWPE
24" \leq 36"	#4 HMWPE
36" \leq 60"	#2 HMWPE
60" OR LARGER	2x #2 HMWPE

NOTES:

1. PROVIDE AND INSTALL REDUNDANT BOND WIRES, EVENLY SPACED AROUND THE PIPE.
2. REMOVE A 2 1/2 INCH SQUARE (MAXIMUM) OF PIPE COATING FOR EXOTHERMIC WELD CONNECTION.
3. WELD CAP SHALL EXTEND AT LEAST 3/4 INCH OVER PIPE COATING.
4. EXOTHERMIC WELDS SHALL BE CLEANED AND COATED. SIZE EXOTHERMIC WELD CHARGE BASED ON PIPE MATERIAL.
5. JOINT TYPE MAY VARY.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

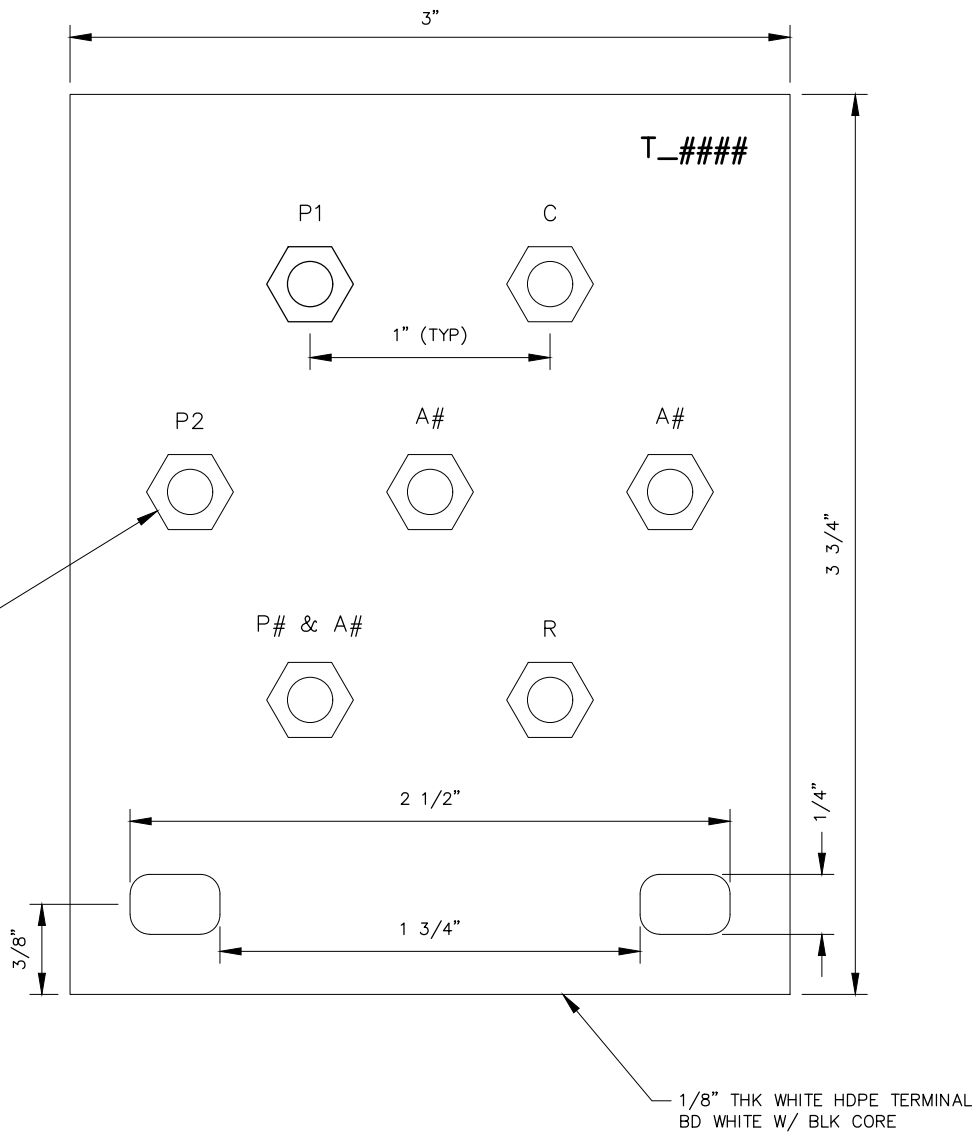
ORIGINATION DATE: JULY 2021

REVISION DATE:

**13080
METALLIC PIPE
JOINT BONDING**



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

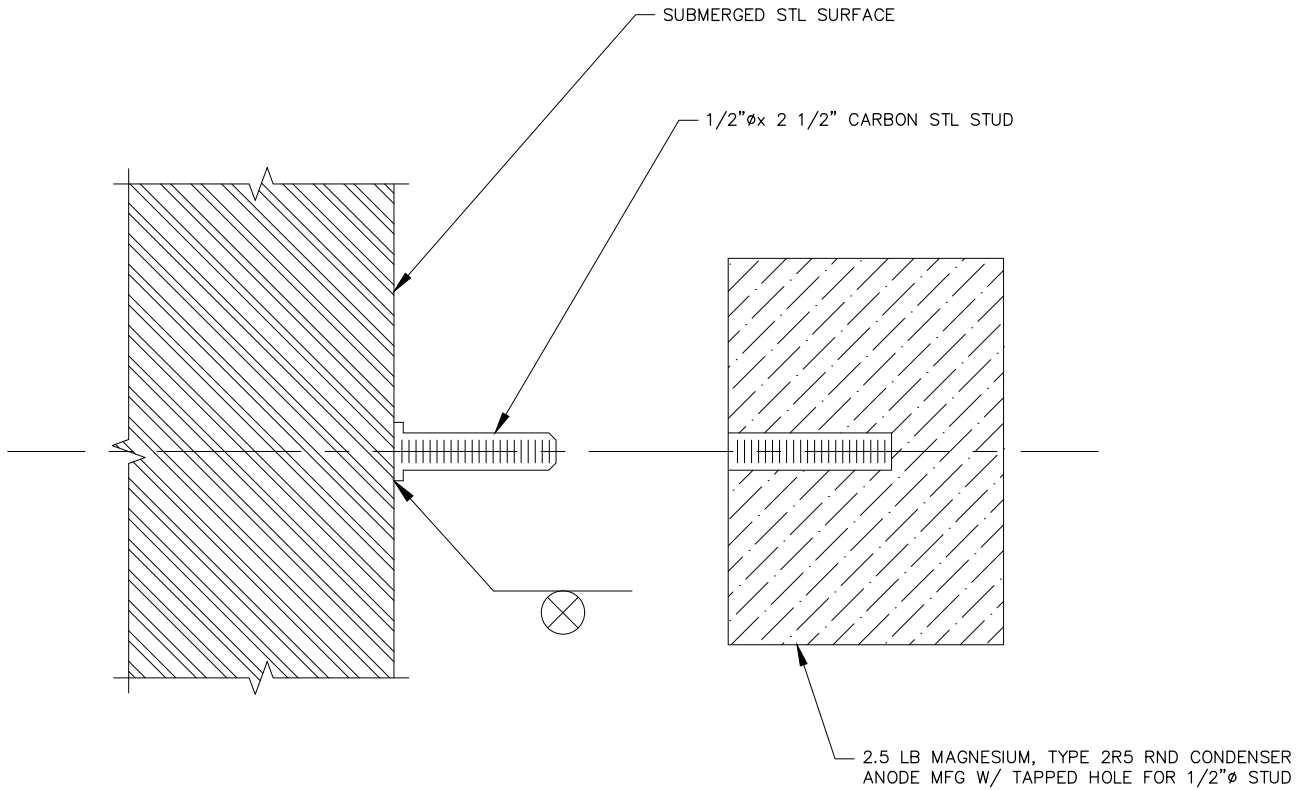
ORIGINATION DATE: JULY 2021

REVISION DATE:

13081
TERMINAL BOARD CARD



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

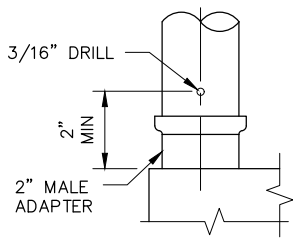
REVISION DATE:

13090 CONDENSER ANODE INSTALLATION

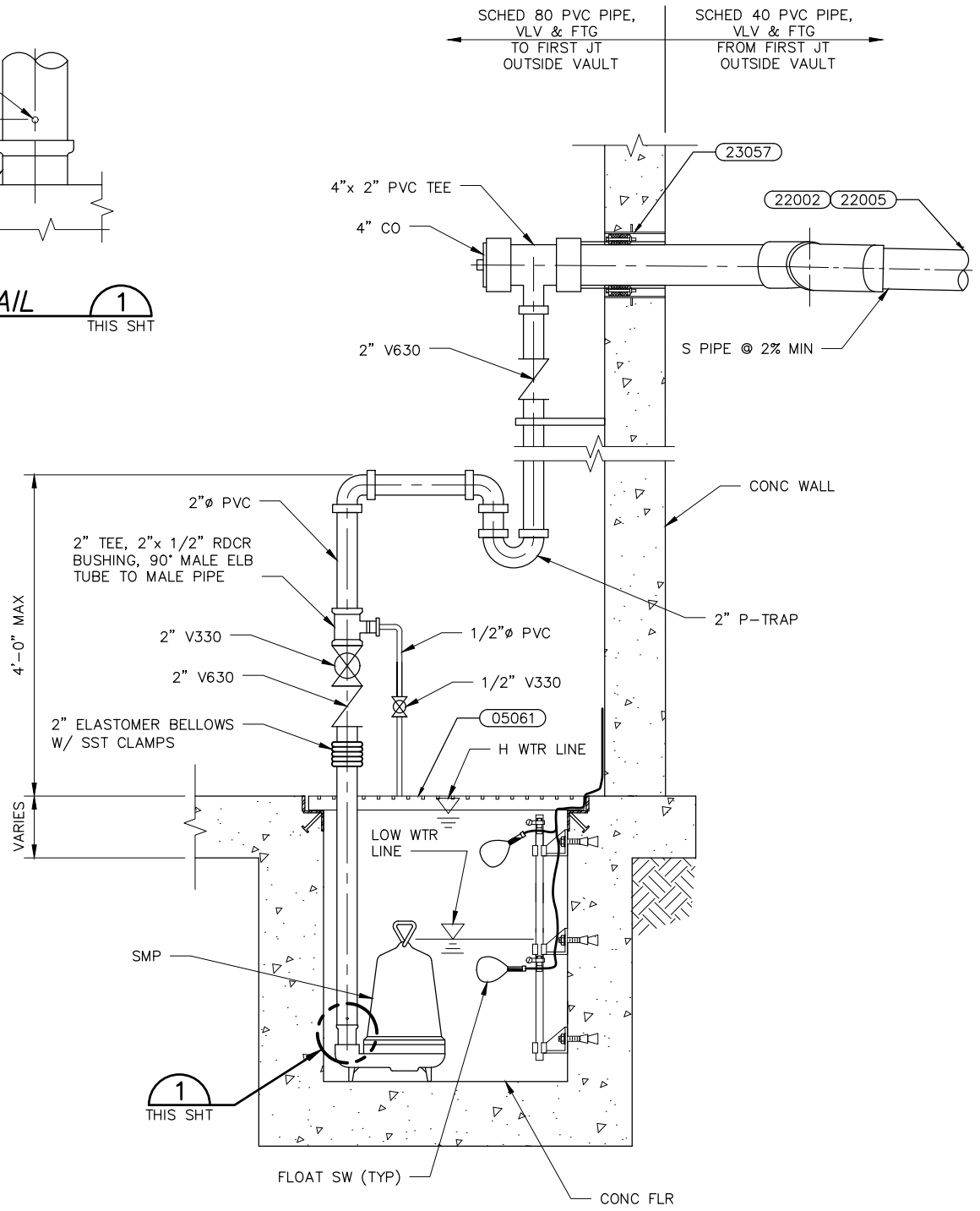


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INTENTIONALLY BLANK



DETAIL 1
THIS SHT

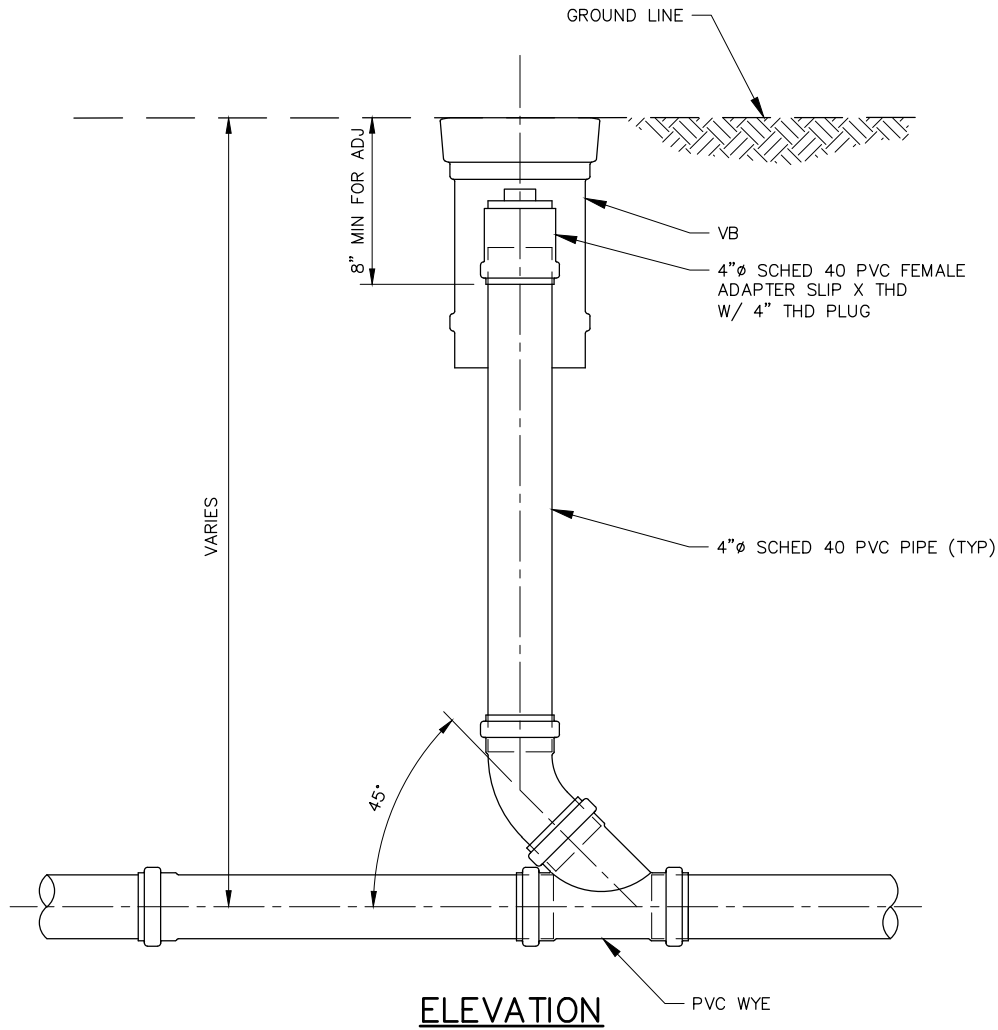


DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

22001
SUMP ASSEMBLY AND PIPING

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NOTE:

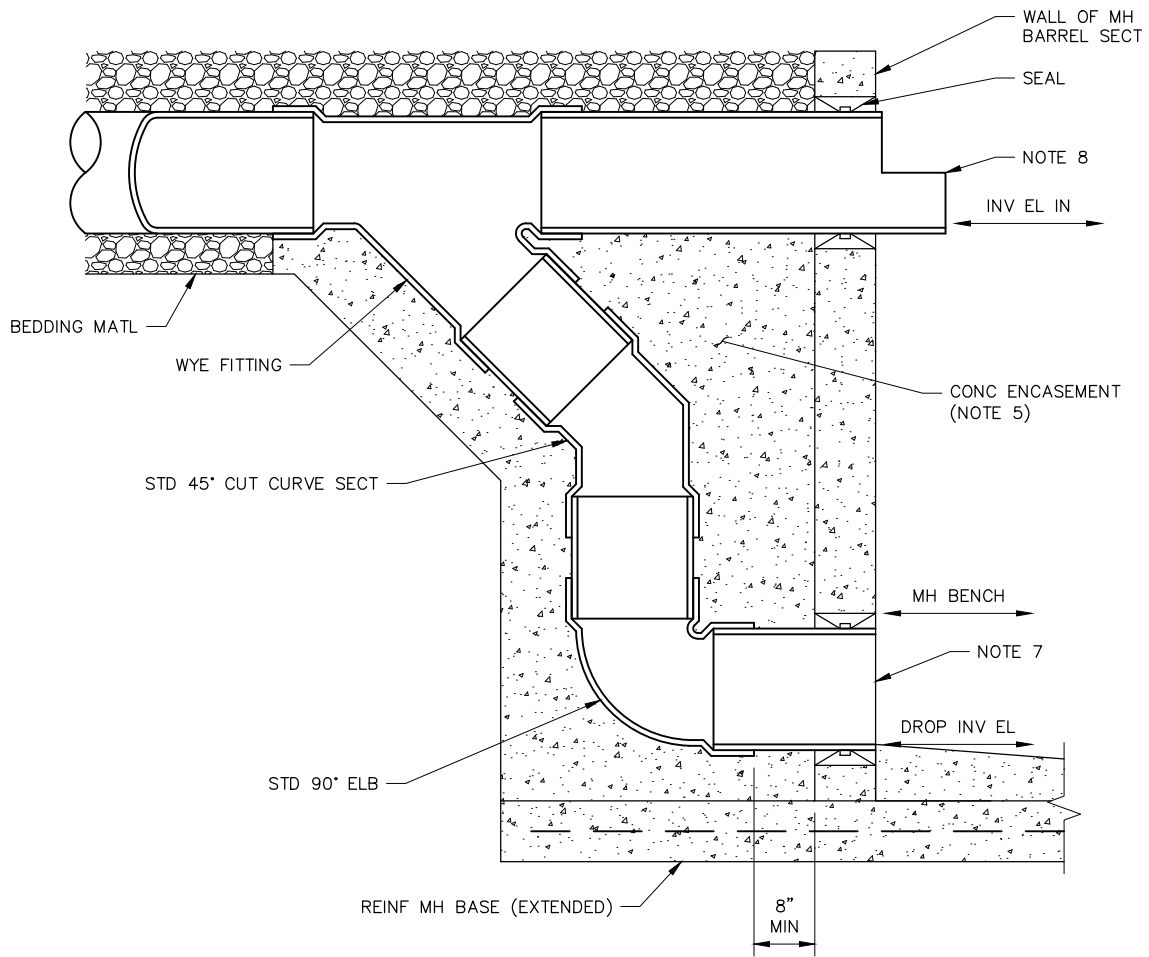
COVER SHALL BE MARKED "CO".

DRAWN BY: <i>DITTERLINE</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**22002
4" INLINE CLEANOUT**



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ELEVATION

NOTES:

1. PIPE AND FITTINGS SHALL BE ASTM AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.
2. DIAMETER OF THE PIPE SHALL NOT BE LESS THAN MAIN LINE PIPE DIAMETER.
3. THE APPROPRIATE MANHOLE SEAL, ADAPTER, OR CONNECTOR SHALL BE USED FOR THE SPECIFIED PIPE MATERIAL, AND SHALL BE APPROVED BY THE AUTHORITY HAVING JURISDICTION.
4. OUTSIDE DROP SHALL BE ALL OF ONE MATERIAL.
5. CONCRETE ENCASEMENT SHALL BE A MINIMUM OF 8 INCHES THICK ALL AROUND. FOR DROPS OVER 4 FEET PLACE #4@18 INCHES ON CENTER HORIZONTAL AND VERTICAL REINFORCEMENT ON EACH SIDE OF THE PIPE.
6. PIPE DIMENSIONS ARE APPROXIMATE AND MAY VARY FROM ONE MANUFACTURER TO ANOTHER.
7. ALL REQUIRED WALL OPENINGS SHALL BE PRECAST BLOCK-OUTS OR CORE DRILLED. JACK HAMMERING OF OPENINGS IS NOT ALLOWED.
8. CUT TOP HALF OF PIPE TO CREATE 4 INCH LONG SHELF.

DRAWN BY: *DITTERLINE*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

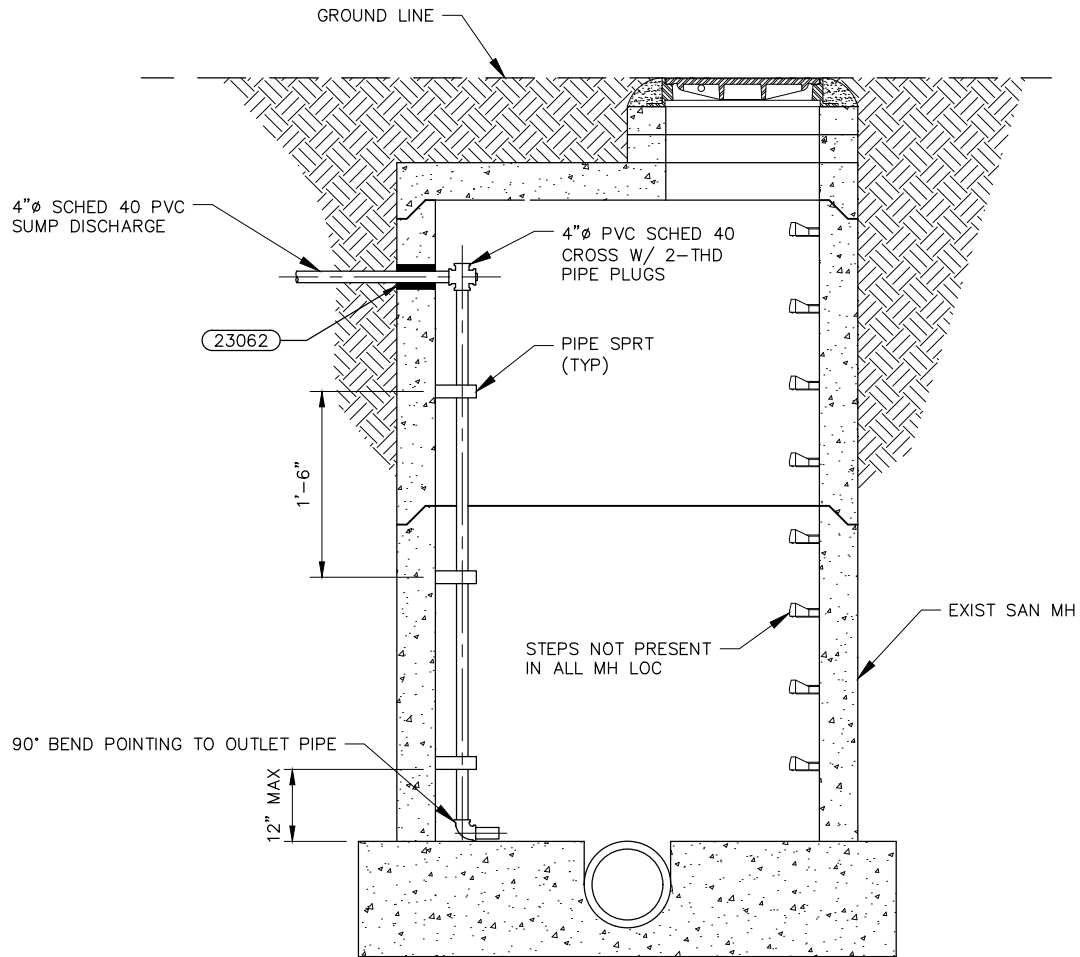
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

22003 OUTSIDE DROP MANHOLE CONNECTION



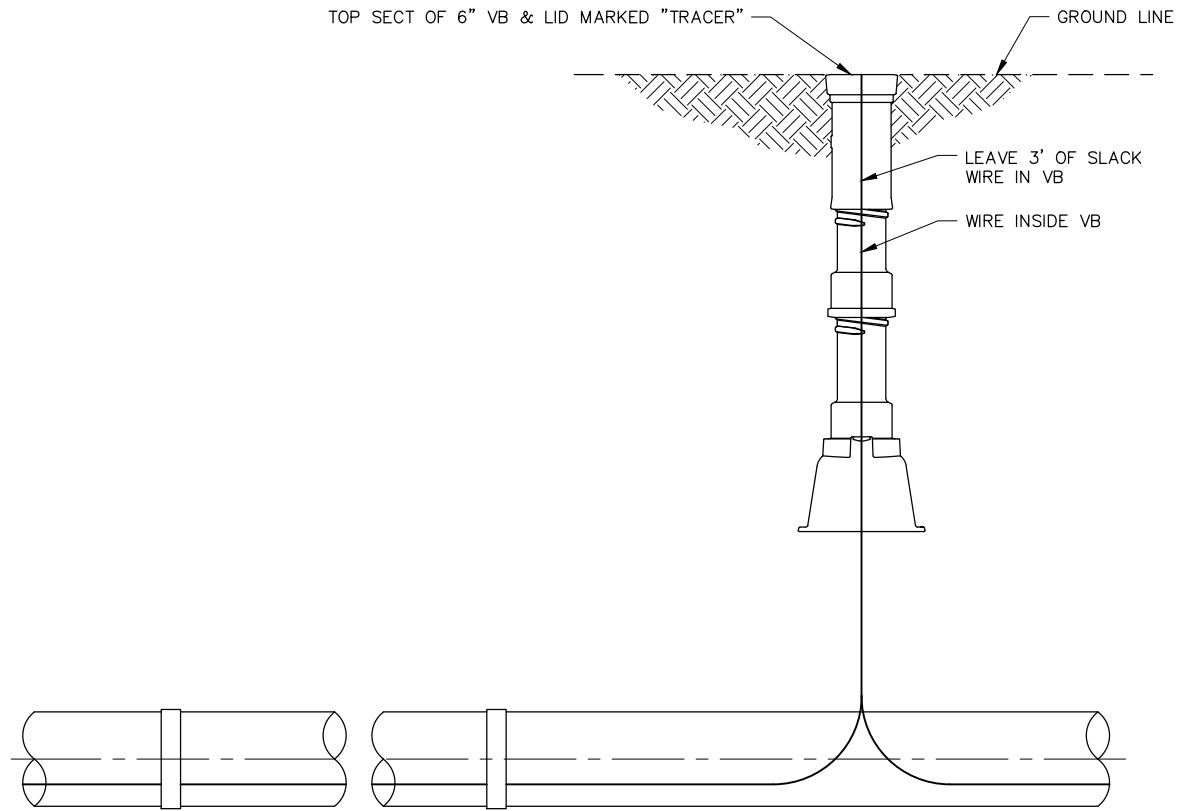
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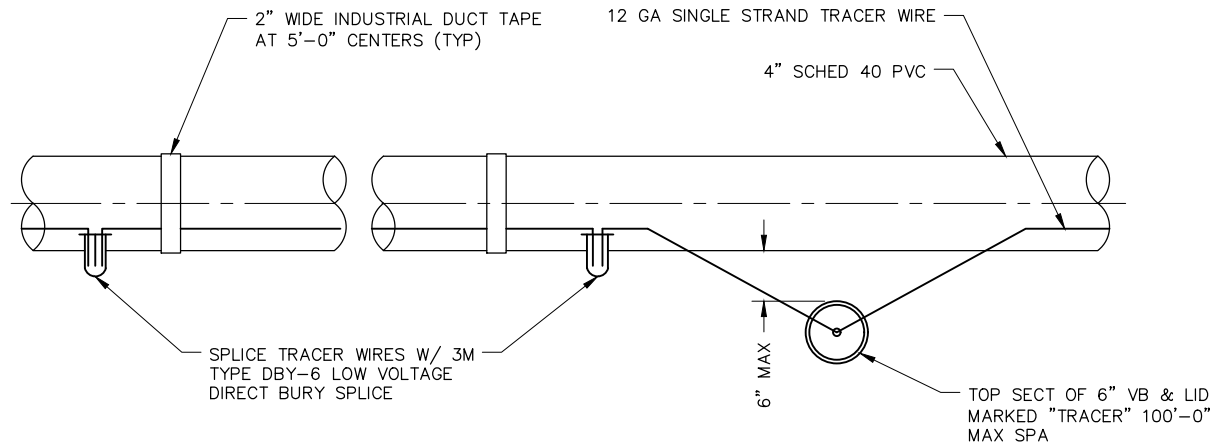
DRAWN BY: MITCHELL
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

22004
SUMP DRAIN INTO EXISTING
SANITARY SEWER MANHOLE

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ELEVATION



PLAN

DRAWN BY: MITCHELL

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

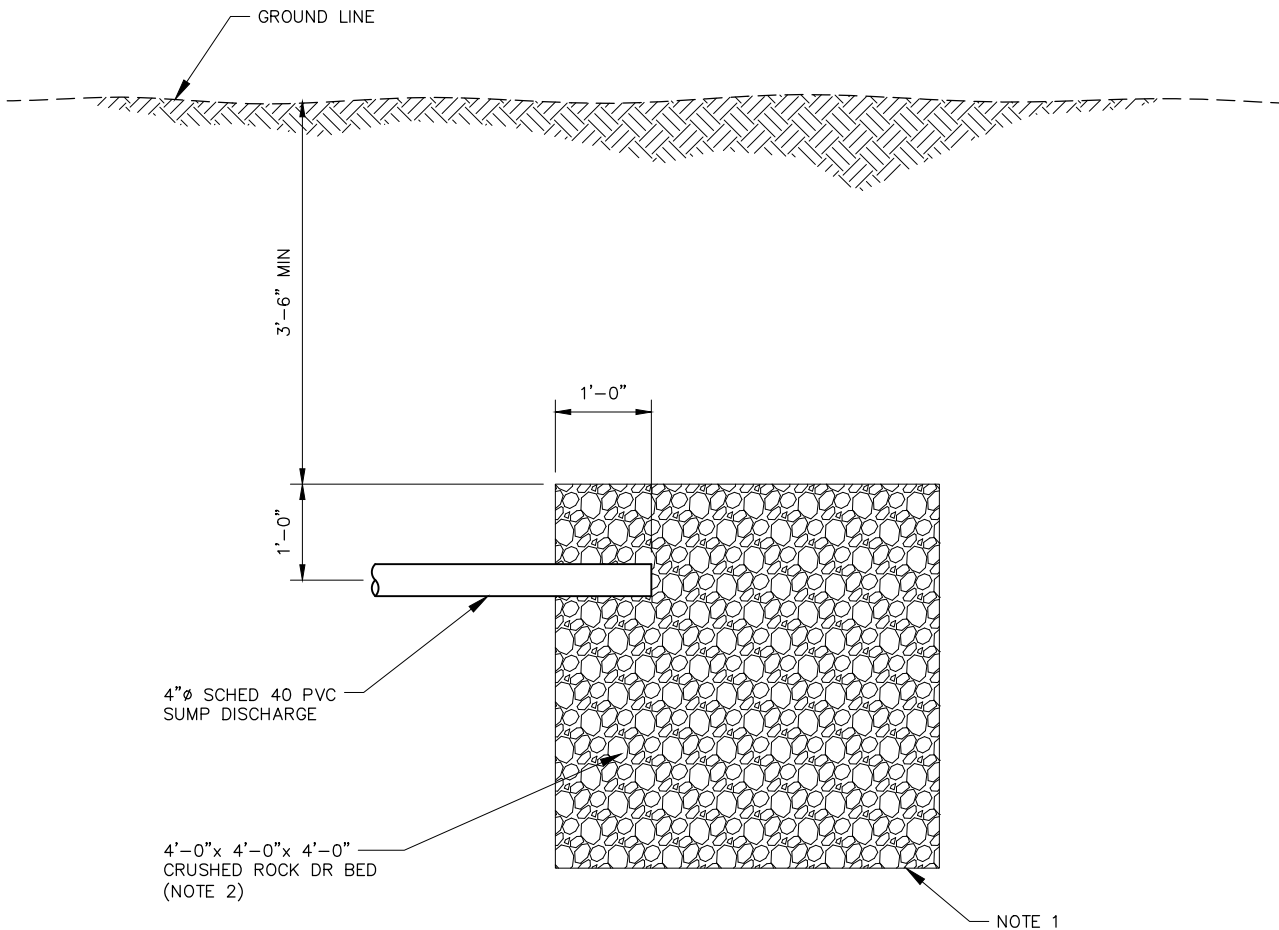
ORIGINATION DATE: JULY 2021

REVISION DATE:

**22005
TRACER WIRE INSTALLATION
FOR PVC SUMP PUMP DRAIN**



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NOTES:

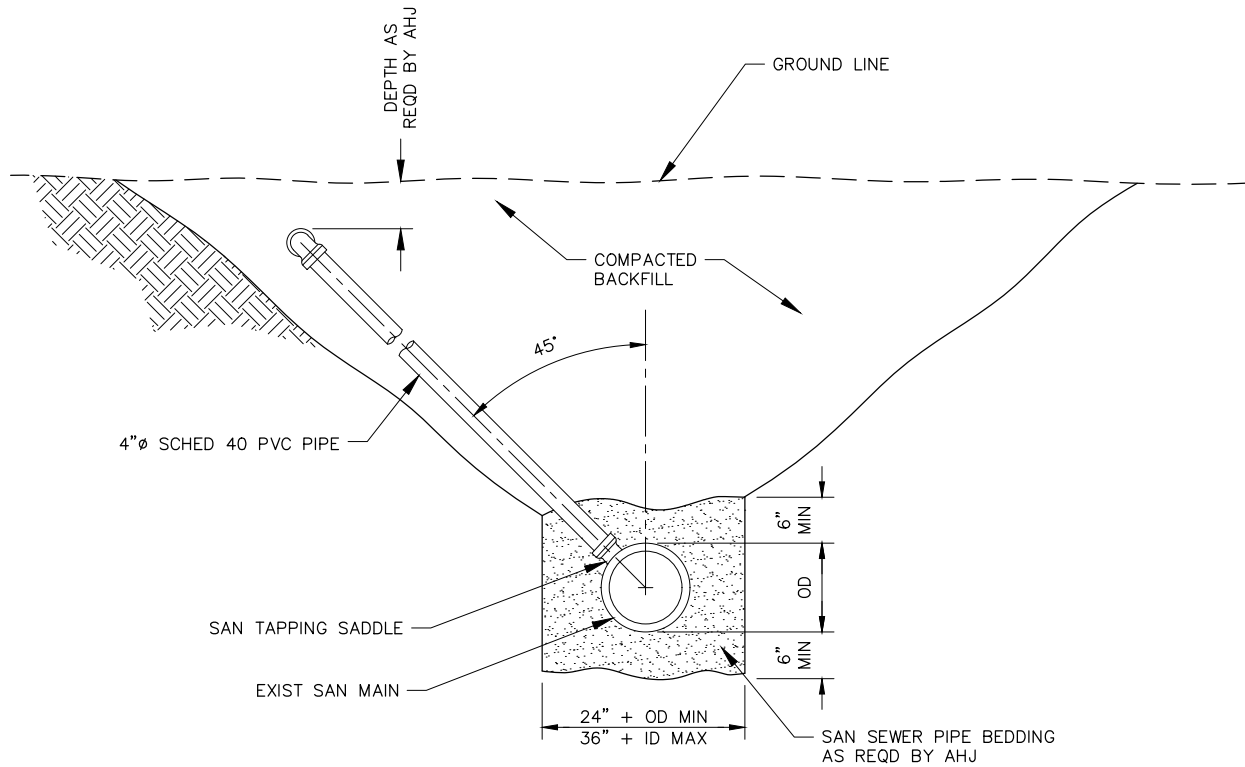
1. CRUSHED ROCK BED SHALL BE LINED WITH GEOTEXTILE FABRIC ON ALL SIDES.
2. CRUSHED ROCK SHALL BE ASTM C33 SIZE NO 4 COURSE AGGREGATE.

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**22006
SUMP PUMP DISCHARGE
TO GRAVEL BED**

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DRAWN BY: MITCHELL

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

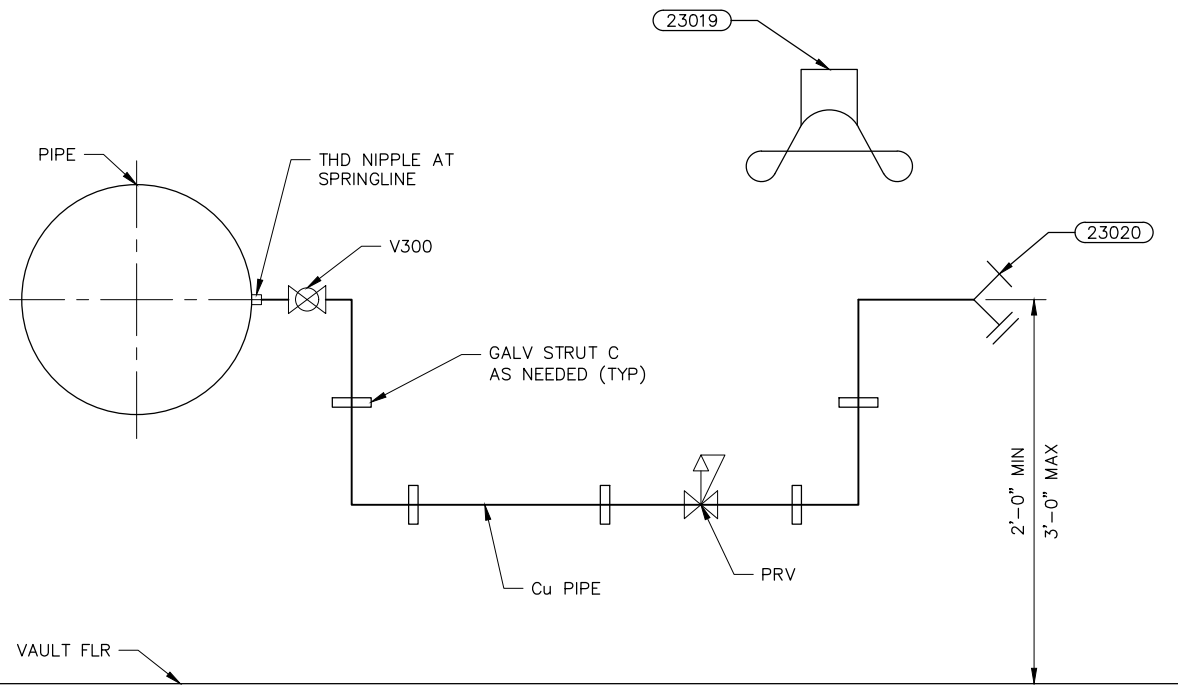
ORIGINATION DATE: JULY 2021

REVISION DATE:

22007
**SUMP PUMP DISCHARGE
 TO EXISTING SANITARY SEWER**



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NOTE:

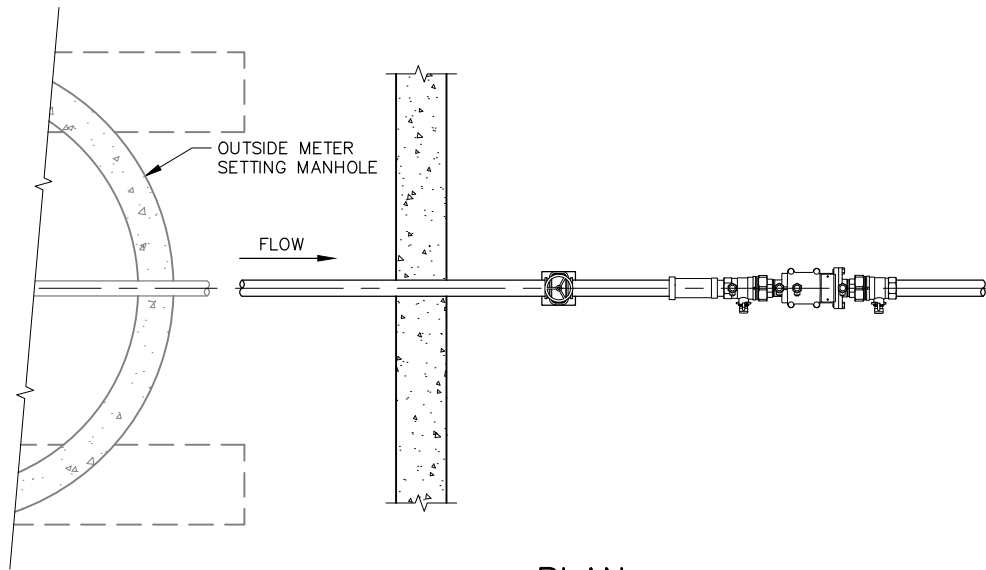
ROUTE COPPER PIPE BELOW ELECTRICAL PANELS AND CONDUIT IF NECESSARY.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

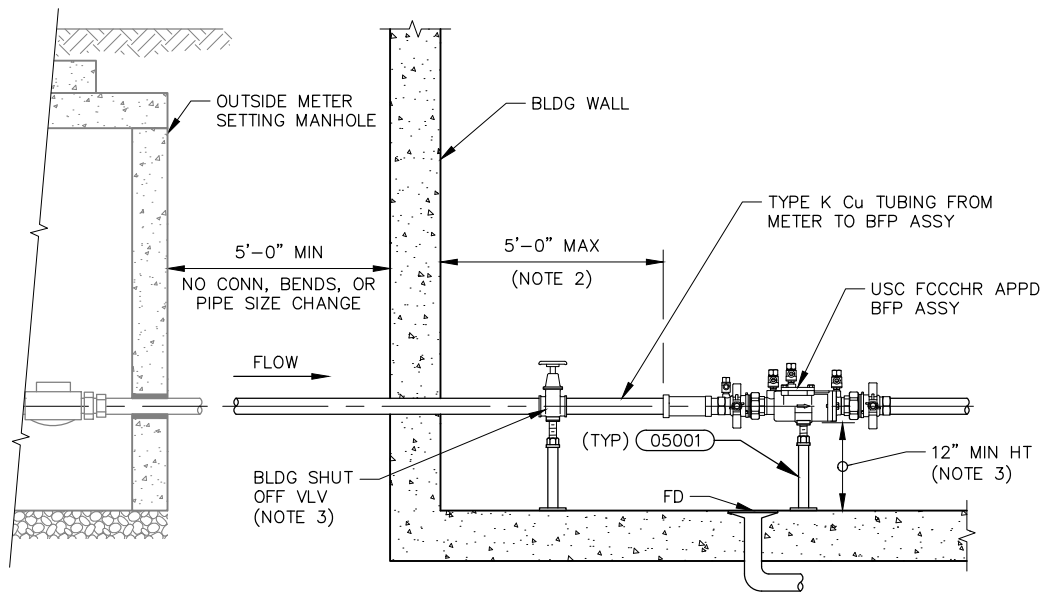
**22010
WASHDOWN PIPING
SCHEMATIC**



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PLAN



ELEVATION

NOTES:

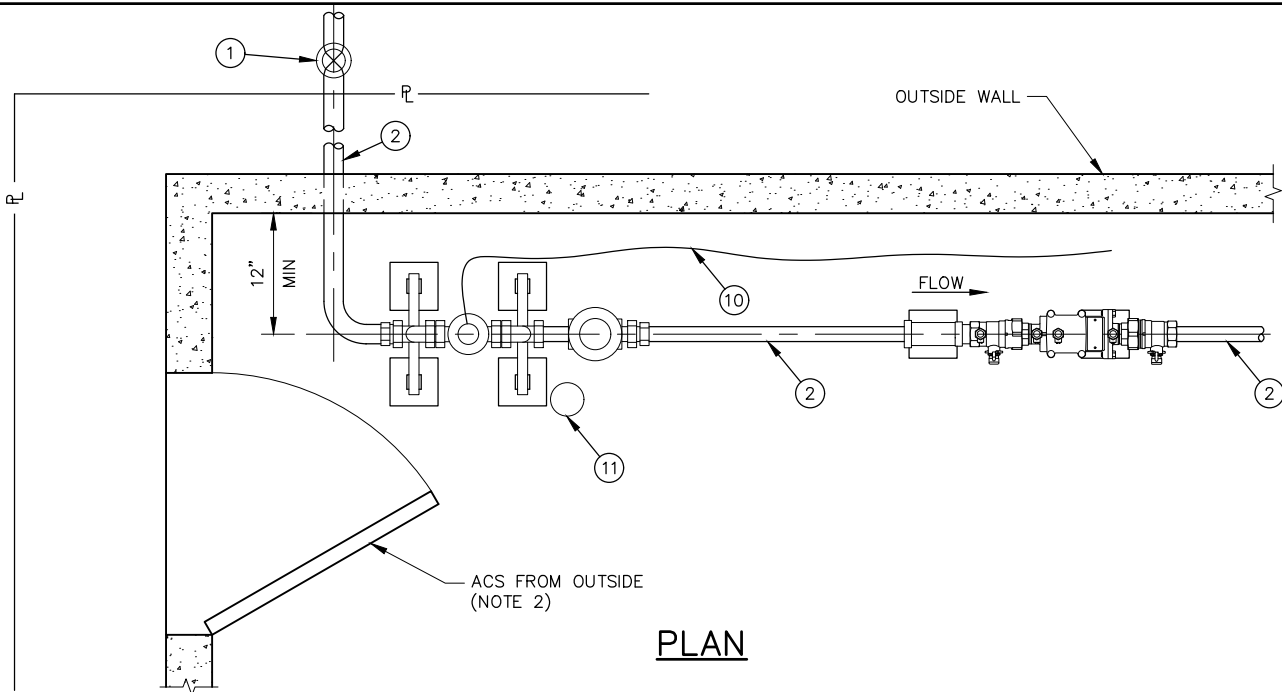
1. USC FCCCHR APPROVED DOUBLE CHECK VALVE OR REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE DETERMINED BY THE DEGREE OF HAZARD POSED BY INTERNAL PLUMBING USE.
2. PLACEMENT OF BACKFLOW PREVENTION ASSEMBLY SHALL BE A MAXIMUM OF 5 FEET FROM THE INSIDE WALL OF BUILDING.
3. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR INSTALLATION INSTRUCTIONS.
4. INSTALL STANDARD ADJUSTABLE SUPPORTS WITHIN 12 INCHES OF INLET AND OUTLET ISOLATION VALVES.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

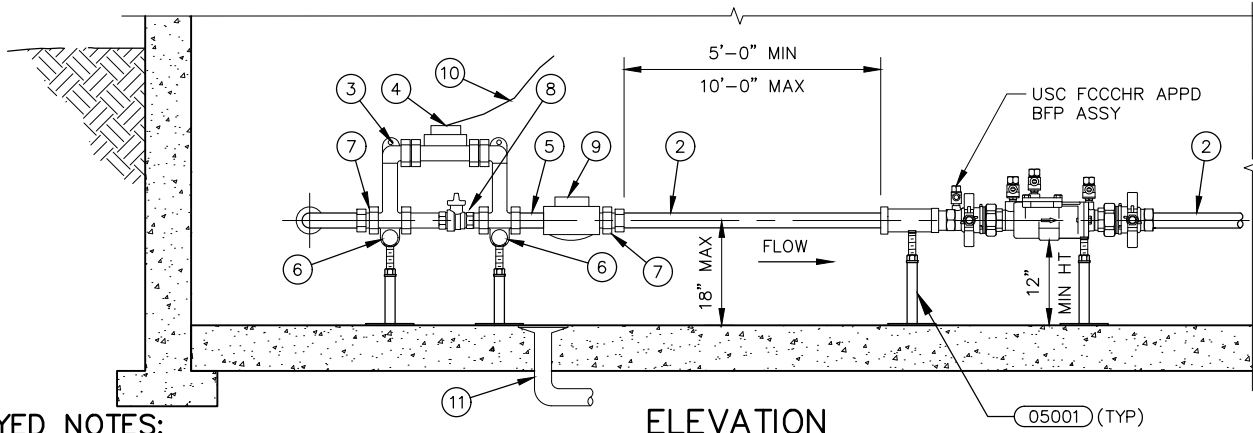
22015
INSIDE BACKFLOW PREVENTION
ASSEMBLY FOR OUTSIDE SETTING
OF 1 1/2" & 2" METER & BYPASS
IN A MANHOLE

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PLAN



ELEVATION

KEYED NOTES:

- ① CURB STOP
- ② TYPE "K" Cu TUBING
- ③ 2" COPPERSETTER/METER YOKE
- ④ METER W/ ENCODER REGISTER
- ⑤ 3" NIPPLE BTWN COPPERSETTER & CHKV (IF REQD)
- ⑥ 1" x 18" BSP-40
- ⑦ MIP TO FLARE CPLG FROM INLET SIDE OF COPPERSETTER & OUTLET SIDE OF CHKV
- ⑧ BY-PASS W/ VLV WILL BE 1" FOR 1 1/2" COPPERSETTERS & 1 1/2" OR 1 1/4" FOR 2" COPPERSETTERS
- ⑨ CHKV - NOT REQD WHERE A BFP ASSY IS INSTALLED. BUT MAY BE REQD IF DIST TO BFP ASSY IS MORE THAN 150' & ALLOWS EXCESSIVE WTR TO DR DURING METER MAINTENANCE
- ⑩ SIGNAL WIRE TO AMR DEVICE
- ⑪ FD

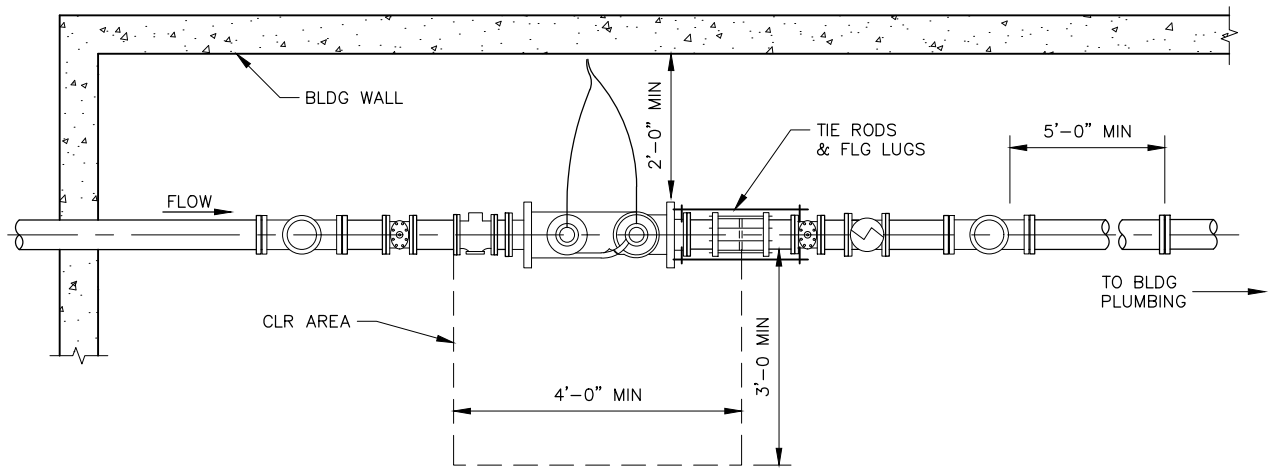
NOTES:

1. NEW INSIDE METER INSTALLATIONS ARE PERMITTED ONLY BY WRITTEN APPROVAL BY DENVER WATER. EXISTING INSIDE METER INSTALLATIONS SHALL COMPLY WITH THIS DRAWING.
2. INSTALLATION SHALL ALLOW FOR ACCESS FROM PUBLIC RIGHT-OF-WAY OR EASEMENT TO METER AND VALVES, AND PROVIDE PROTECTION FROM FREEZING.
3. A FLOOR DRAIN SHALL BE PLACED WITHIN 10 FEET OF THE METER INSTALLATION IN THE SAME ROOM.
4. METER SUPPORT MAY BE EITHER CONCRETE OR STRUCTURAL CHANNEL ATTACHED TO WALL.
5. WALL PENETRATIONS SHALL BE GROUTED WITH CONCRETE.
6. USC FCCCHR APPROVED DOUBLE CHECK VALVE OR REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY DETERMINED BY DEGREE OF HAZARD POSED BY INTERNAL PLUMBING USE.
7. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR SPECIFIC INSTALLATION INSTRUCTIONS.

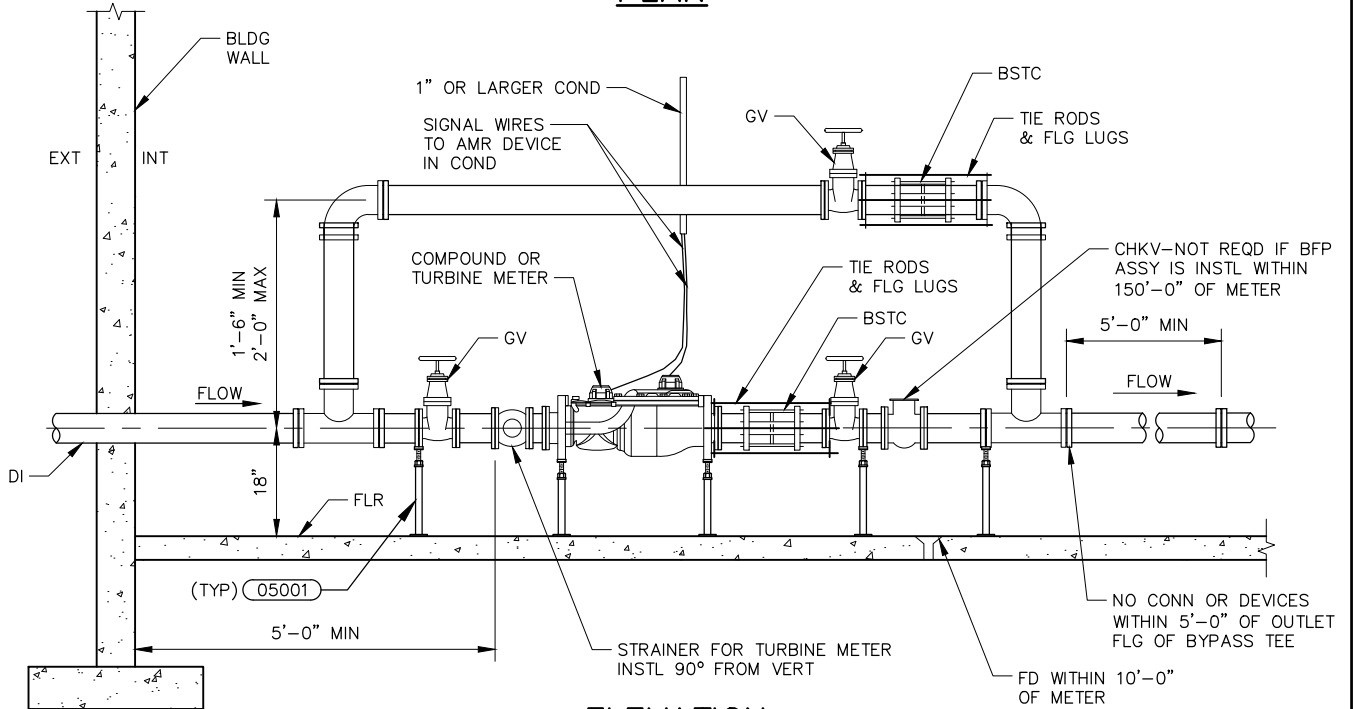
DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

22016
INSIDE SETTING FOR 1 1/2" & 2" METER & BYPASS W/ INSIDE BACKFLOW PREVENTION ASSY

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PLAN



ELEVATION

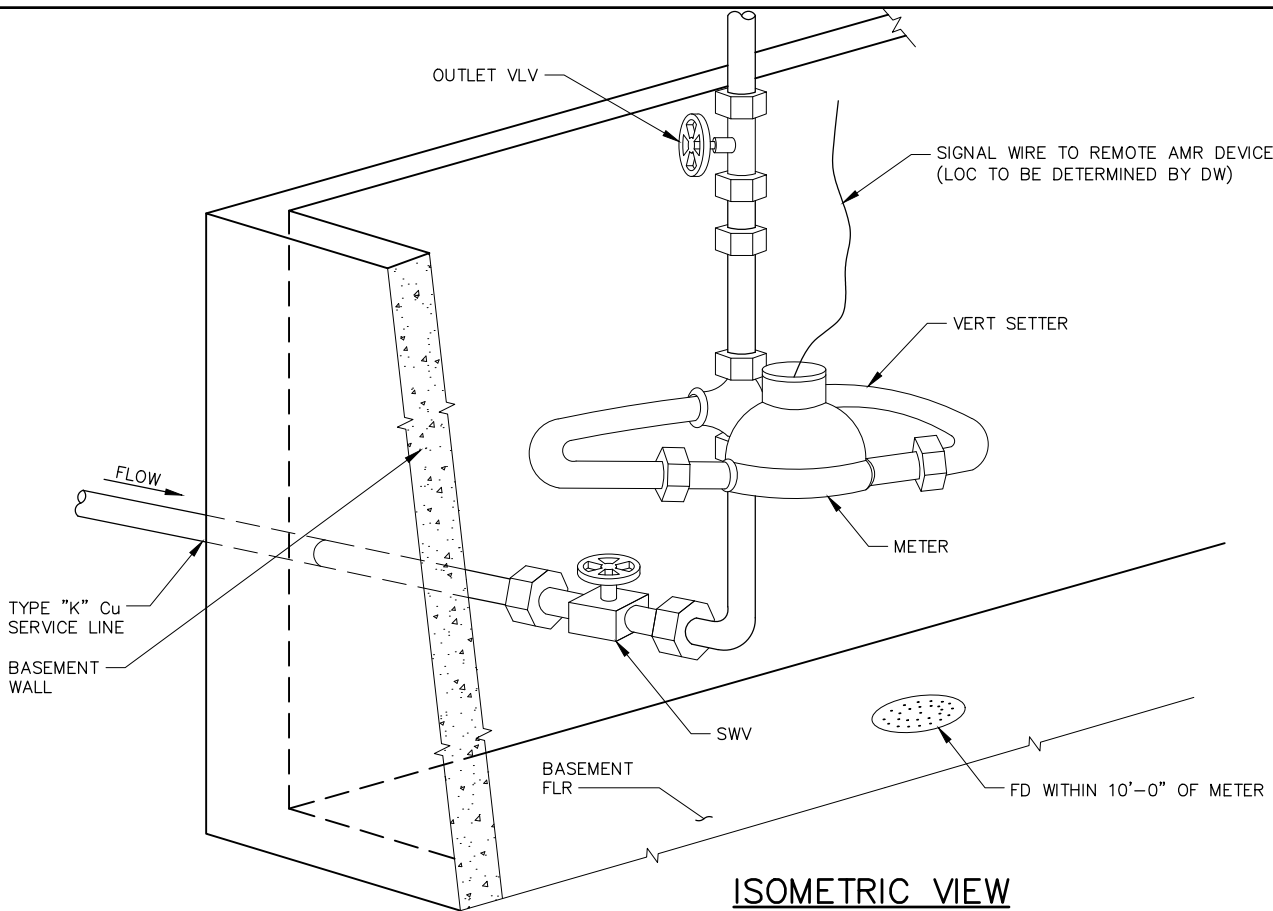
NOTES:

1. NEW INSIDE METER INSTALLATIONS ARE PERMITTED ONLY BY WRITTEN APPROVAL BY DENVER WATER. EXISTING INSIDE METER INSTALLATIONS SHALL COMPLY WITH THIS DRAWING.
2. PIPING FOR 3-INCH AND LARGER METERS SHALL BE FLANGED DUCTILE IRON FROM THE METER THROUGH THE BACKFLOW PREVENTION ASSEMBLY.
3. INSTALLATION SHALL ALLOW FOR FULL ACCESS TO THE METER AND VALVES AND PROVIDE PROTECTION FROM FREEZING WITH A MINIMUM 2 FEET CLEARANCE TO WALL.
4. GATE VALVES SHALL BE NON-RISING STEM, RIGHT HAND OPEN, WITH HAND WHEEL OPERATORS.
5. FOR INSIDE SETTINGS, THE PROPERTY OWNER SHALL PROVIDE A DETAILED DRAWING SHOWING DIMENSIONS OF THE METER ROOM INCLUDING PIPING AND EQUIPMENT WITH APPROPRIATE DIMENSIONS FOR DENVER WATER APPROVAL PRIOR TO CONSTRUCTION.
6. THE TURBINE METER REQUIRES A STRAINER BEFORE THE METER.
7. WALL PENETRATIONS SHALL BE GROUTED WITH CONCRETE.

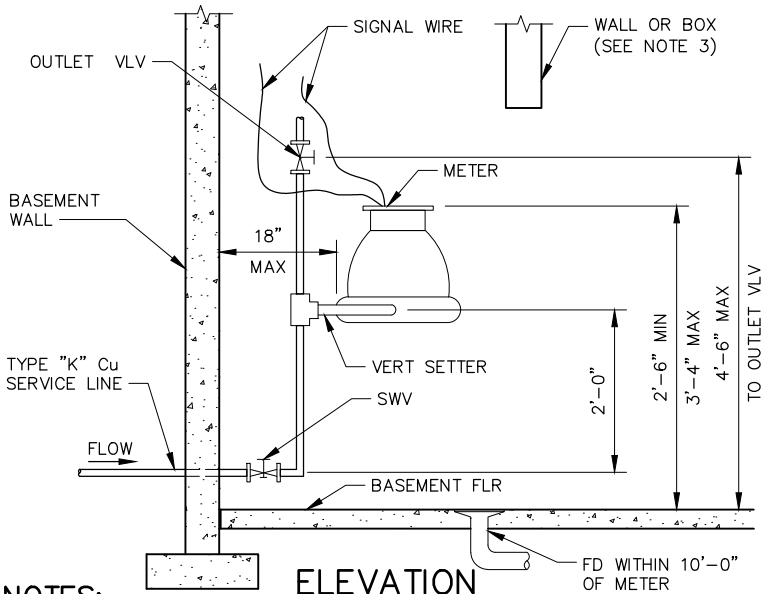
DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**22017
INSIDE SETTING FOR
3" & LARGER METER**

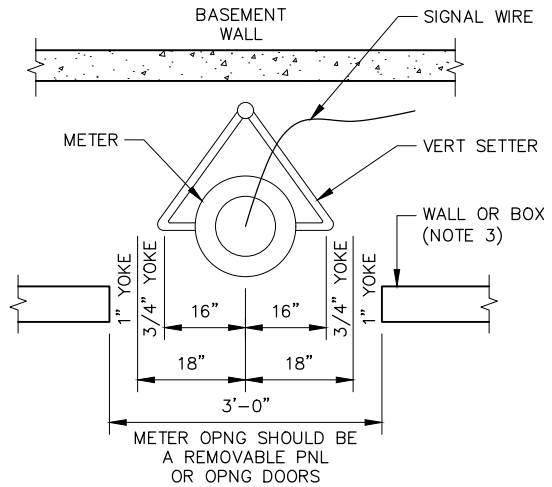
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ISOMETRIC VIEW



ELEVATION



PLAN

NOTES:

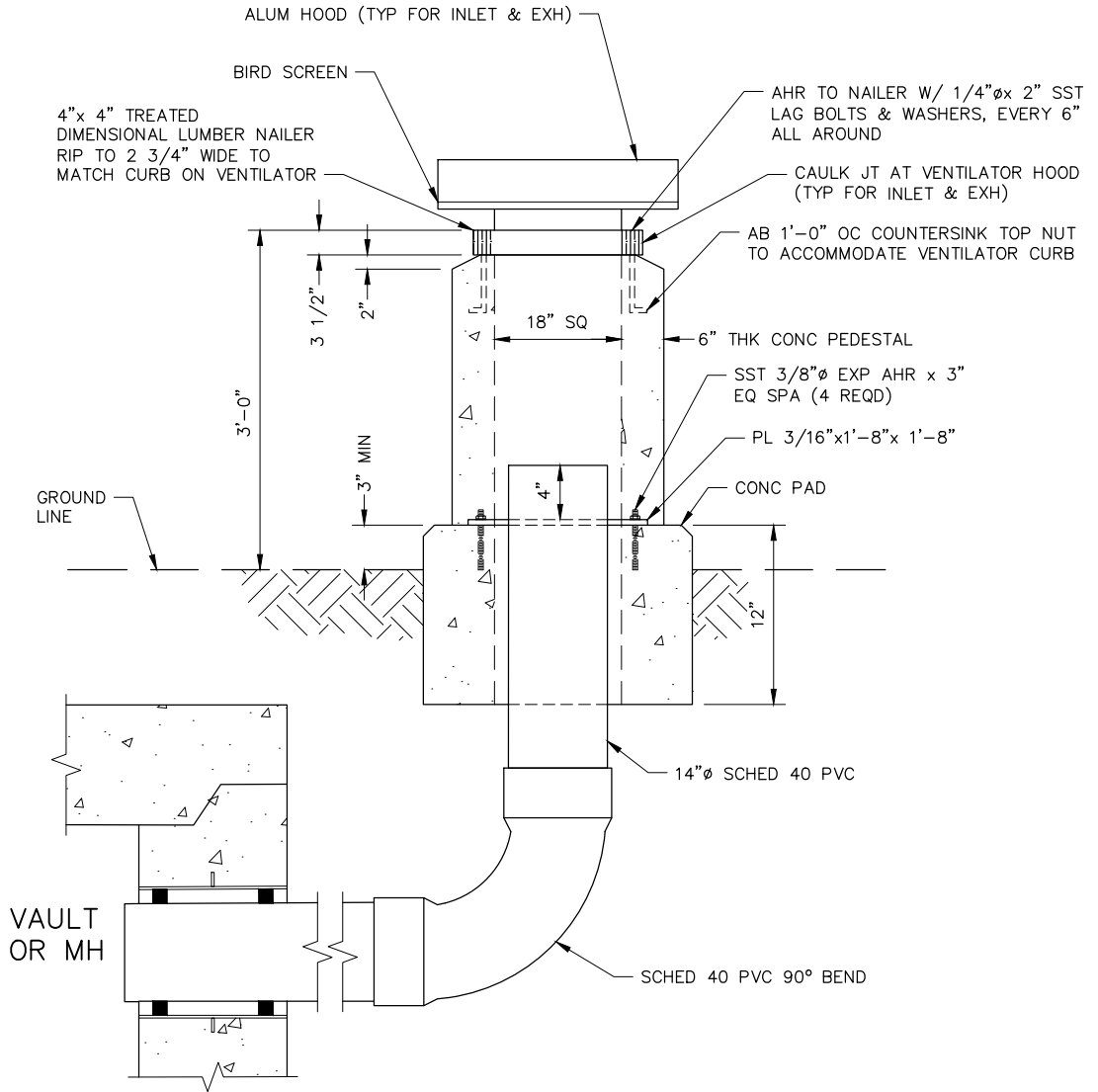
1. THE METER SHALL BE PROTECTED FROM FREEZING AND DAMAGE.
2. NO BENDS, FITTINGS, CONNECTIONS, OR CHANGES IN PIPE SIZE ARE PERMITTED ON THE SERVICE LINE FROM THE CORPORATION STOP AT THE WATER MAIN TO THE METER OUTLET VALVES EXCEPT AS SHOWN.
3. IF THE METER IS BOXED IN OR PLACED BEHIND A WALL, PROVIDE AN ACCESS OPENING 36 INCHES WIDE FROM ABOVE THE OUTLET VALVE TO THE FLOOR.
4. VALVES SHALL BE ACCESSIBLE FROM THE OPENING.
5. METER SHALL BE CENTERED IN THE OPENING.

DRAWN BY: BAIREs
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

22018
INSIDE SETTING FOR EXISTING
3/4" & 1" METER WITH
AUTOMATIC METER READING

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DRAWN BY: *BAIRES*

CHKD BY: *K ROSS / KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

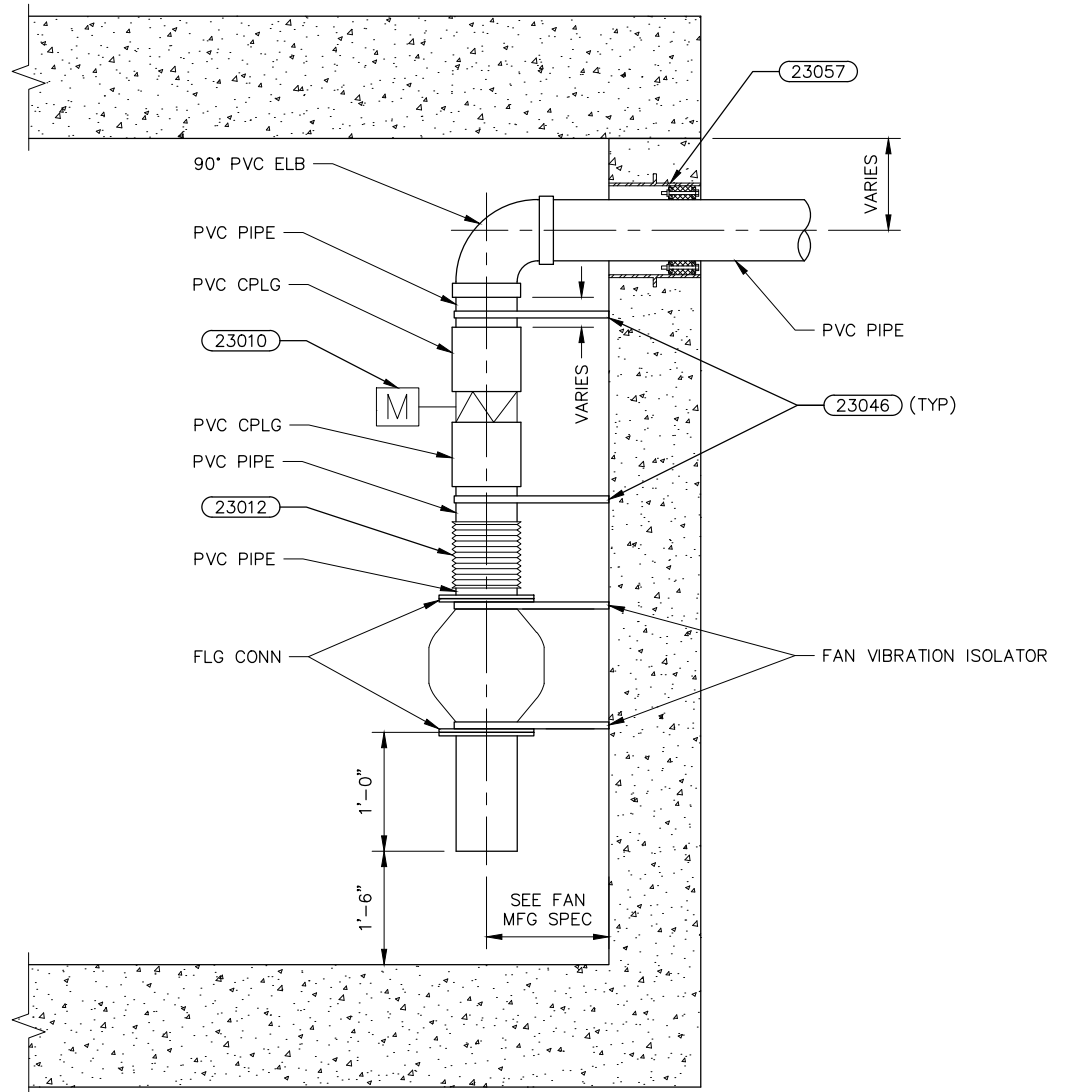
REVISION DATE:

**22035
CONCRETE PEDESTAL
VENT HOOD**



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INTENTIONALLY BLANK



NOTES:

1. EXHAUST FAN DIMENSIONS ARE APPROXIMATE, SEE MANUFACTURER DRAWINGS.
2. SEAL PIPE CONNECTIONS WITH POLYVINYL CHLORIDE PIPE SEALER AND ADHESIVE, AND/OR GASKET AT FLANGE CONNECTIONS.
3. PIPE AND FITTINGS SHALL BE SCHEDULE 40 POLYVINYL CHLORIDE.

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

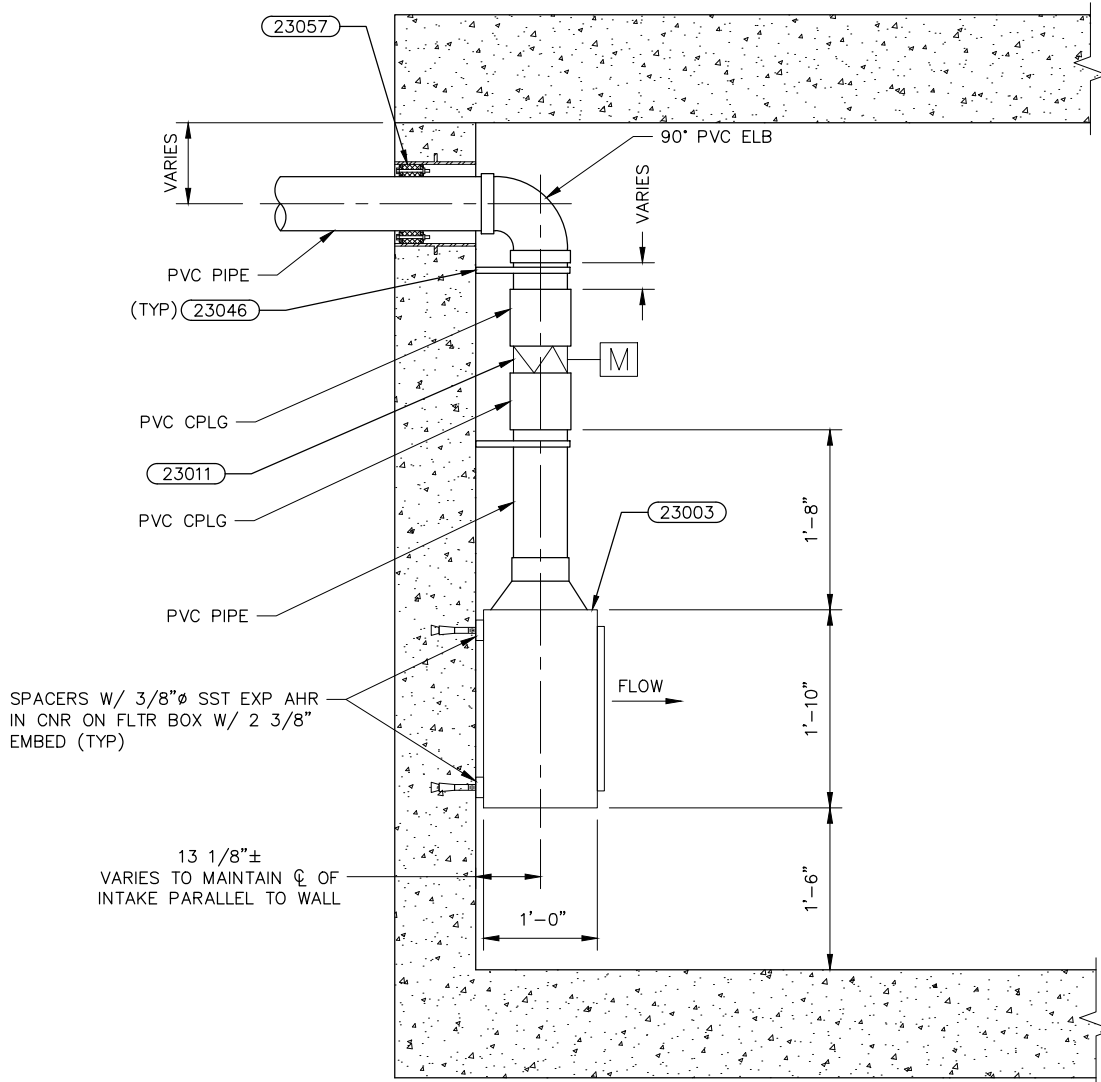
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

23001
TYPICAL EXHAUST FAN



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NOTES:

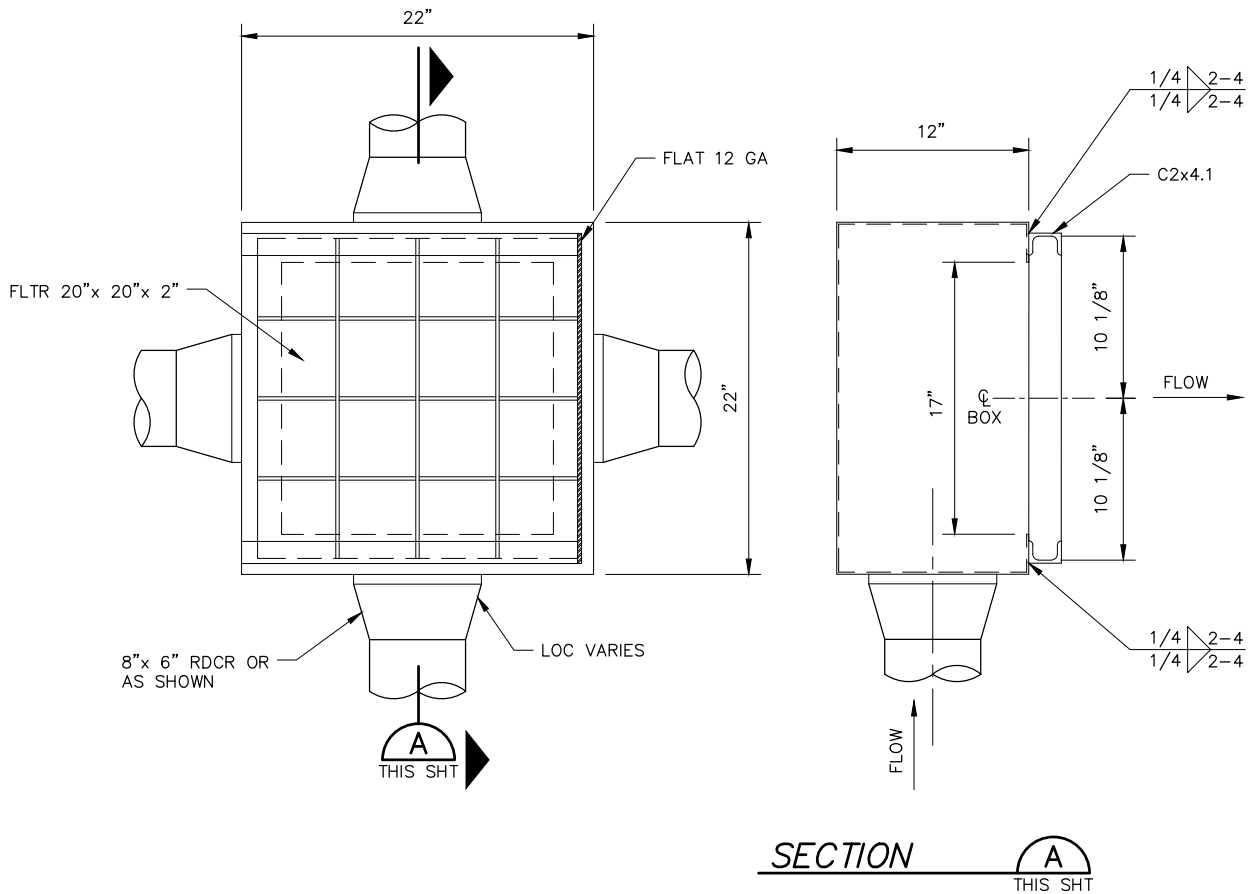
1. SEAL PIPE CONNECTIONS WITH POLYVINYL CHLORIDE PIPE SEALER AND ADHESIVE.
2. PIPE AND FITTINGS SHALL BE SCHEDULE 40 POLYVINYL CHLORIDE.

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**23002
TYPICAL INTAKE**



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NOTES:

1. SEE SPECIFIC VAULT DRAWINGS FOR PROPER ORIENTATION.
2. 8-INCH x 6-INCH REDUCER CAN BE MOUNTED ON EITHER SIDE OF FILTER BOX TO OBTAIN CORRECT ORIENTATION OF BOX.
3. MATERIAL: ASTM A 240 TYPE 304 OR TYPE 316 STAINLESS STEEL.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

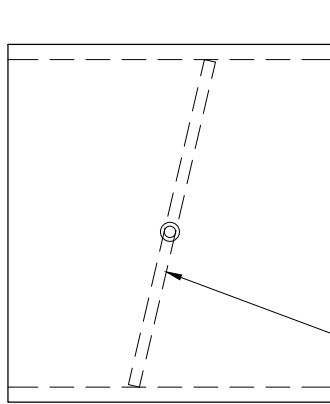
ORIGINATION DATE: JULY 2021

REVISION DATE:

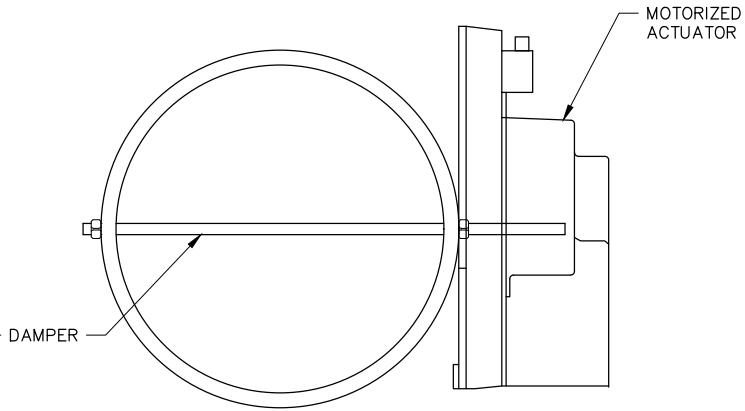
23003 FILTER BOX



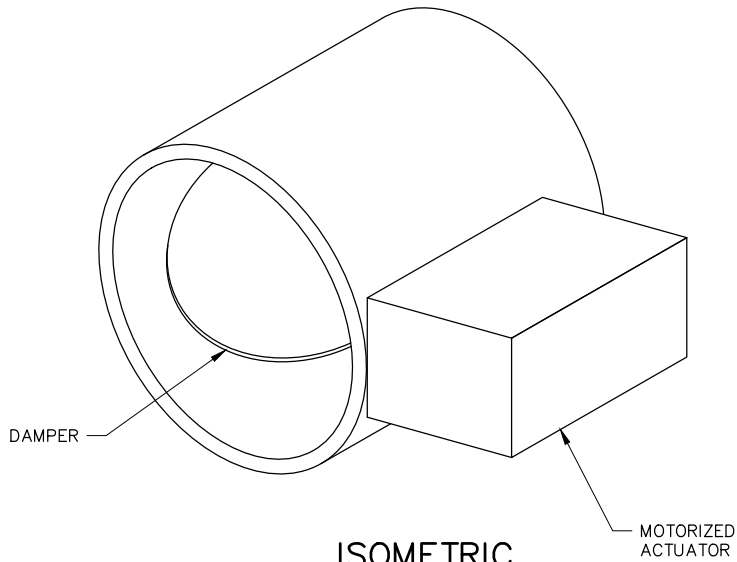
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FRONT



SIDE



ISOMETRIC

NOTE:

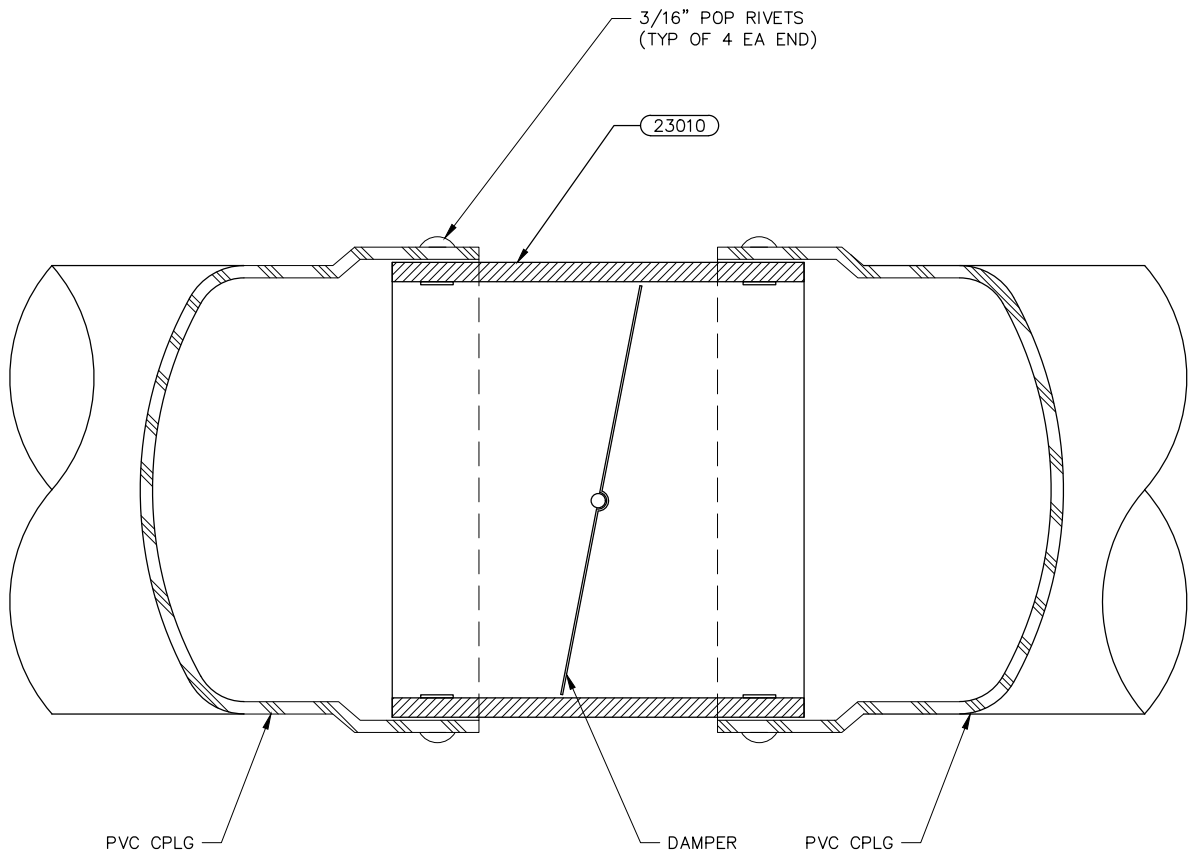
SEAL PIPE CONNECTIONS WITH POLYVINYL CHLORIDE PIPE SEALER AND ADHESIVE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23010
PVC MOTORIZED DAMPER**



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DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

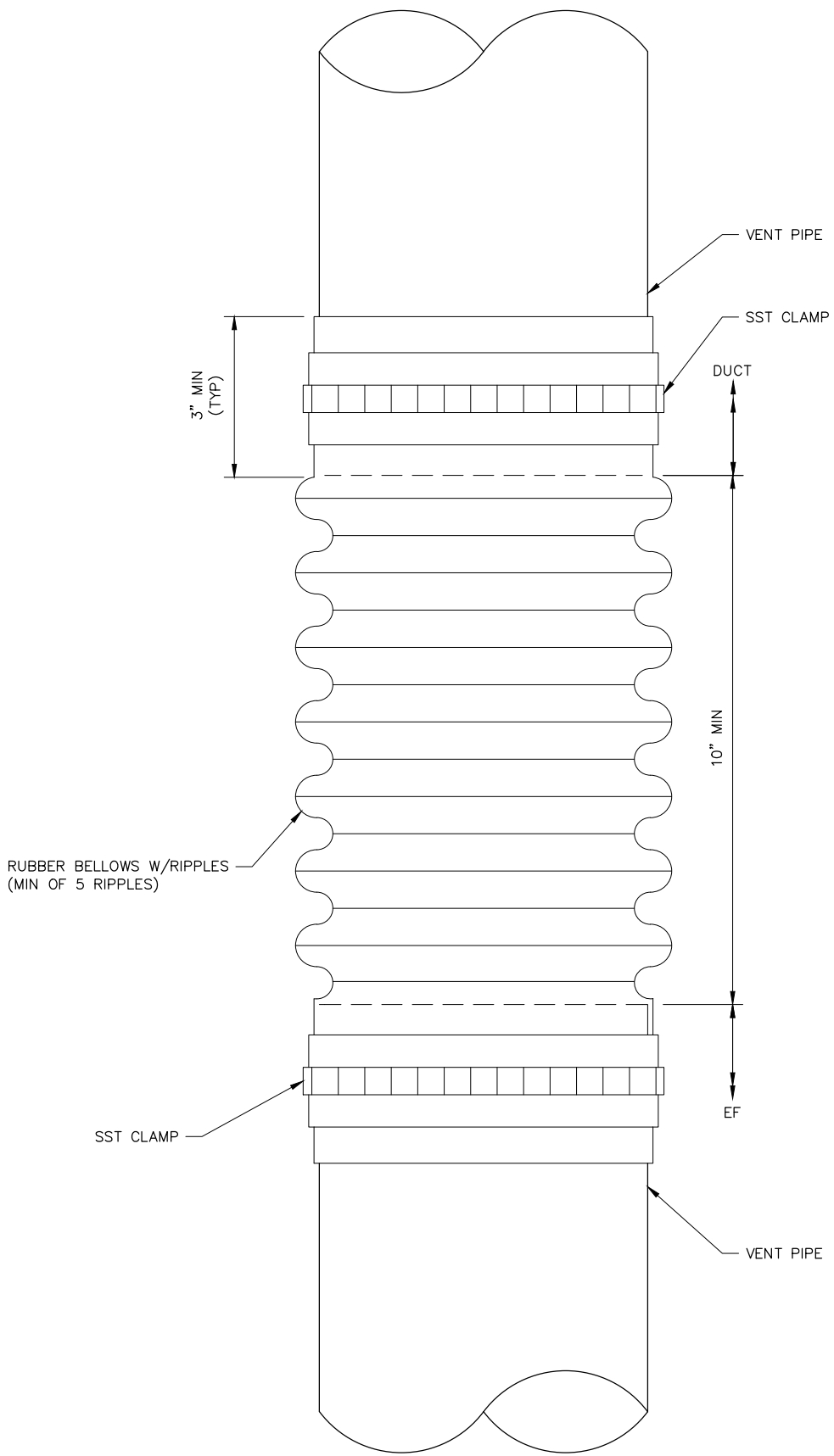
ORIGINATION DATE: JULY 2021

REVISION DATE:

23011
INLINE DAMPER INSTALLATION



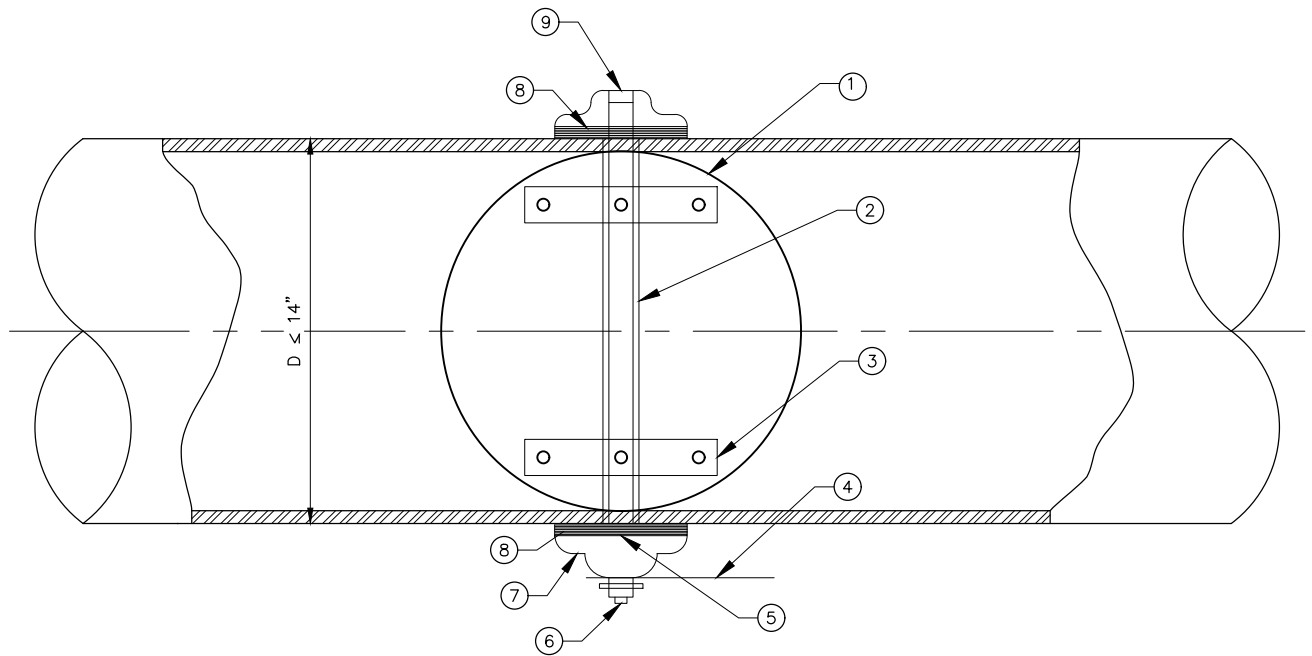
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DRAWN BY: WENKHEIMER
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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
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**23012
FLEXIBLE CONNECTION**

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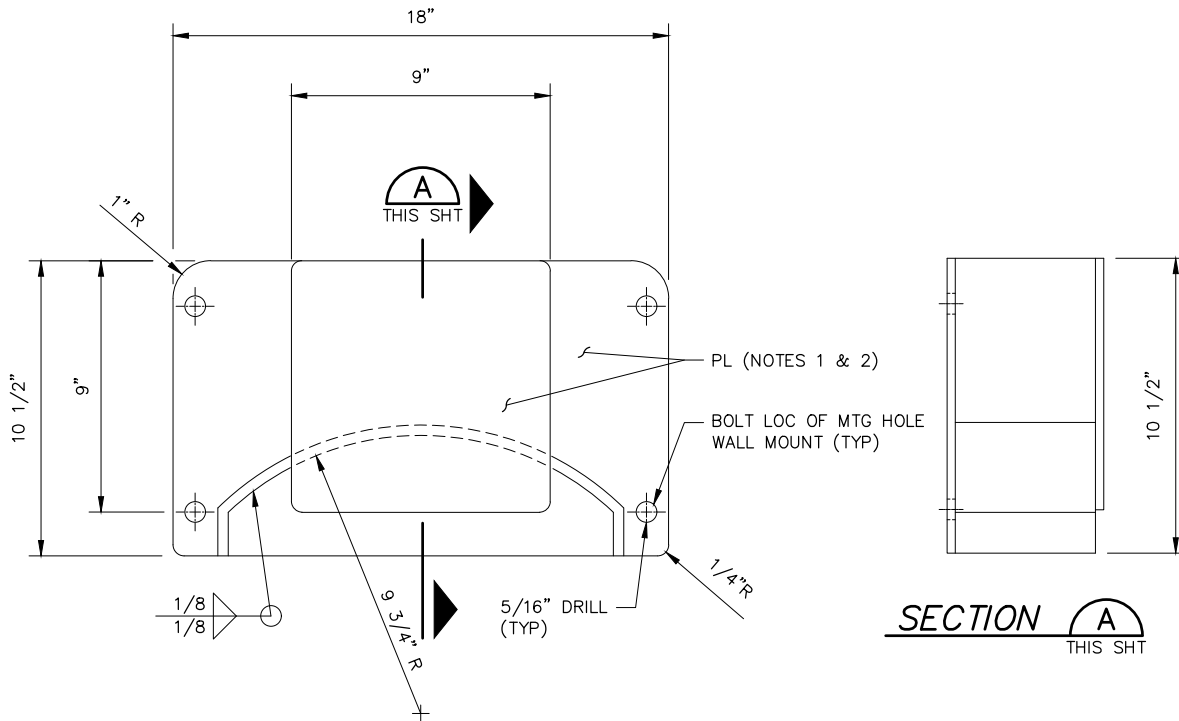
KEYED NOTES:

- ① DAMPER BLADE DIAMETER SHALL BE 1/4" LESS THAN DUCT DIAMETER. BLADE SHALL BE 16 GAUGE GALVANIZED STEEL
- ② 3/8" ROD
- ③ 1" WIDE x 16 GAUGE GALVANIZED STRAP (2 REQUIRED)
- ④ INDICATING HANDLE AND LOCKING QUADRANT
- ⑤ 3/8" SQ. ROD W/ SET SCREWS (2 REQUIRED)
- ⑥ LOCKNUT
- ⑦ REGULATOR
- ⑧ GASKET
- ⑨ END BEARING

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23014
ROUND VOLUME DAMPER
(UP TO 14")**

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WALL MOUNTED

NOTES:

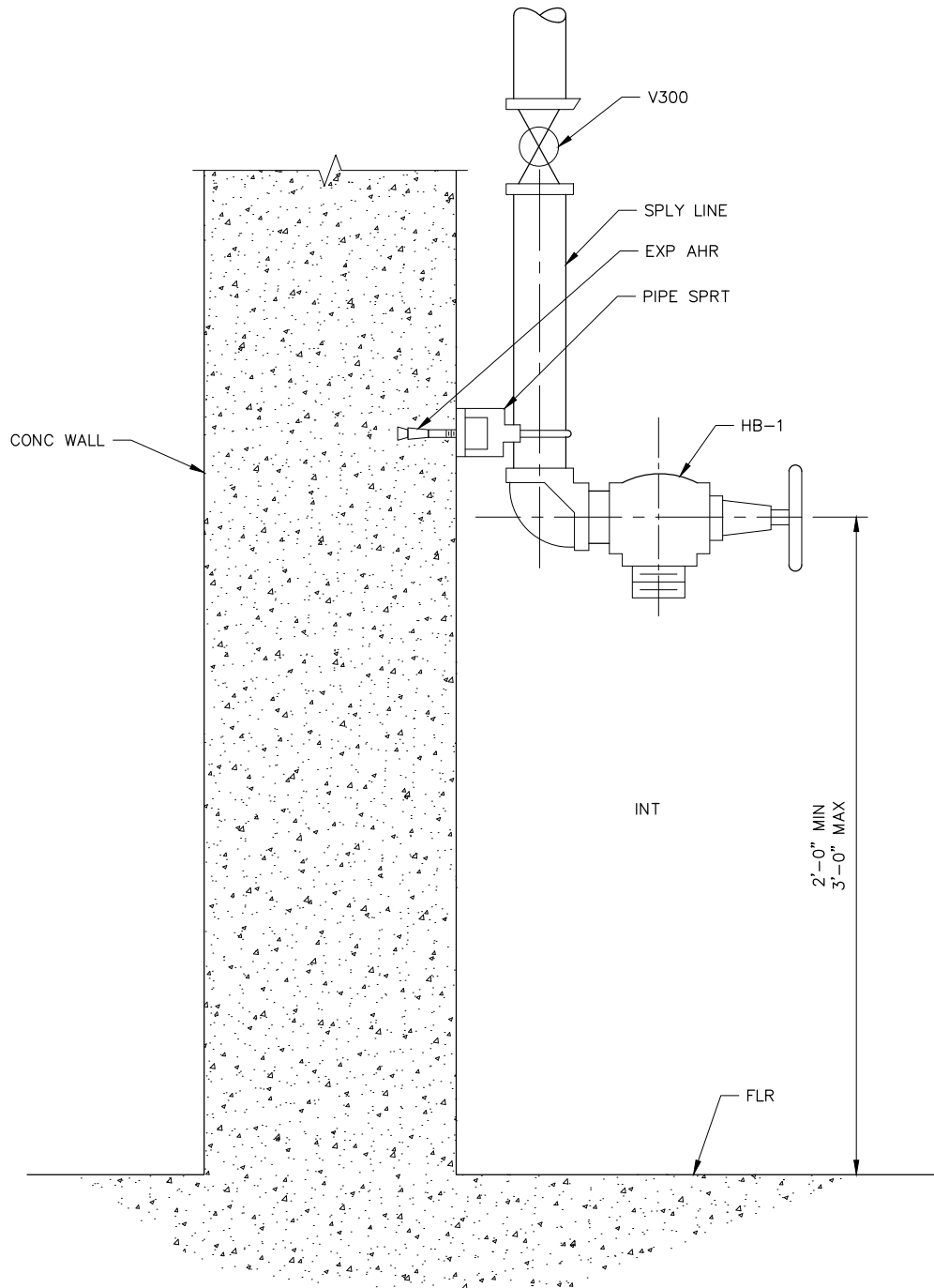
1. INTERIOR UNITS SHALL BE FABRICATED FROM 1/8-INCH ASTM A 36 STEEL PLATE AND HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 153.
2. EXTERIOR UNITS SHALL BE FABRICATED FROM 3/16-INCH 6061-T6 ALUMINUM ALLOY PLATE.
3. ATTACH TO CONCRETE WALL WITH FOUR 1/4-INCH 18-8 STAINLESS STEEL EXPANSION ANCHORS.
4. MOUNT HOSE RACK 3 FEET ABOVE FINISHED FLOOR OR GROUND ELEVATION.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23019
WALL MOUNTED HOSE RACK
FOR 3/4" AND 1" HOSE



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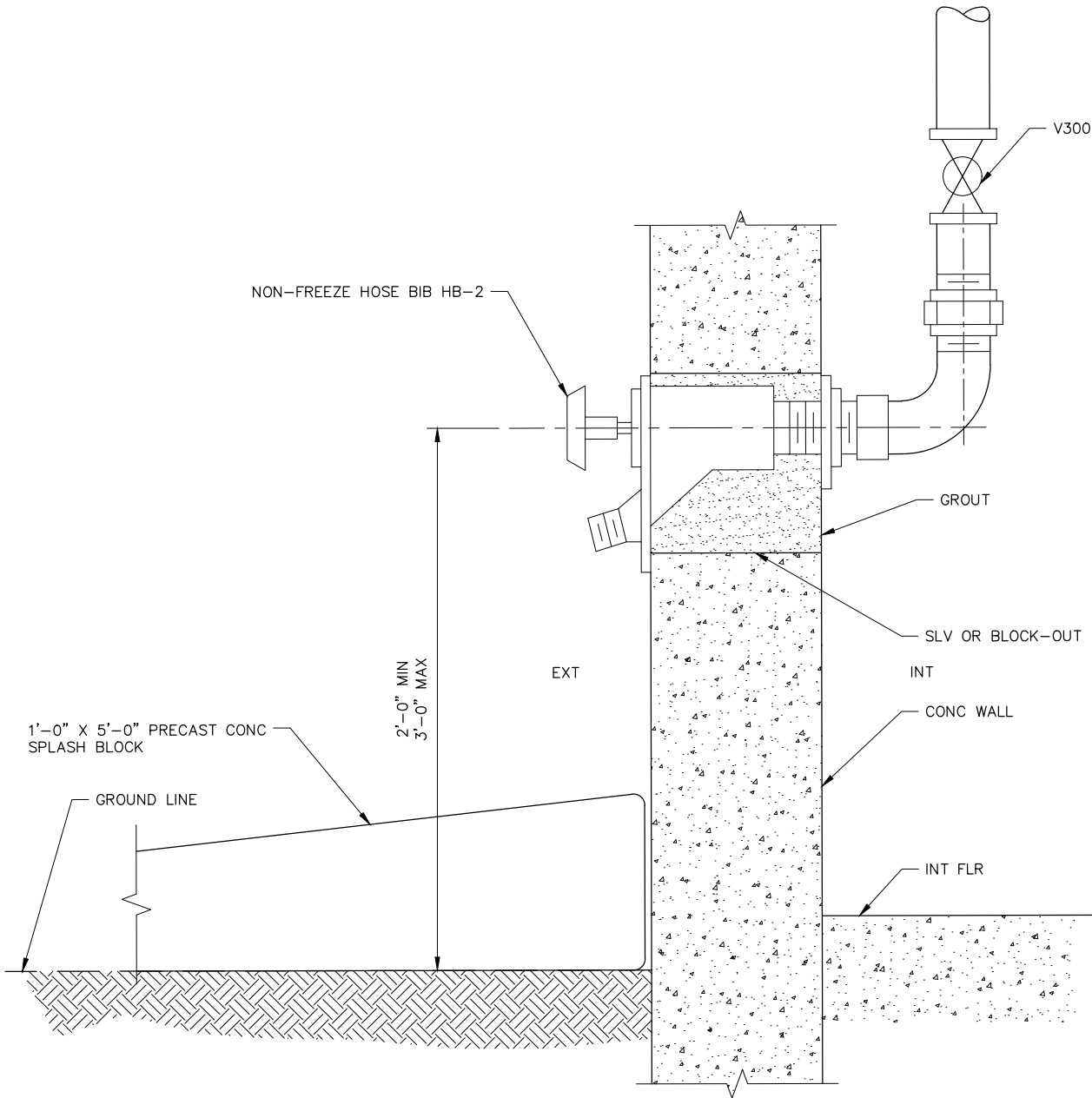


DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

23020
INTERIOR HOSE BIB, HB-1



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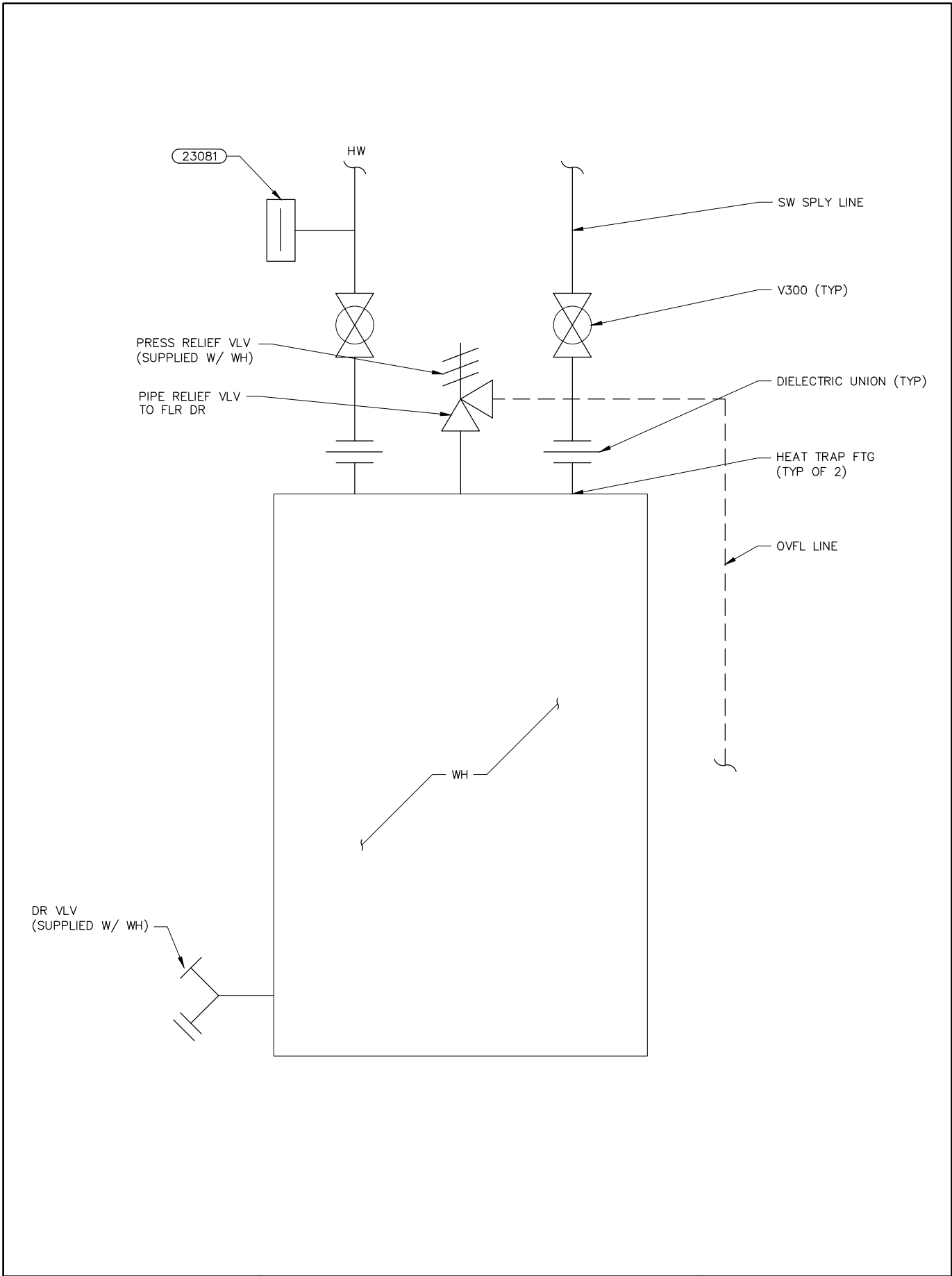


DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23021
NON-FREEZE
WALL HYDRANT, HB-2


DENVER WATER

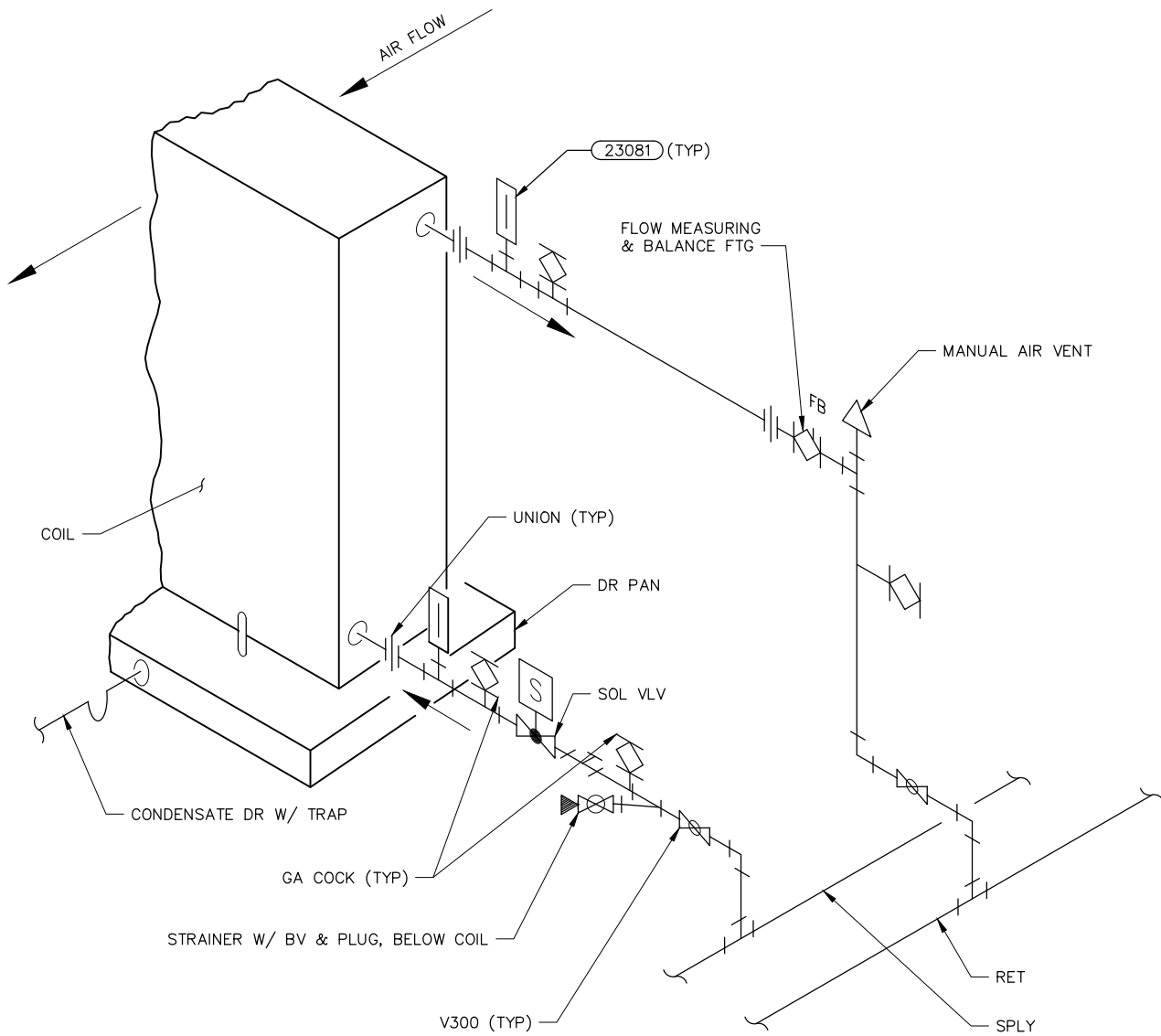
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DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23022 WATER HEATER


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NOTE:

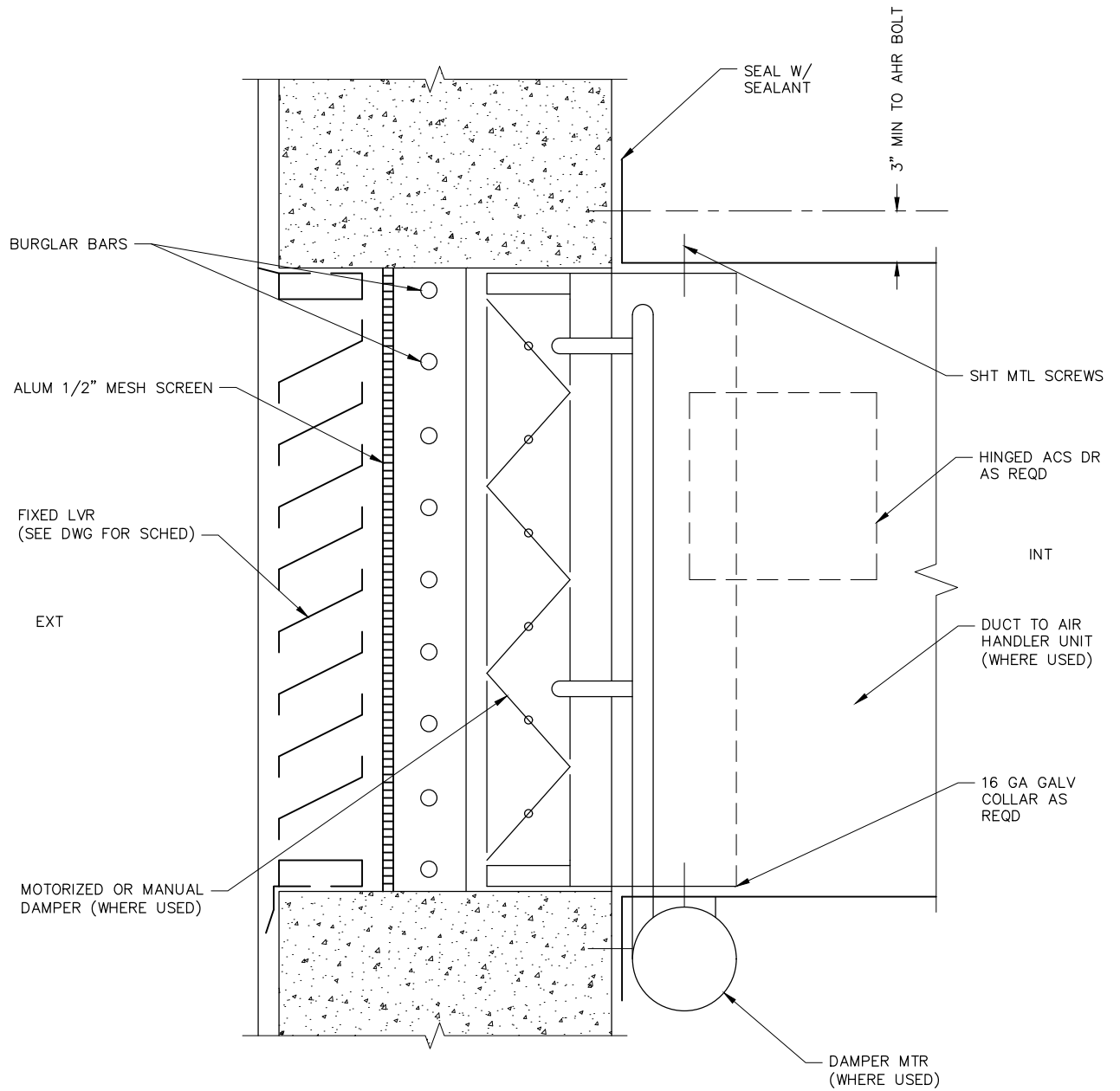
DETAIL GIVES REQUIRED SEQUENCE OF EQUIPMENT AND VALVES. PIPING ARRANGEMENT MAY VARY TO SUIT FIELD REQUIREMENTS. PIPE COIL FOR COUNTER FLOW WITH AIR.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23023
COOLING AND HEATING
COIL CONNECTION**




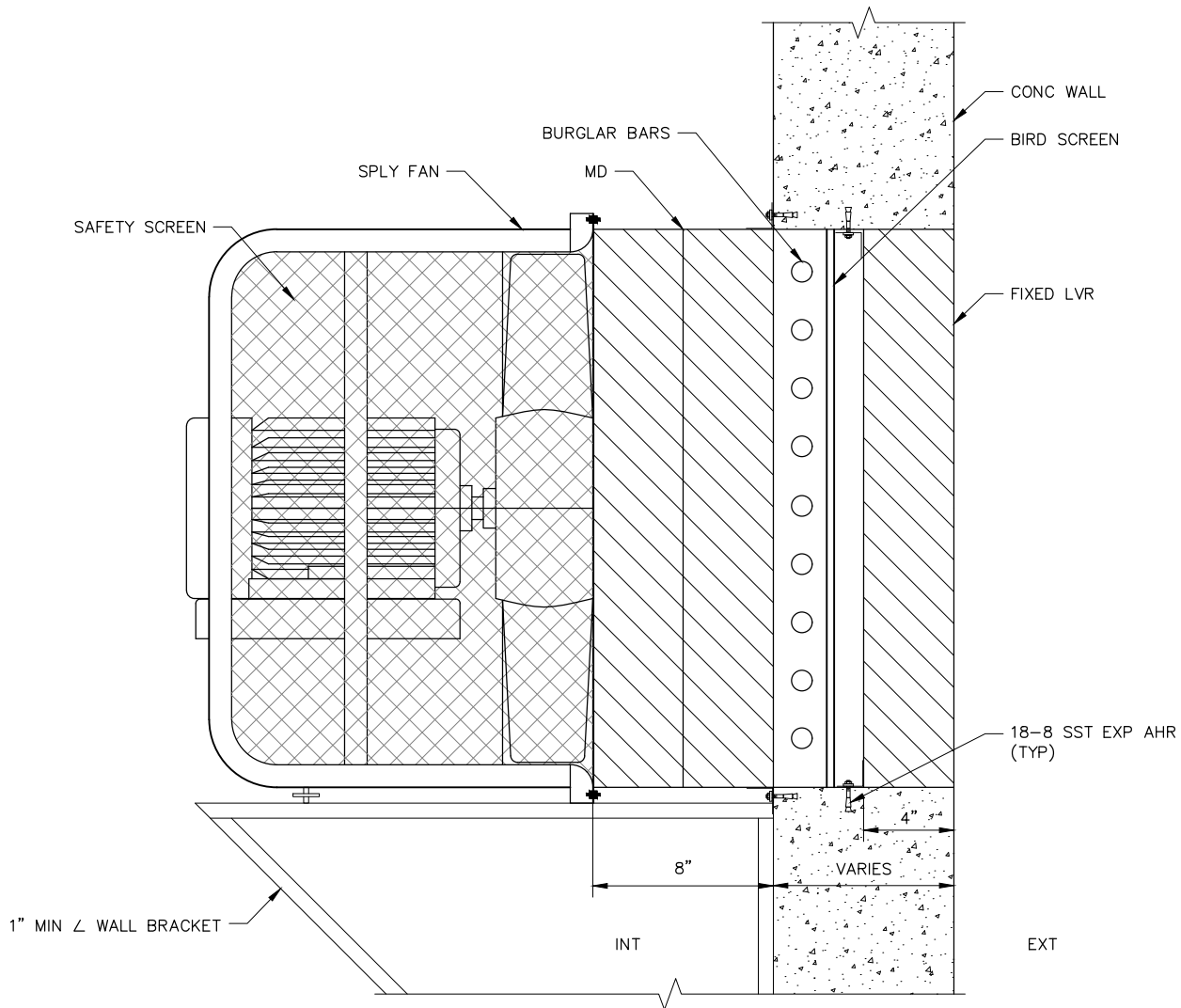
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DRAWN BY: <i>WENKHEIMER</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

23030
OUTSIDE AIR INTAKE

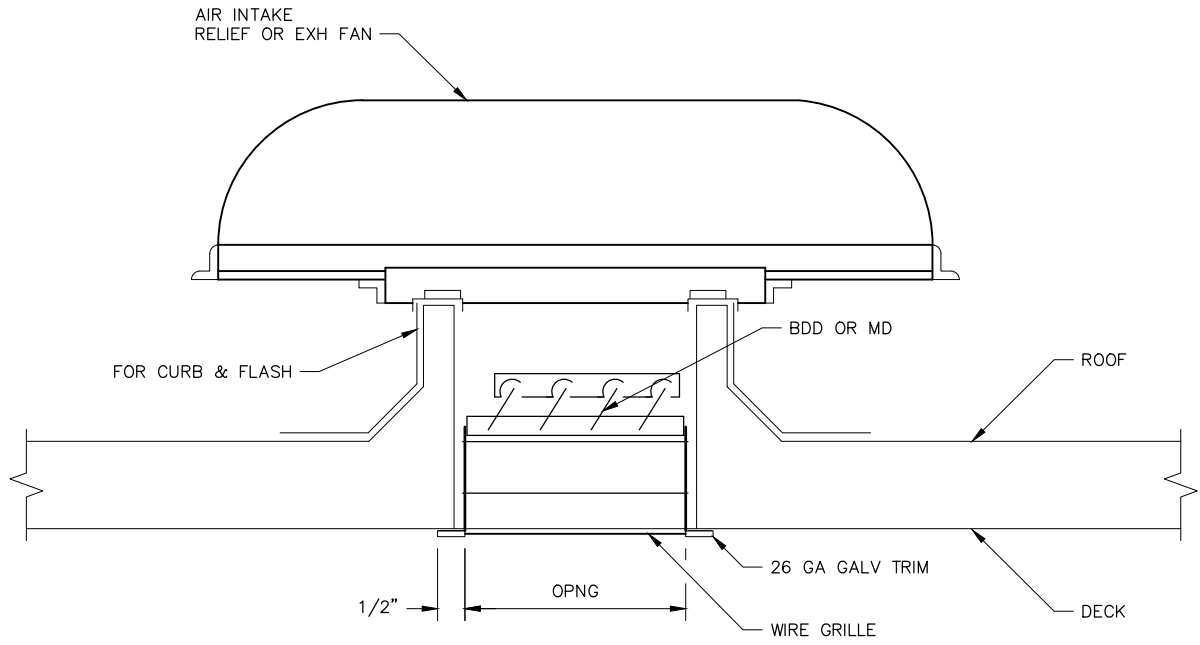

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DRAWN BY: WENKHEIMER
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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23031
PROPELLER FAN MOUNT

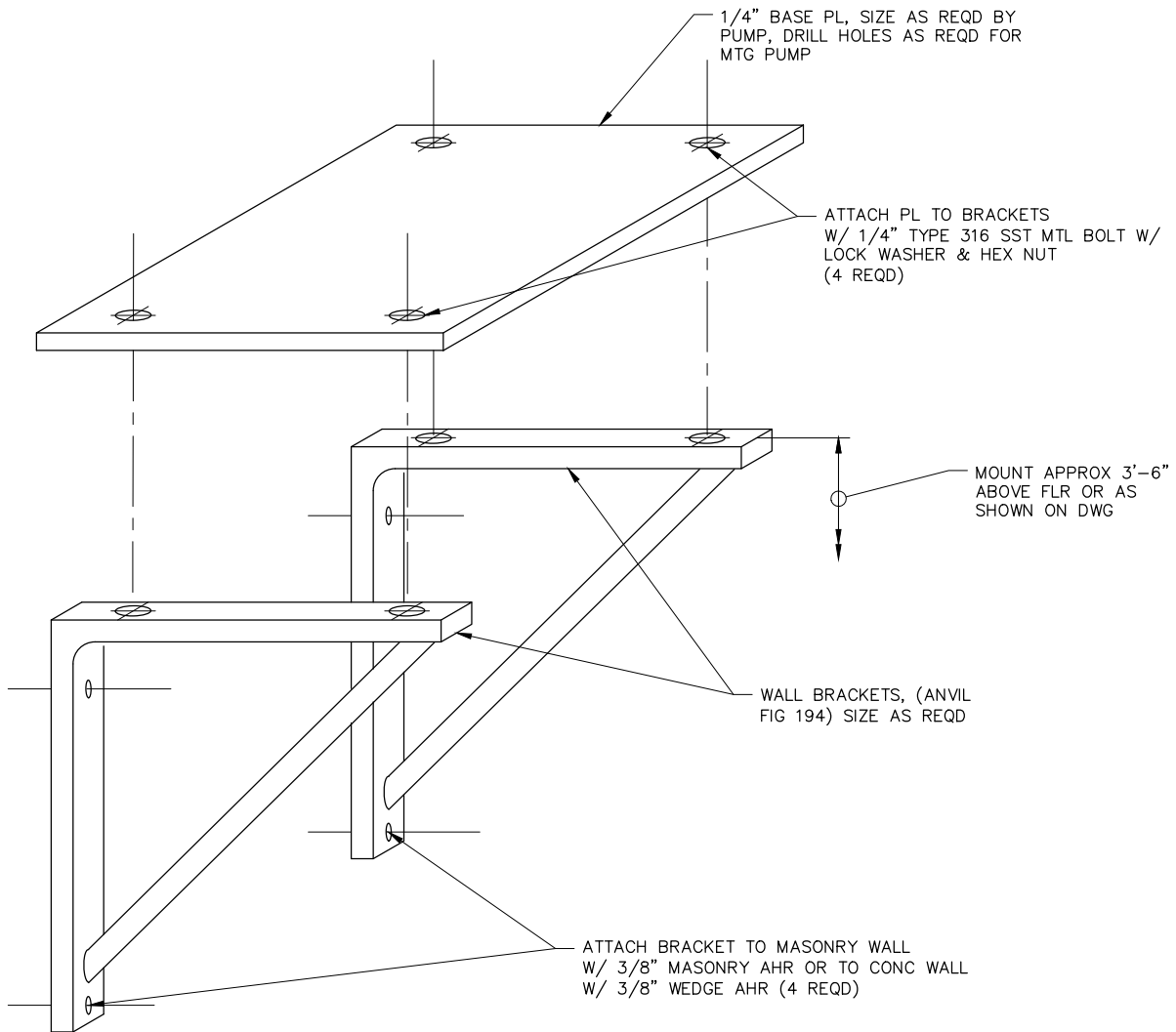

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DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

23032
ROOF EXHAUST OR INTAKE

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NOTES:

1. PUMP SUPPORT SHALL BE TYPE 316 STAINLESS STEEL, FIBERGLASS REINFORCED PLASTIC, OR GALVANIZED STEEL IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
2. HOT DIP GALVANIZE ENTIRE ASSEMBLY AFTER FABRICATION.

DRAWN BY: IVERY

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

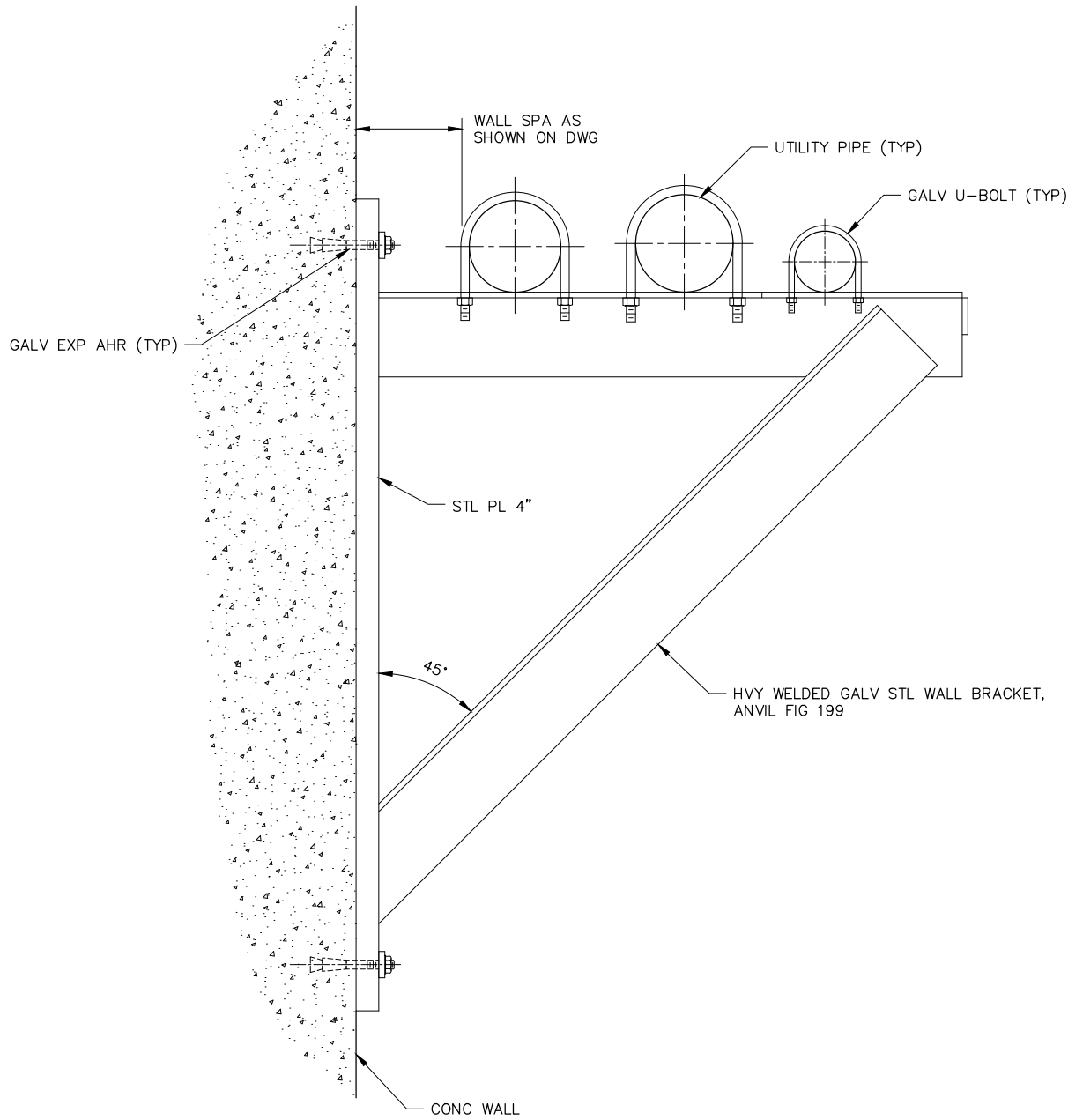
ORIGINATION DATE: JULY 2021

REVISION DATE:

23038
SMALL PUMP SUPPORT



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NOTE:

SIZE AS REQUIRED FOR PIPE DIAMETER, NUMBER, AND LOAD.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

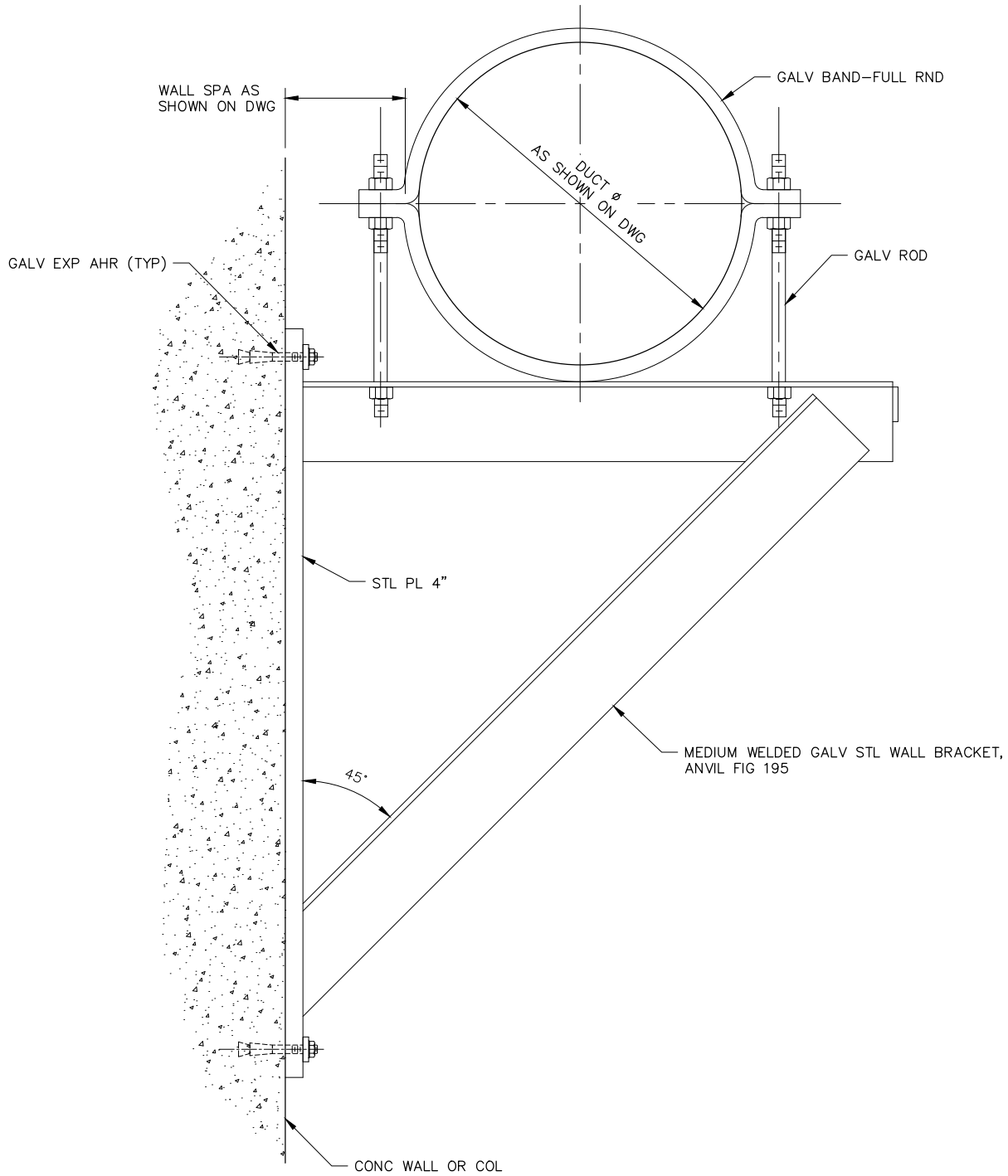
ORIGINATION DATE: JULY 2021

REVISION DATE:

23040 WALL BRACKET



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NOTE:

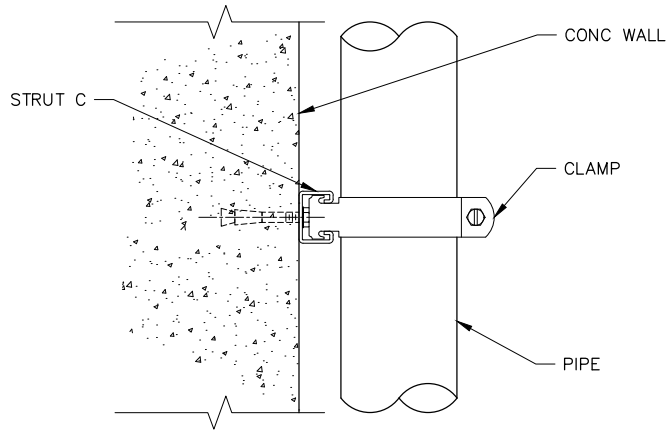
SIZE AS REQUIRED FOR DUCT DIAMETER AND LOAD.

DRAWN BY: <i>WENKHEIMER</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

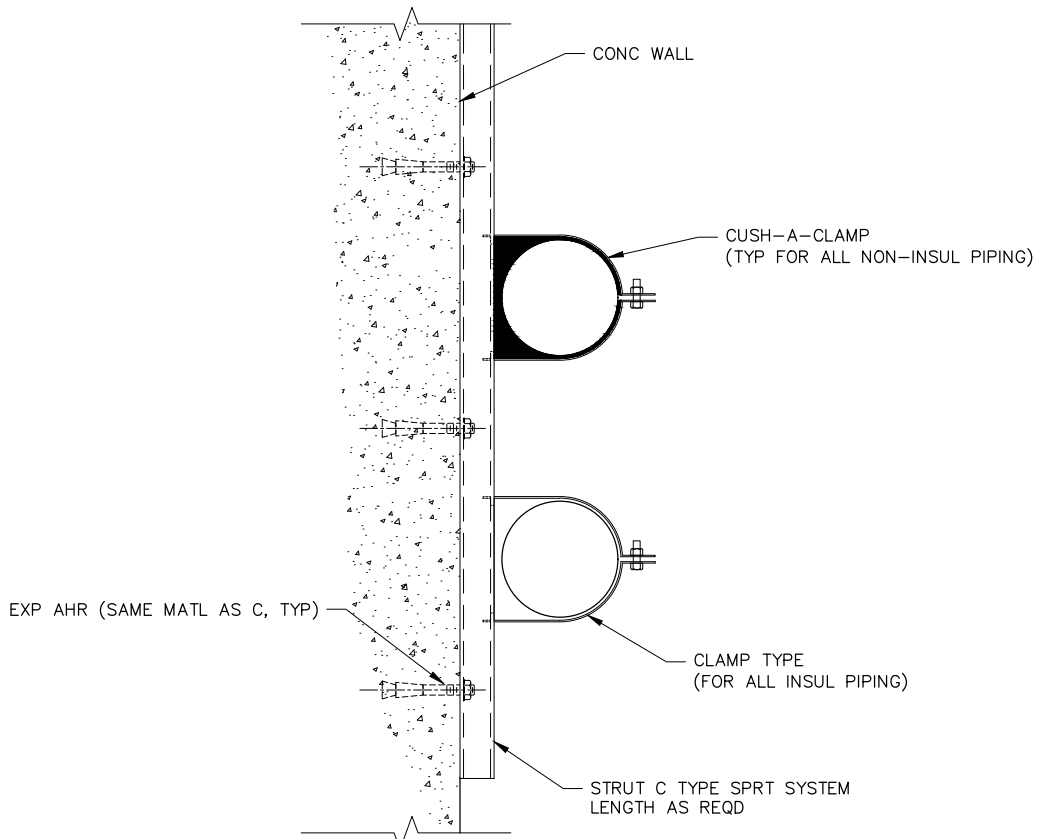
**23041
DUCT SUPPORT-
BRACKET SYSTEM**



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VERTICAL



HORIZONTAL

NOTES:

1. CLAMP MATERIAL SHALL BE THE SAME AS CHANNEL MATERIAL.
2. WHERE INSULATED, PIPE SHALL BE FITTED WITH RIGID POLYVINYL CHLORIDE JACKET FOR PROTECTION.
3. PROVIDE STAINLESS STEEL CLAMPS, FASTENERS, INSERTS, AND CHANNEL FOR SUBMERGED OR WETTED AREAS. PROVIDE GALVANIZED MATERIALS FOR ALL OTHER LOCATIONS.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

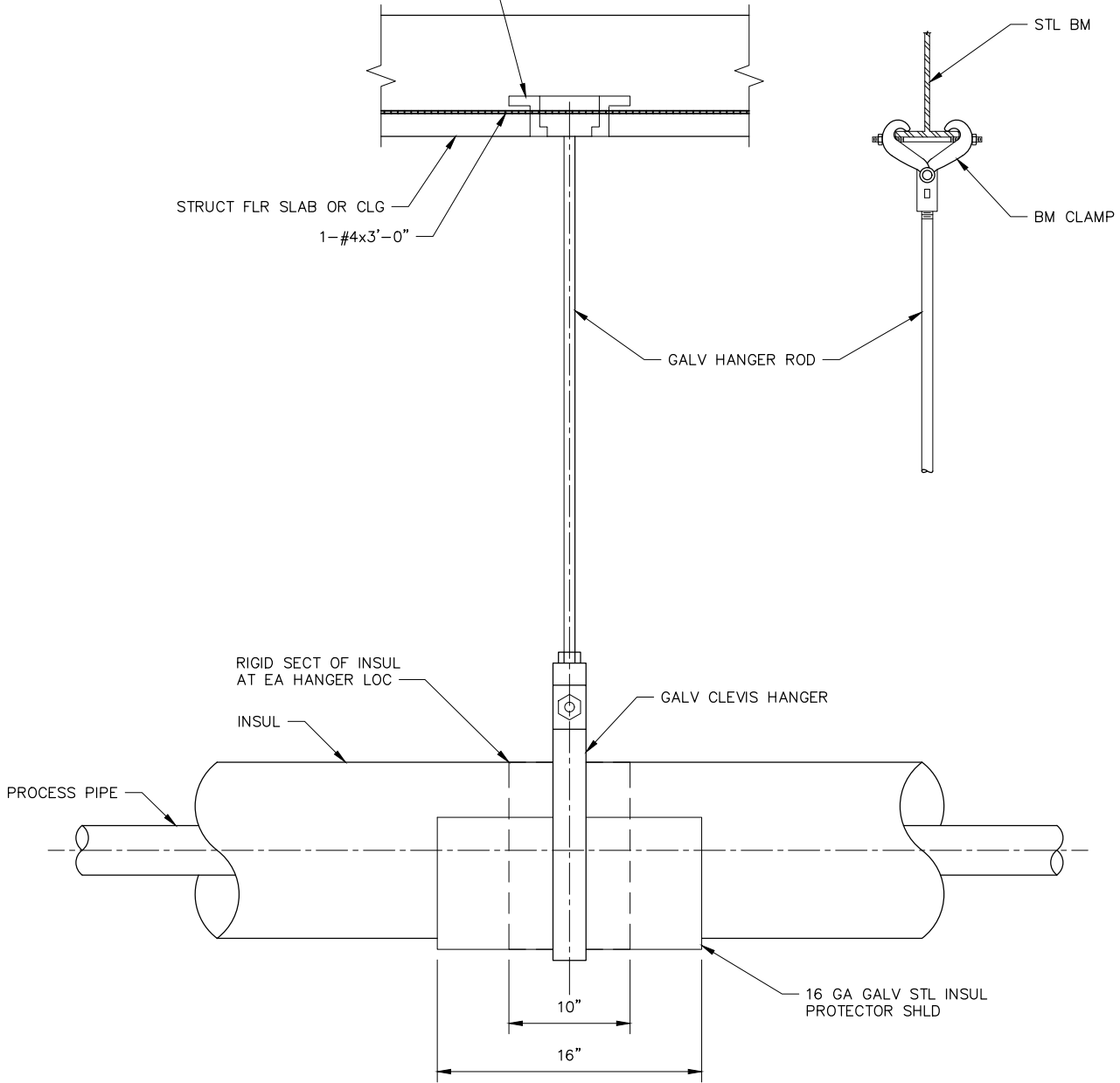
REVISION DATE:

**23042
PIPE SUPPORT-
STACKED WALL SYSTEM**



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FOR CONC APPLICATIONS USE UNIVERSAL
 CONC INSERT OR STRUT C, FOR STL BM
 APPLICATION USE BM CLAMPS

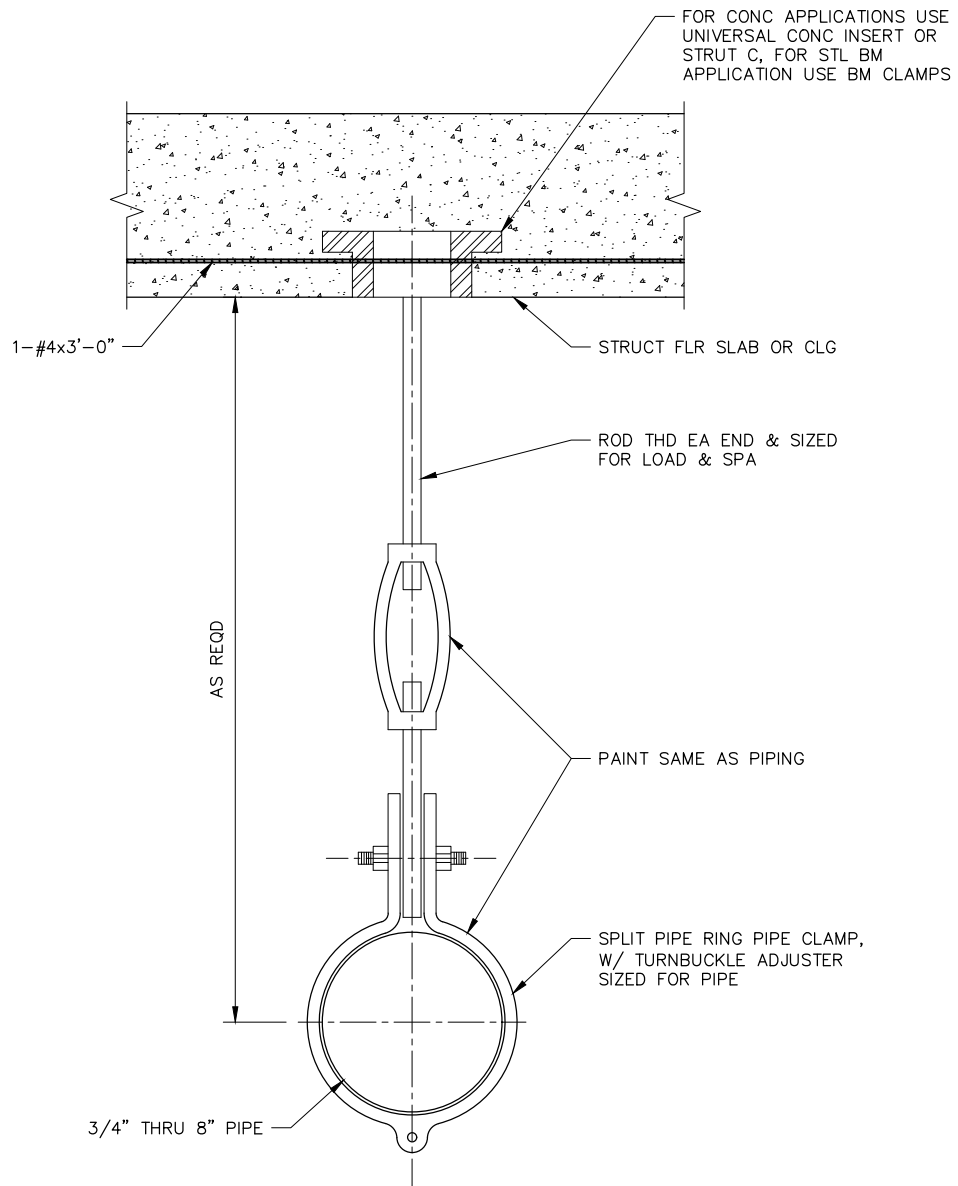


DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

23043
HANGER SUPPORT
SYSTEM-INSULATED
HORIZONTAL PIPING



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NOTE:

TOTAL LOADING ON EACH CONCRETE INSERT OR OTHER TYPE HANGER ROD ANCHOR SHALL NOT EXCEED MANUFACTURER RECOMMENDED LOADING.

DRAWN BY: *WENKHEIMER*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

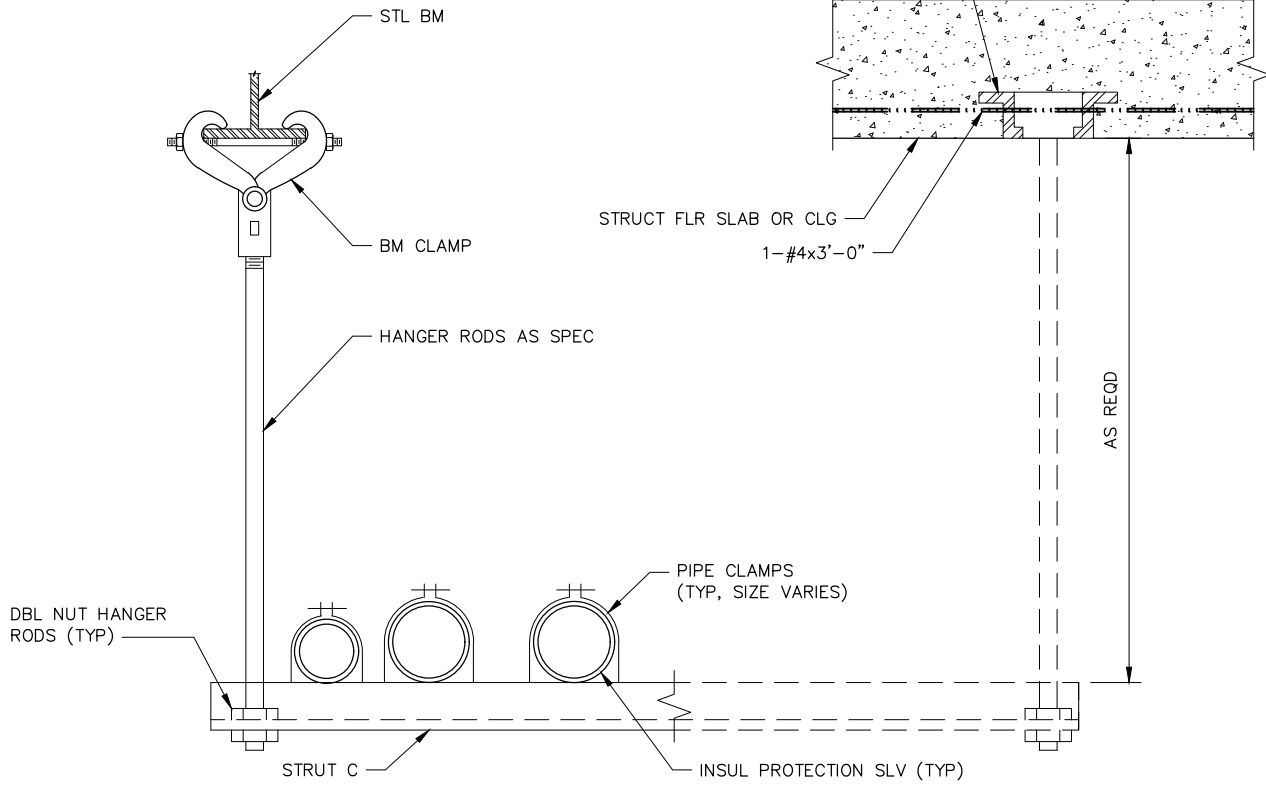
REVISION DATE:

**23044
PIPE HANGER**



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FOR CONC APPLICATIONS USE UNIVERSAL CONC INSERT
OR STRUT C, FOR STL BM APPLICATION USE BM CLAMPS

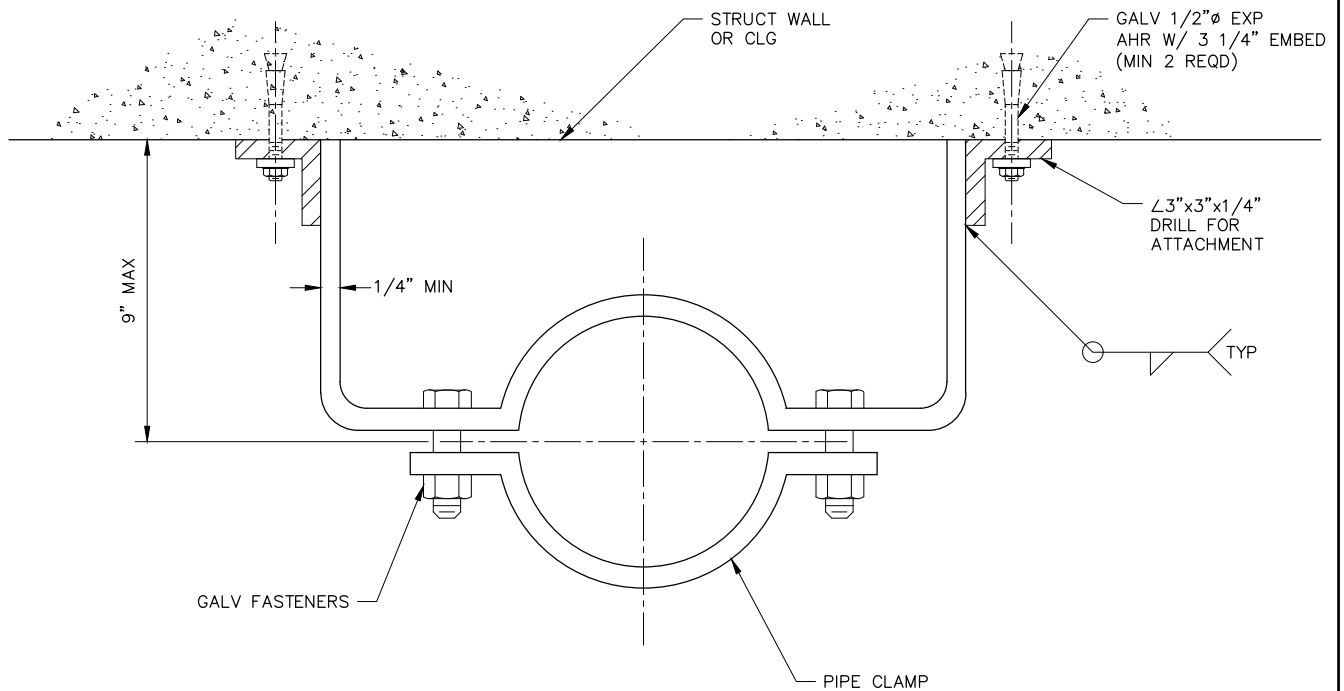


DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23045 TRAPEZE PIPE HANGER

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NOTES:

1. HOT DIP GALVANIZE ASSEMBLY AFTER FABRICATION.
2. FOR INSULATED PIPING, CLAMP INSIDE DIAMETER SHALL BE SUITABLE FOR OUTSIDE DIAMETER OF INSERT.
3. MAXIMUM PIPING DIAMETER 6 INCH.
4. EXPANSION ANCHORS SHALL BE APPROVED BY MANUFACTURER FOR OVERHEAD USE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23046
OFFSET PIPE CLAMP**

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PENETRATION TABLE			
PENETRATION	CONDITION	TYPE	LIMITATION
WATER HOLDING STRUCTURE	ABOVE WATER SURFACE	C,D,F,G	
	BELOW WATER SURFACE	A,B,F,L,Q	
INTERIOR WALL	CONCRETE	C,D,F,M	PIPE > 4"
		H,M	PIPE < 4"
	BLOCK	H	
FOUNDATION WALL	ALL	E	PIPE > 4"
		F,G,M,S	
		L	REINFORCED CONCRETE PIPE
EXTERIOR WALL	ALL	-	AS SHOWN
ROOF	ALL	I	AS SHOWN
CEILING, FLOOR	ALL	I	
FOUNDATION FLOOR	METAL PIPE	A,B	PIPE > 4"
		I,H,Q	PIPE < 4"
	PLASTIC PIPE	I	
DUCT	ALL	J,K	
ELECTRICAL	EXTERIOR WALLS	G,F,N,R,T,U	
	INTERIOR FLOORS	O,Q,R,S	
	INTERIOR WALLS	G,N,P,Q,R,S	
	EXTERIOR FOUNDATION FLOORS, SLABS AND EQUIPMENT PADS	R,S,T,U	

NOTES:

1. PENETRATIONS CONFORM TO THE PENETRATION TABLE FOR THE CONDITION INDICATED UNLESS OTHERWISE NOTED ON THE DRAWINGS.
2. TABLE TERMINOLOGY:
 - A. WATER HOLDING STRUCTURE – ANY PART OF A STRUCTURE CONTAINING WATER
 - B. WATER SURFACE – AN ELEVATION 9 INCHES ABOVE MAXIMUM WATER SURFACE SHOWN ON THE DRAWINGS
3. COAT EMBEDDED WALL AND FLOOR PIPES AND SLEEVES WITH SPECIFIED PAINT SYSTEM PRIOR TO CONCRETE PLACEMENT.
4. PENETRATION DETAILS ARE NOT SHOWN FOR ABOVE GRADE EXTERIOR WALLS AND ROOFS. DETAILS SHALL BE AS SPECIFIED OR SHOWN ON THE DRAWINGS.
5. SLEEVES IN FOUNDATION WALLS AND TANK WALLS SHALL HAVE 5/16 INCH MINIMUM THICKNESS WALL COLLARS. COLLARS ARE NOT REQUIRED ON ALL OTHER WALL SLEEVES.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

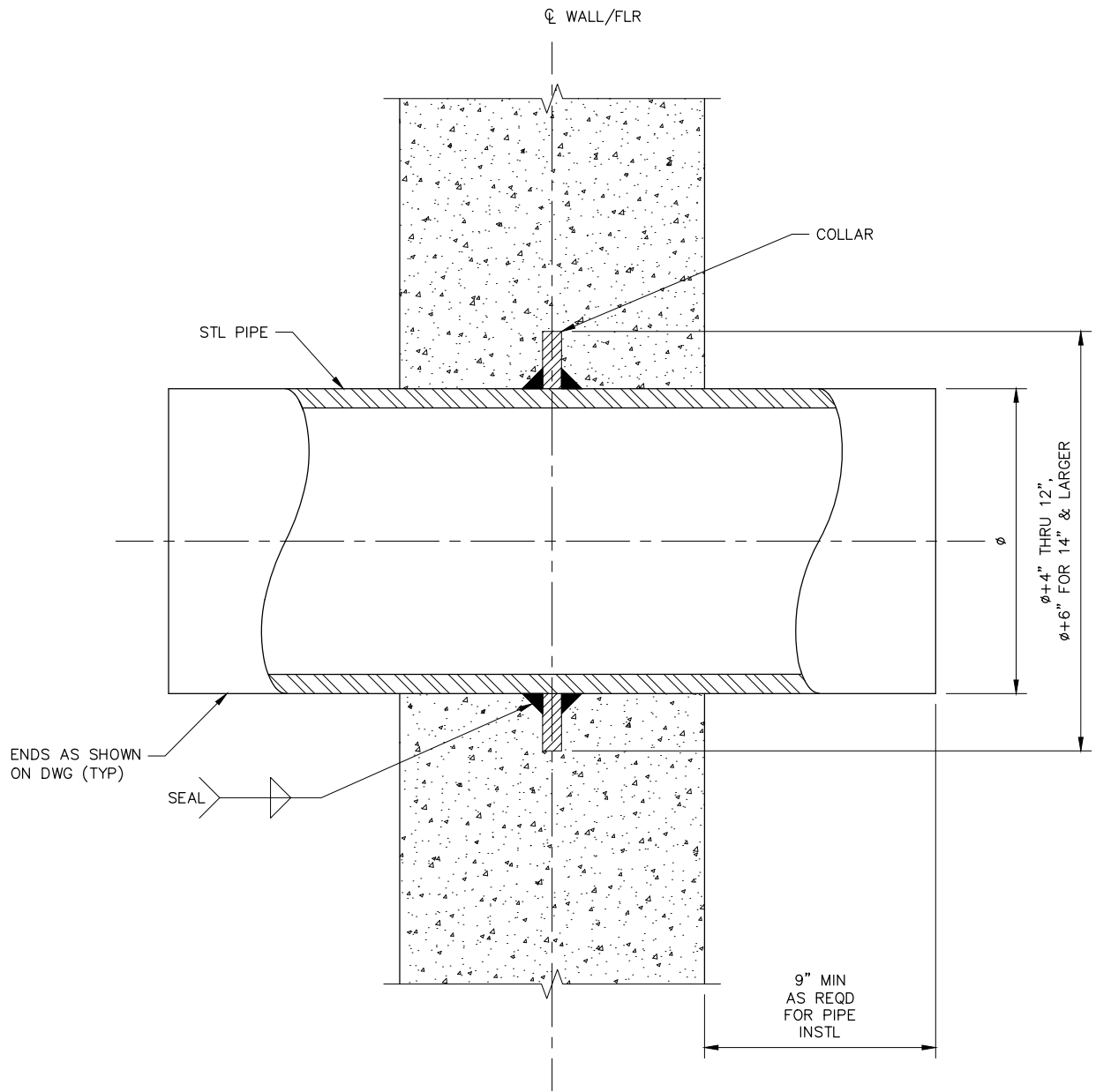
ORIGINATION DATE: JULY 2021

REVISION DATE:

**23050
PIPE PENETRATION
TABLE AND NOTES**



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Denver, Colorado 80204-3412
T: 303.628.6000
F: 303.628.6199
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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

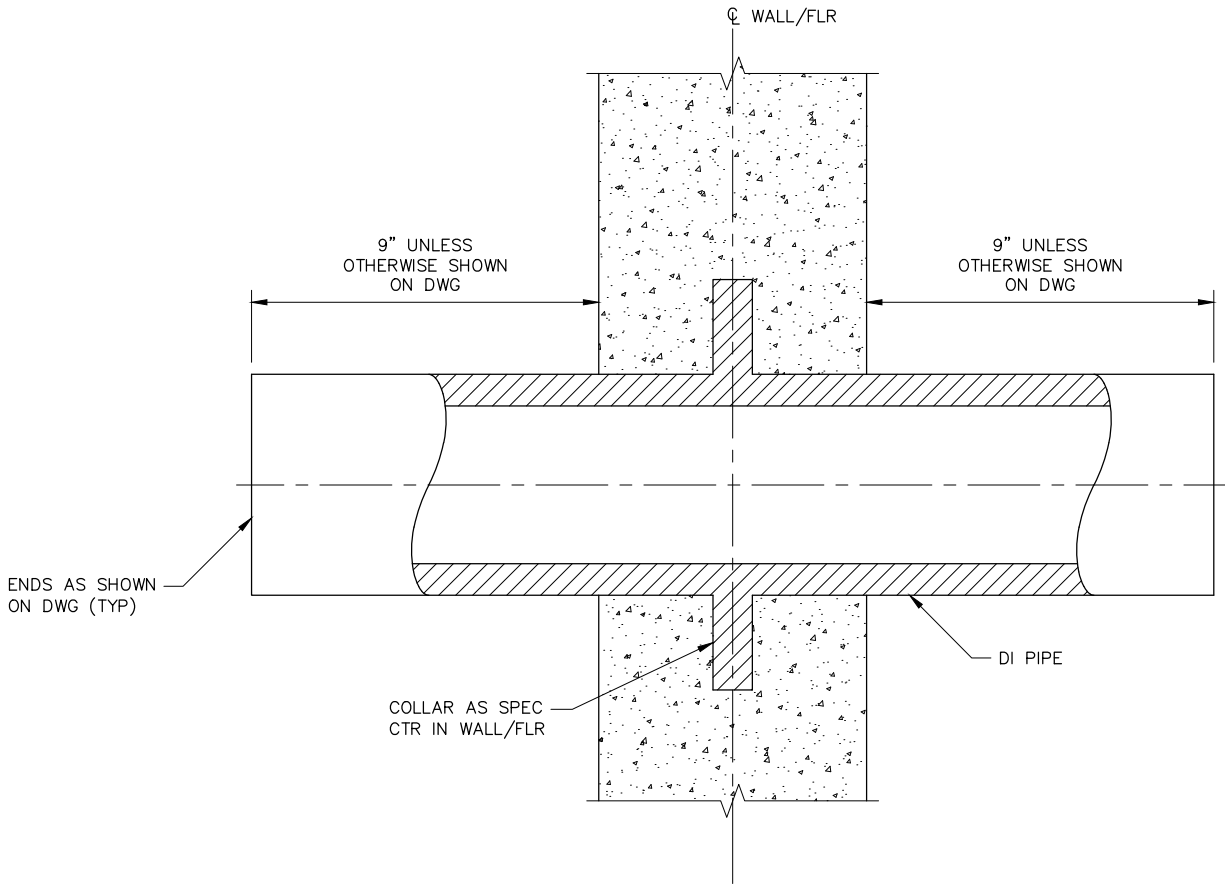
ORIGINATION DATE: JULY 2021

REVISION DATE:

**23051
TYPE A PENETRATION**



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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE **23050**.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

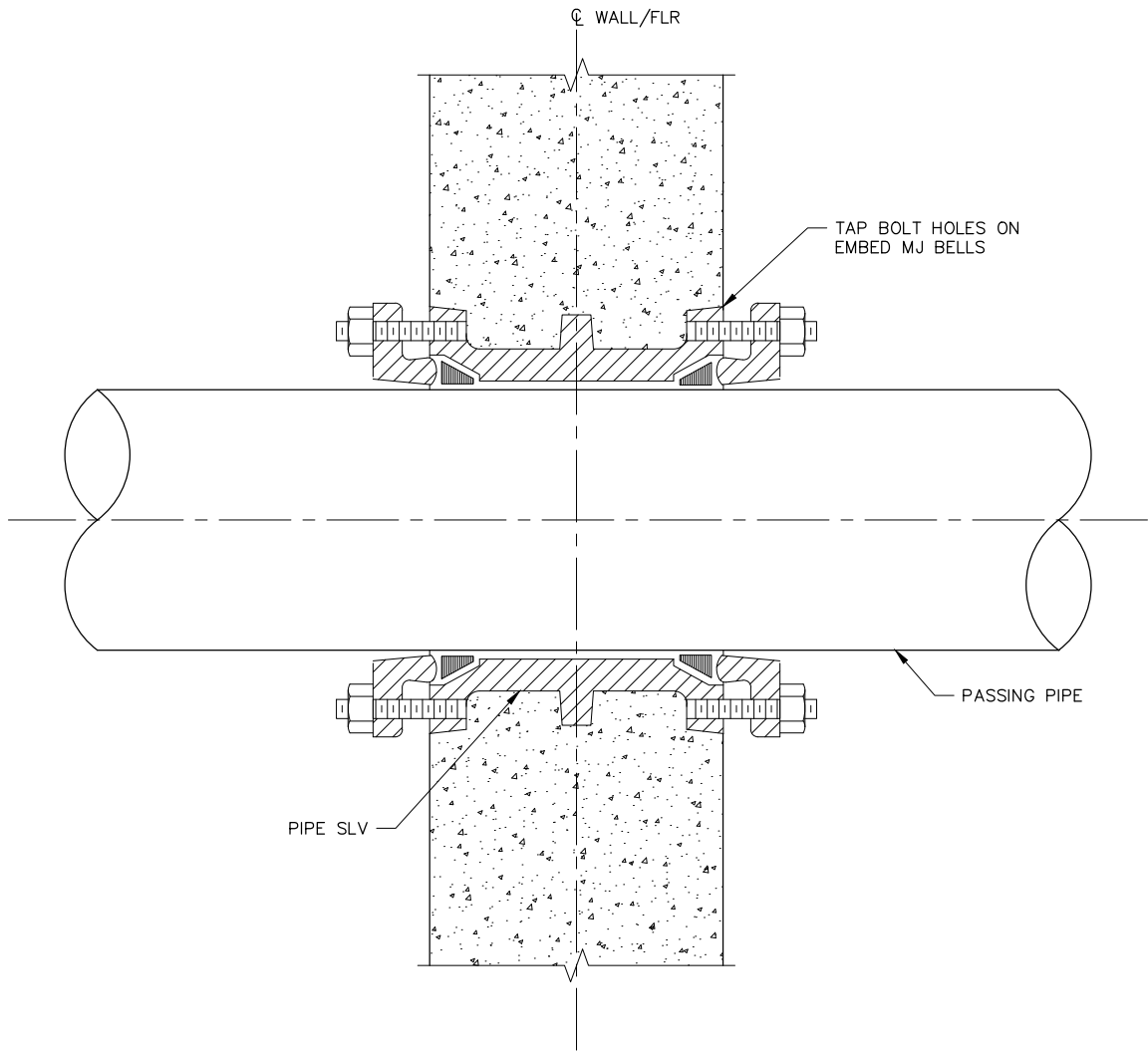
ORIGINATION DATE: JULY 2021

REVISION DATE:

23052
TYPE B PENETRATION



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T: 303.628.6000
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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

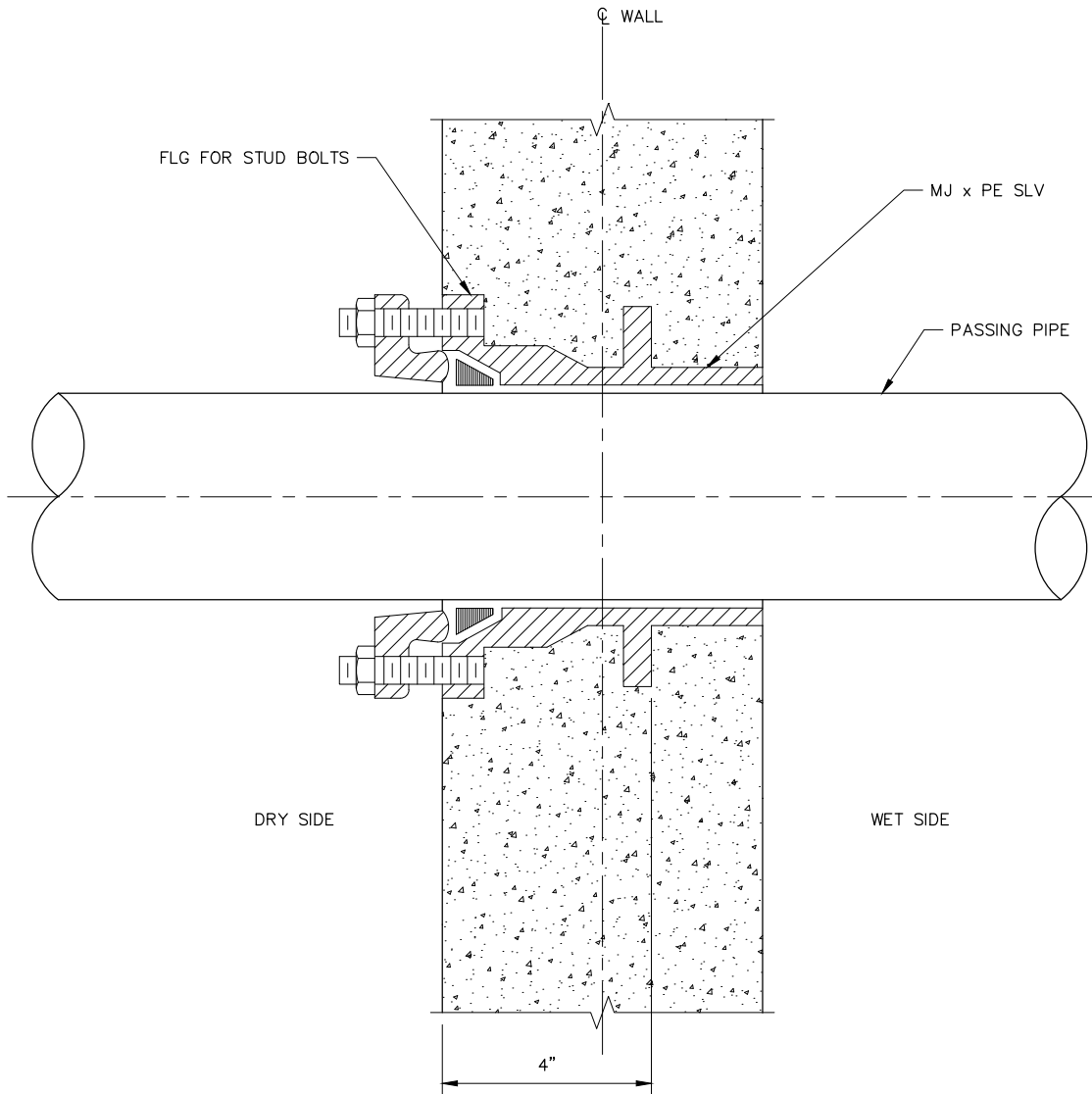
ORIGINATION DATE: JULY 2021

REVISION DATE:

**23053
TYPE C PENETRATION**



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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE 23050.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

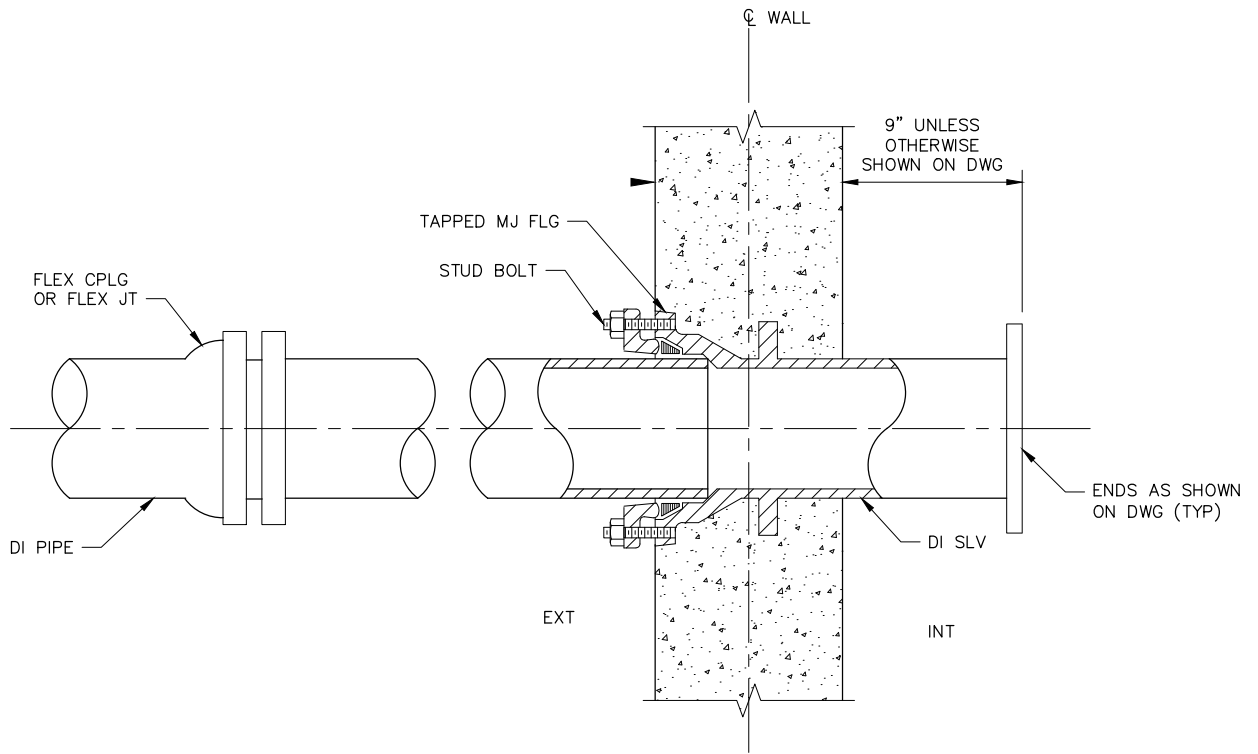
ORIGINATION DATE: JULY 2021

REVISION DATE:

**23054
TYPE D PENETRATION**



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NOTES:

1. ONE NOMINAL PIPE DIAMETER BUT NOT LESS THAN 2 FEET.
2. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

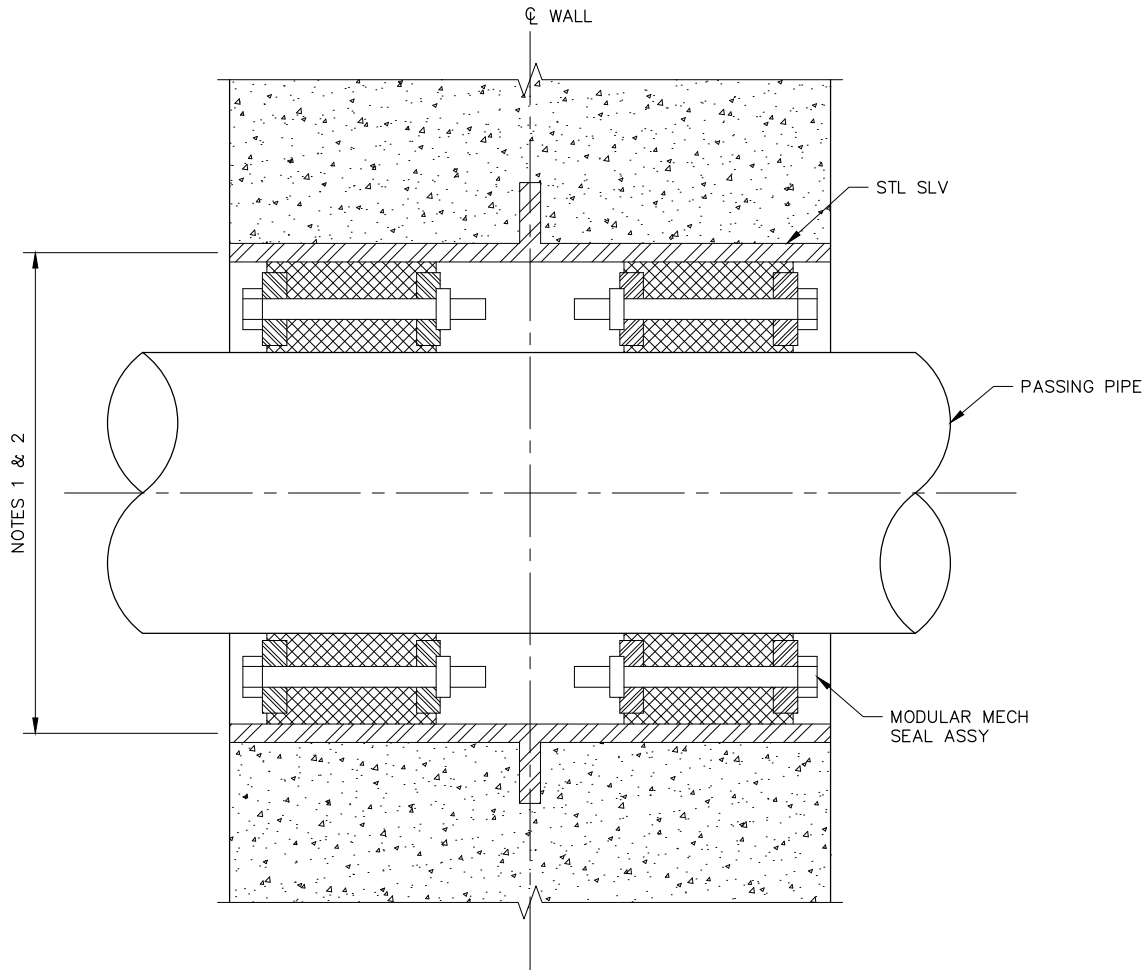
ORIGINATION DATE: JULY 2021

REVISION DATE:

23055
TYPE E PENETRATION



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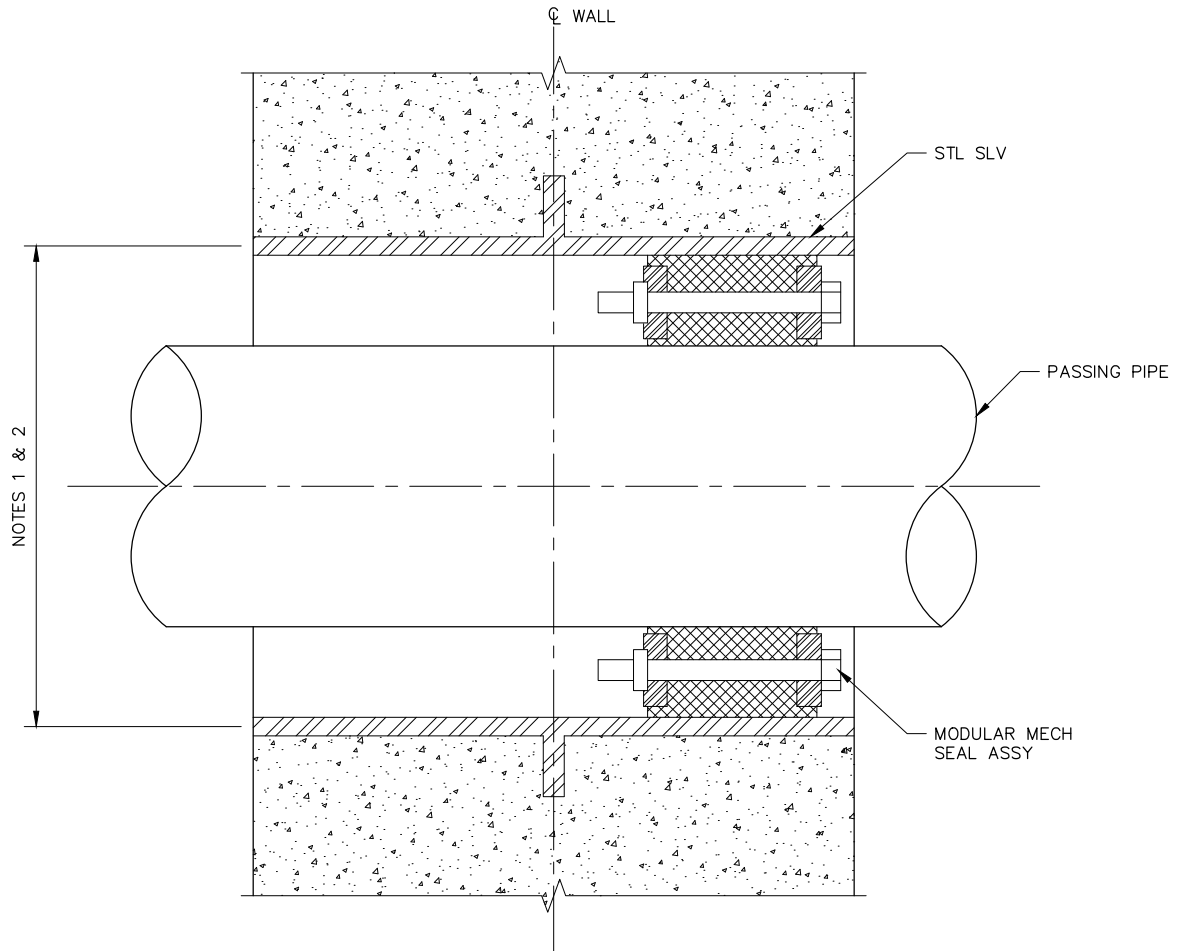
NOTES:

1. INSIDE DIAMETER OF PIPE SLEEVE AS REQUIRED BY THE MODULAR MECHANICAL SEAL ASSEMBLY MANUFACTURER, FOR THE PASSING PIPE SEAL.
2. FOR EXISTING WALL OMIT PIPE SLEEVE. CORE DRILL AS REQUIRED FOR PASSING PIPE AND MECHANICAL SEAL ASSEMBLY.
3. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

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CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23056
TYPE F PENETRATION**

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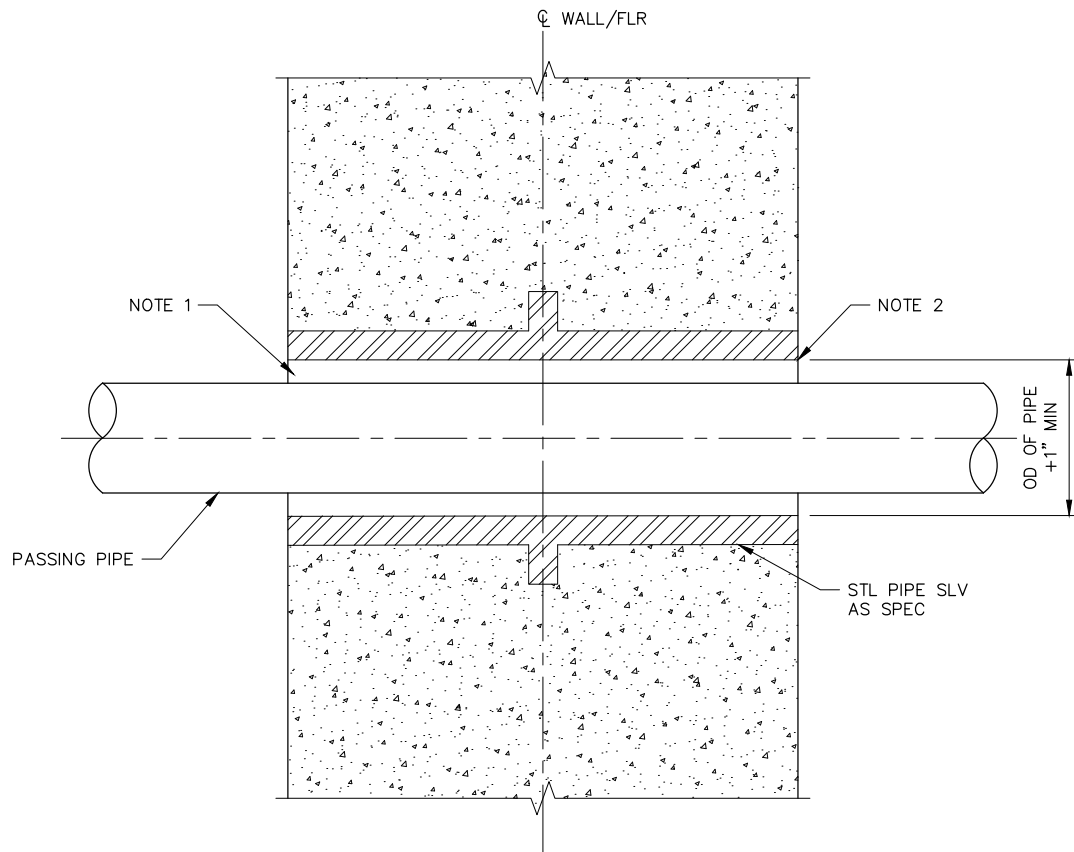
NOTES:

1. INSIDE DIAMETER OF PIPE SLEEVE AS REQUIRED BY THE MODULAR MECHANICAL SEAL ASSEMBLY MANUFACTURER, FOR THE PASSING PIPE SEAL.
2. FOR EXISTING WALL OMIT PIPE SLEEVE. CORE DRILL AS REQUIRED FOR PASSING PIPE AND MECHANICAL SEAL ASSEMBLY.
3. USE THIS DETAIL FOR ELECTRICAL CONDUIT WHEN APPROVED FOR WALLS TOO NARROW FOR TYPE F PENETRATION, (23056). FILL VOIDS WITH OAKUM.
4. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23057
TYPE G PENETRATION**

D DENVER WATER
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NOTES:

1. ANNULAR SPACES BETWEEN PASSING PIPE AND SLEEVES SHALL BE SEALED AS FOLLOWS:
 - A. ANNULAR SPACES IN PENETRATIONS OF FIRE RATED WALLS SHALL MEET FIRE CODE REQUIREMENTS OF AUTHORITY HAVING JURISDICTION.
 - B. SEAL FOUNDATION FLOOR SLEEVES WITH NON-SHRINK GROUT. WRAP PIPE WITH POLYETHYLENE BAGGING INSIDE SLEEVE.
 - C. SEAL INTERIOR WALLS AND SLABS WITH ELASTOMERIC SEALANT AND BACKER ROD.
2. FOR CONCRETE MASONRY UNIT PENETRATIONS, GROUT SLEEVE IN PLACE AND PROVIDE GALVANIZED PIPE COLLAR BOTH SIDES.
3. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

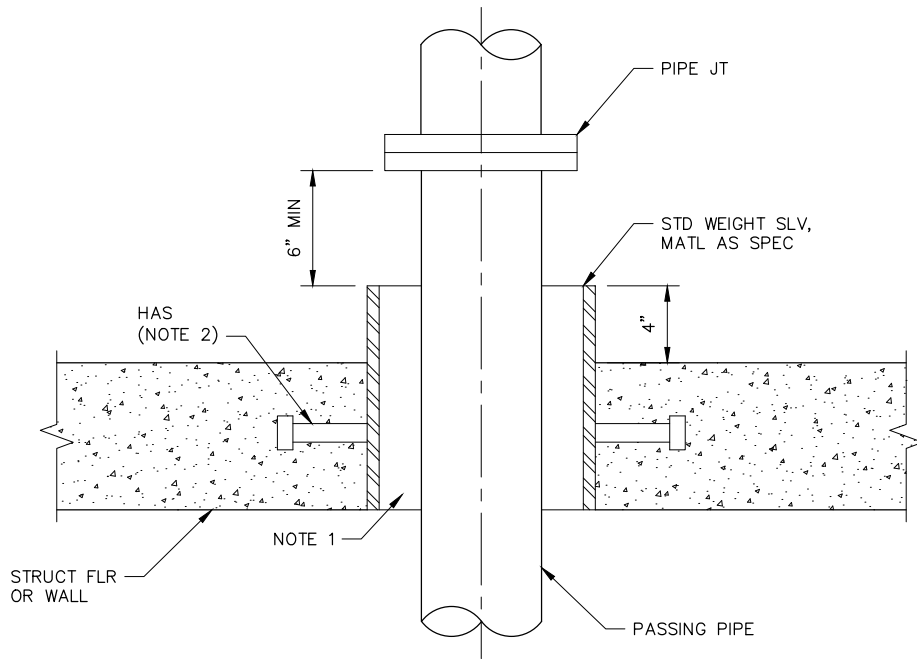
ORIGINATION DATE: JULY 2021

REVISION DATE:

23058
TYPE H PENETRATION



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NOTES:

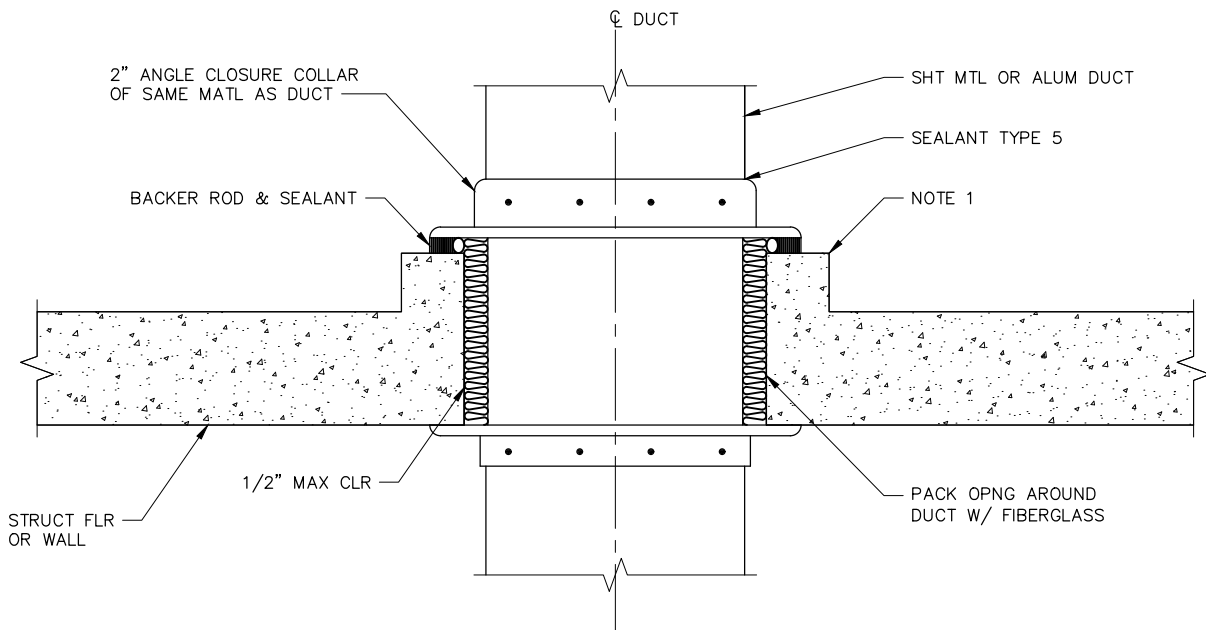
1. ANNULAR SPACES BETWEEN PASSING PIPE AND SLEEVES SHALL BE SEALED AS FOLLOWS:
 - A. ANNULAR SPACES IN PENETRATIONS OF FIRE RATED WALLS SHALL MEET FIRE CODE REQUIREMENTS OF AUTHORITY HAVING JURISDICTION.
 - B. SEAL FOUNDATION FLOOR SLEEVES WITH NON-SHRINK GROUT. WRAP PIPE WITH POLYETHYLENE BAGGING INSIDE SLEEVE.
 - C. SEAL INTERIOR WALLS AND SLABS WITH ELASTOMERIC SEALANT AND BACKER ROD.
2. PROVIDE A MINIMUM OF 3 HEADED ANCHOR STUDS PER SLEEVE, EQUALLY SPACED.
3. INSIDE DIAMETER OF SLEEVE SHALL BE A MINIMUM OF THE DIAMETER REQUIRED TO REMOVE THE PASSING PIPE PLUS LARGE ENOUGH TO INSTALL THE INDICATED ANNULAR PIPE SEAL.
4. FOR PIPE PENETRATION TABLE AND NOTES, SEE 23050.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23059
TYPE I PENETRATION

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NOTES:

1. FOR DUCT PENETRATIONS IN FLOOR AREAS 3 1/2 INCH x 3 1/2 INCH. PROVIDE CURB ALL AROUND. CURB NOT REQUIRED FOR WALL PENETRATIONS.
2. TYPE K PENETRATION FOR DRY AREAS – CURB NOT REQUIRED.
3. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

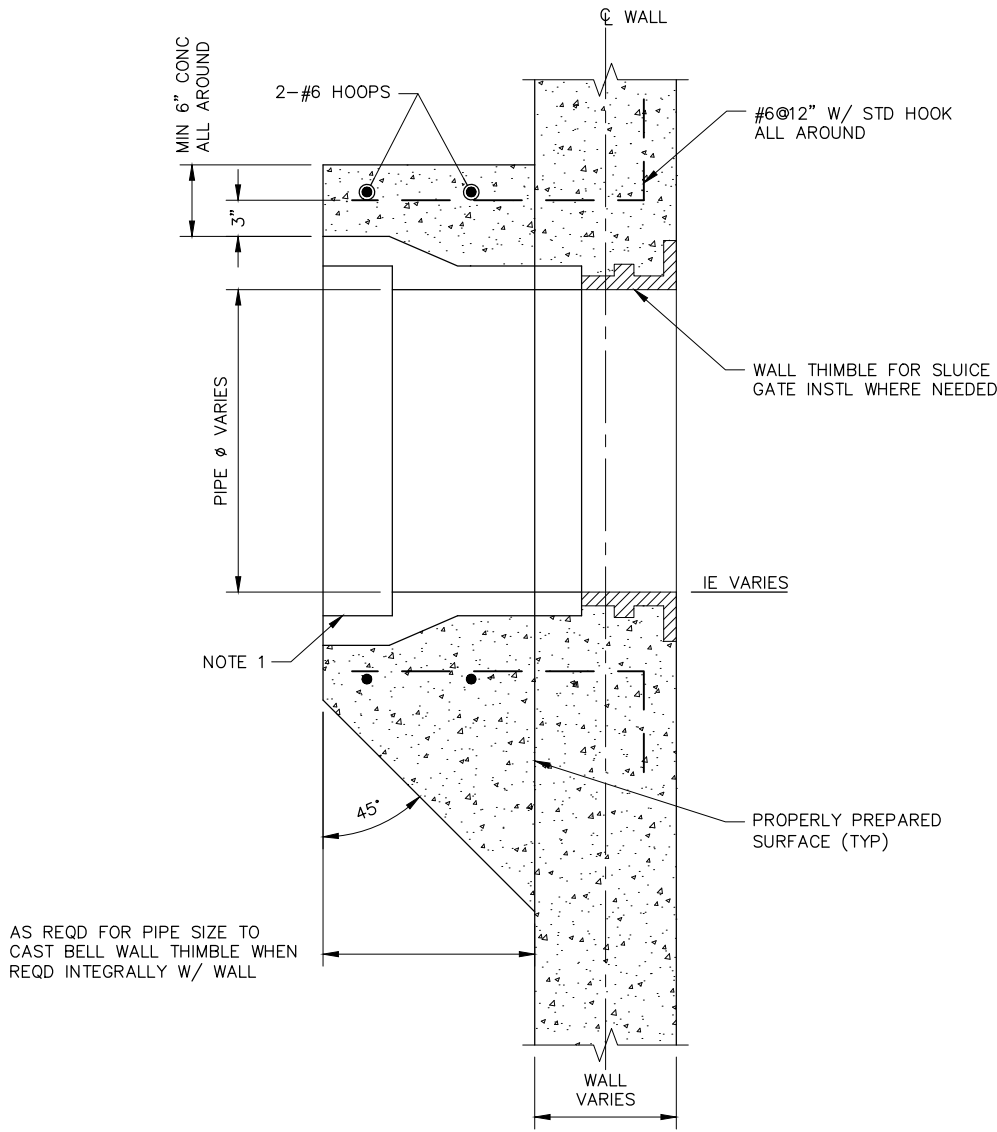
ORIGINATION DATE: JULY 2021

REVISION DATE:

23060
TYPE J PENETRATION AND
TYPE K PENETRATION



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AS REQD FOR PIPE SIZE TO CAST BELL WALL THIMBLE WHEN REQD INTEGRALLY W/ WALL

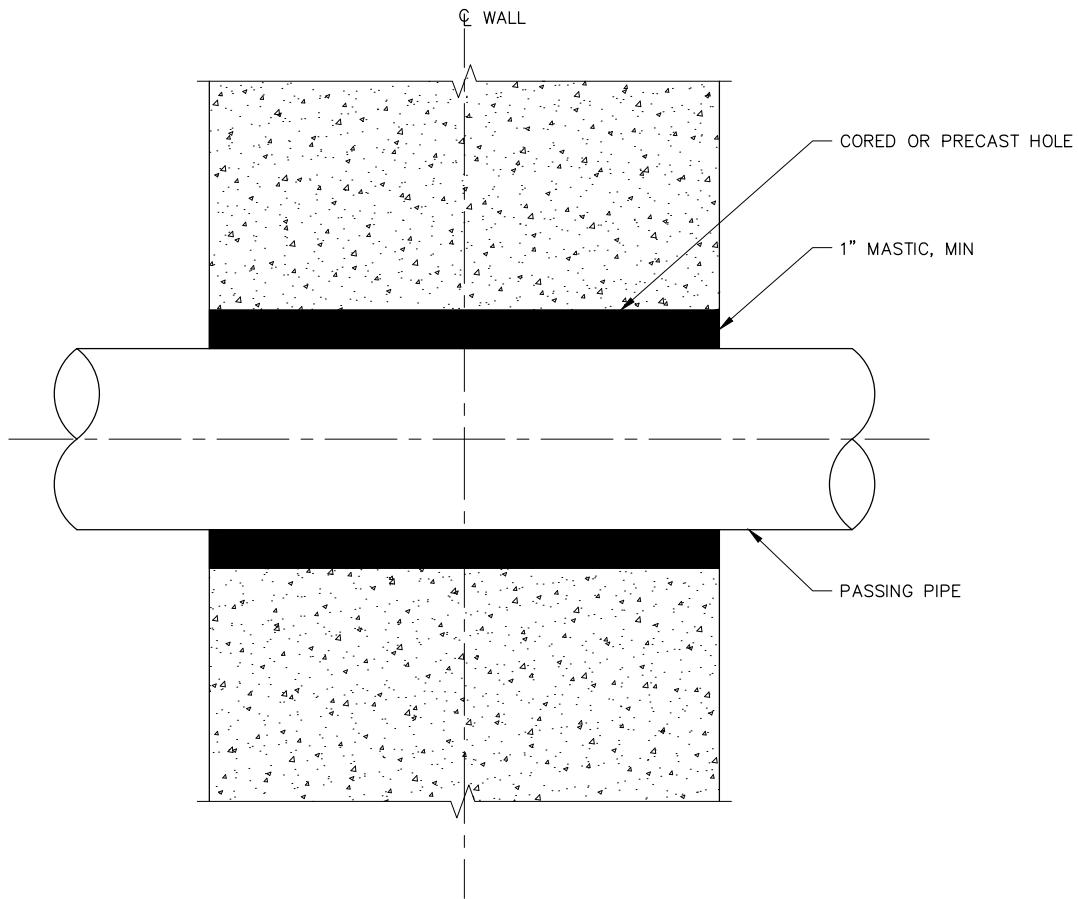
NOTES:

1. REINFORCED CONCRETE SPOOL OR SPECIAL WALL THIMBLE WITH BELL TYPE GASKETED JOINT AS SPECIFIED. PROVIDE SECOND JOINT WITHIN ONE PIPE DIAMETER OF WALL.
2. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

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CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23061
TYPE L PENETRATION**

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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

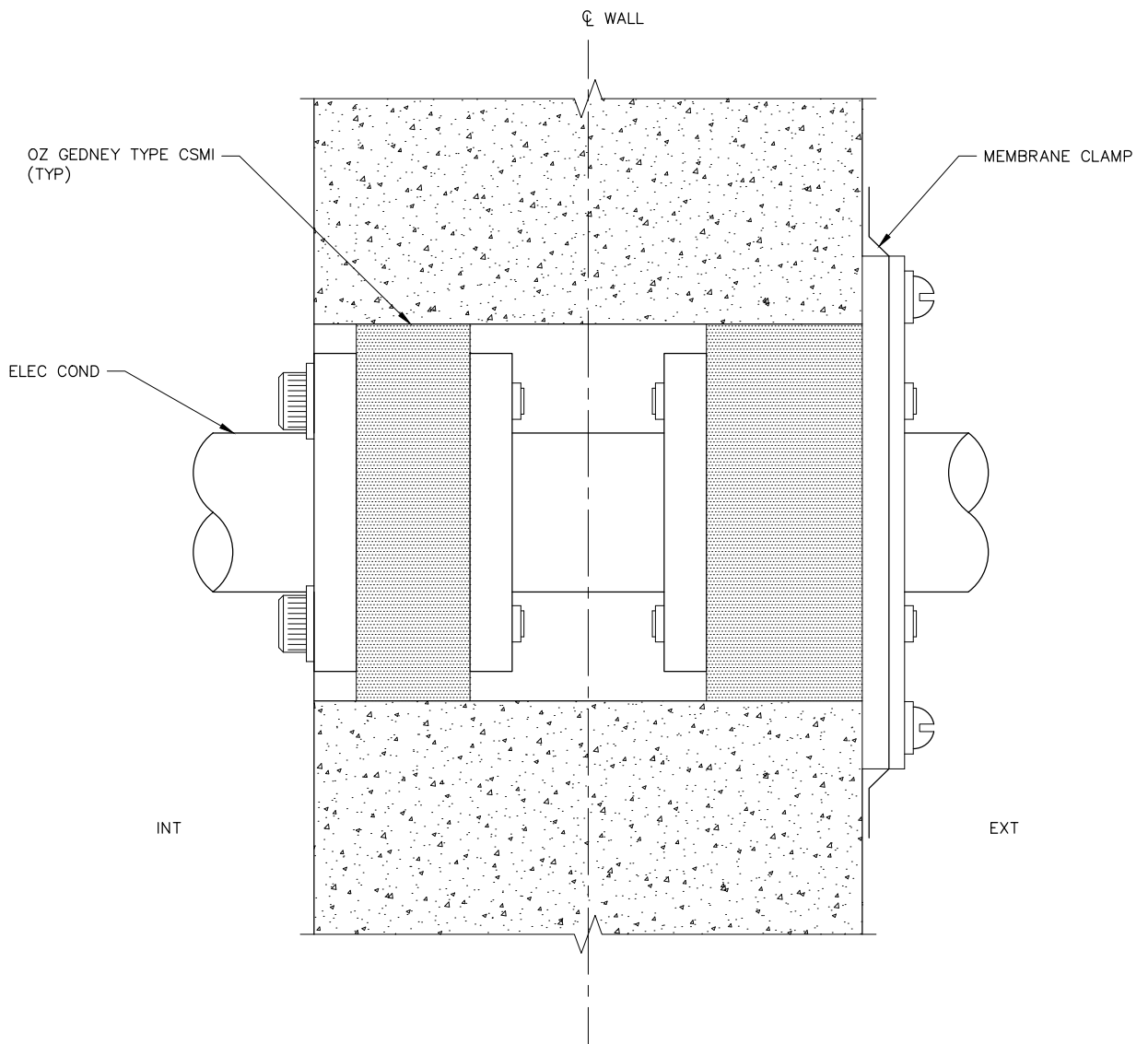
ORIGINATION DATE: JULY 2021

REVISION DATE:

**23062
TYPE M PENETRATION**



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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

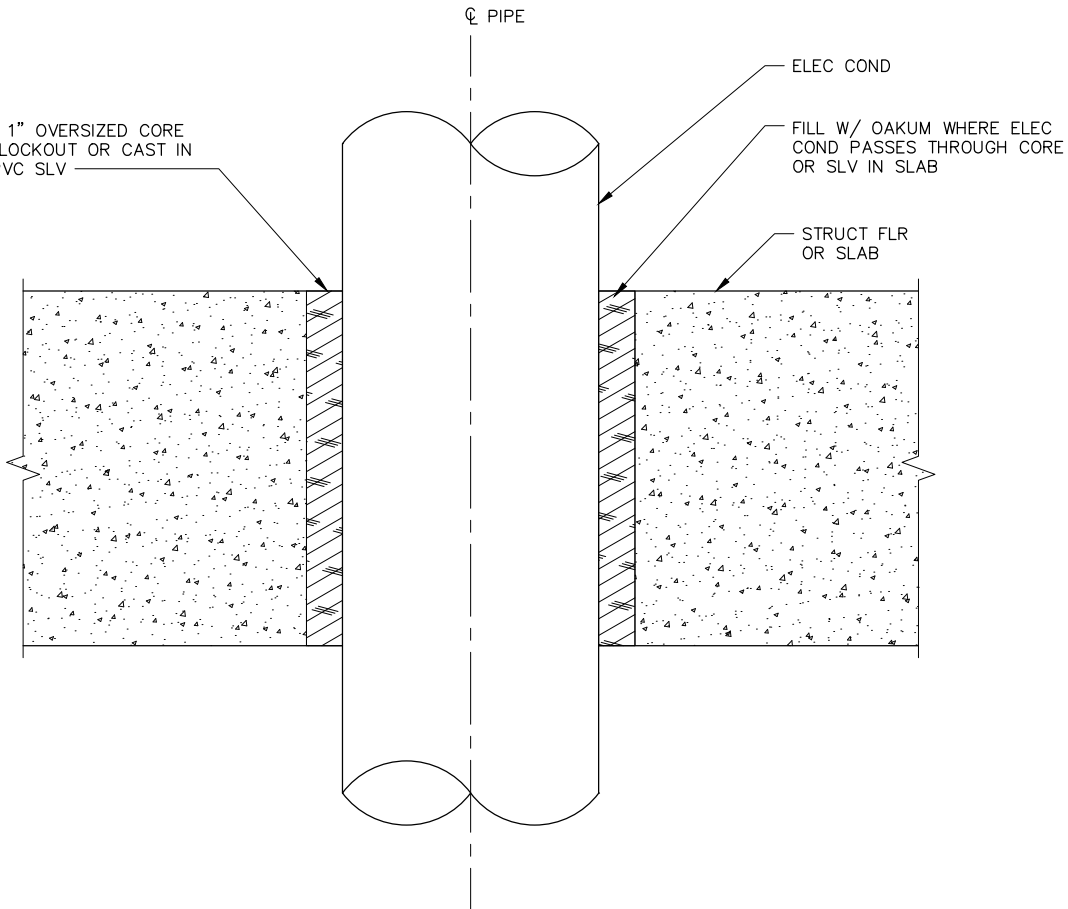
DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23063
TYPE N PENETRATION



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PROVIDE 1" OVERSIZED CORE
DRILL, BLOCKOUT OR CAST IN
PLACE PVC SLV



NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

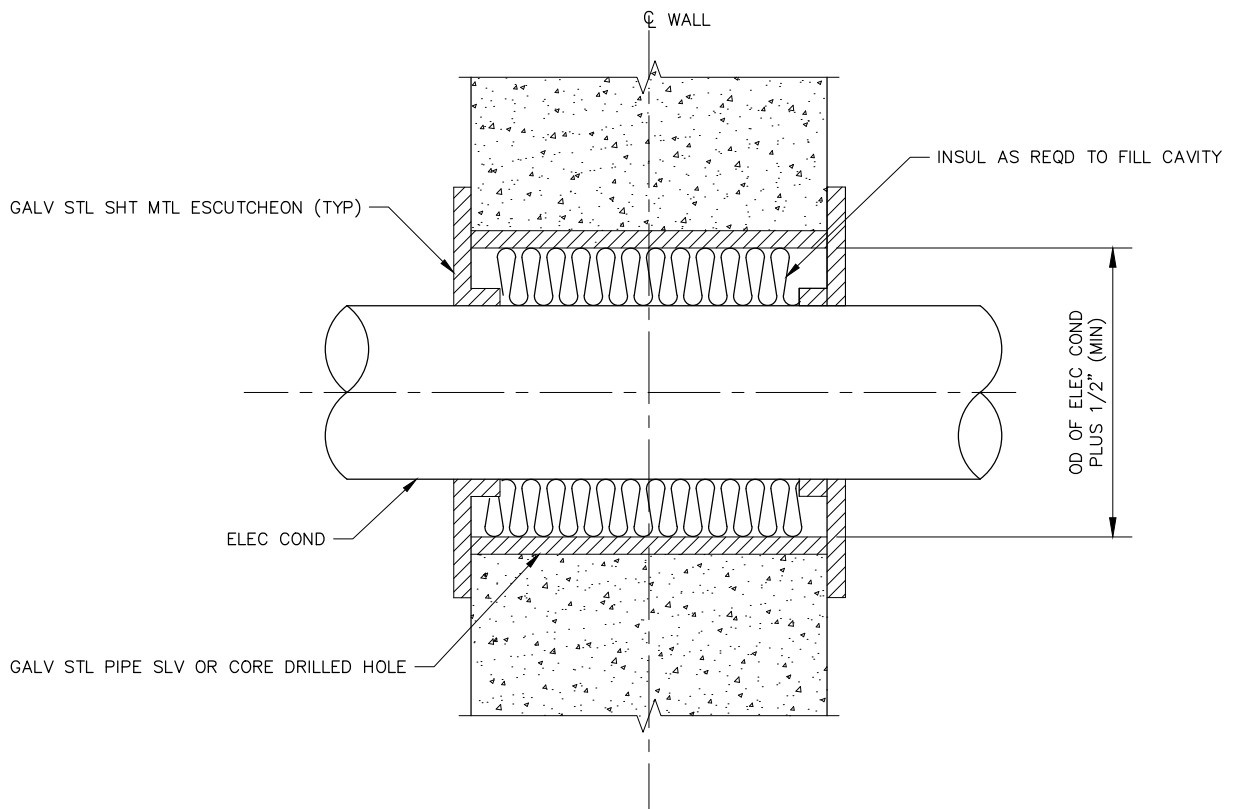
ORIGINATION DATE: JULY 2021

REVISION DATE:

**23064
TYPE O PENETRATION**



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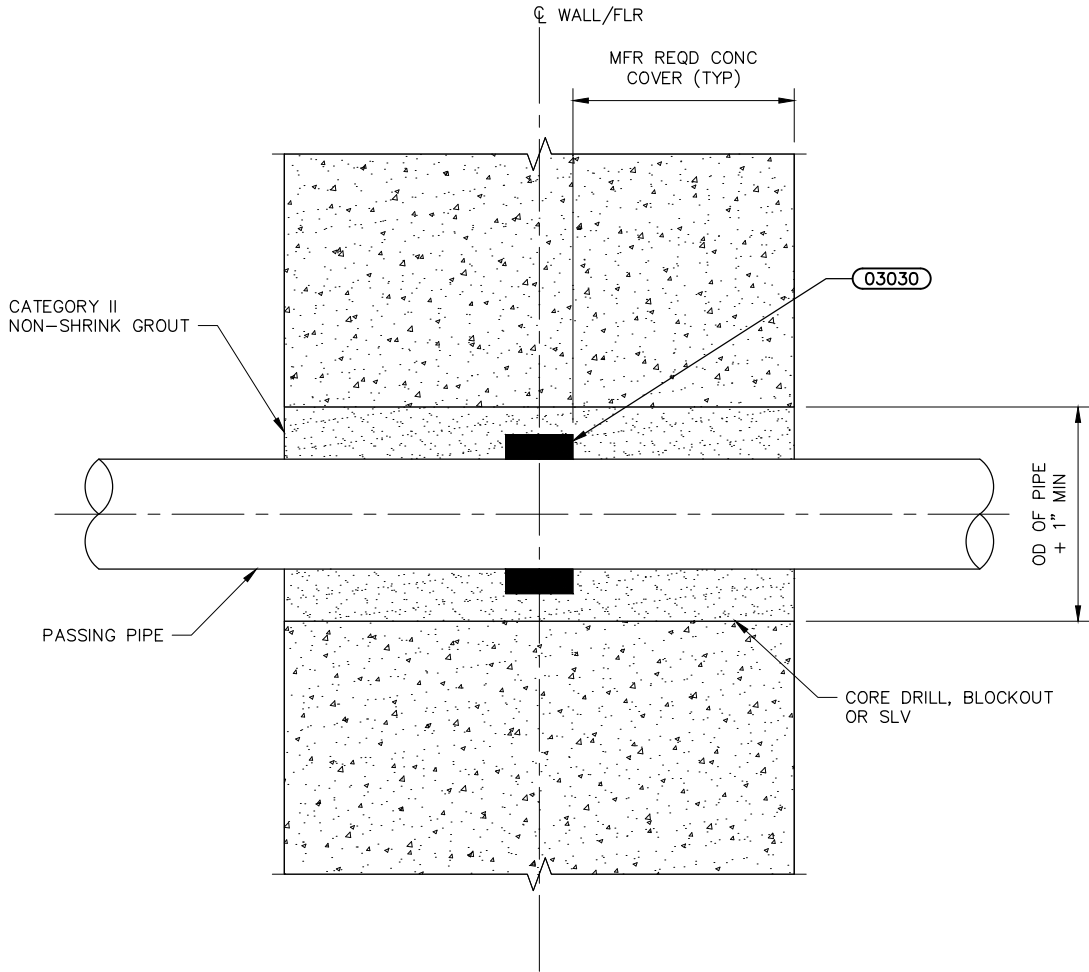
NOTES:

1. CONDUITS WHICH INDIVIDUALLY PASS THROUGH AN INTERIOR WALL SHALL BE INSTALLED IN ACCORDANCE WITH THIS DETAIL.
2. IF THE WALL IS A FIRE WALL, FILL CAVITY WITH FIRE STOP SEALANT MEETING FIRE RATING REQUIREMENTS.
3. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23065
TYPE P PENETRATION**

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NOTES:

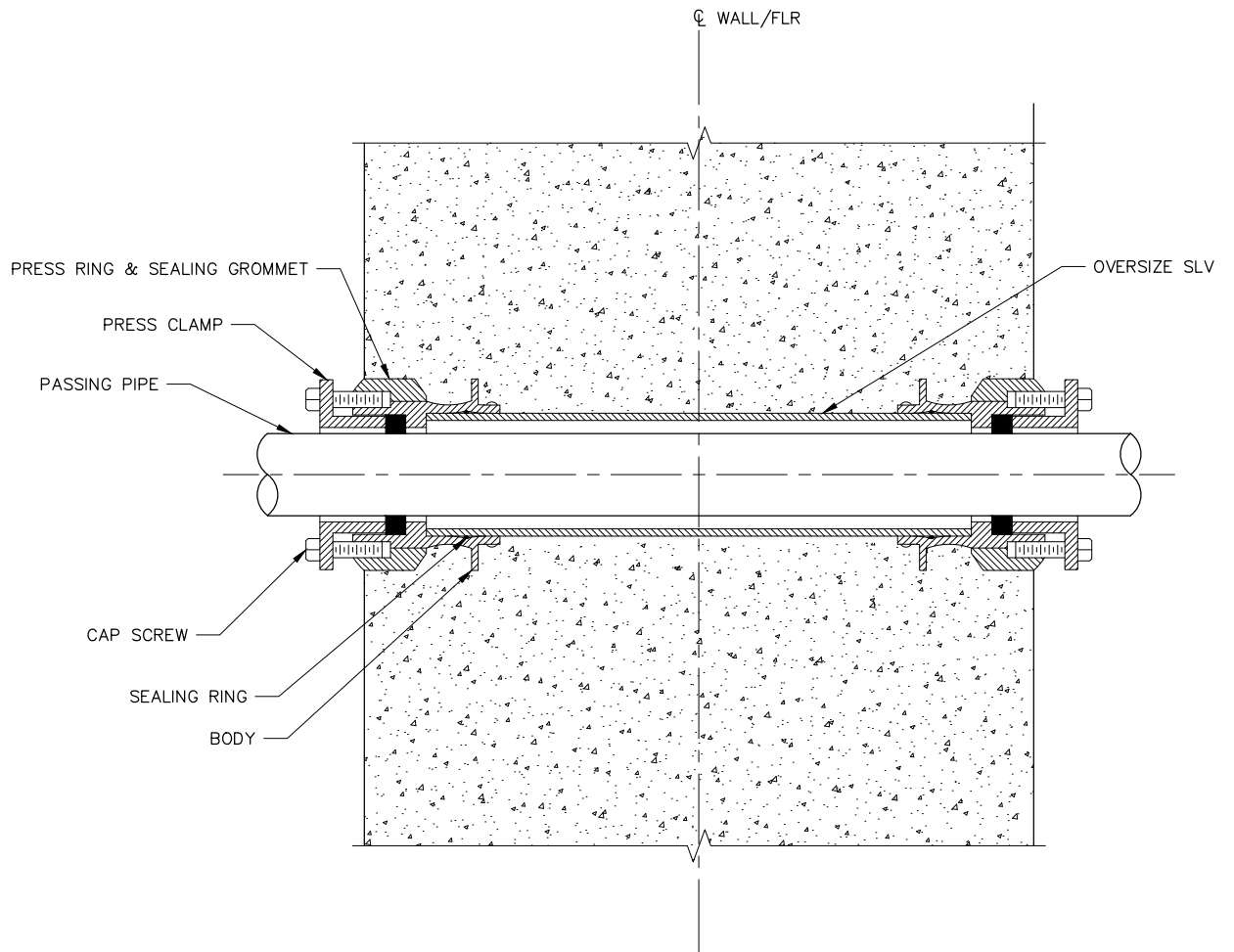
1. NOT FOR USE IN CONCRETE MASONRY UNIT WALLS.
2. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23066
TYPE Q PENETRATION



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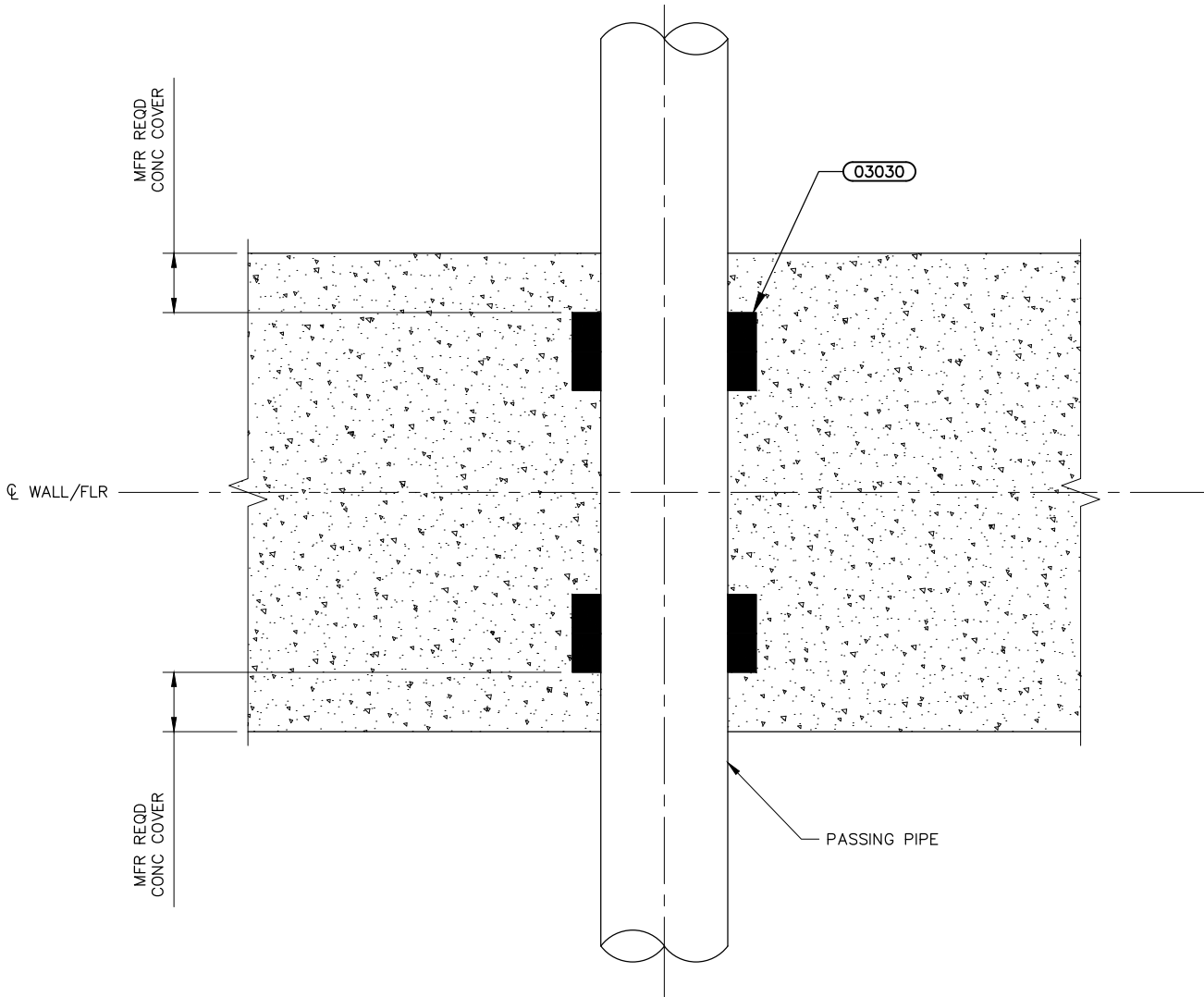
NOTES:

1. WHEN SINGLE-ENDED SEALS ARE APPROVED, SEAL SHALL BE ON THE OUTSIDE OF THE WALL OR ON THE TOP OF THE FLOOR.
2. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23067
TYPE R PENETRATION**

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NOTES:

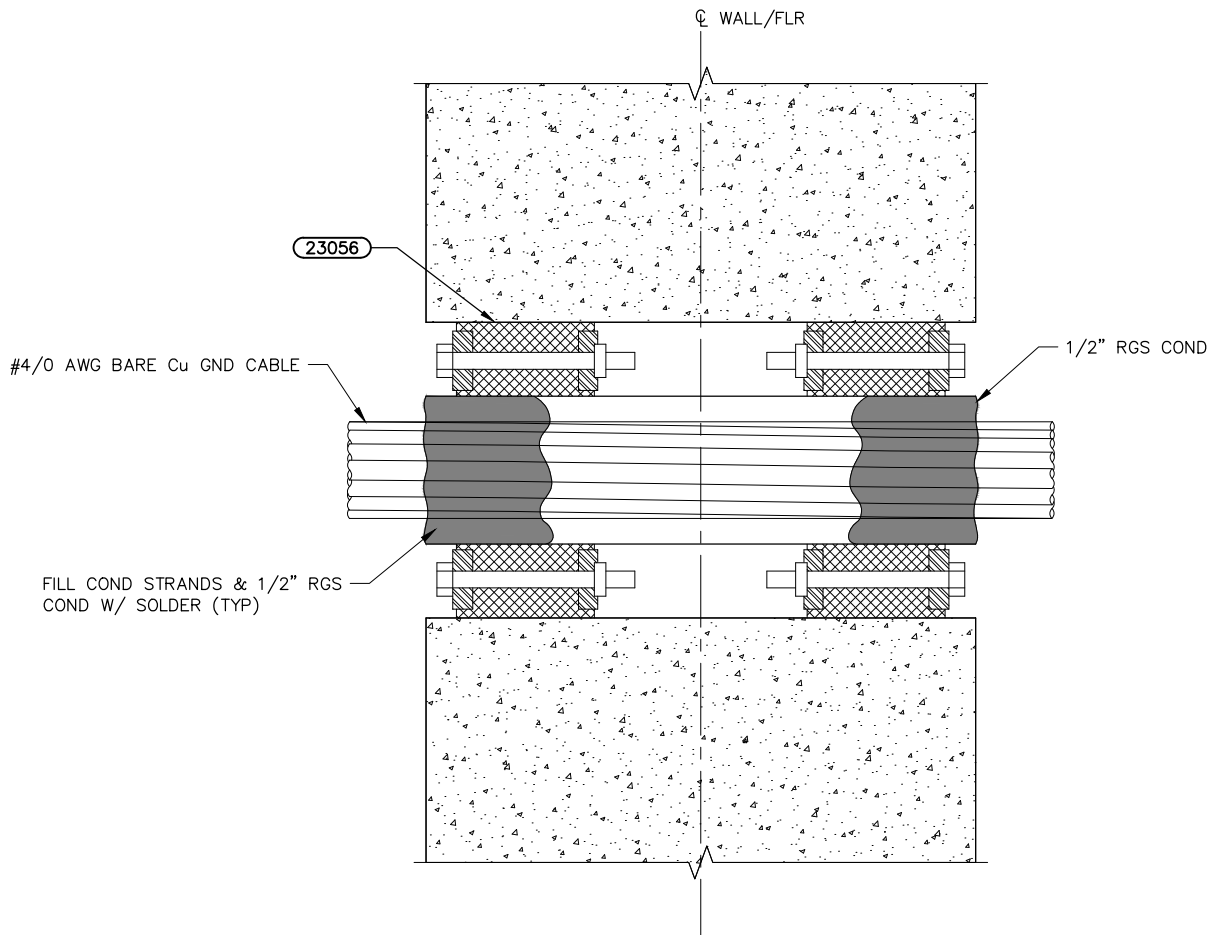
1. FOR EXTERIOR SLABS AND EQUIPMENT PADS OR WHEN APPROVED FOR PIPES TOO DENSE FOR TYPE R PENETRATIONS.
2. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23068
TYPE S PENETRATION



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NOTE:

FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

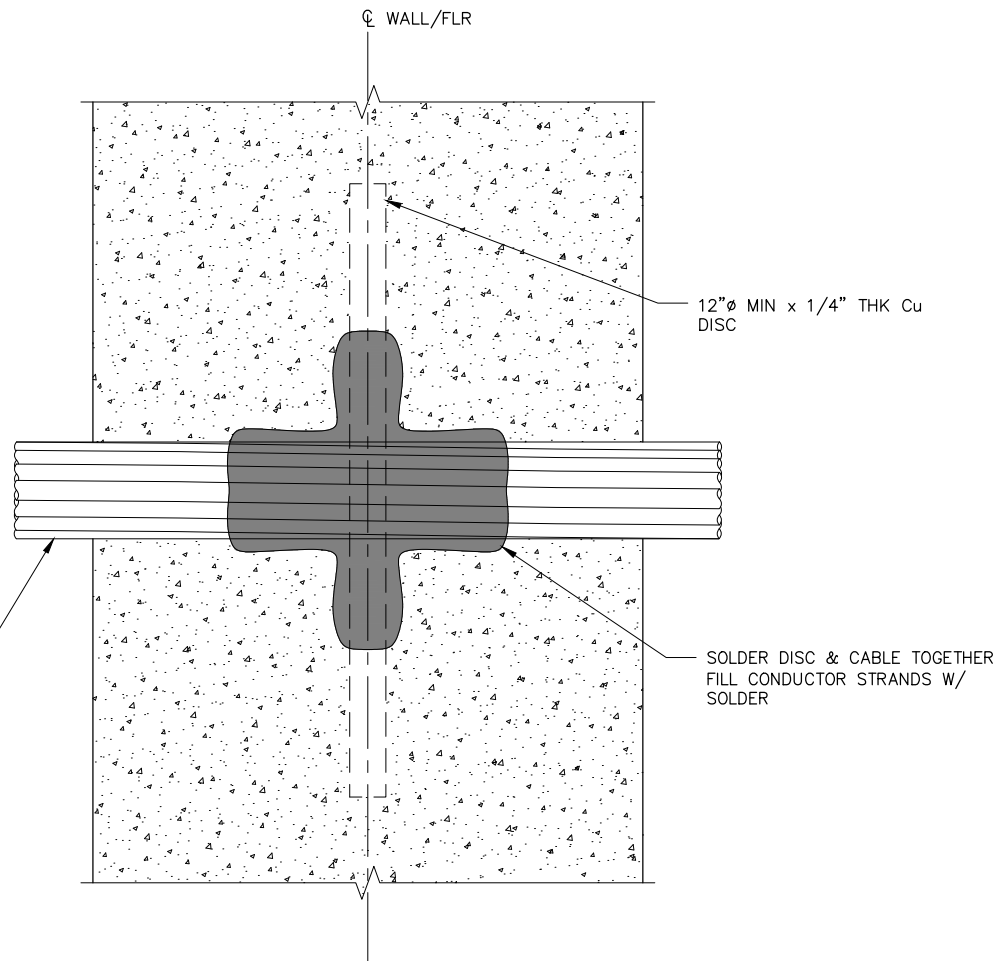
ORIGINATION DATE: JULY 2021

REVISION DATE:

23069
TYPE T PENETRATION



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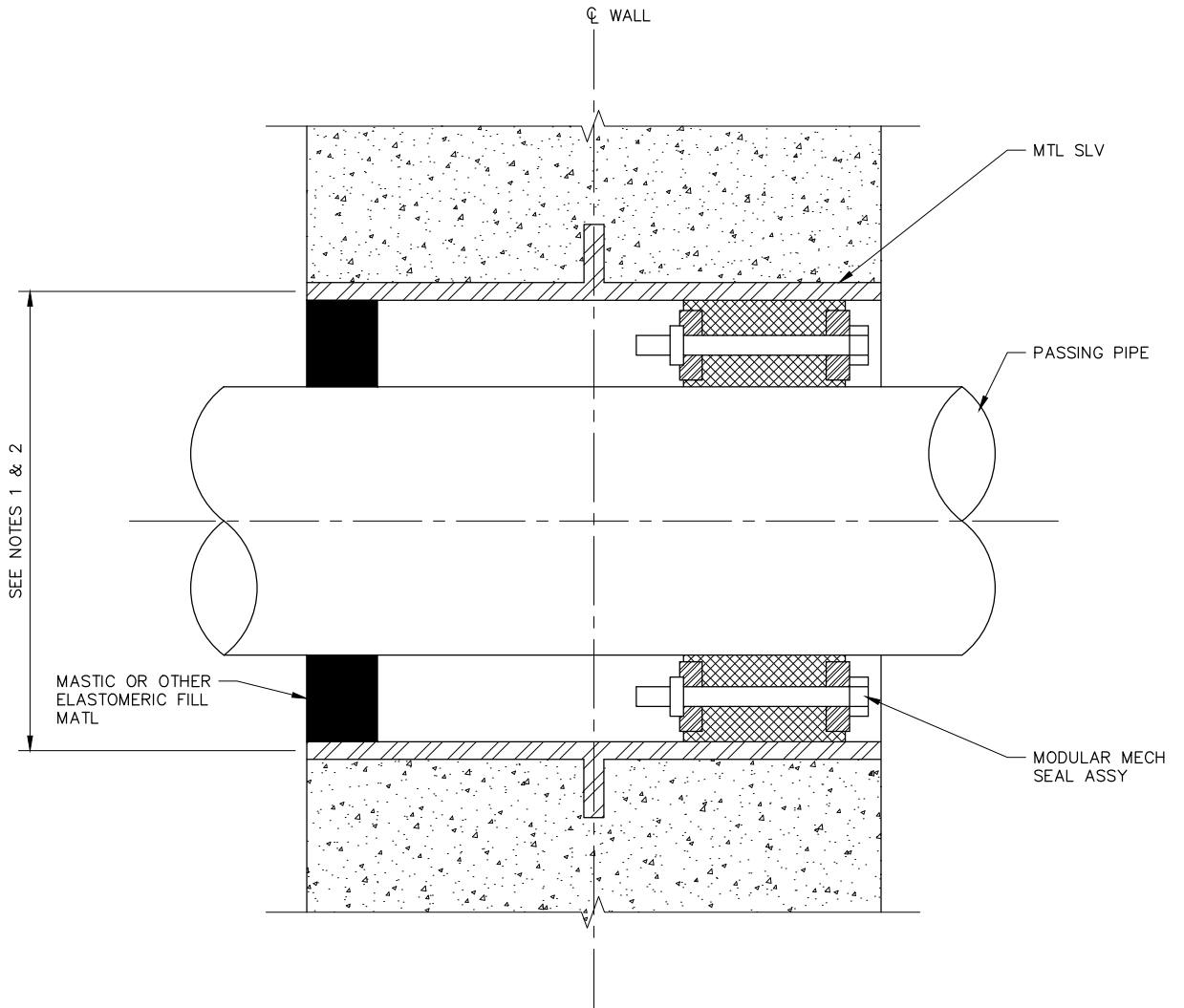
ORIGINATION DATE: JULY 2021

REVISION DATE:

23070
TYPE U PENETRATION



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NOTES:

1. INSIDE DIAMETER OF PIPE SLEEVE AS REQUIRED BY THE MODULAR MECHANICAL SEAL ASSEMBLY MANUFACTURER, FOR THE PASSING PIPE SEAL.
2. FOR EXISTING WALL OMIT PIPE SLEEVE. CORE DRILL AS REQUIRED FOR PASSING PIPE AND MECHANICAL SEAL ASSEMBLY.
3. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

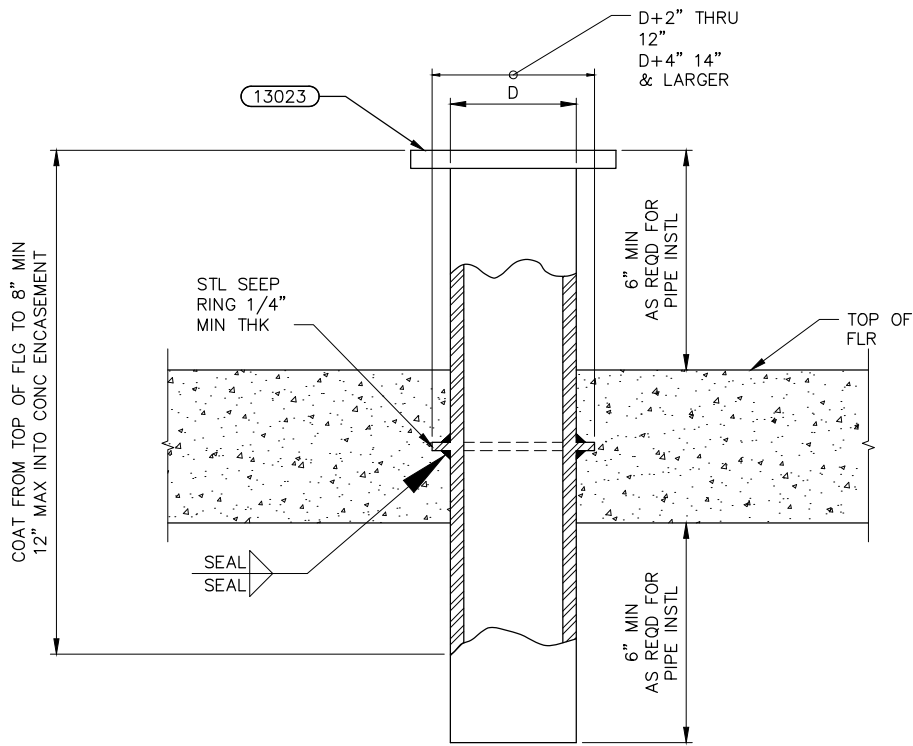
ORIGINATION DATE: JULY 2021

REVISION DATE:

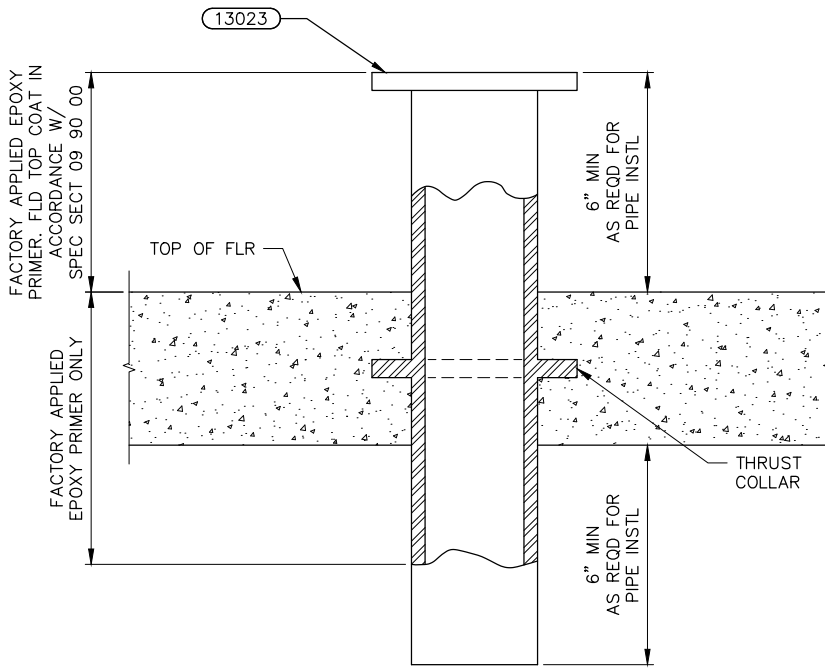
**23071
TYPE V PENETRATION**



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STEEL



DUCTILE IRON

NOTES:

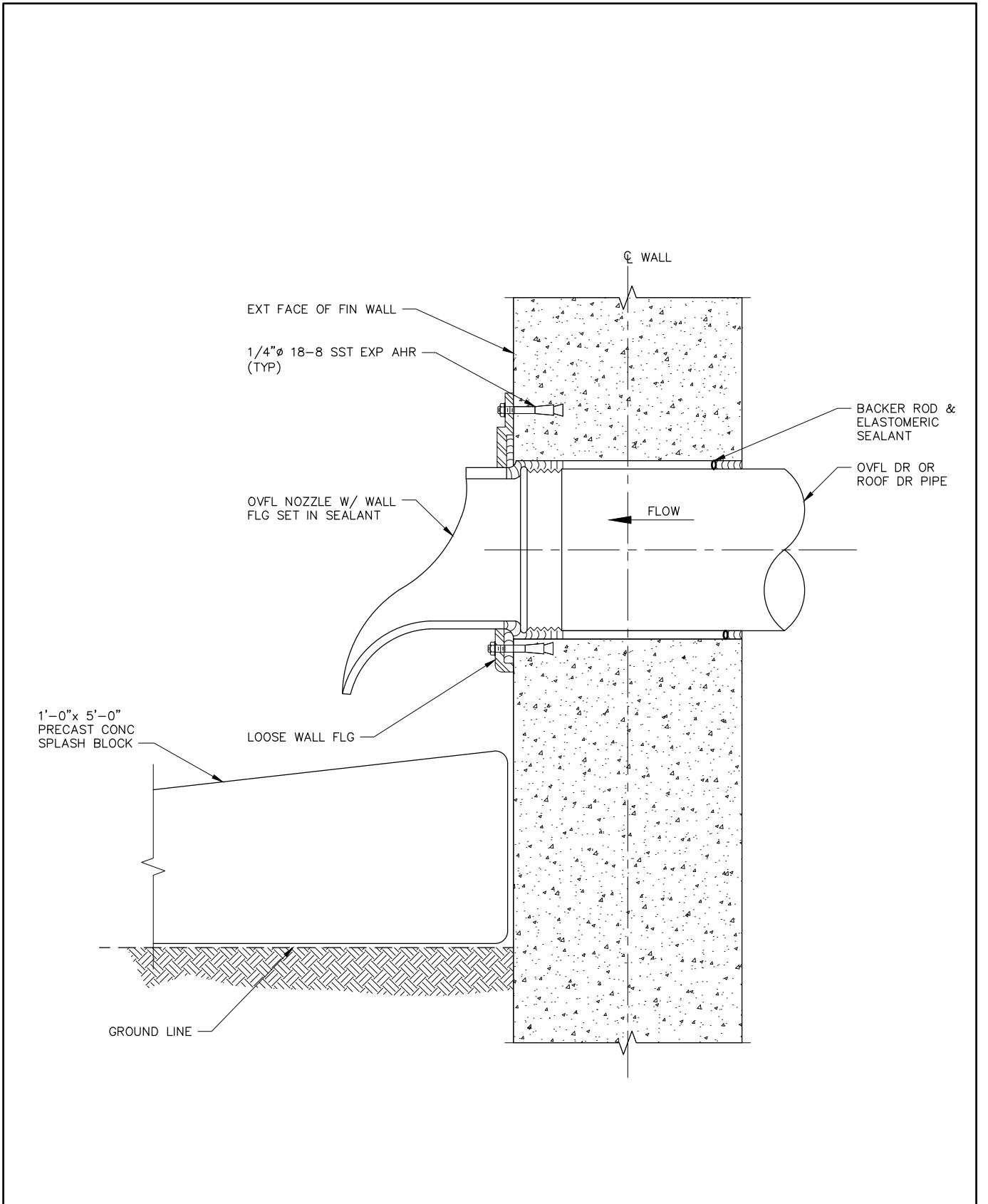
1. COAT FLOOR PIPE WITH SPECIFIED PAINT SYSTEM PRIOR TO CONCRETE PLACEMENT.
2. VERIFY REINFORCING BAR IS NOT ELECTRICALLY CONTINUOUS WITH PIPE PRIOR TO CONCRETE PLACEMENT.

DRAWN BY: IVERY
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**23072
FLOOR PIPE PENETRATION**



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NOTES:

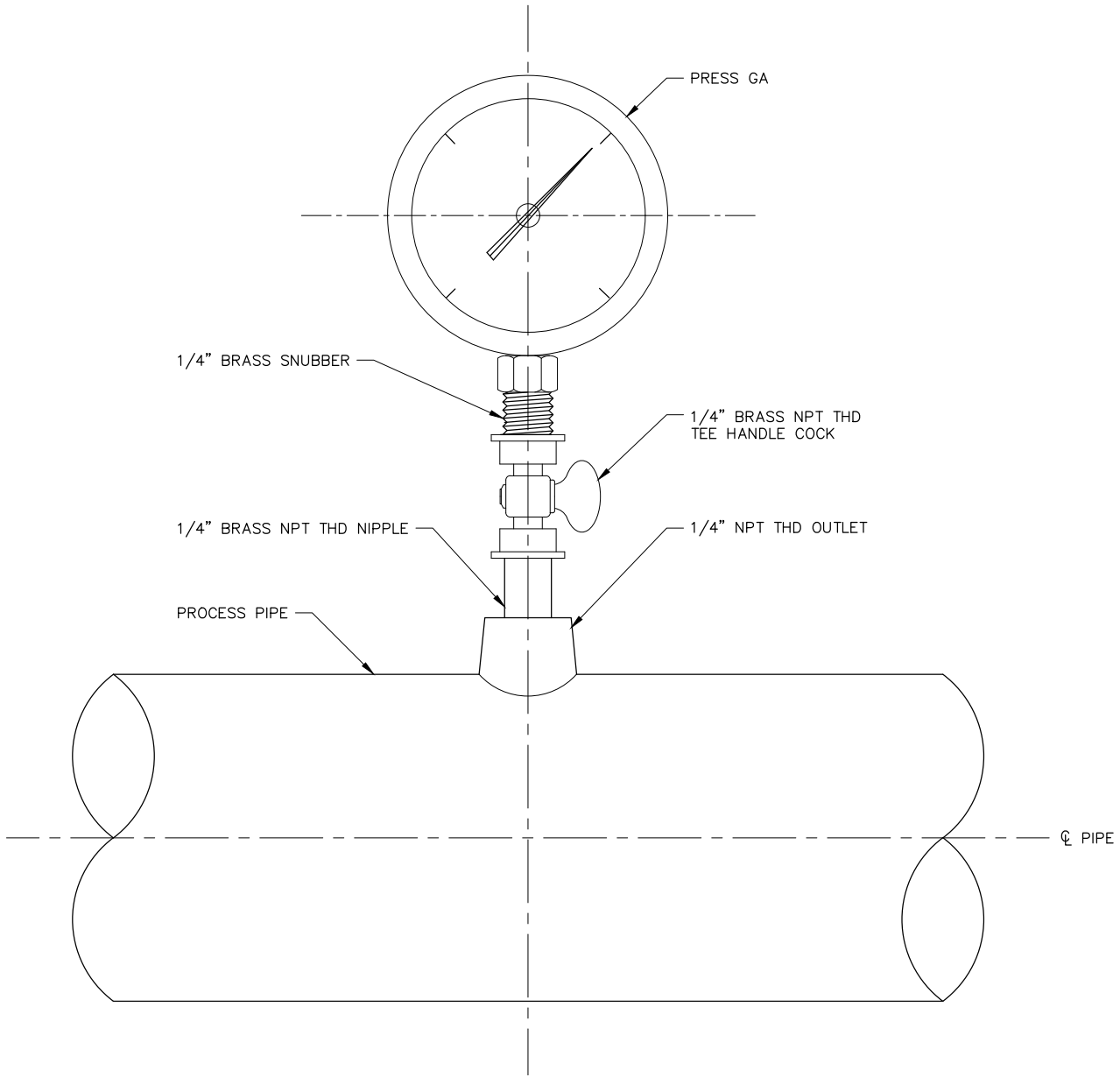
- 1. SATIN FINISH BRONZE.
- 2. SAME SIZE AS DOWNSPOUT PIPING.

DRAWN BY: <i>WENKHEIMER</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**23076
DOWNSPOUT NOZZLE**

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

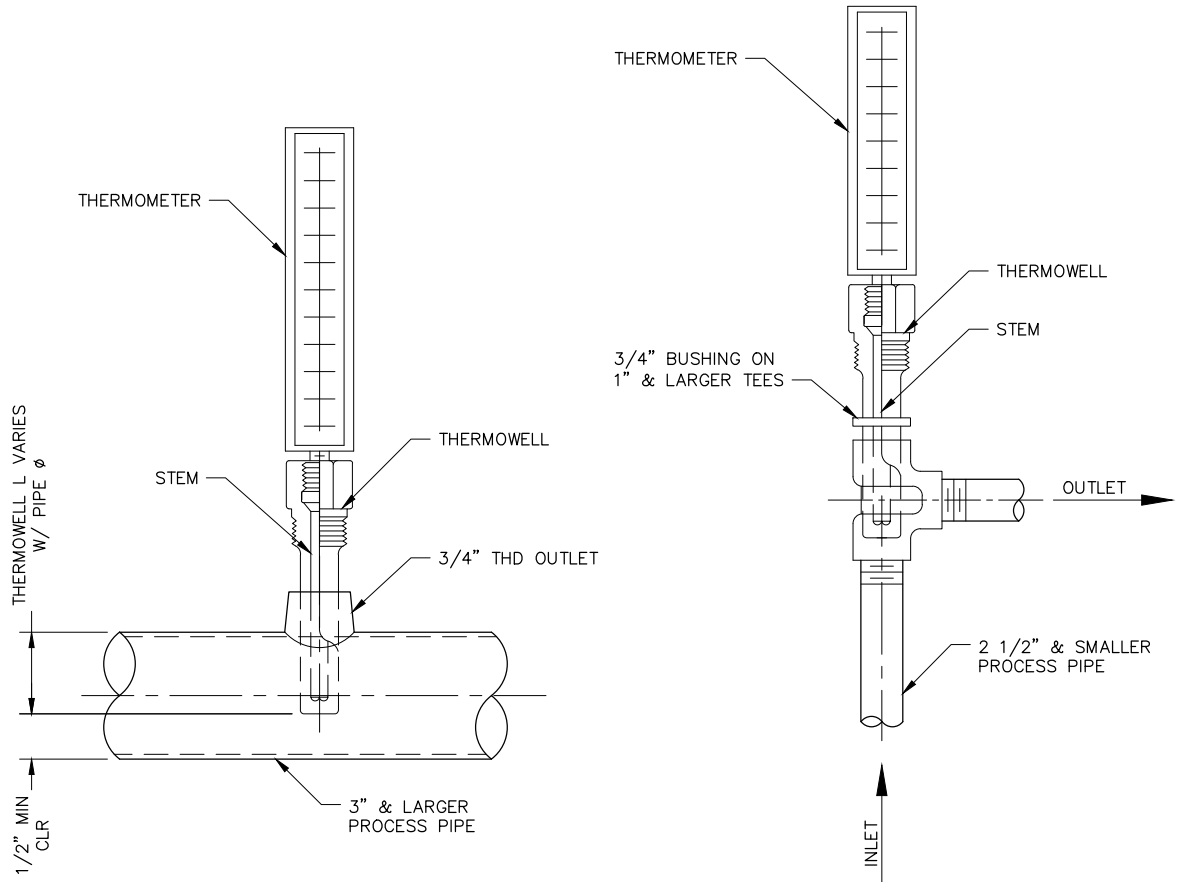
ORIGINATION DATE: JULY 2021

REVISION DATE:

23080
PRESSURE GAUGE
INSTALLATION



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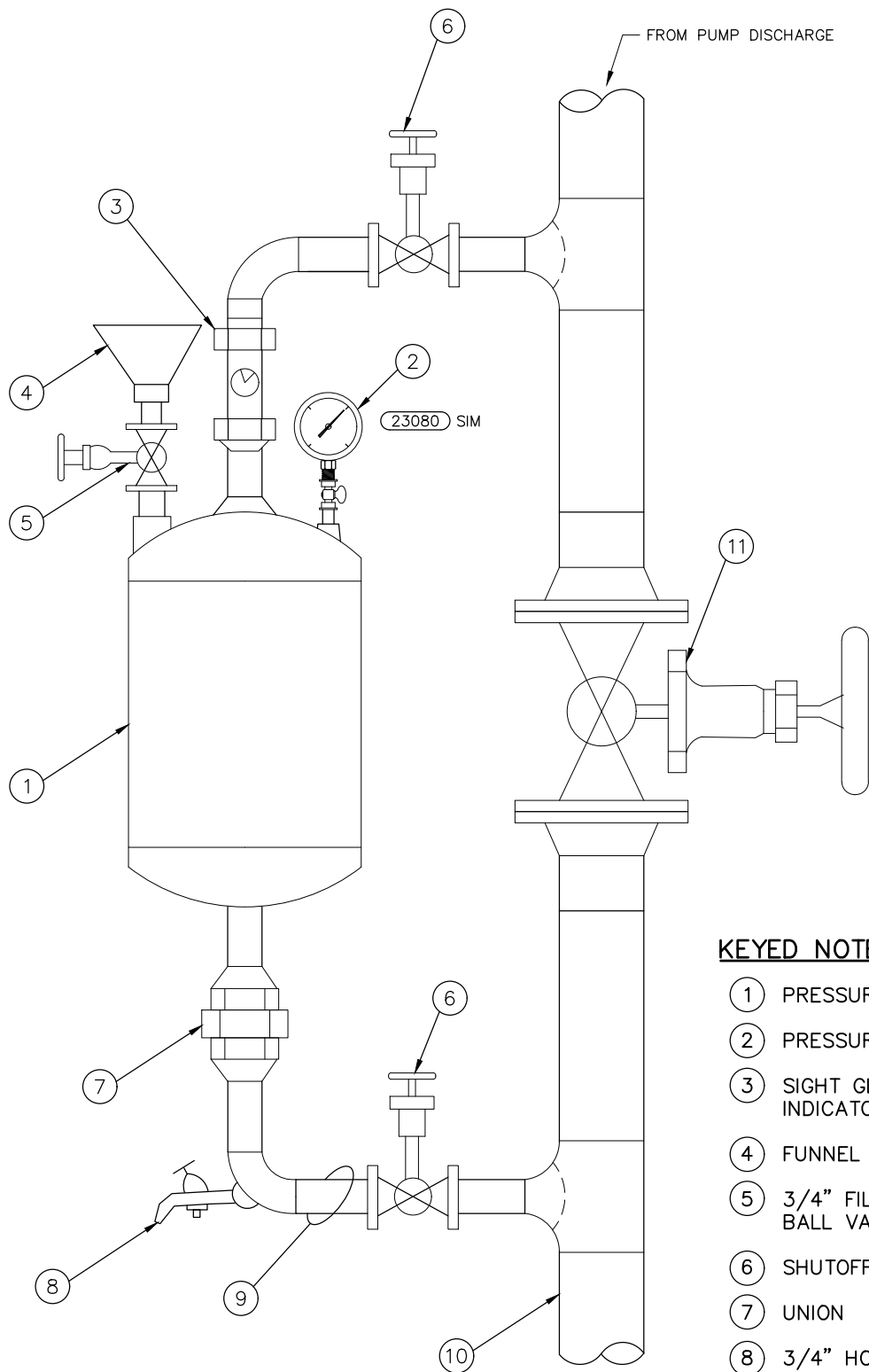
NOTES:

1. FOR STEEL, GALVANIZED STEEL, COPPER, AND POLYVINYL CHLORIDE 2 1/2 INCH AND SMALLER, USE A 3/4 INCH BUSHING IN TEE.
2. FOR DUCTILE IRON AND FIBERGLASS REINFORCED PLASTIC PIPE, ALL SIZES, USE A 3/4 INCH TAPPING SADDLE.
3. FOR STEEL AND STAINLESS STEEL PIPES 3 INCHES AND LARGER, AND PRESSURE VESSELS, USE 3/4 INCH THREADED OUTLET AS SHOWN.

DRAWN BY: WENKHEIMER
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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

23081
THERMOMETER INSTALLATION

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KEYED NOTES:

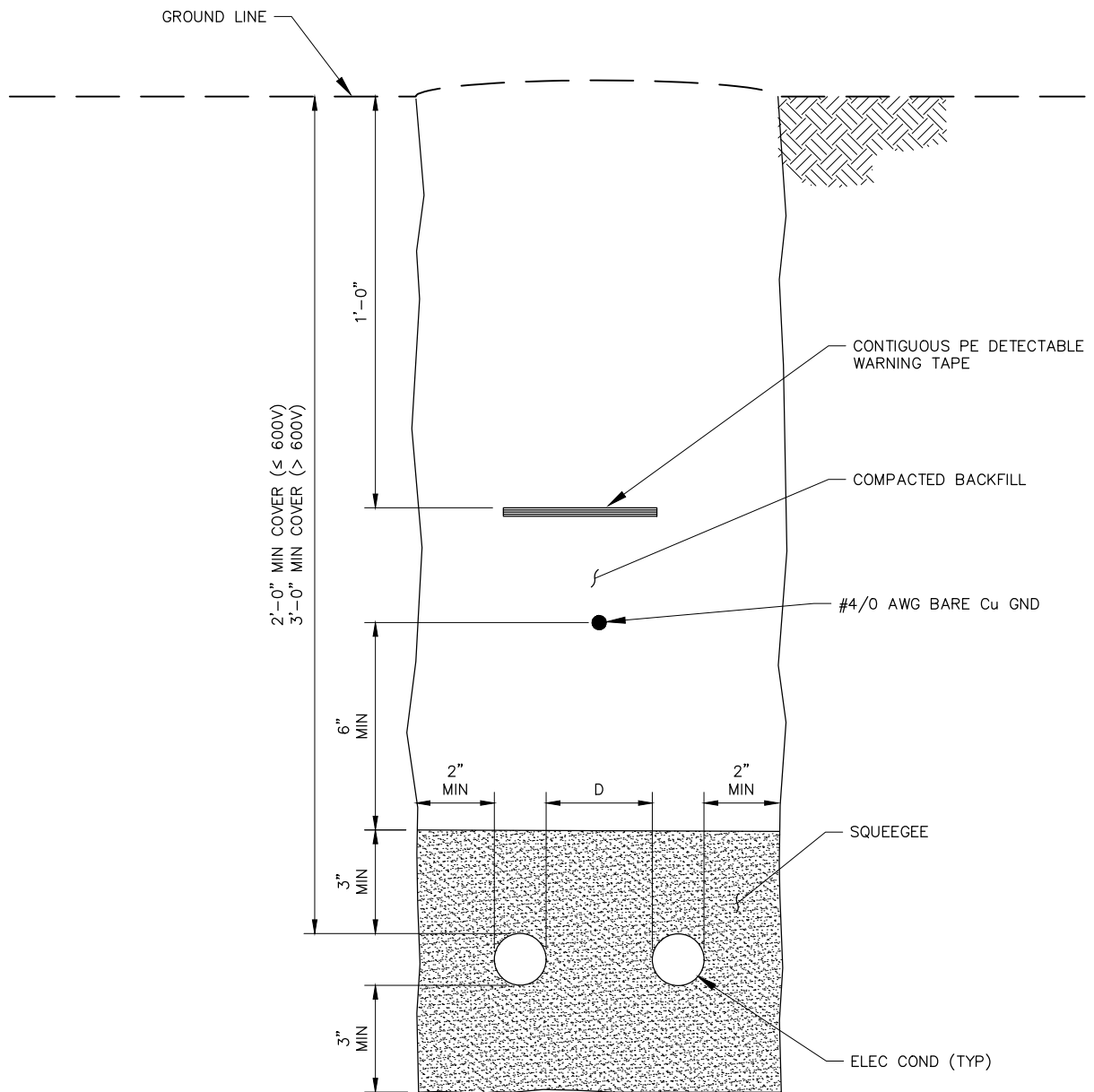
- ① PRESSURE-RATED FEEDER
- ② PRESSURE GAUGE & COCK
- ③ SIGHT GLASS OR FLOW INDICATOR
- ④ FUNNEL
- ⑤ 3/4" FILL & VENT BALL VALVE (V300)
- ⑥ SHUTOFF BALL VALVE (V300)
- ⑦ UNION
- ⑧ 3/4" HOSE COCK (V201)
- ⑨ ONE-HALF MAIN PIPE SIZE
- ⑩ SYSTEM MAIN TO BE TREATED W/ CHEMICAL
- ⑪ BALL VALVE (V300)

DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

**23090
 CHEMICAL SHOT FEEDER**



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NOTE:

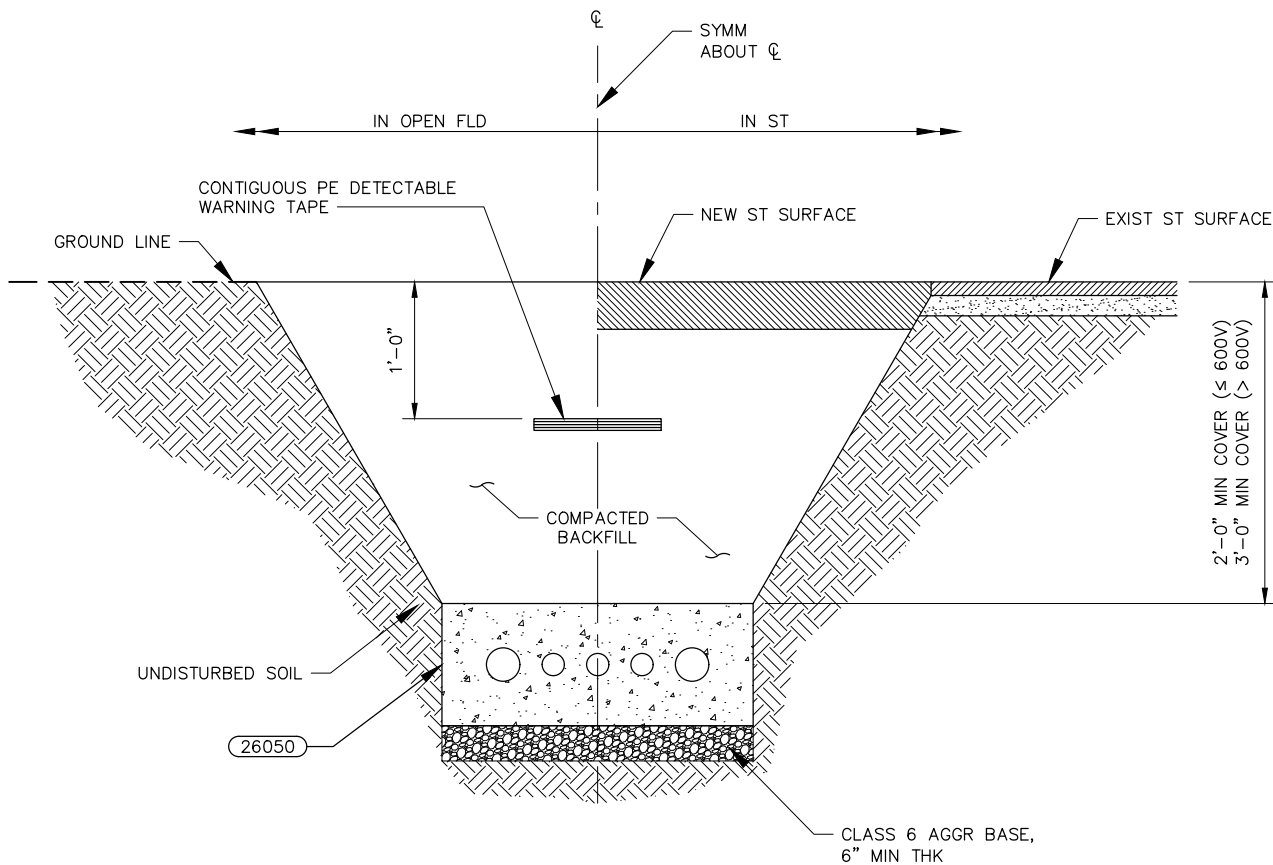
D = 2-INCH MINIMUM FOR 1 1/2 INCH AND SMALLER CONDUIT.
D = 3-INCH MINIMUM FOR 2 INCH AND LARGER CONDUIT.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26005
ELECTRICAL TRENCH
AND CONDUIT SECTION**

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NOTE:

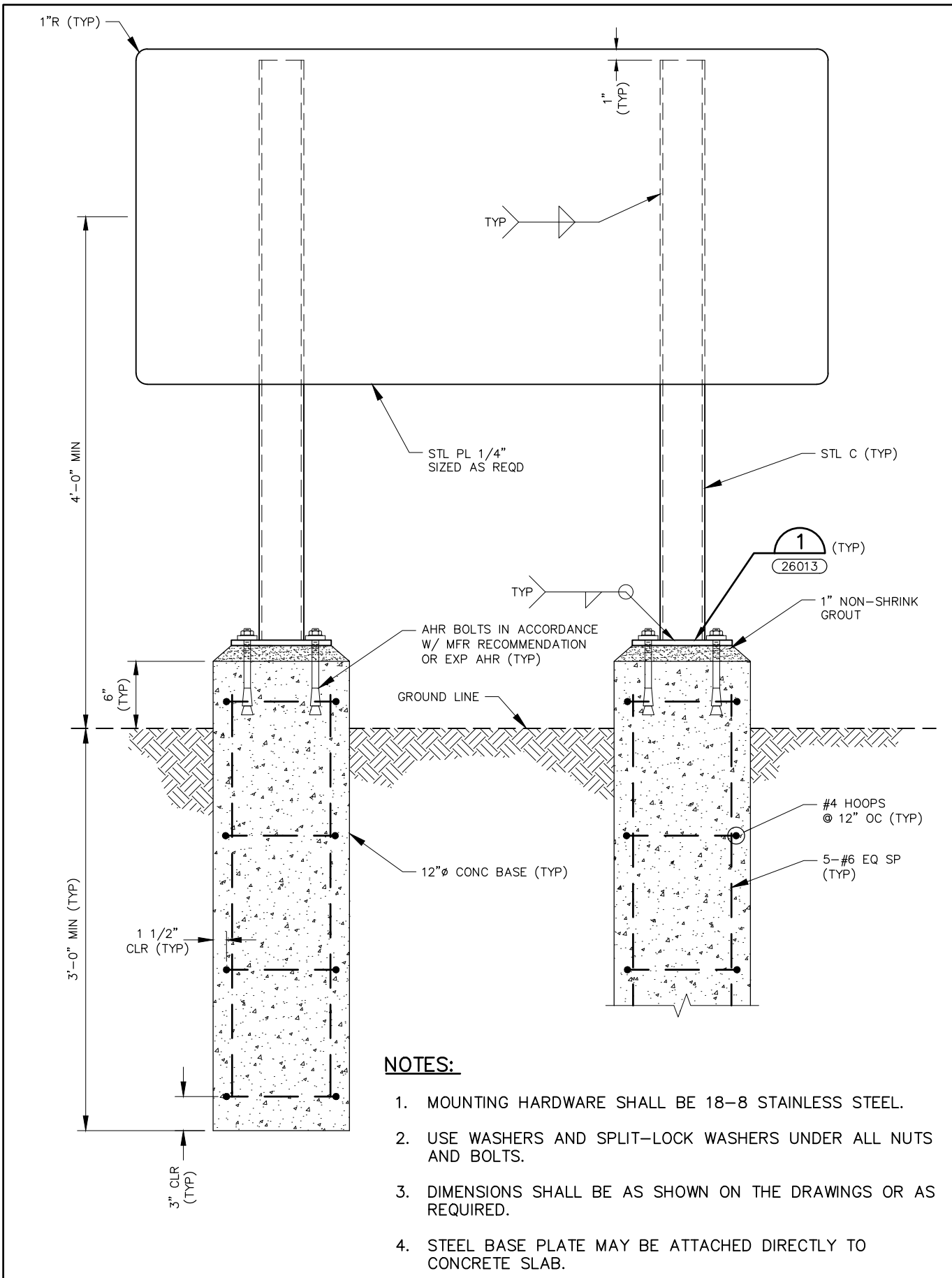
TRENCH SHALL CONFORM TO APPLICABLE OSHA REQUIREMENTS.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26006
DUCTBANK TRENCH SECTION**



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NOTES:

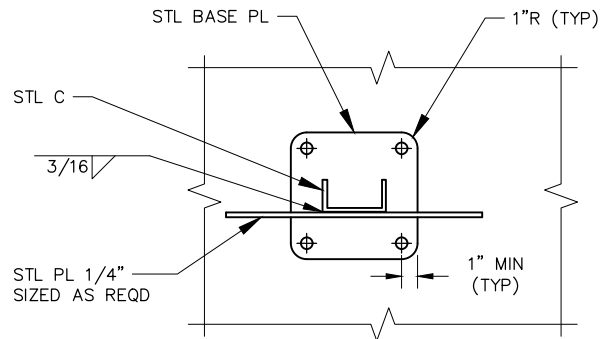
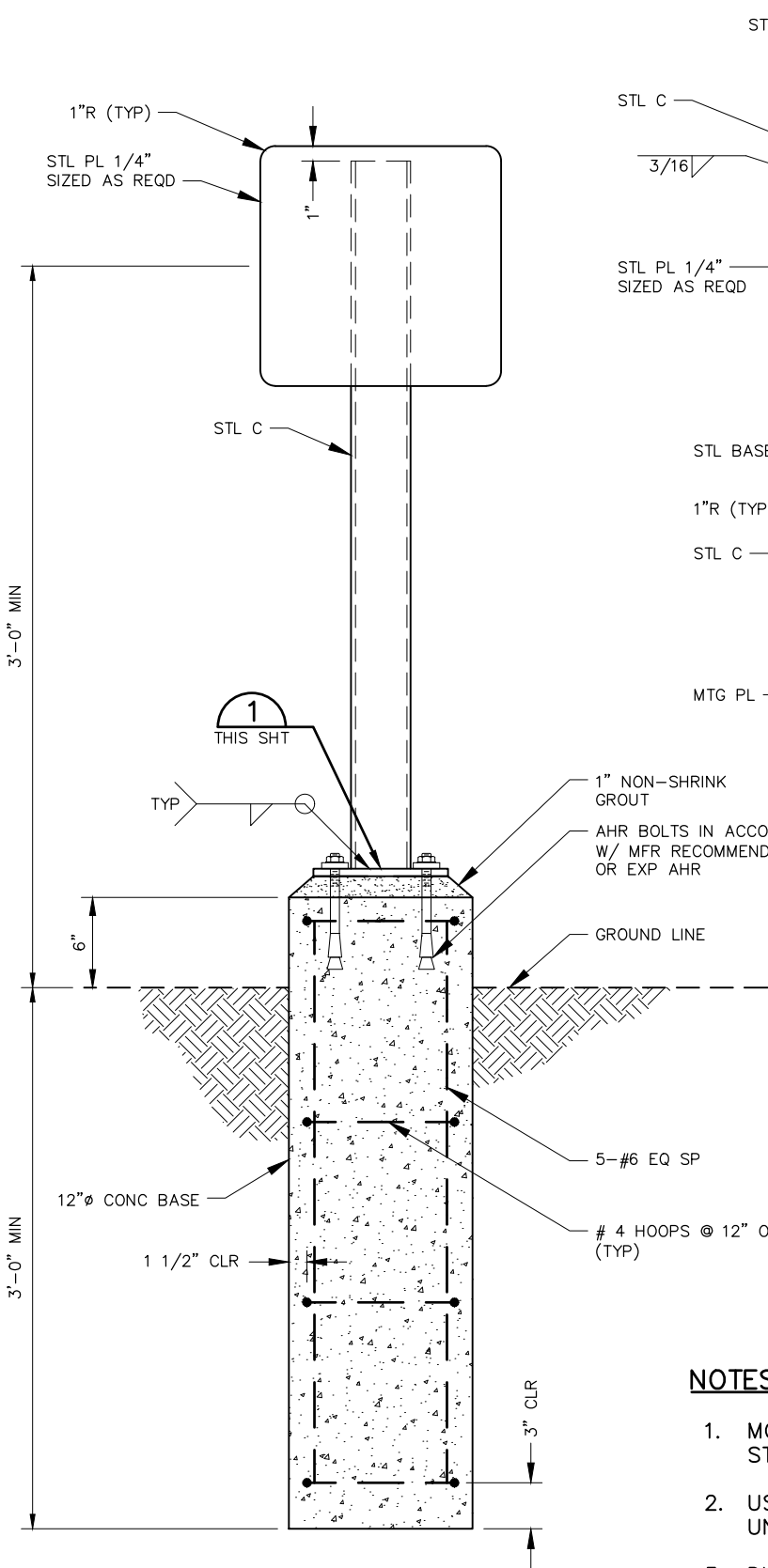
1. MOUNTING HARDWARE SHALL BE 18-8 STAINLESS STEEL.
2. USE WASHERS AND SPLIT-LOCK WASHERS UNDER ALL NUTS AND BOLTS.
3. DIMENSIONS SHALL BE AS SHOWN ON THE DRAWINGS OR AS REQUIRED.
4. STEEL BASE PLATE MAY BE ATTACHED DIRECTLY TO CONCRETE SLAB.

DRAWN BY: BERKNES
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

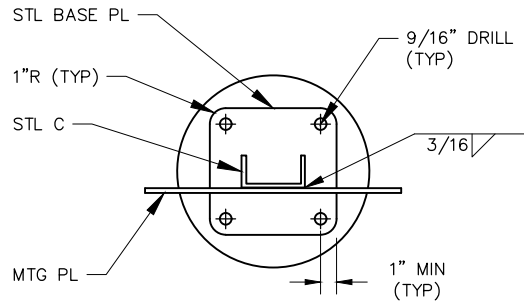
26012
LARGE EQUIPMENT PEDESTAL

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PLAN
(CONC SURFACE)



PLAN
(CONC PIER)

DETAIL 1
THIS SHT
26012

NOTES:

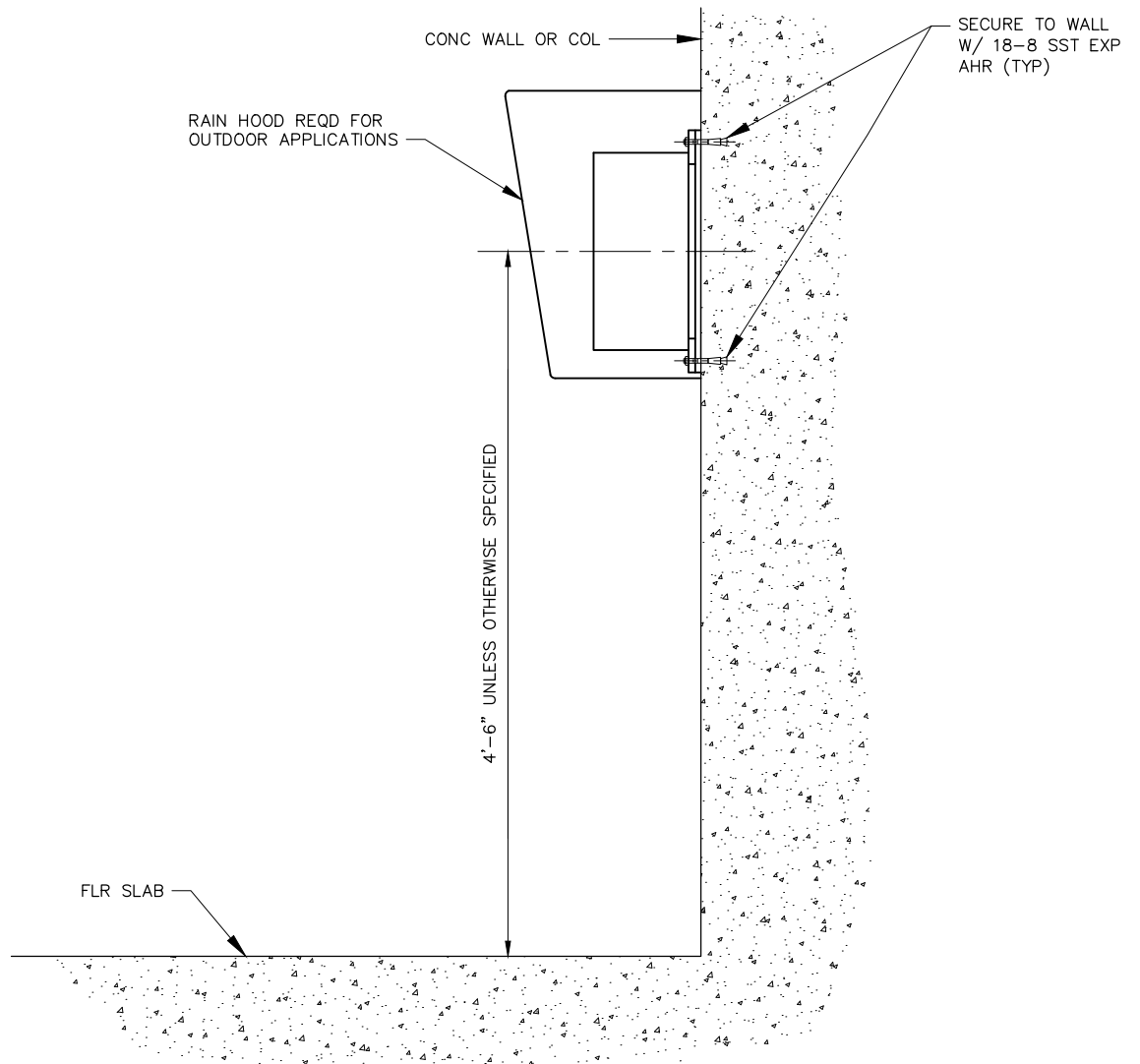
1. MOUNTING HARDWARE SHALL BE 18-8 STAINLESS STEEL.
2. USE WASHERS AND SPLIT-LOCK WASHERS UNDER ALL NUTS AND BOLTS.
3. DIMENSIONS SHALL BE AS SHOWN ON THE DRAWINGS OR AS REQUIRED.
4. STEEL BASE PLATE MAY BE ATTACHED DIRECTLY TO CONCRETE SLAB.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26013
SMALL EQUIPMENT PEDESTAL

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NOTE:

MOUNTING HARDWARE SHALL BE 18-8 STAINLESS STEEL.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

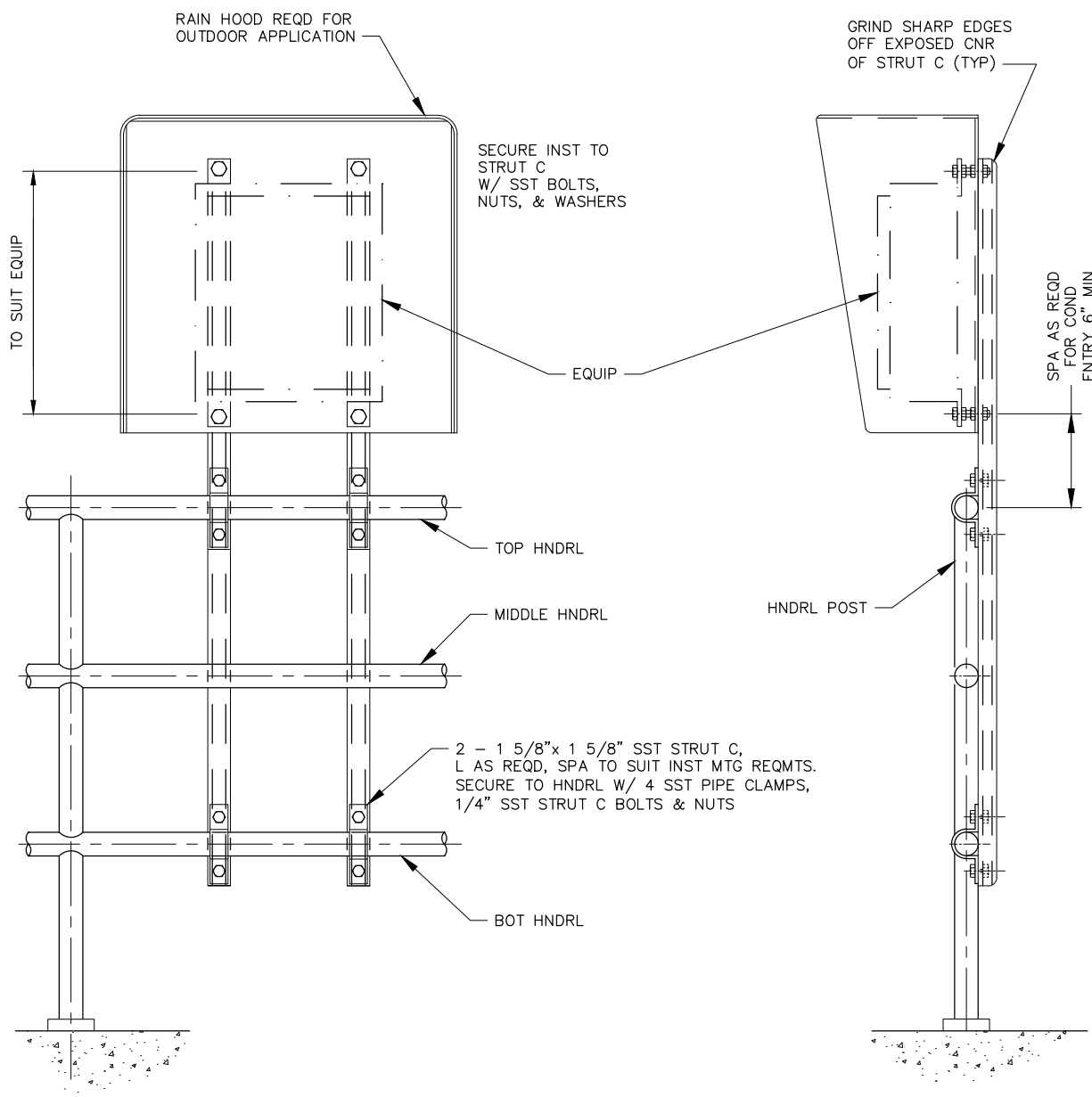
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26014
EQUIPMENT WALL MOUNTING**



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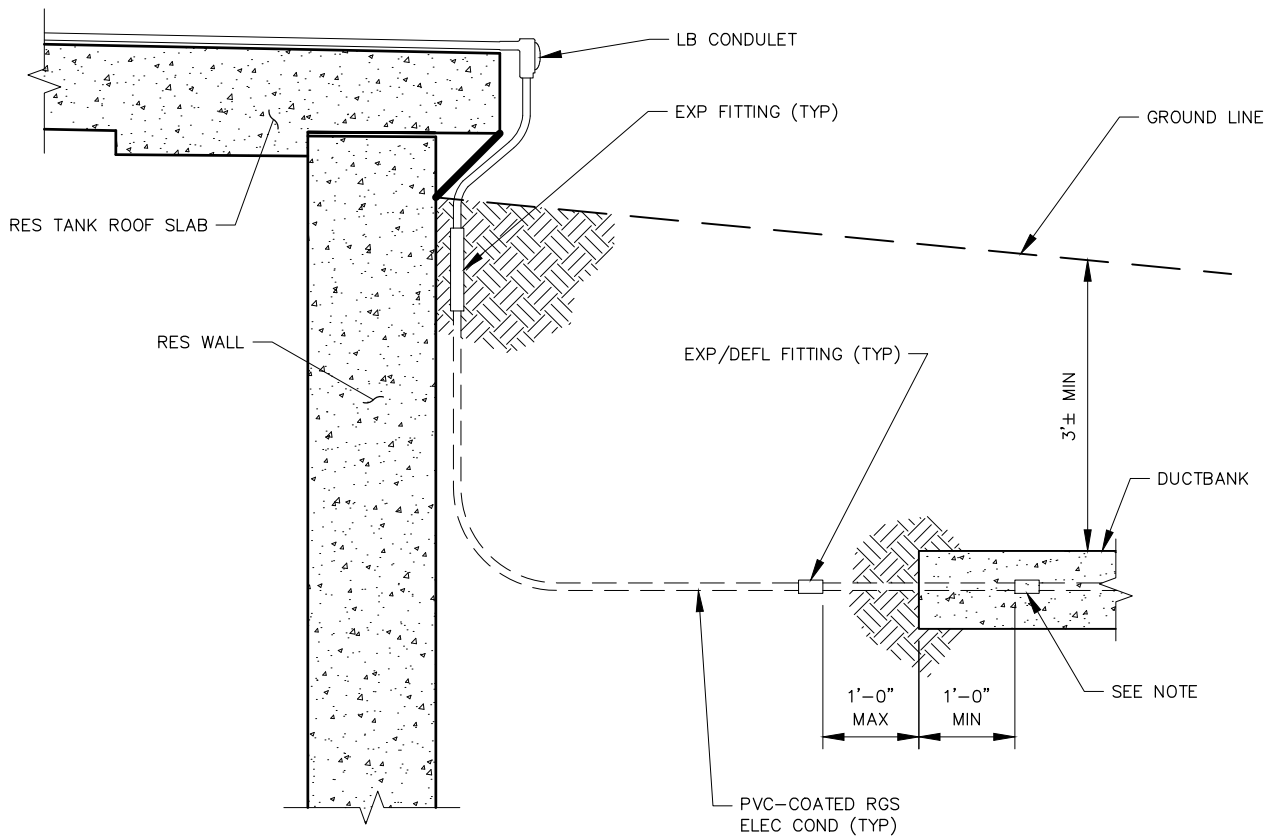


DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26015 HANDRAIL MOUNTING FOR EQUIPMENT

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NOTE:

TRANSITION FROM POLYVINYL CHLORIDE TO POLYVINYL CHLORIDE-COATED RIGID GALVANIZED STEEL BEFORE EXITING DUCTBANK.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

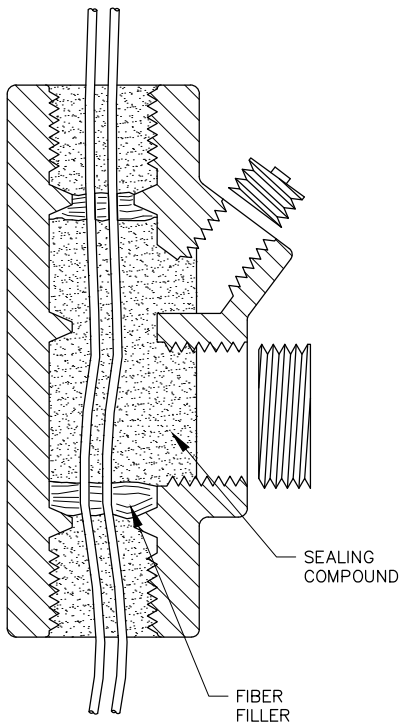
ORIGINATION DATE: JULY 2021

REVISION DATE:

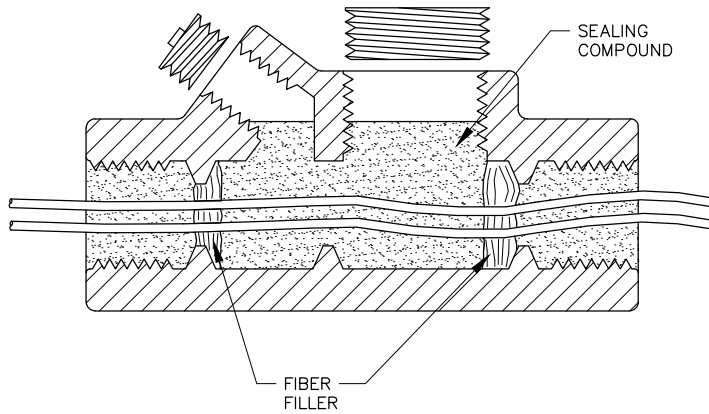
**26038
RESERVOIR LID-DUCTBANK
EXPOSED CONDUIT
INTERFACE**



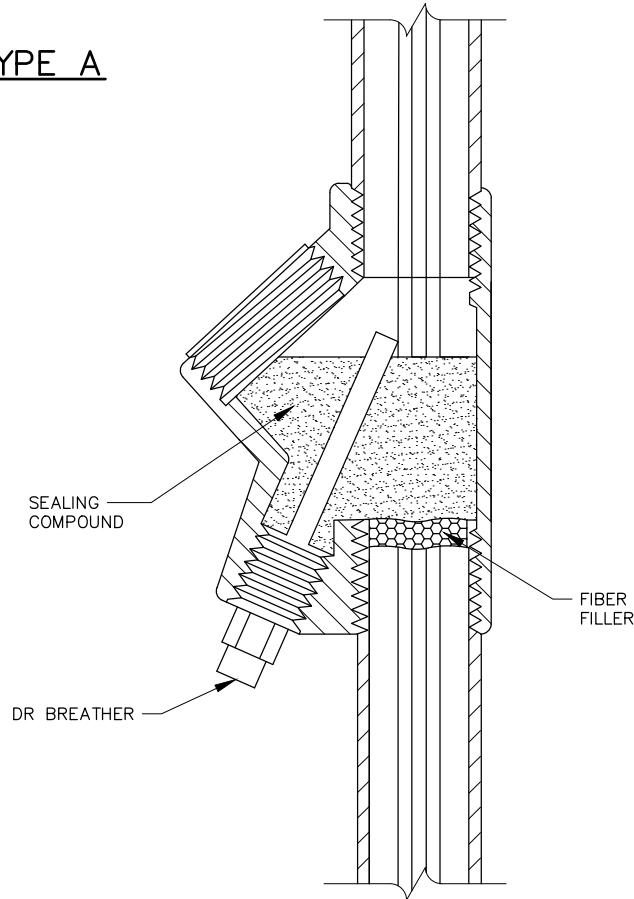
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VERTICAL CONDUIT TYPE A



HORIZONTAL CONDUIT TYPE A



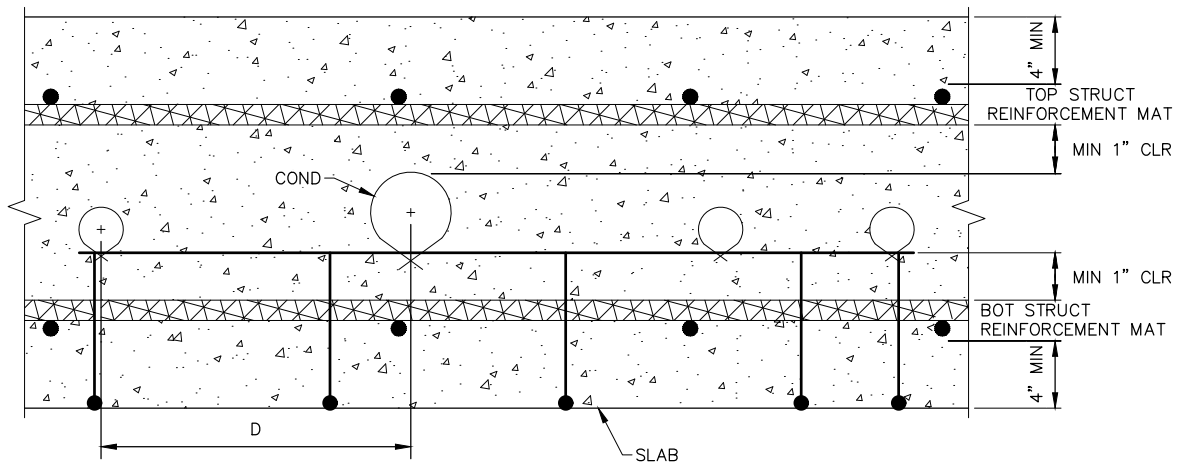
VERTICAL CONDUIT TYPE B

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

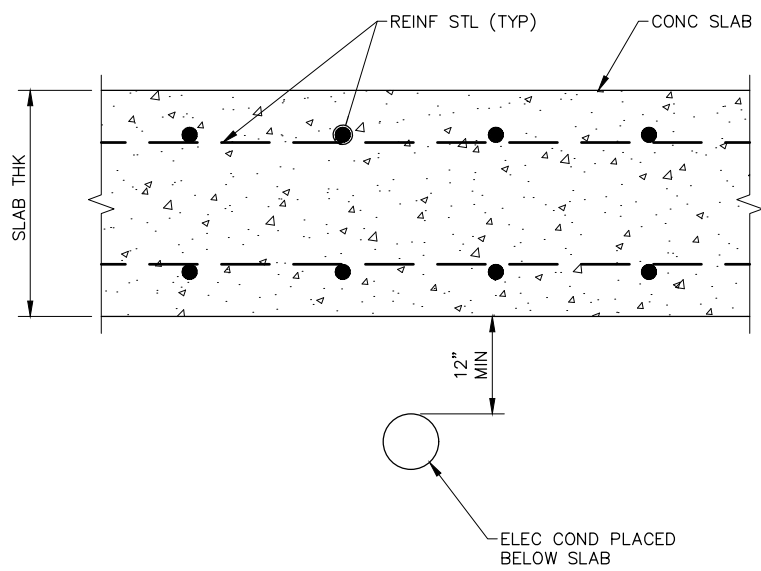
**26040
CONDUIT SEAL-OFF FITTING**



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IN SLAB
TYPE A



UNDER SLAB
TYPE B

NOTES:

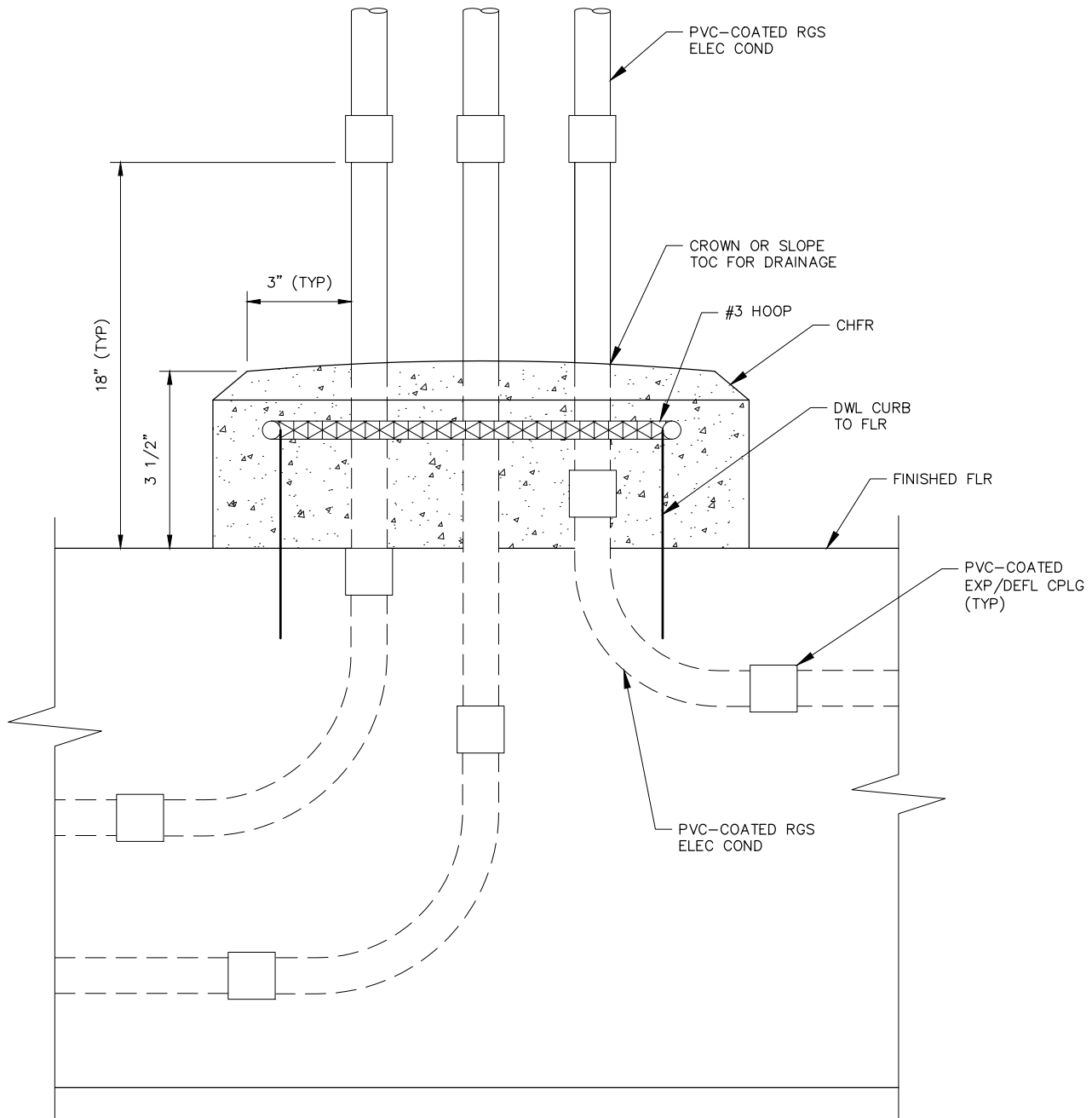
1. D = 2 INCH MINIMUM FOR 1 1/2 INCH AND SMALLER CONDUITS
D = 3 INCH MINIMUM FOR 2 INCH AND LARGER CONDUITS.
2. SUPPORT CONDUITS ON ADDED REINFORCEMENT CHAIRS OR BOLSTERS. TIE CONDUITS TO SUPPORTS AND ANCHOR TO PREVENT FLOTATION.
3. CENTER LARGEST DIAMETER CONDUIT BETWEEN TOP AND BOTTOM REINFORCEMENT MATS.

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26044
ELECTRICAL CONDUIT
CONCRETE SLAB PLACEMENT

D DENVER WATER

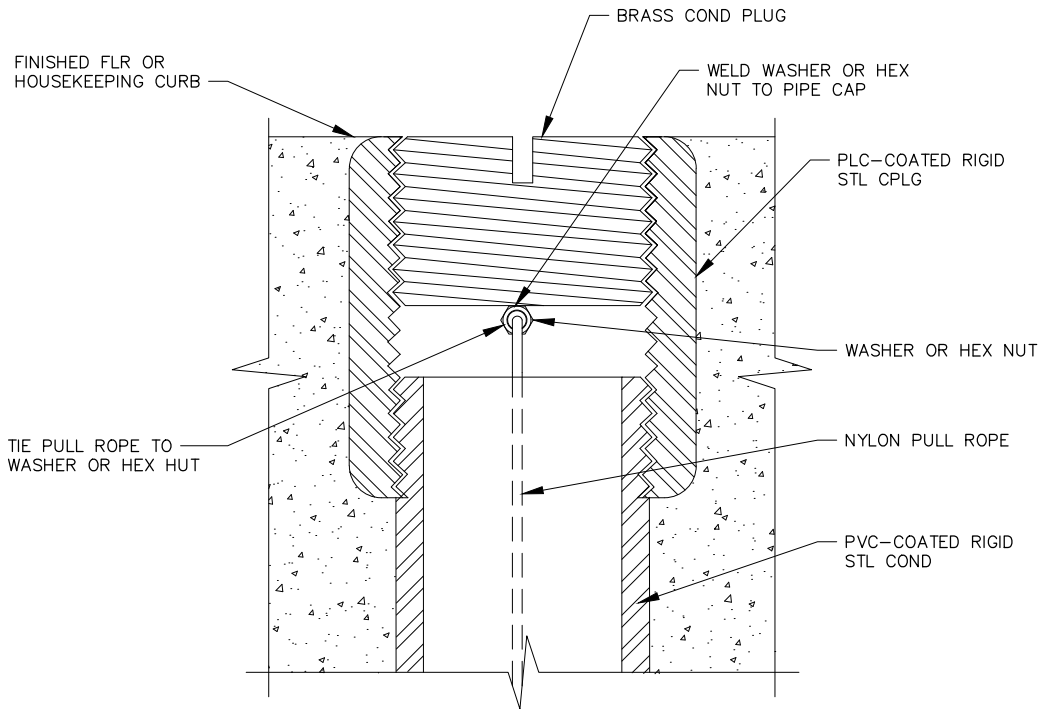
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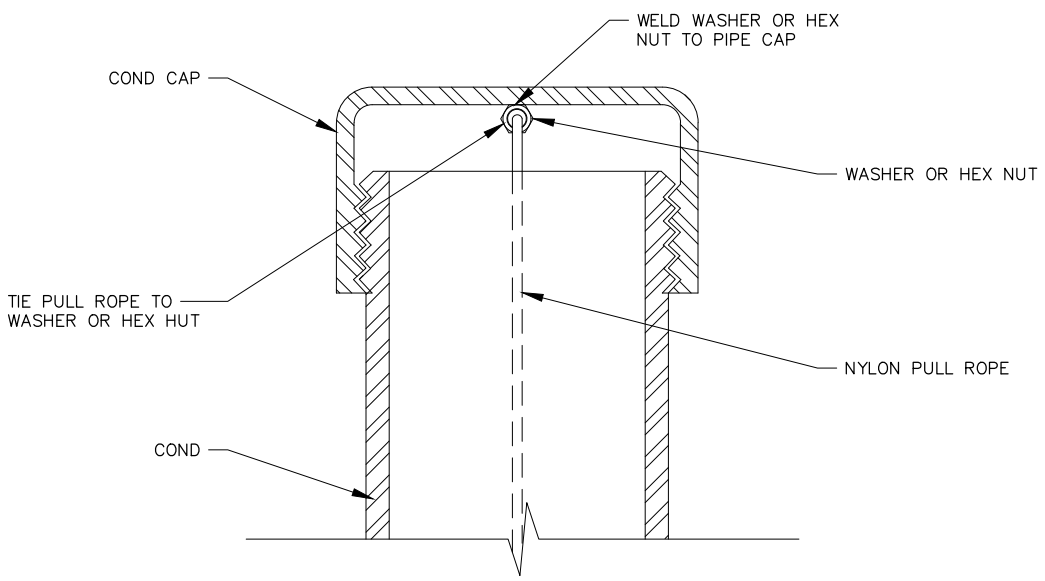
DRAWN BY: ORTEGA
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

26045
CONDUIT BELOW GRADE OR IN
SLAB TO EXPOSED CURB

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ENCASED CONDUITS



EXPOSED CONDUITS

NOTE:

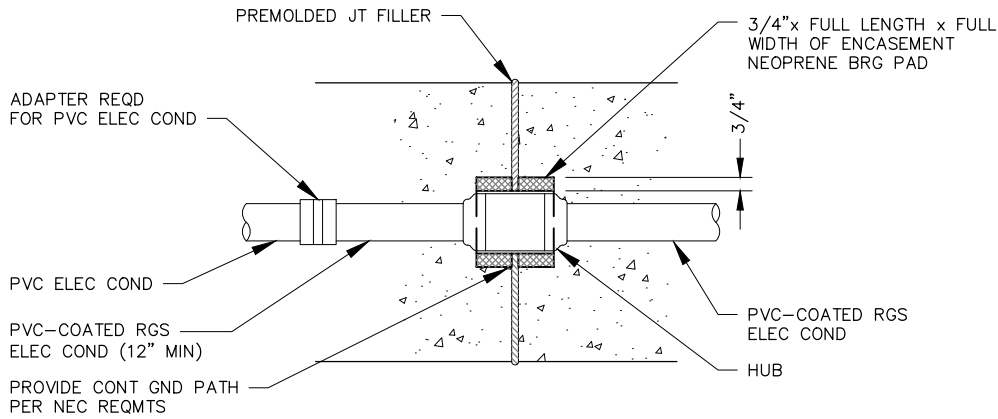
PROVIDE 2 INCH MIN CLEAR BETWEEN ADJACENT CONDUITS.

DRAWN BY: <i>ORTEGA</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

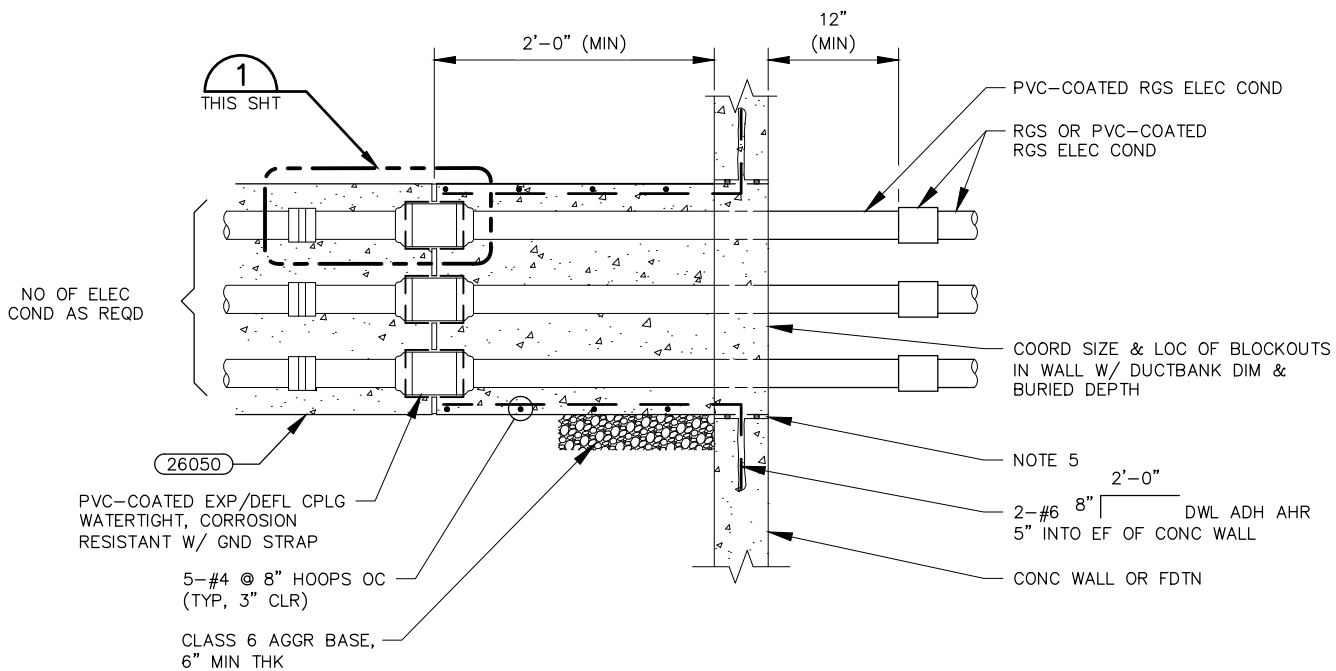
**26046
SPARE CONDUIT**

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DETAIL 1
THIS SHT
26052



NOTES:

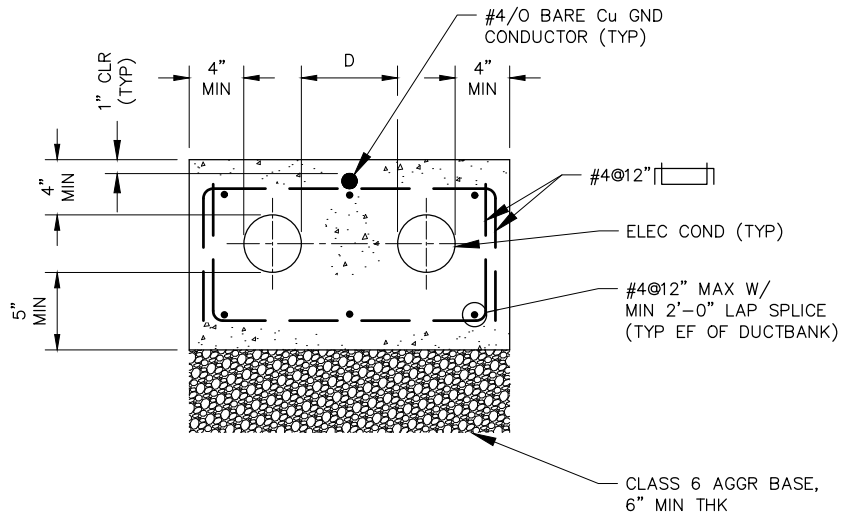
1. DETAIL APPLIES TO ELECTRICAL CONDUIT EMBEDDED IN STRUCTURAL CONCRETE AT CONCRETE WALL OR FOUNDATION INTERFACES AND AT STRUCTURAL EXPANSION JOINTS.
2. DETAIL APPLIES TO ALL EXPANSION JOINTS FOR THE UNDERGROUND CONCRETE ENCASED ELECTRICAL CONDUITS.
3. TERMINATE DUCTBANK REINFORCEMENT 3 INCHES EACH SIDE OF JOINT.
4. THIS DETAIL APPLIES TO HANDHOLES AND MANHOLES WHEN INDICATED.
5. SEAL WALL ALL AROUND DUCTBANK WITH HYDROPHILIC WATERSTOP. INSTALL IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

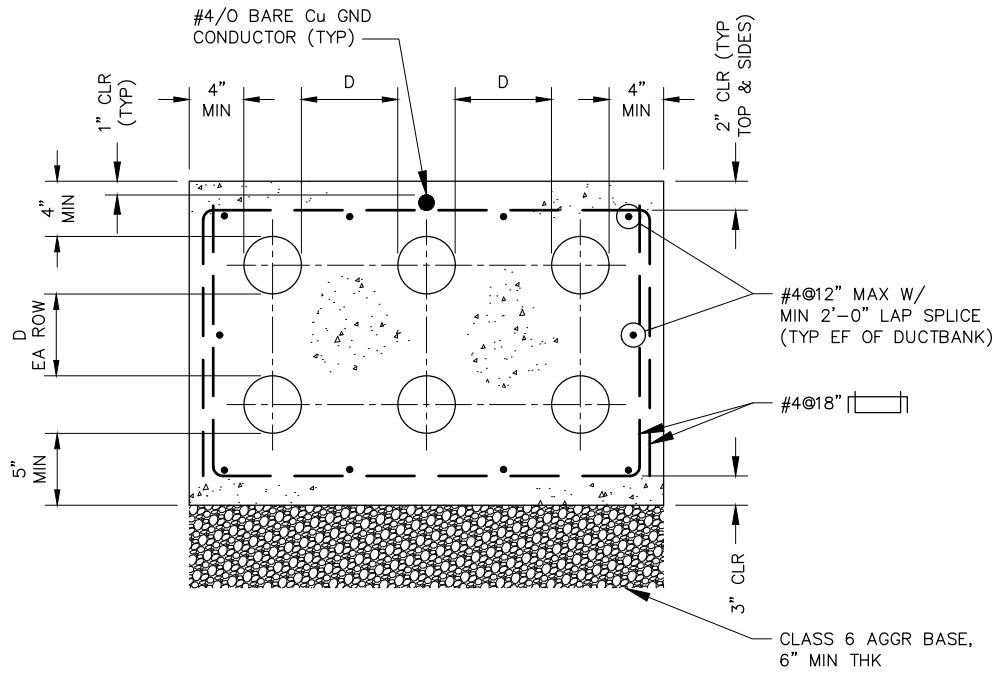
26049
DUCTBANK INTERFACE AT
WALL BLOCKOUT



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SINGLE ROW CONDUIT



TWO OR MORE ROWS CONDUIT

NOTES:

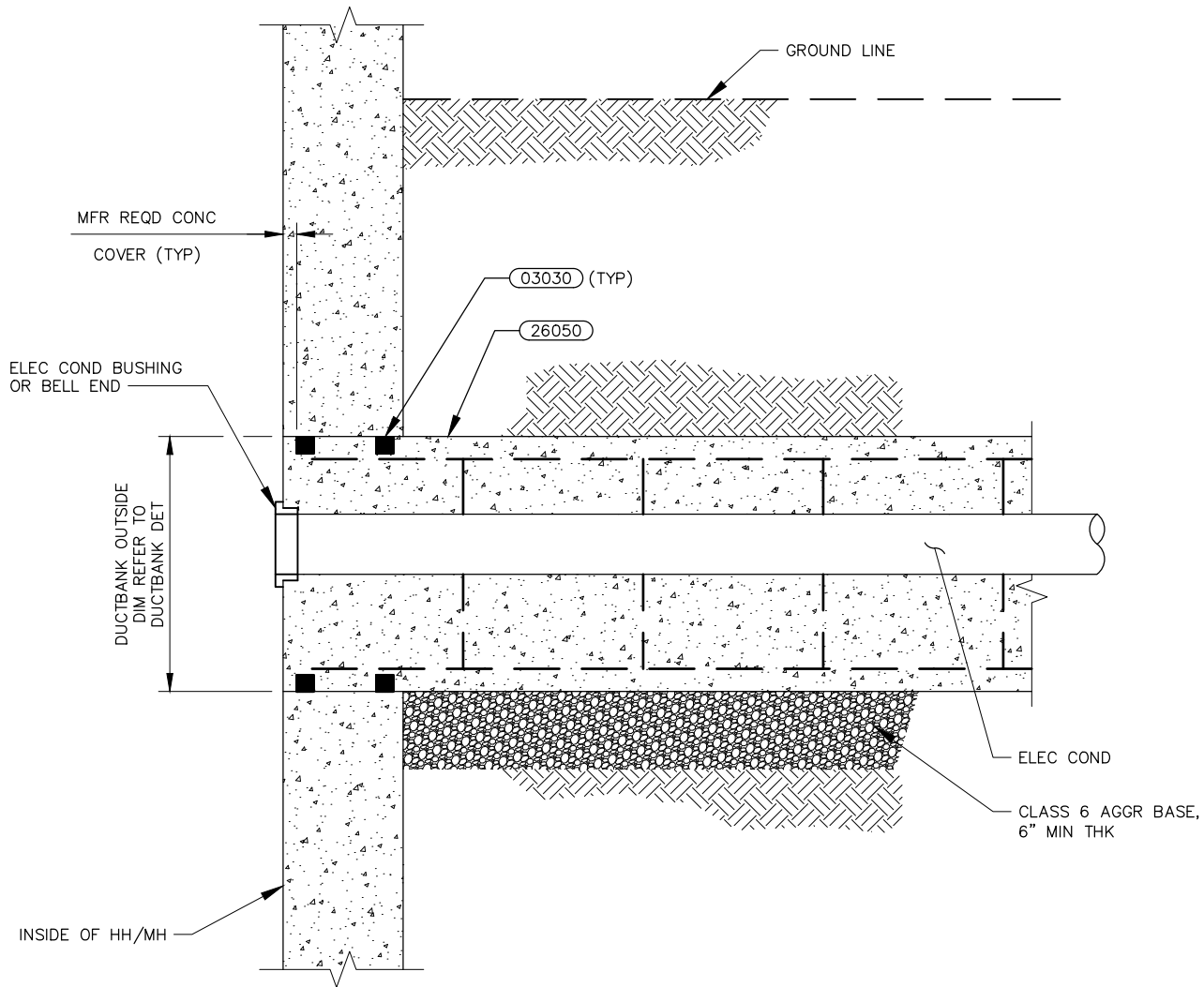
1. SEE (26006) FOR TRENCH REQUIREMENTS.
2. D = 2 INCH MINIMUM FOR 1 1/2 INCH AND SMALLER CONDUITS.
D = 3 INCH MINIMUM FOR 2 INCH AND LARGER CONDUITS.
3. REFERENCE COLORADO DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS FOR CLASS 6 AGGREGATE BASE REQUIREMENTS.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26050
CONCRETE-ENCASED
STEEL-REINFORCED
DUCTBANK**

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DRAWN BY: BOWMAN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

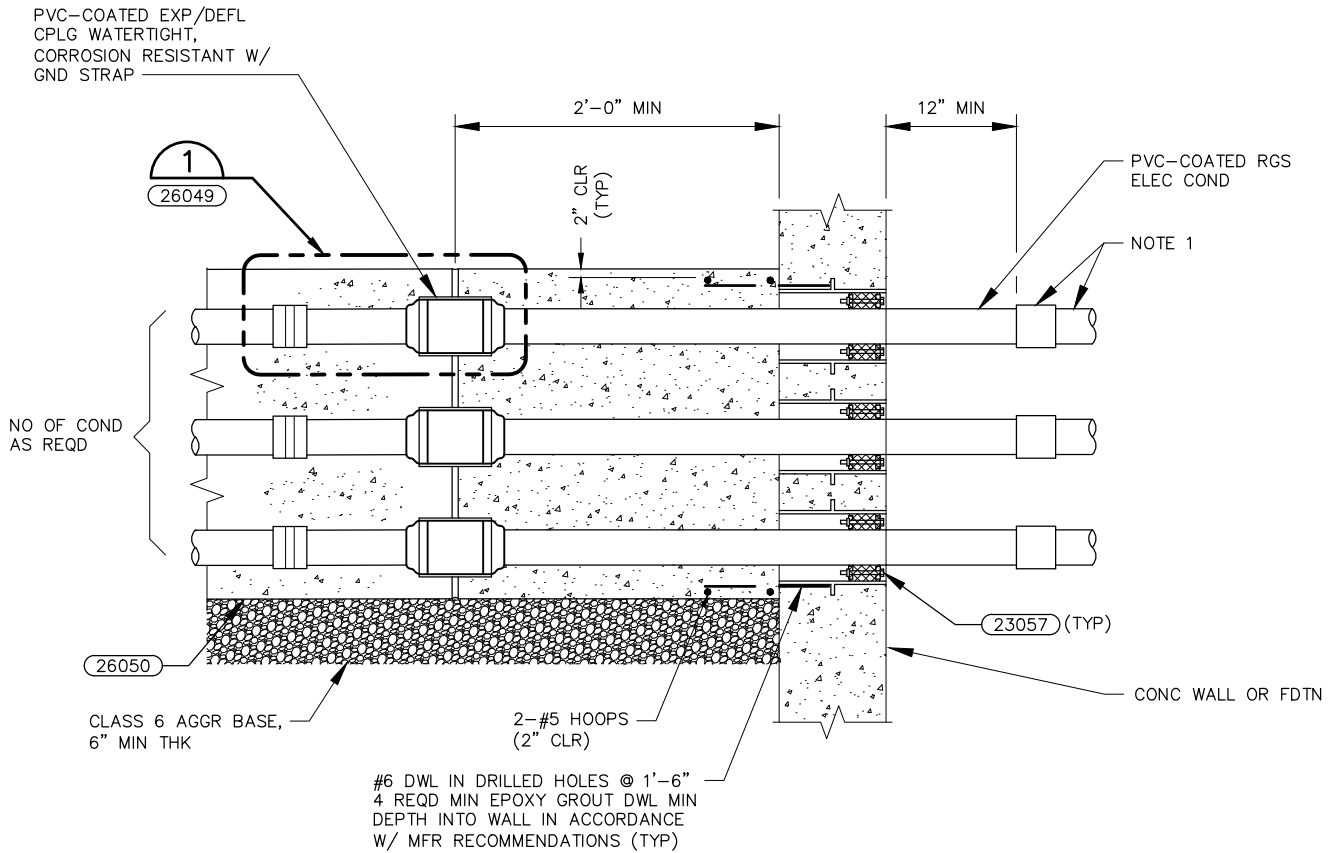
ORIGINATION DATE: JULY 2021

REVISION DATE:

26051
DUCTBANK HANDHOLE
AND MANHOLE INTERFACE



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NOTES:

1. CONTINUATION OF ELECTRICAL CONDUITS IN THE INTERIOR SHALL BE RIGID GALVANIZED STEEL OR POLYVINYL CHLORIDE-COATED RIGID GALVANIZED STEEL.
2. THIS DETAIL APPLIES TO ALL DUCTBANK CONCRETE WALL OR FOUNDATION PENETRATIONS INCLUDING BUILDING AND VAULTS. THIS DETAIL APPLIES TO HANDHOLES AND MANHOLES WHEN INDICATED.

DRAWN BY: *BOWMAN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

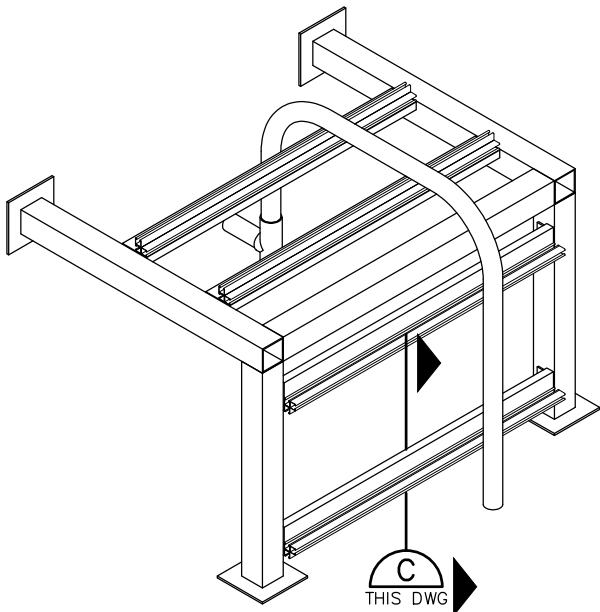
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

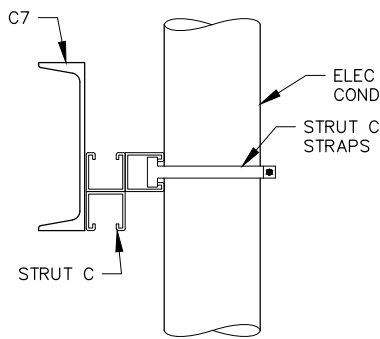
**26052
DUCTBANK INTERFACE
AT WALL**



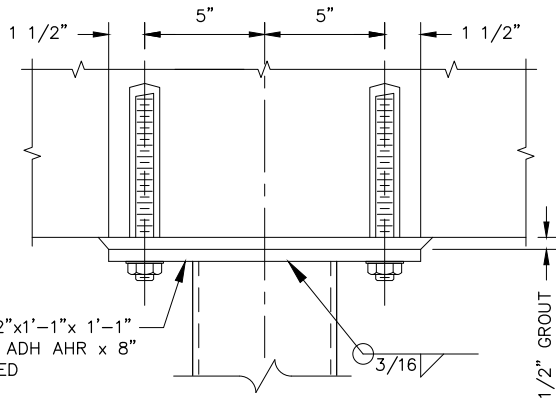
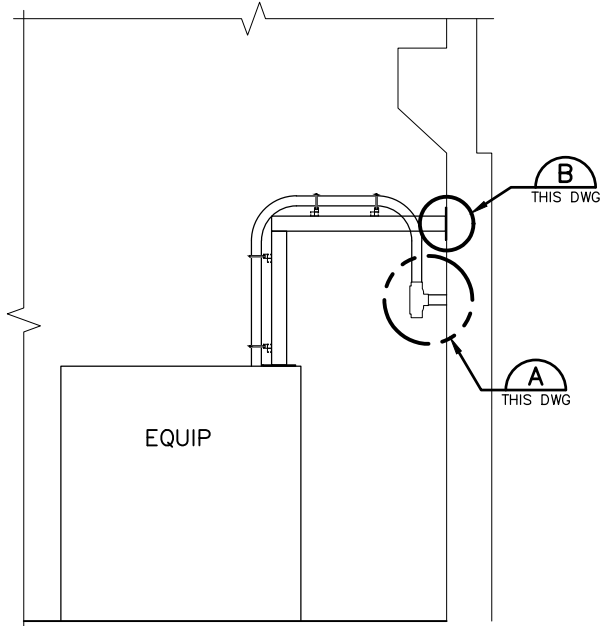
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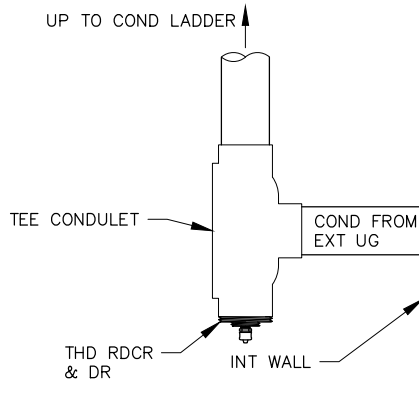
ISO VIEW



SECTION C
SCALE: 3" = 1'-0" THIS DWG



SECTION B
SCALE: 3" = 1'-0" THIS DWG



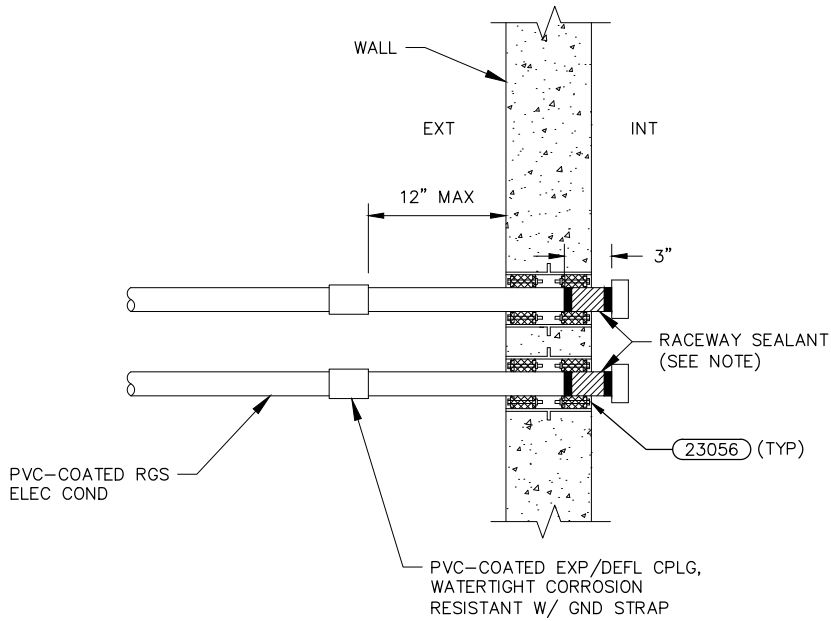
SECTION A
SCALE: 3" = 1'-0" THIS DWG

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

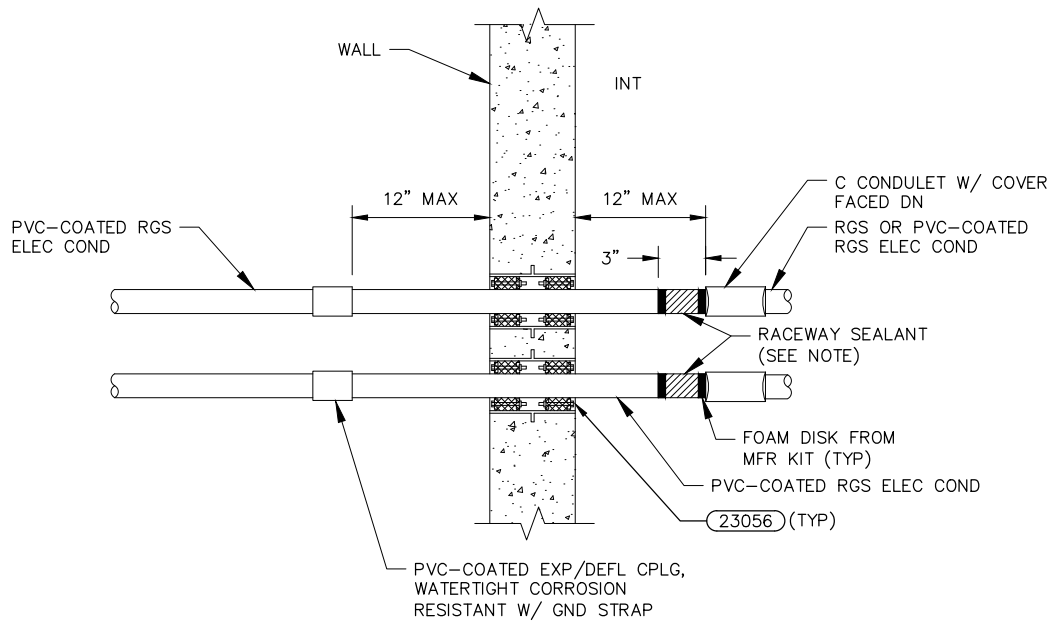
26054
UNDERGROUND CONDUIT TO
BELOW GRADE EQUIPMENT

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EHH



STRUCT

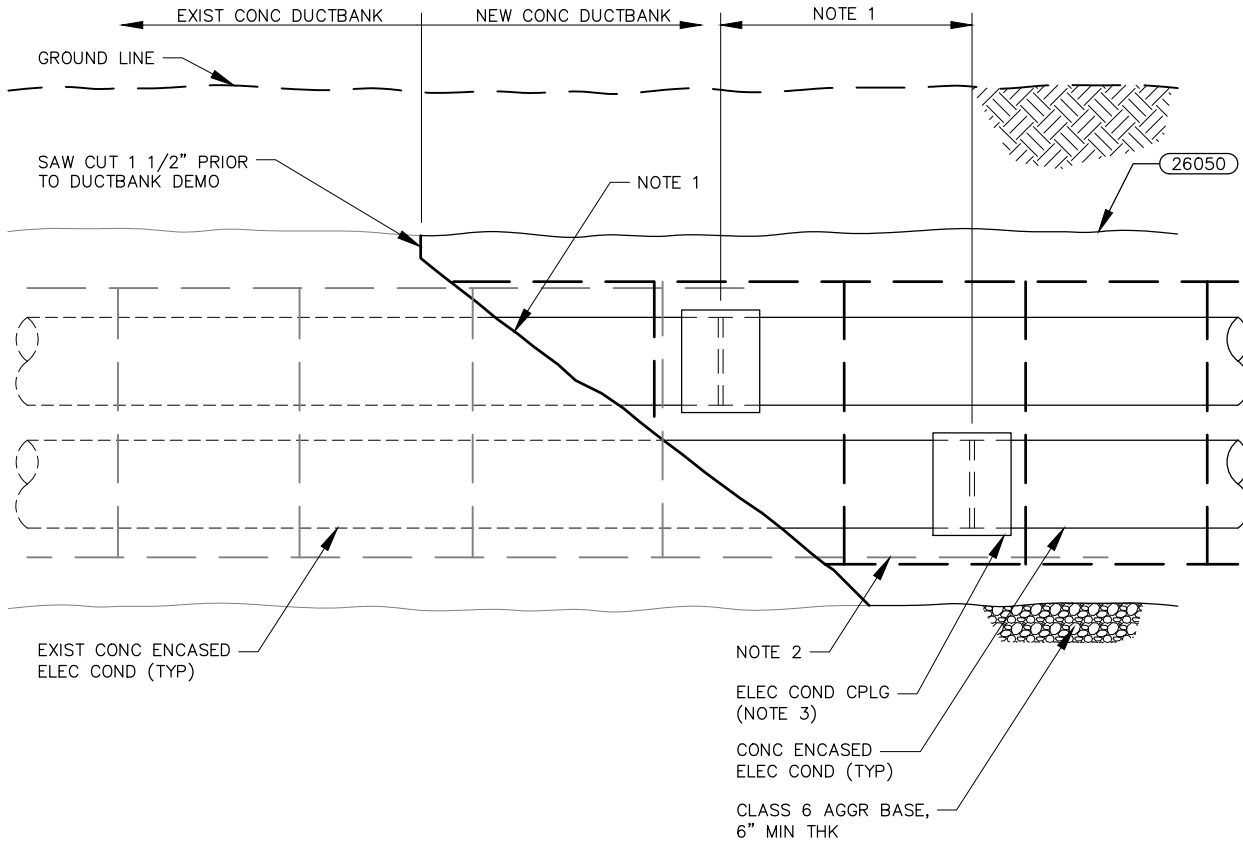
NOTE:

SEE MANUFACTURER TABLES FOR RECOMMENDED QUANTITY OF FOAM TO INSTALL BASED ON OUTER DIAMETER OF CONDUIT USED.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26055
UNDERGROUND CONDUIT
INTERFACE**

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ELEVATION

NOTES:

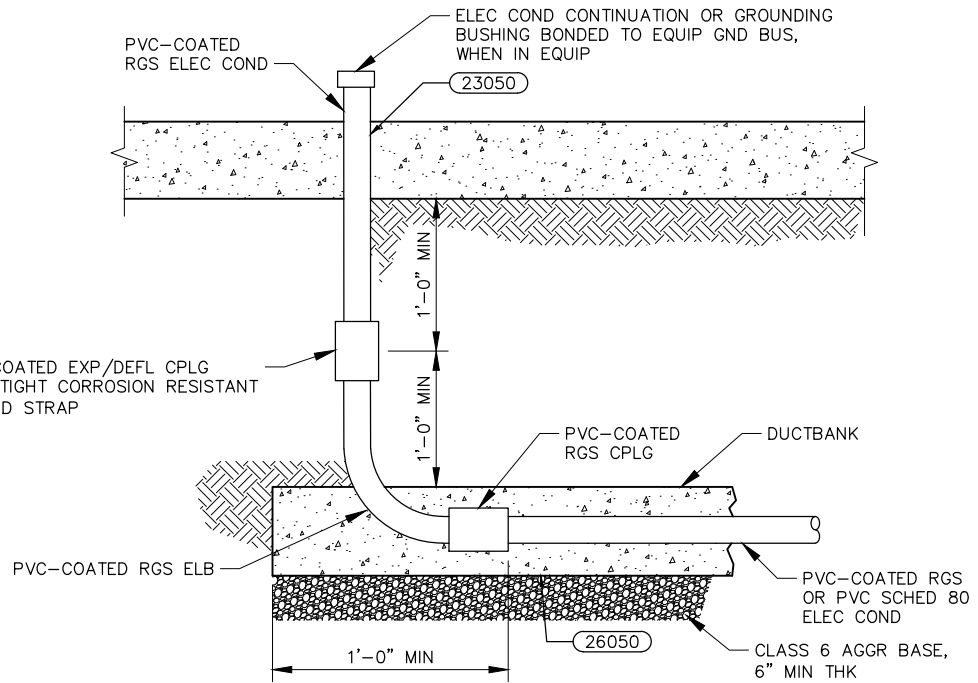
1. REMOVE EXISTING CONCRETE FROM DUCTBANK WITHOUT DAMAGING ELECTRICAL CONDUITS, AND REINFORCING STEEL. LOWER ELECTRICAL CONDUIT SHALL EXTEND A MINIMUM OF 18 INCHES BEYOND UPPER ELECTRICAL CONDUIT.
2. CONNECT NEW REINFORCING STEEL TO EXISTING REINFORCING STEEL BY OVERLAPPING STEEL A MINIMUM OF 29 INCHES AND SECURING WITH TIE WIRE.
3. EXTEND EXISTING ELECTRICAL CONDUIT WITH ELECTRICAL CONDUIT OF LIKE MATERIAL (POLYVINYL CHLORIDE-COATED RIGID STEEL CONDUIT, RIGID STEEL CONDUIT, OR SCHEDULE 80 POLYVINYL CHLORIDE). FOR STEEL ELECTRICAL CONDUIT, PROVIDE CONCRETE RATED TYPE THREADLESS COUPLING TO CONNECT EXISTING RIGID ELECTRICAL STEEL CONDUIT TO NEW ELECTRICAL CONDUIT. FOR POLYVINYL CHLORIDE-COATED RIGID STEEL CONDUIT, RE-COAT ANY DAMAGED POLYVINYL CHLORIDE COATING AND THREADLESS COUPLING WITH NEW POLYVINYL CHLORIDE COATING TOUCH UP MATERIAL. FOR SCHEDULE 80 POLYVINYL CHLORIDE ELECTRICAL CONDUIT, CONNECT EXPOSED UNDAMAGED SCHEDULE 80 POLYVINYL CHLORIDE ELECTRICAL CONDUIT TO NEW ELECTRICAL CONDUIT WITH POLYVINYL CHLORIDE COUPLING AND APPROPRIATE CEMENT.

DRAWN BY: <i>BOWMAN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

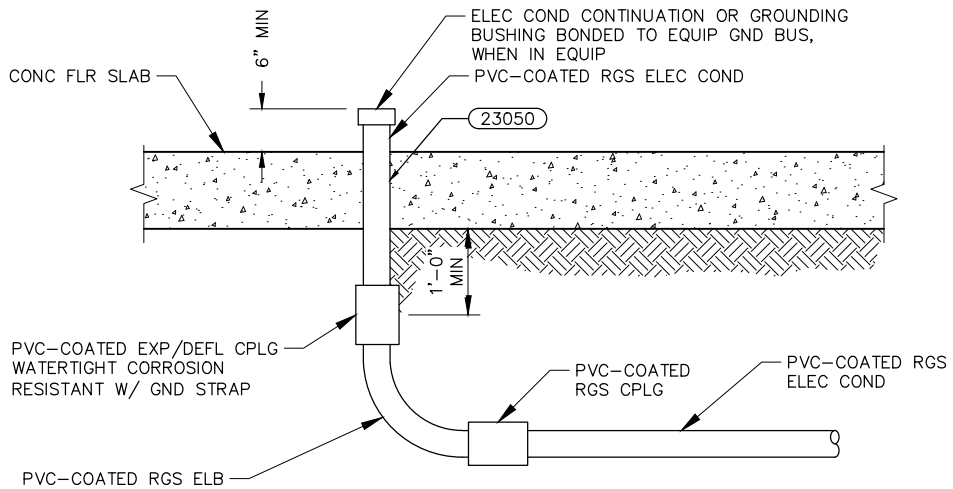
**26058
EXISTING DUCTBANK
EXTENSION**



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**FROM DUCTBANK
TYPE A**



**FROM DIRECT BURIED
TYPE B**

NOTE:

THIS DETAIL APPLIES TO RISER FROM UNDERGROUND ELECTRIC CONDUIT BENEATH CONCRETE SLABS, CONCRETE FLOORS, AND EQUIPMENT.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

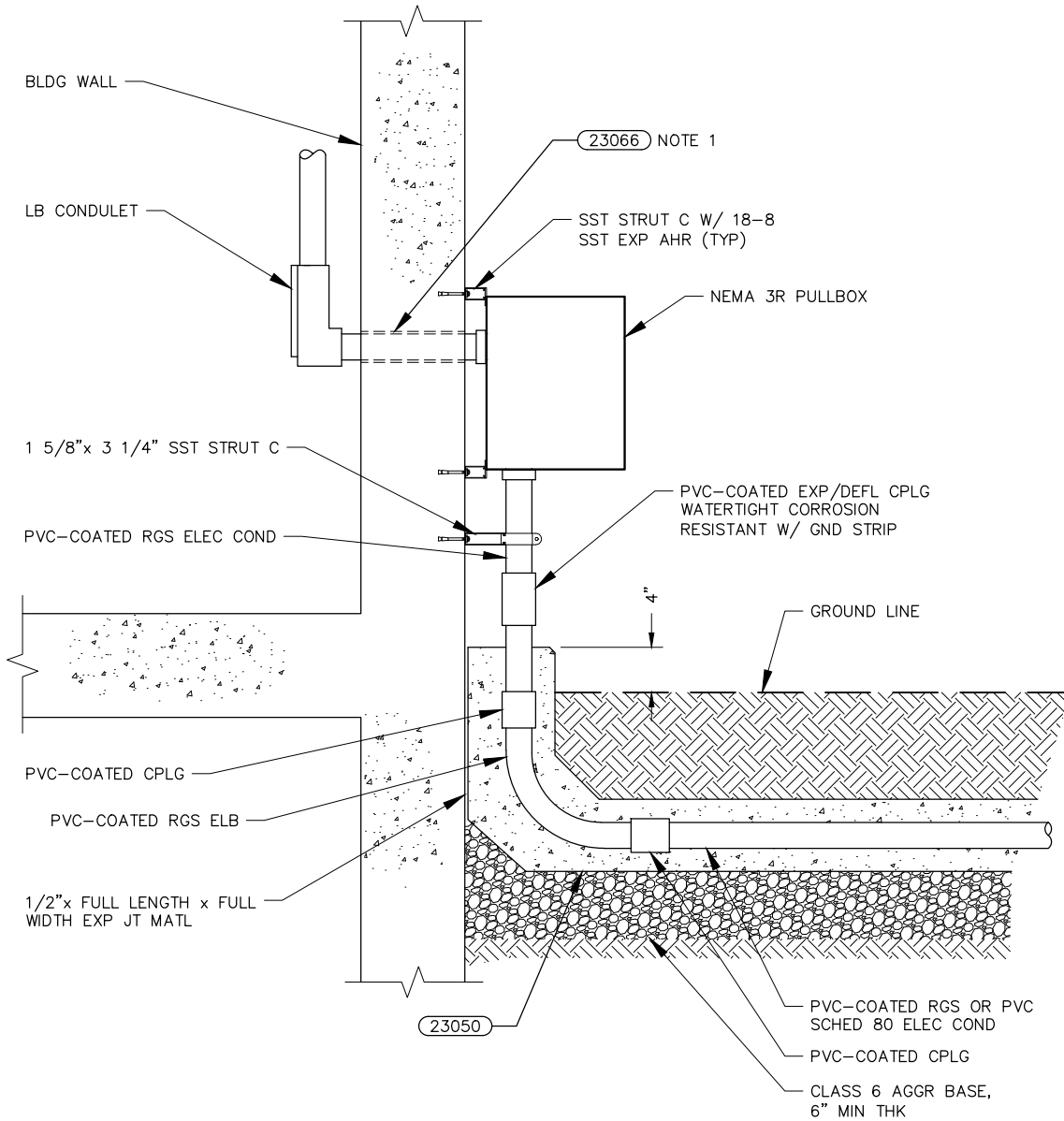
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26059
UNDERGROUND CONDUIT
RISER**



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NOTES:

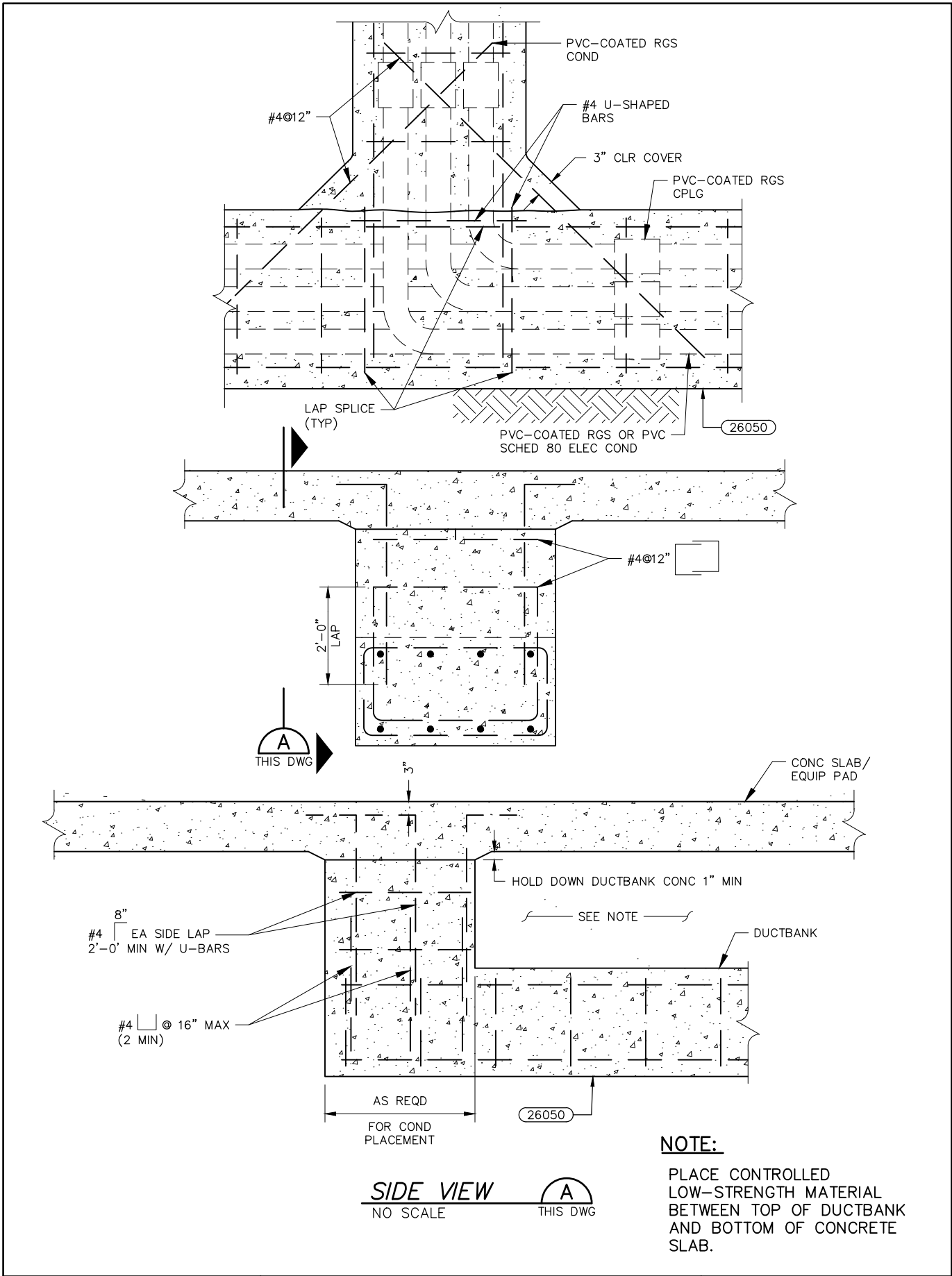
1. X-RAY AND CORE DRILL HOLE THROUGH WALL TO AVOID REINFORCING STEEL.
2. FOR PIPE PENETRATION TABLE AND NOTES, SEE (23050).

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26060
BUILDING UNDERGROUND
CONDUIT ENTRANCE

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NOTE:
 PLACE CONTROLLED
 LOW-STRENGTH MATERIAL
 BETWEEN TOP OF DUCTBANK
 AND BOTTOM OF CONCRETE
 SLAB.

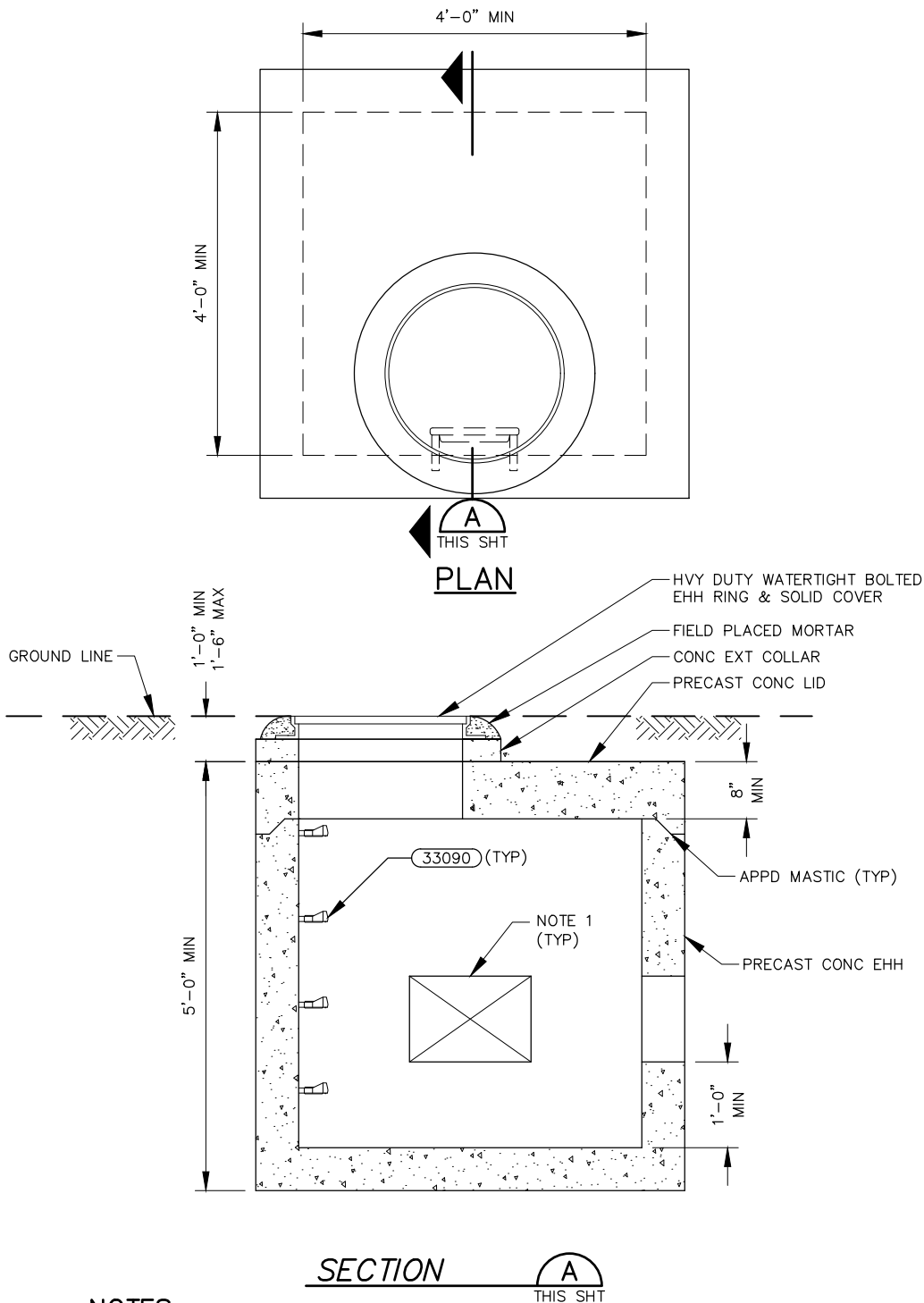
SIDE VIEW
 NO SCALE

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26061 DUCTBANK RISER AND EQUIPMENT PAD INTERFACE

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NOTES:

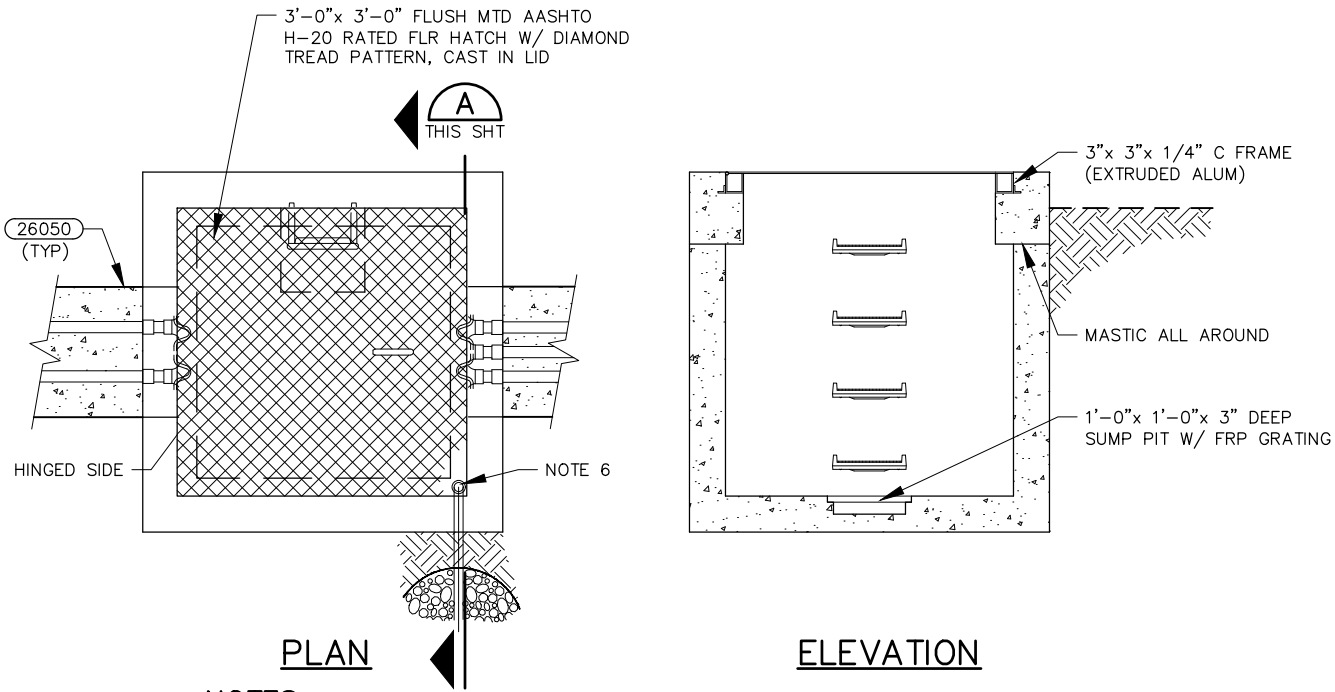
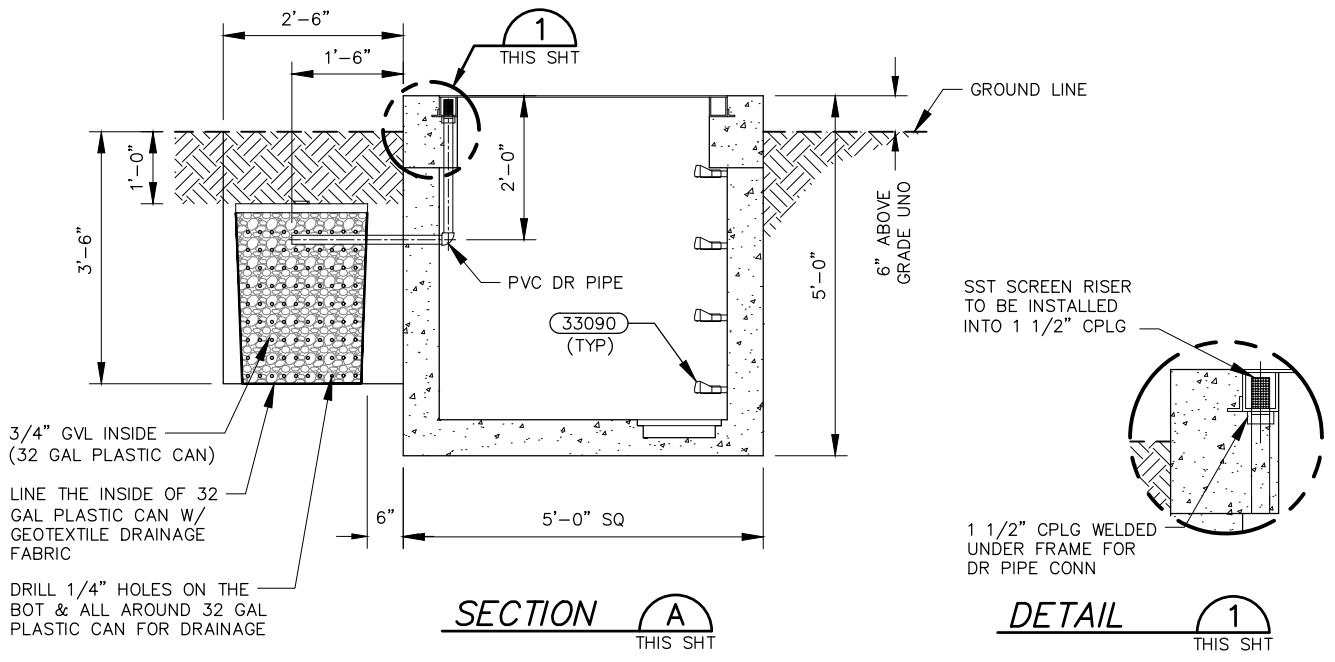
1. PROVIDE BLOCKOUTS FOR DUCTBANK AND ELECTRICAL CONDUIT PENETRATIONS INTO THE HANDHOLE IN ACCORDANCE WITH (26049).
2. PROVIDE CABLE RACKS AT A MAXIMUM SPACING OF 2 FEET. ALL SUPPORT MATERIALS AND INSTALLATION SHALL BE APPROVED BY THE ENGINEER.
3. DESIGN PRECAST CONCRETE ELECTRICAL HANDHOLE IN ACCORDANCE WITH ASTM C 857 AND ASTM C 858. VAULT AND LID DESIGN LOADING SHALL BE AASHTO H-20, WITH IMPACT.
4. VAULTS SHALL BE PROVIDED WITH 1.25-INCH PULLING EYES (REMOVABLE STYLE).

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26064
IN-STREET ELECTRICAL
HANDHOLE**



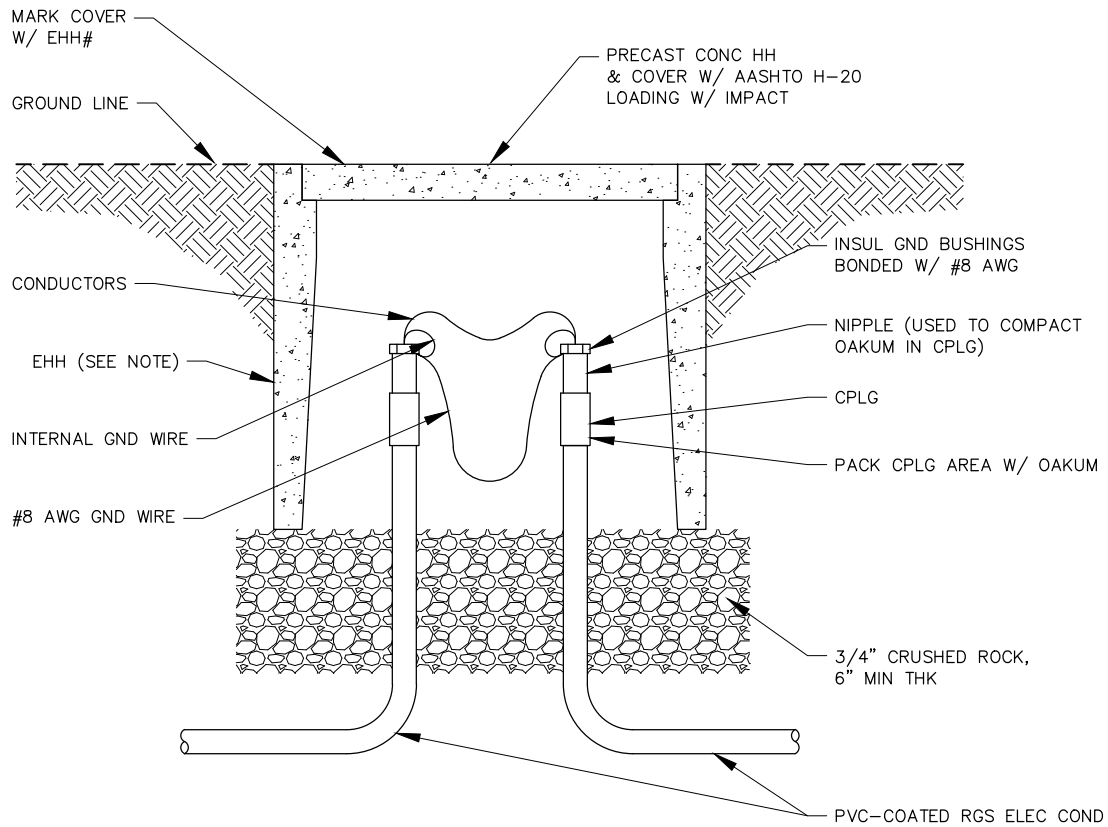
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NOTES:

1. ELECTRICAL CONDUITS SHOWN IN DUCTBANKS DO NOT NECESSARILY REFLECT NUMBER OF ELECTRICAL CONDUITS REQUIRED.
2. VAULT AND LID DESIGN LOADING SHALL BE AASHTO H-20, WITH IMPACT.
3. #4/0 GROUND CONDUCTORS SHALL BE CADWELDED/BONDED TOGETHER. ELECTRICAL HANDHOLE LID SHALL BE BONDED TO THE GROUND GRID. BONDING/GROUNDING METHOD AND MATERIAL SHALL BE APPROVED BY THE ENGINEER AND MEET THE REQUIREMENTS OF NATIONAL ELECTRICAL CODE 314-30.
4. VAULTS SHALL BE PROVIDED WITH 1 1/4 INCH ID PULLING EYES (REMOVAL STYLE).
5. PROVIDE ENGINEER APPROVED LOCK CORE WITH BRASS PLUG ENGRAVED WITH ELECTRICAL HANDHOLE NUMBER.
6. SUBJECT TO ENGINEER APPROVAL, ROUTE VAULT LID DRAIN PIPING AND GRAVEL DRAIN SYSTEM TO THE CORNER OF THE VAULT TO SUIT THE FIELD CONDITIONS.

DRAWN BY: BERKNES	<h2 style="margin: 0;">26065</h2> <h1 style="margin: 0;">ELECTRICAL HANDHOLE</h1>	<p style="font-size: 8px; margin: 5px 0;">1600 West 12th Ave Denver, Colorado 80204-3412 T: 303.628.6000 F: 303.628.6199 denverwater.org</p>
CHKD BY: K ROSS/KLR		
APPD BY: [Signature]		
ORIGINATION DATE: JULY 2021		
REVISION DATE:		



NOTE:

ELECTRICAL HANDHOLE DIMENSIONS ARE 18 INCH BY 12 INCH BY 12 INCH MINIMUM.

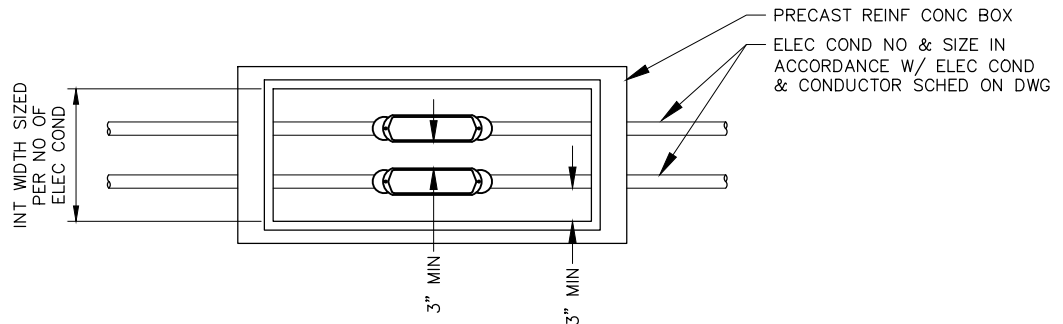
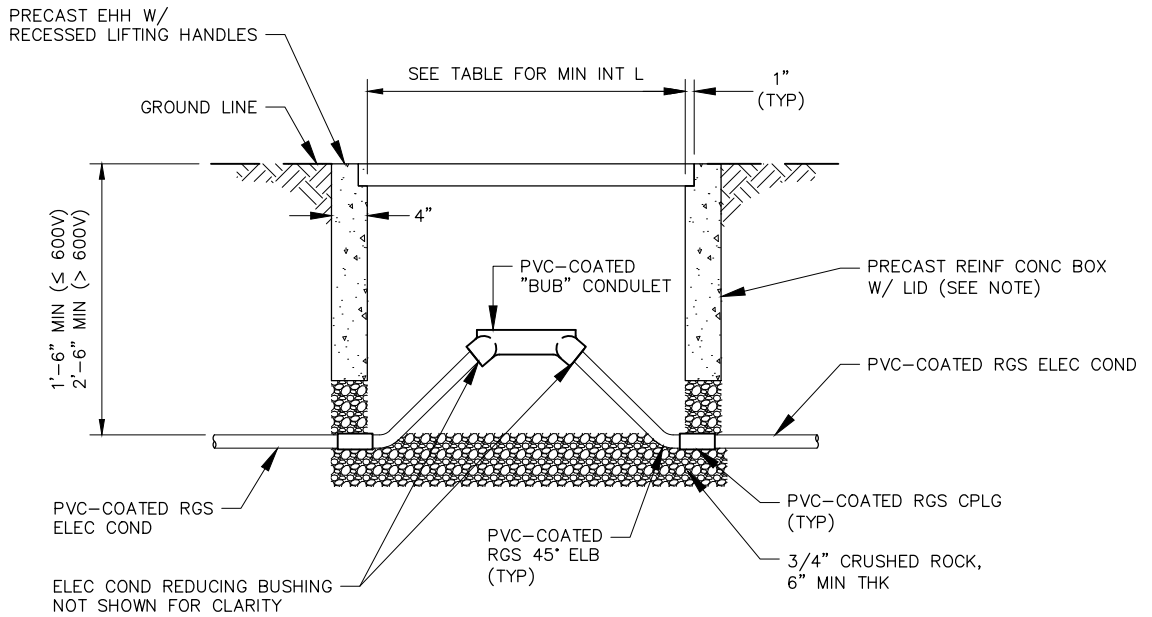
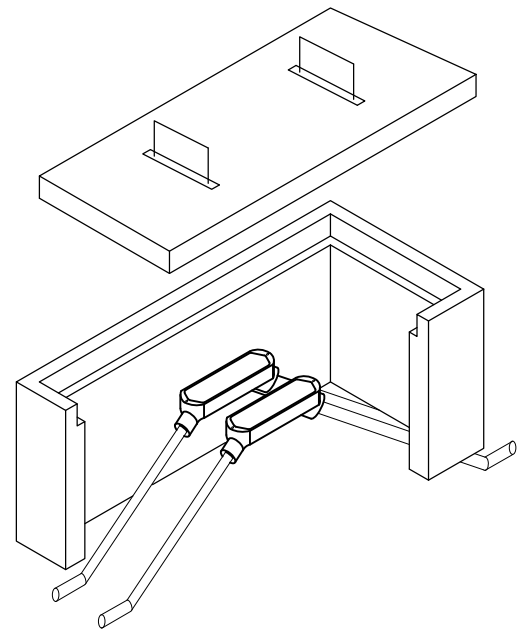
DRAWN BY: <i>BOWMAN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**26066
SMALL ELECTRICAL
HANDHOLE**



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LARGEST SIZE	MIN INT EHH LENGTH
1"	30"
1 1/4"	36"
1 1/2"	36"
2"	48"
2 1/2"	48"
3"	66"



NOTE:

DESIGN PRECAST CONCRETE ELECTRICAL HANDHOLE IN ACCORDANCE WITH ASTM C 857 AND ASTM C 858. VAULT AND LID DESIGN LOADING SHALL BE AASHTO H-20, WITH IMPACT.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

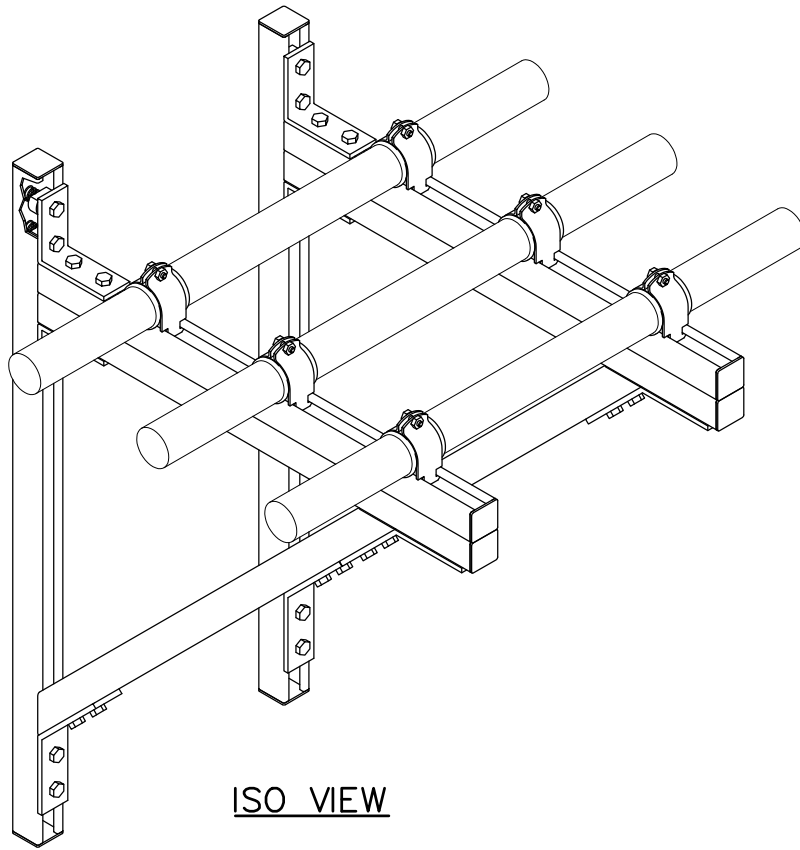
ORIGINATION DATE: JULY 2021

REVISION DATE:

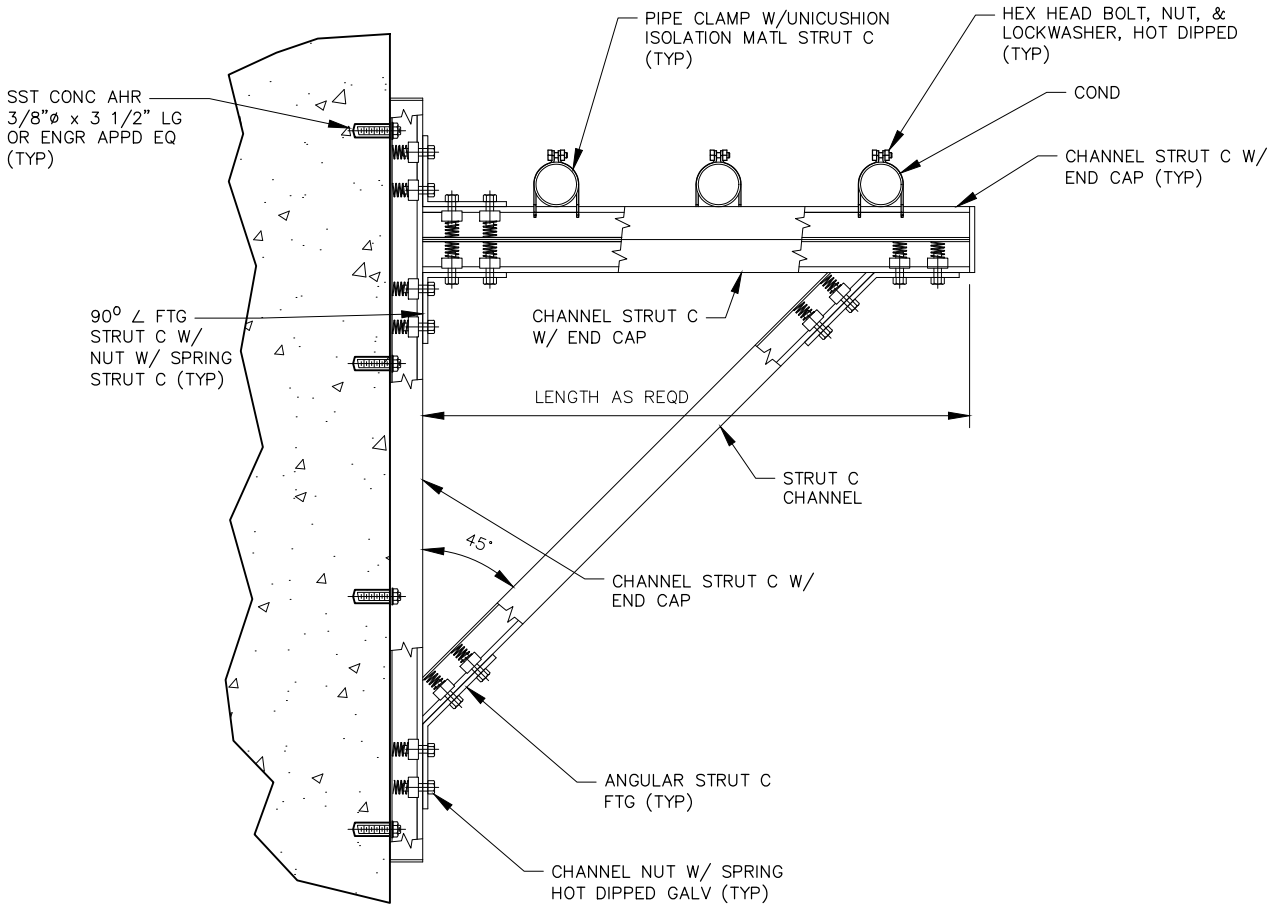
**26067
SMALL ELECTRICAL
HANDHOLE WITH CONDULET**



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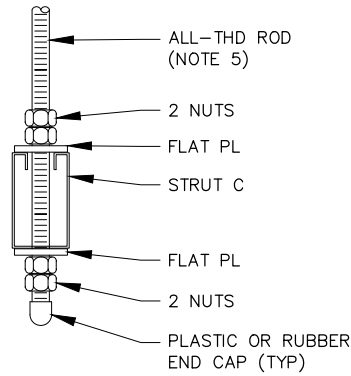
ISO VIEW



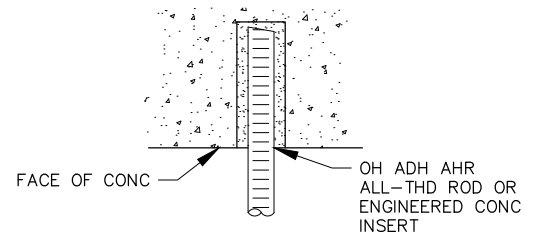
DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26089
STRUT CHANNEL WALL
BRACKET CONDUIT RACKING
SYSTEM

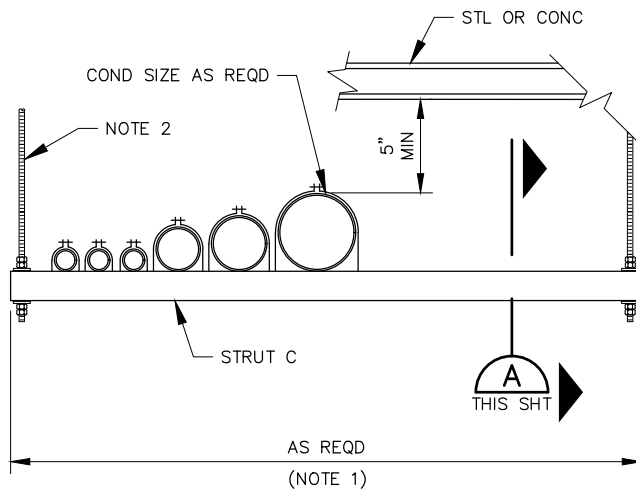

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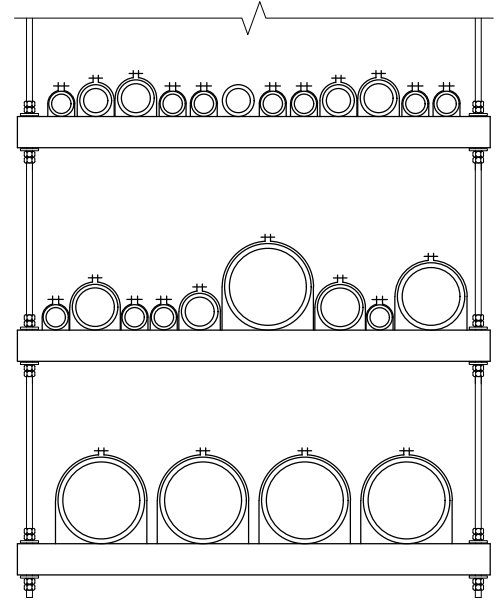
SECTION A
THIS SHT



CONCRETE INSERT



SINGLE RACK



MULTIPLE RACK

NOTES:

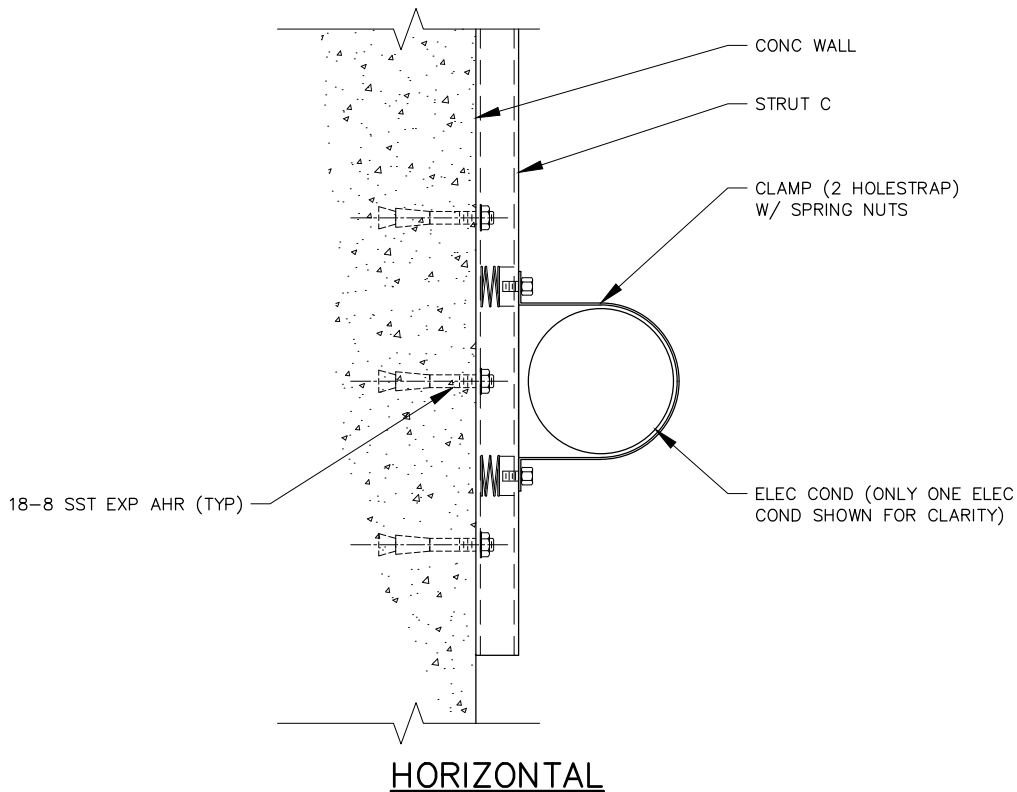
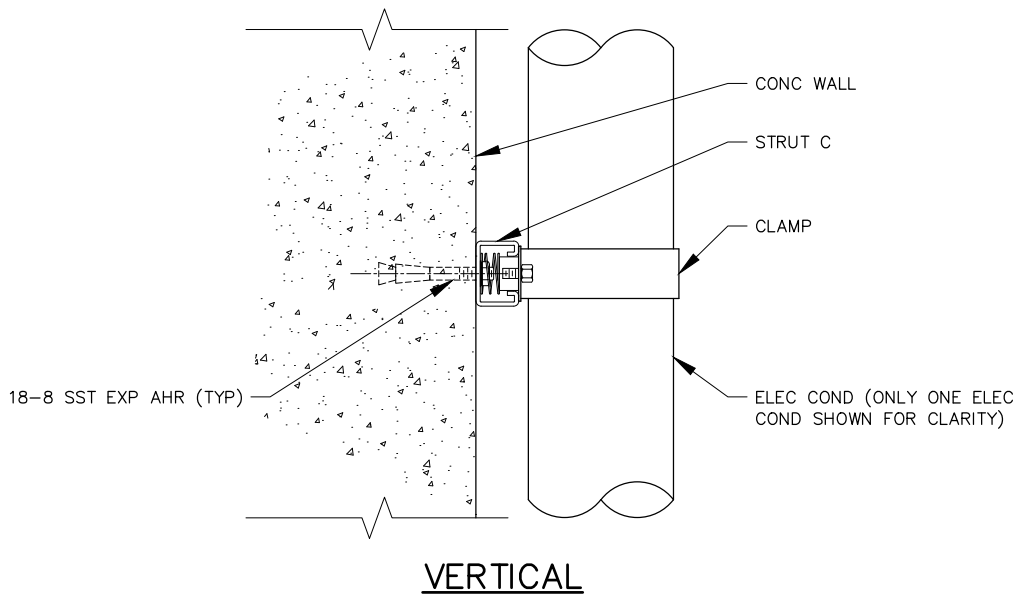
1. LENGTH VARIES WITH NUMBER OF ELECTRICAL CONDUITS TO BE SUPPORTED AND SPACING BETWEEN ELECTRICAL CONDUITS.
2. SIZE HANGER RODS FOR LOADS AND SPACING. SUBMIT CALCULATIONS FOR APPROVAL.
3. ALLOWABLE SPAN, NUMBER AND SIZE OF SUPPORT RODS AND ALLOWABLE LOADING IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
4. FOR HANGER ROD SUPPORT IN CONCRETE APPLICATIONS, USE SWIVEL CONCRETE INSERTS. FOR STEEL BEAM APPLICATIONS, USE SWIVEL BEAM CLAMPS.
5. ALL MATERIALS INCLUDING HARDWARE SHALL BE STAINLESS STEEL IN WET AND CORROSIVE AREAS.
6. SPACE ELECTRICAL CONDUIT SUFFICIENTLY TO ALLOW REMOVAL OF ONE CONDUIT WITHOUT DISTURBING ADJACENT ELECTRICAL CONDUITS.
7. INSTALL RACK MOUNTED ELECTRICAL CONDUIT IN ACCORDANCE WITH THIS DETAIL.

DRAWN BY: <i>BOWMAN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**26090
STRUT CHANNEL TRAPEZE
CONDUIT
RACKING SYSTEM**

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NOTES:

1. PLACE HORIZONTAL PIPES ABOUT THE SUPPORTS AS SYMMETRICALLY AS POSSIBLE.
2. PLACE EXPANSION ANCHORS ON 12 INCH CENTERS AS NECESSARY, BUT IN NO CASE SHALL THERE BE FEWER THAN 3 EXPANSION ANCHORS PER SECTION OF STRUT CHANNEL (ONE AT EACH END AND ONE IN THE CENTER). CAP OPEN ENDS OF STRUT CHANNELS.

DRAWN BY: *BOWMAN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

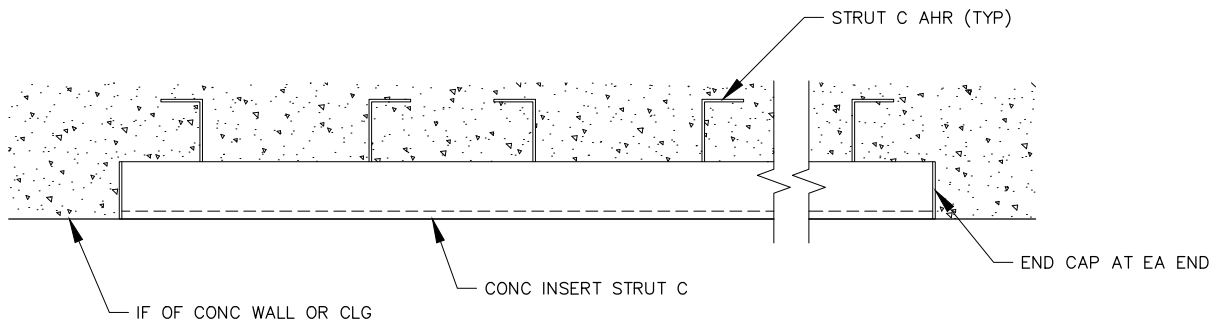
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

**26091
STRUT CHANNEL
CONDUIT MOUNTING**



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NOTE:

PROVIDE AND INSTALL CONCRETE INSERT STRUT CHANNEL CAPABLE OF HANDLING THE LOADING OF TWICE ALL CONDUITS, CONDUCTORS, AND CLAMPS. SUBMIT CALCULATIONS FOR APPROVAL.

DRAWN BY: *BOWMAN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

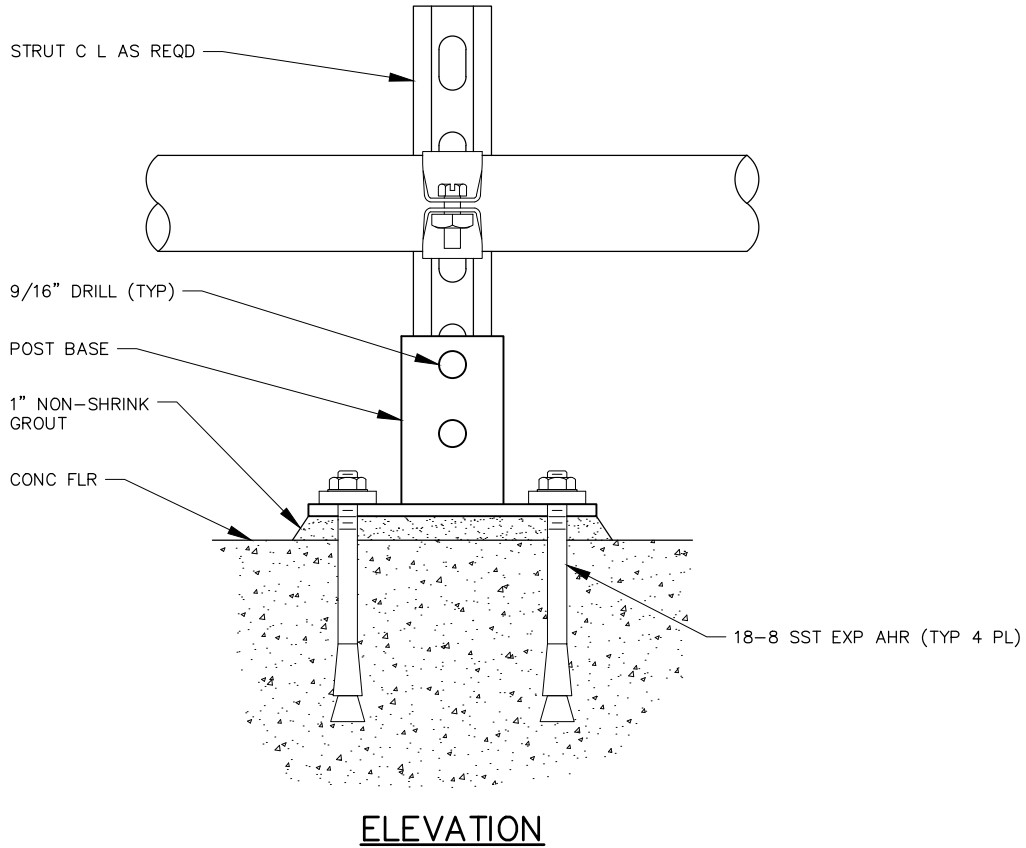
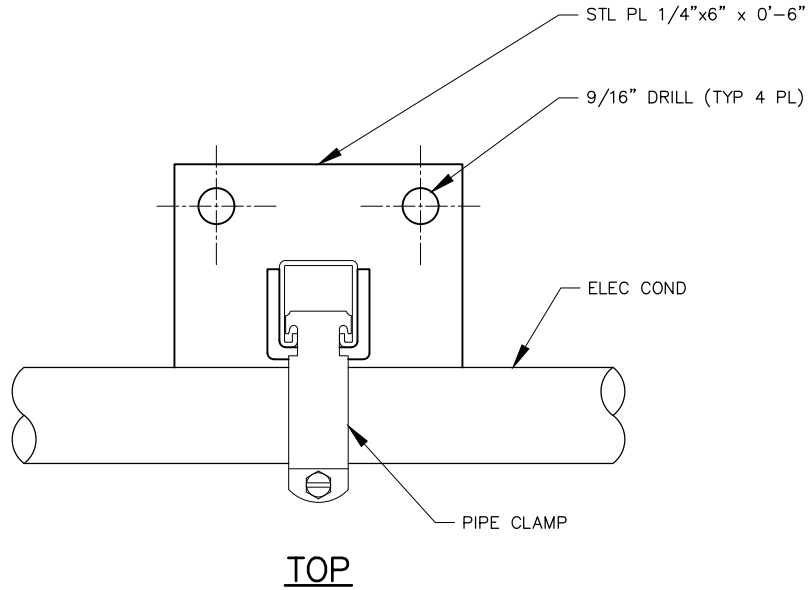
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

**26092
STRUT CHANNEL
CONCRETE INSERT**



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NOTE:

MOUNTING HARDWARE SHALL BE 18-8 STAINLESS STEEL.

DRAWN BY: *BOWMAN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

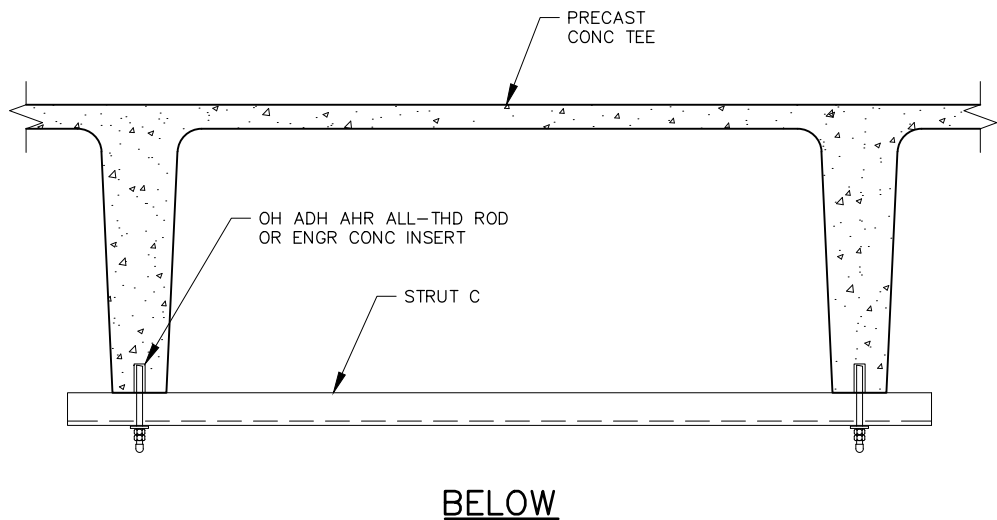
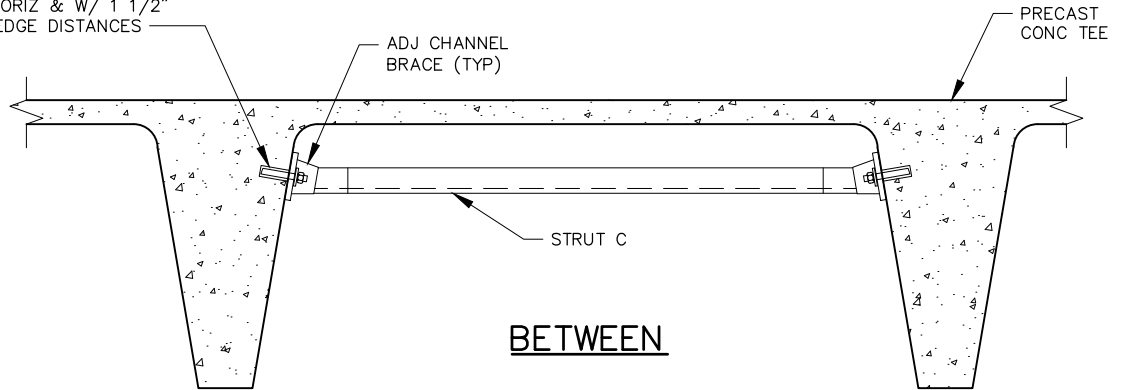
REVISION DATE:

26093
STRUT CHANNEL CONDUIT
FLOOR SUPPORT SYSTEM



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PL 3/8x 3x 8 W/ AHR SPA
5" OC HORIZ & W/ 1 1/2"
END & EDGE DISTANCES



NOTES:

1. HANGER RODS SHALL BE SIZED FOR LOADS AND SPACING. CALCULATIONS SHALL BE SUBMITTED FOR APPROVAL.
2. ALLOWABLE SPAN, NUMBER AND SIZE OF SUPPORT RODS, AND ALLOWABLE LOADING SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
3. ALL HARDWARE SHALL BE STAINLESS STEEL.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

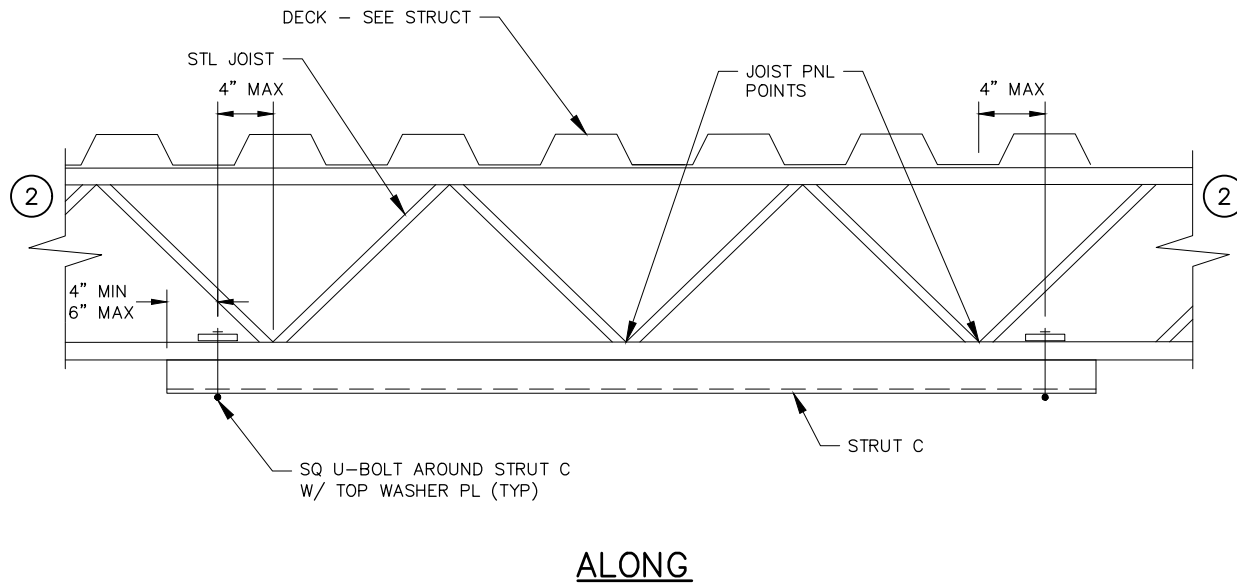
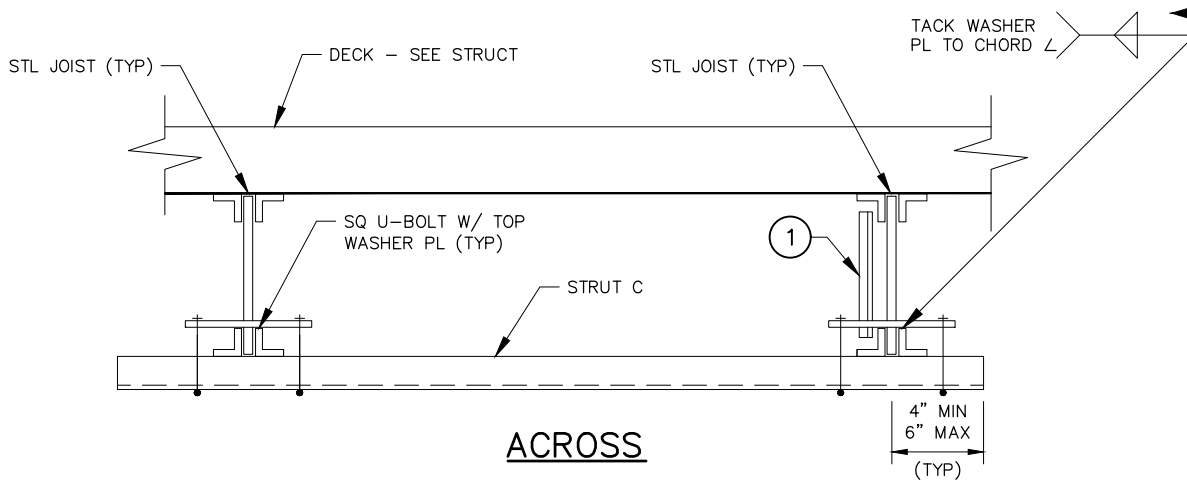
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26095
STRUT CHANNEL
ATTACHMENT TO PRECAST
TEES**



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KEYED NOTES:

- ① WHERE CHANNEL IS OFFSET FROM JOIST PANEL POINT BY MORE THAN 4 INCHES ADD LOAD POINT BRACE.
- ② LOCATE U-BOLTS MAXIMUM 4 INCHES PAST JOIST PANEL POINTS NEAREST EACH END OF LUMINAIRES AND MAXIMUM 48 INCHES ALONG STRUT CHANNEL.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

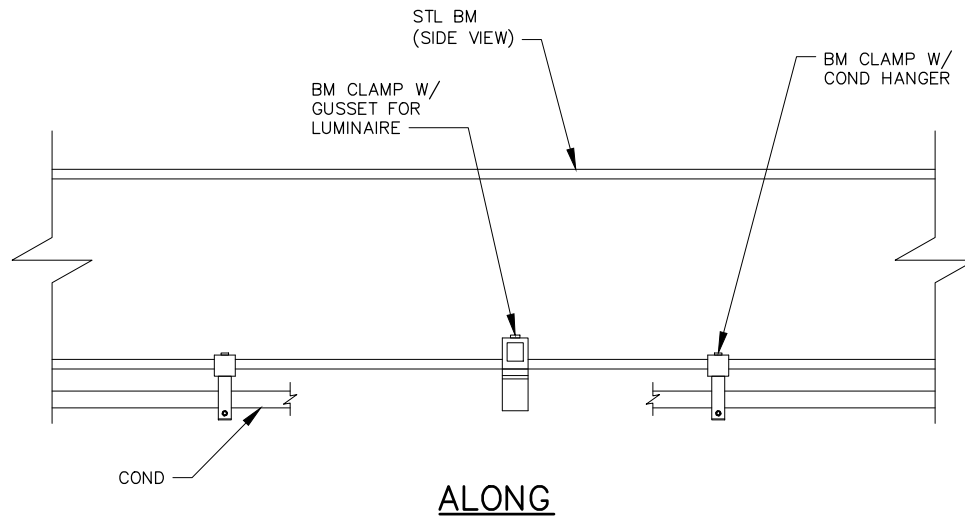
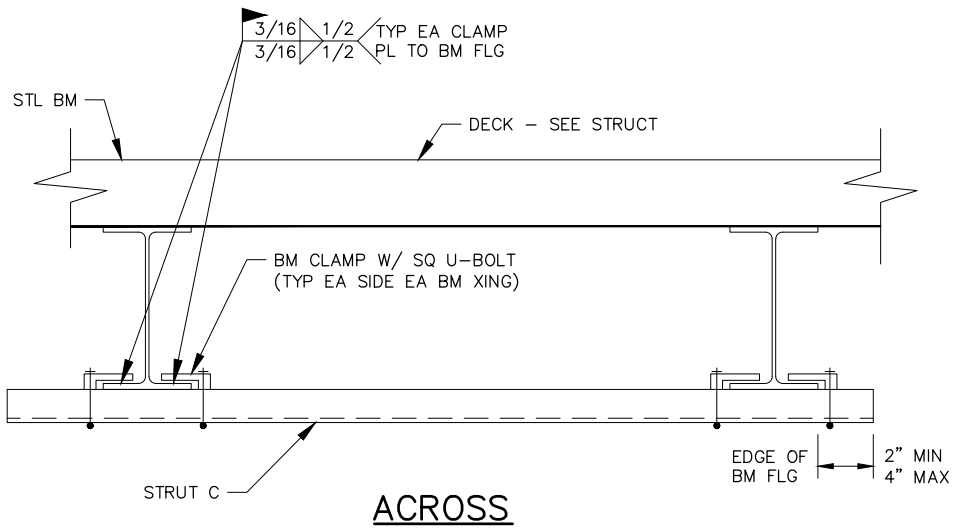
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26096
STRUT CHANNEL
ATTACHMENT TO STEEL
JOISTS**



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DRAWN BY: ROMERO

CHKD BY: K ROSS, KLR

APPD BY: [Signature]

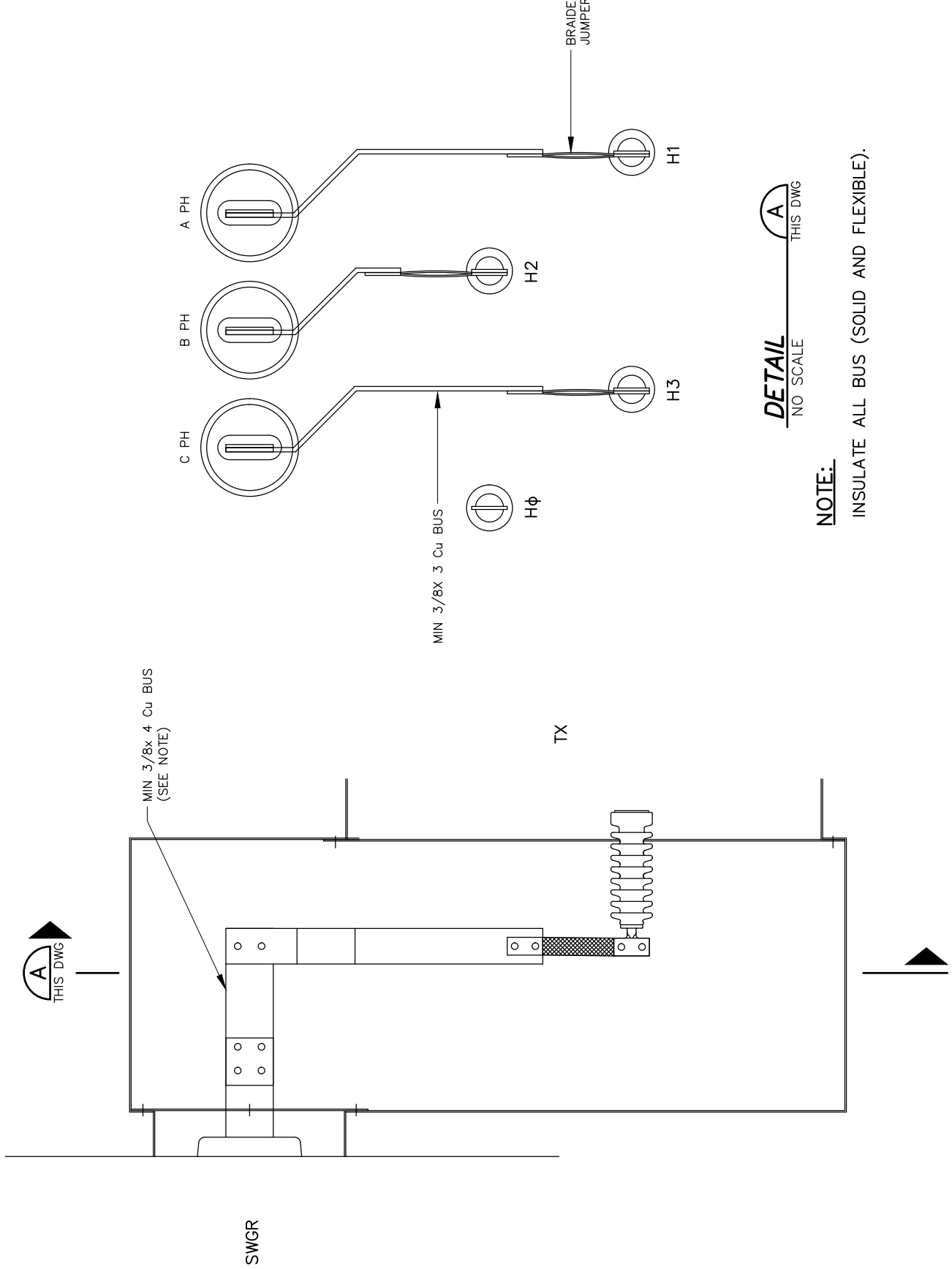
ORIGINATION DATE: JULY 2021

REVISION DATE:

26097
STRUT CHANNEL
ATTACHMENT TO STEEL
BEAMS



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DETAIL
NO SCALE

NOTE:

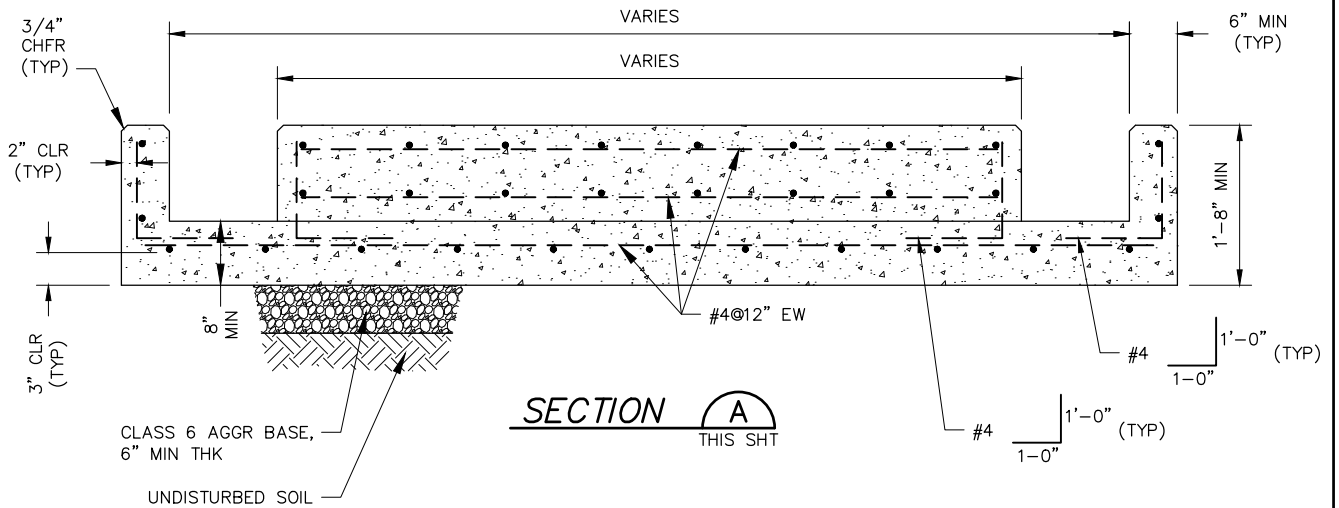
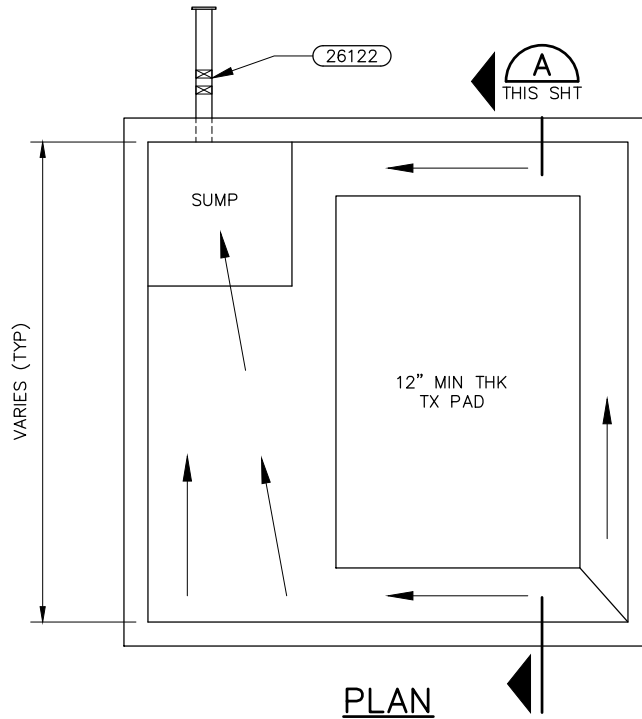
INSULATE ALL BUS (SOLID AND FLEXIBLE).

DRAWN BY: ROMERO
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26119
SWITCHGEAR TO
TRANSFORMER BUS
TRANSITION**

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NOTE:

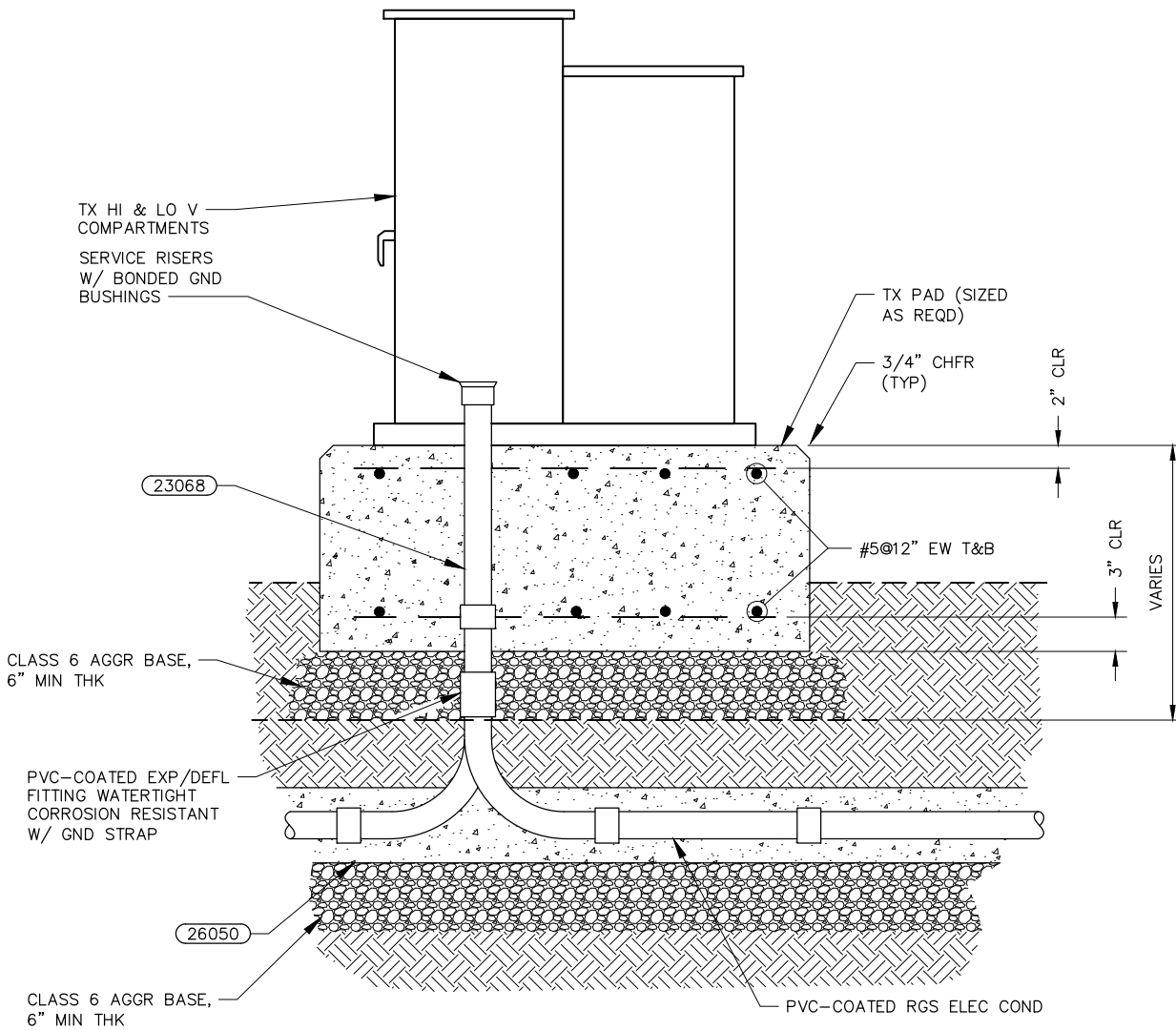
SLOPE CONTAINMENT SLAB TO DRAIN (1/4 INCH PER FOOT).

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26120
TRANSFORMER PAD WITH
CONTAINMENT CURB**

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NOTE:

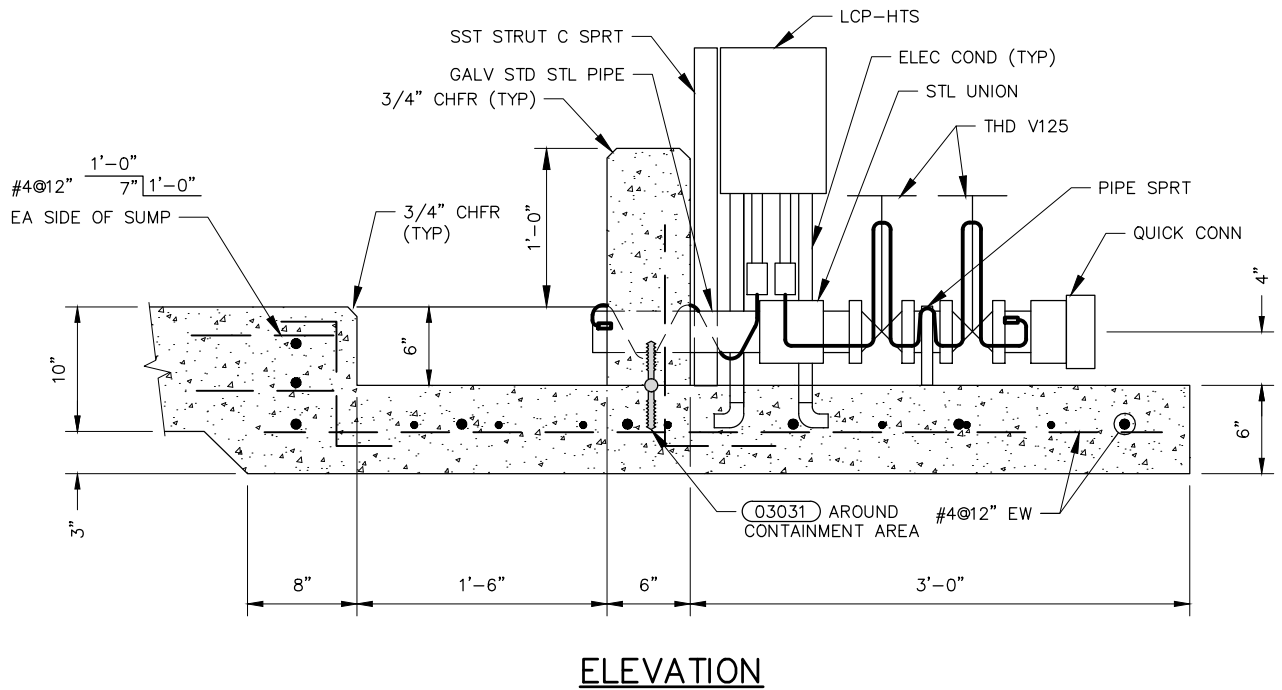
ELECTRICAL CONDUIT 90 DEGREE ELBOWS AND RISER ELECTRICAL CONDUITS SHALL BE POLYVINYL CHLORIDE COATED RIGID GALVANIZED STEEL.

DRAWN BY: BERKNES
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26121
TRANSFORMER-DUCTBANK
INTERFACE**



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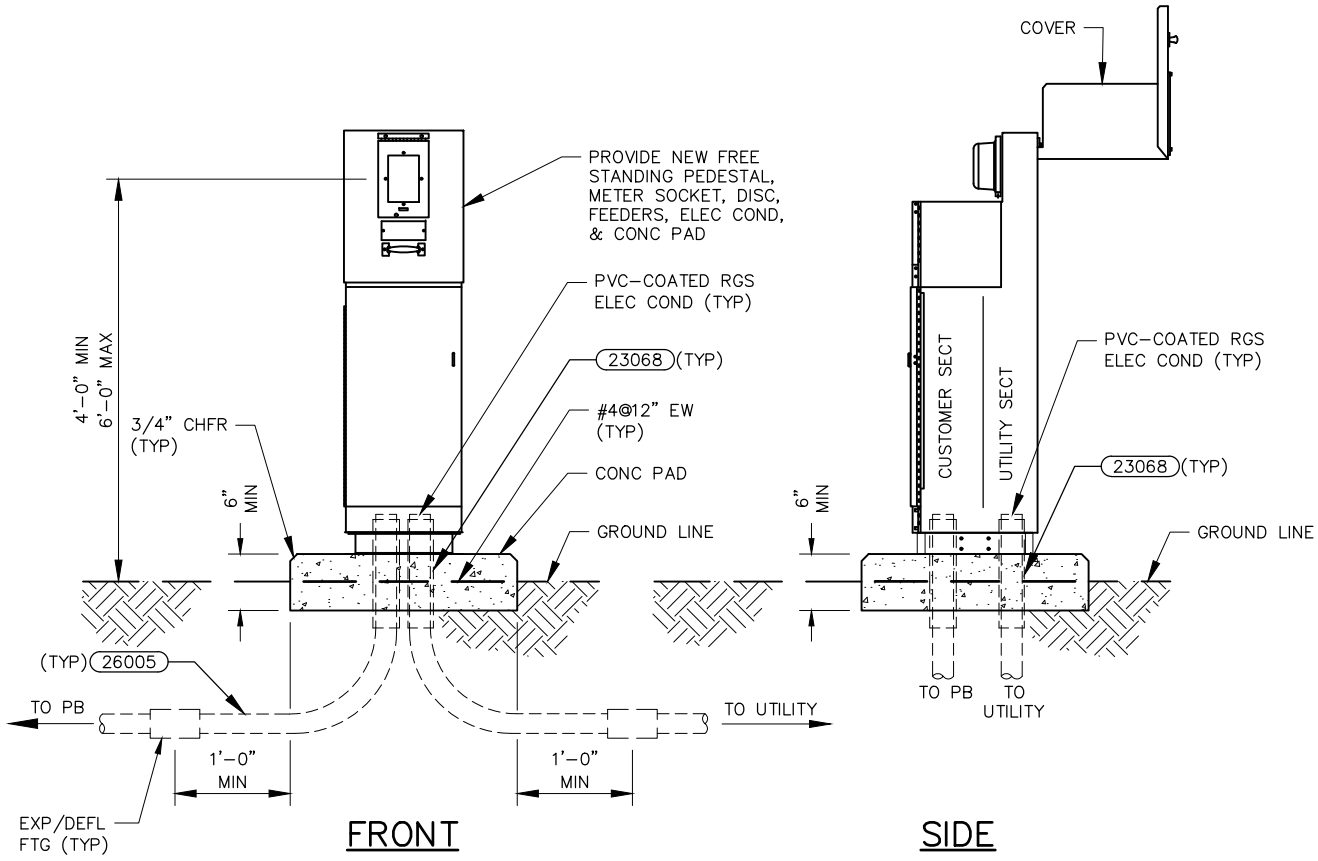
NOTES:

1. ALL ELECTRICAL CONDUITS SHALL BE POLYVINYL CHLORIDE COATED RIGID GALVANIZED STEEL CONDUIT, 3/4 INCH MINIMUM.
2. INSTALL HEAT TAPE 2 INCHES MINIMUM BELOW SURFACE OF SLAB.
3. INSTALL 2 INCHES OF INSULATION ON PIPE AND VALVES.
4. INSTALL HEAT TAPE 3 INCHES FROM CONCRETE EDGE.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26122
CONTAINMENT DRAIN
ASSEMBLY
WITH HEAT TAPE


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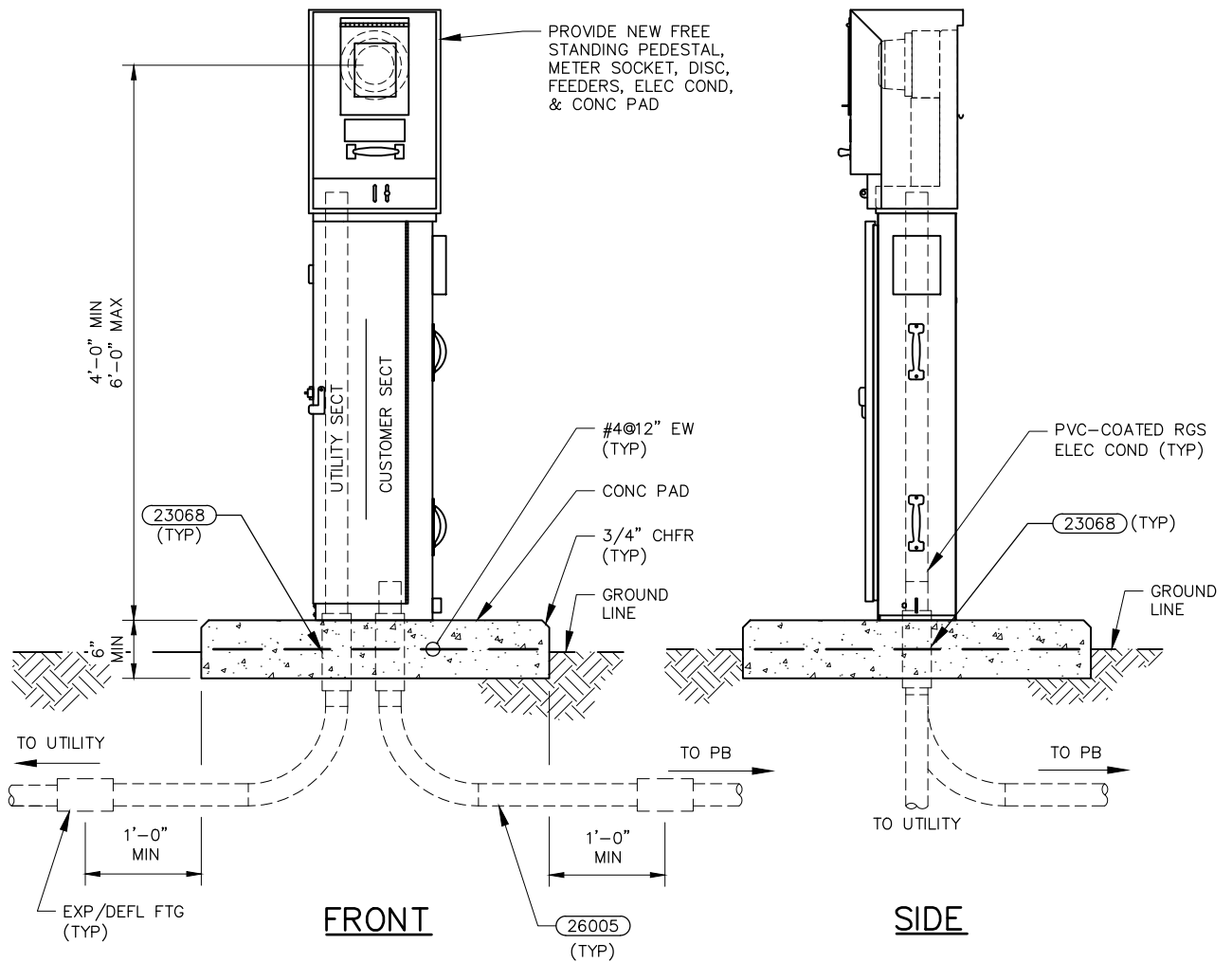
NOTES:

1. ELECTRIC UTILITY (HEAVY DUTY) APPROVED SERVICE METER PEDESTAL. INCLUDE PAD MOUNTING KIT, 24 INCH MINIMUM WIDTH.
2. PEDESTAL SHALL MEET REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND ELECTRICAL UTILITY HAVING JURISDICTION.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26142
ELECTRICAL SERVICE
EQUIPMENT FREE STANDING
METER PEDESTAL 3 PHASE

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NOTES:

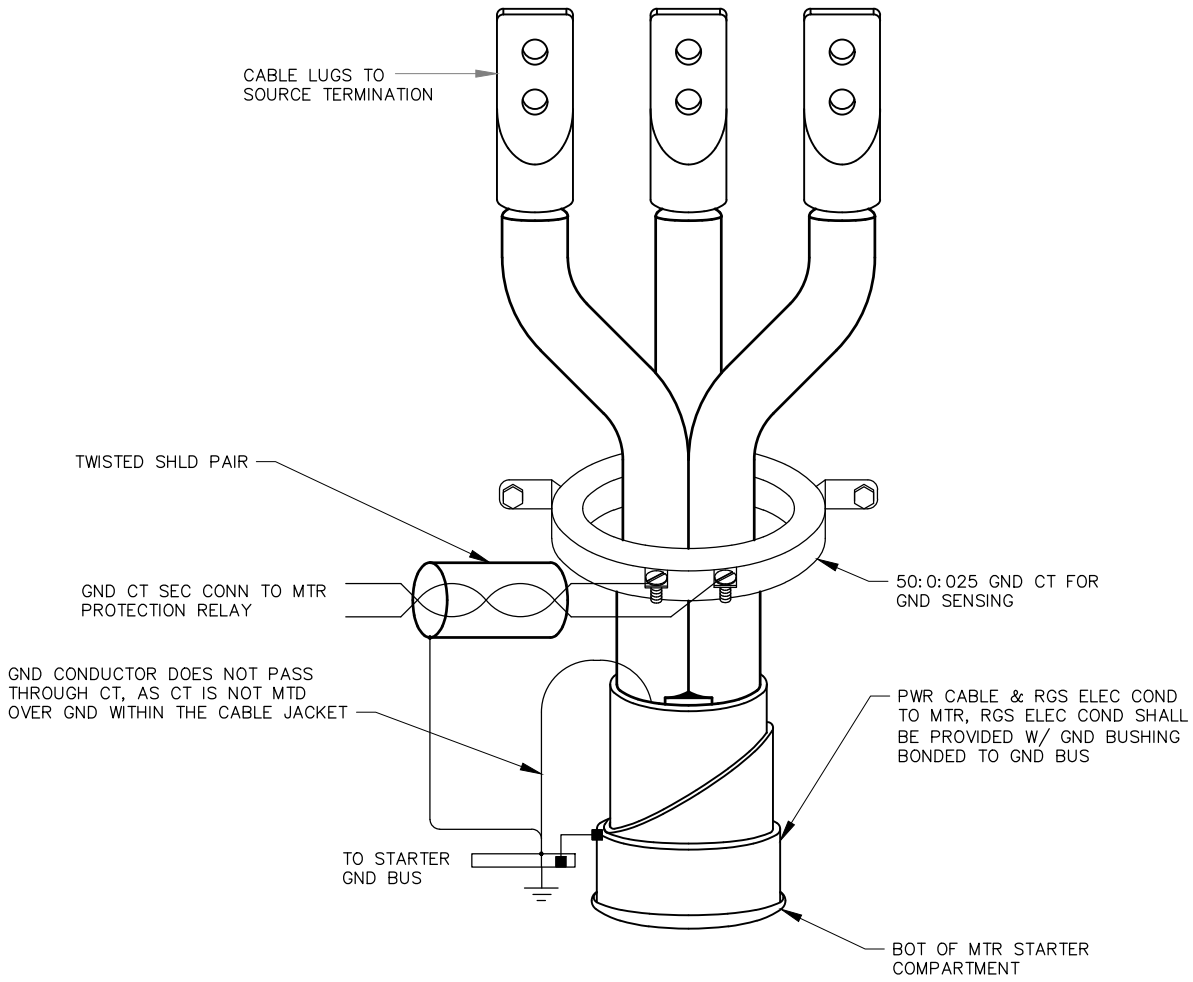
1. ELECTRIC UTILITY (HEAVY DUTY) APPROVED SERVICE METER PEDESTAL. INCLUDE PAD MOUNTING KIT, 24 INCH MINIMUM WIDTH.
2. PEDESTAL SHALL MEET REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND ELECTRICAL UTILITY HAVING JURISDICTION.

DRAWN BY: BERKNES
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26144
ELECTRICAL SERVICE
EQUIPMENT FREE STANDING
METER PEDESTAL 1 PHASE

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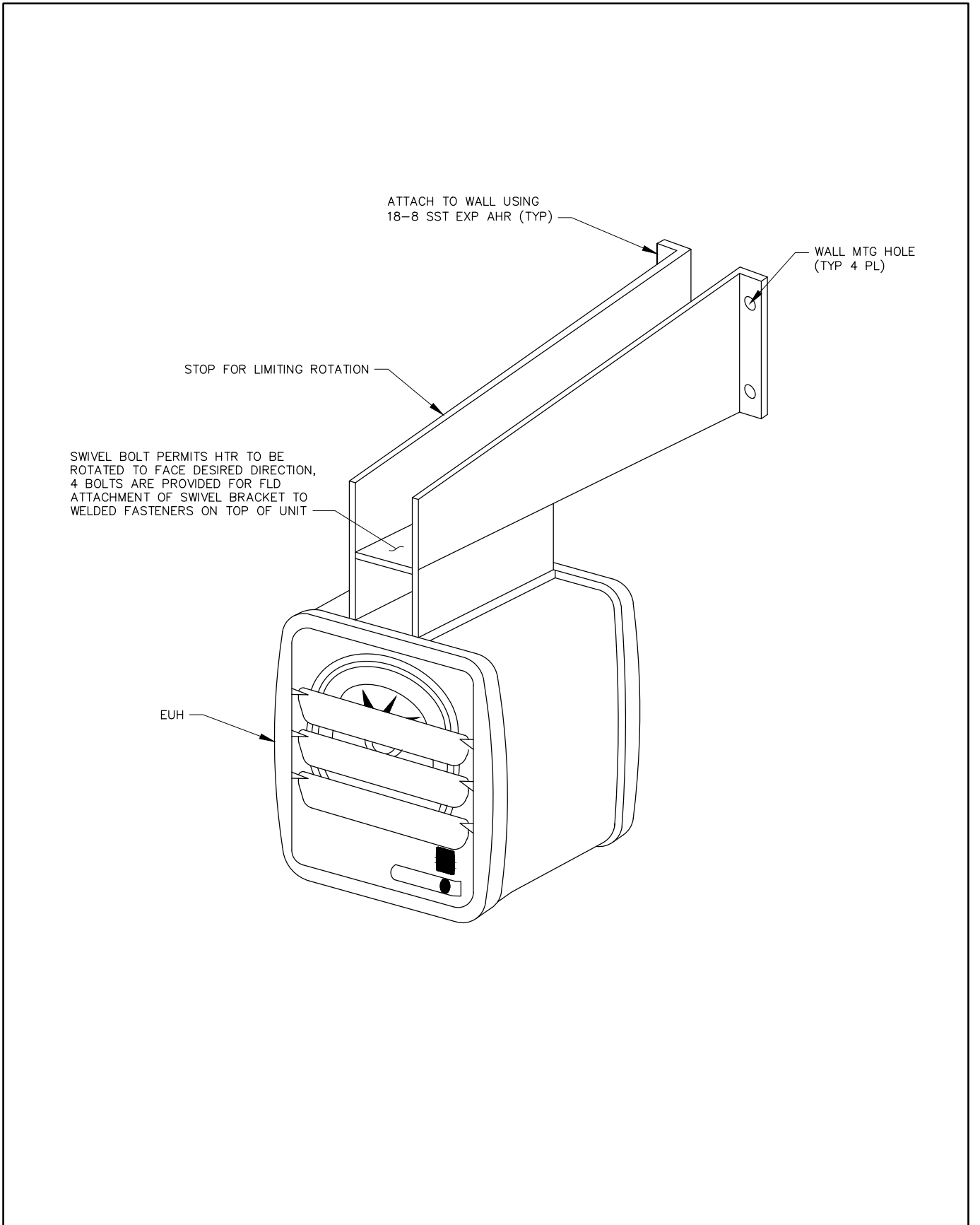


DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26189
**MOTOR GROUND CURRENT
 TRANSFORMER INSTALLATION**

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NOTE:

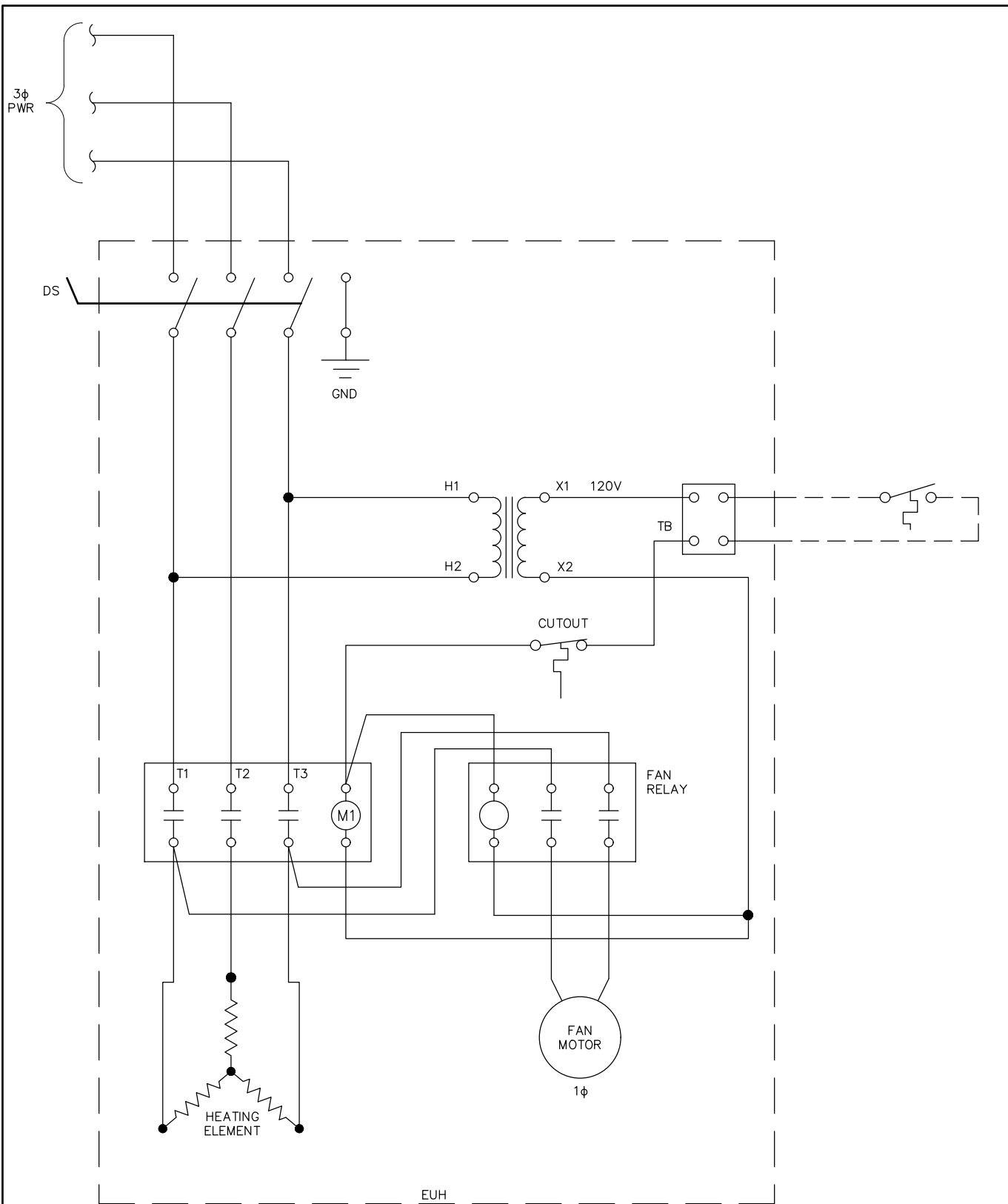
MINIMUM MOUNTING HEIGHT SHALL BE APPROVED BY THE ENGINEER.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26230
ELECTRIC UNIT HEATER
MOUNTING**

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NOTE:

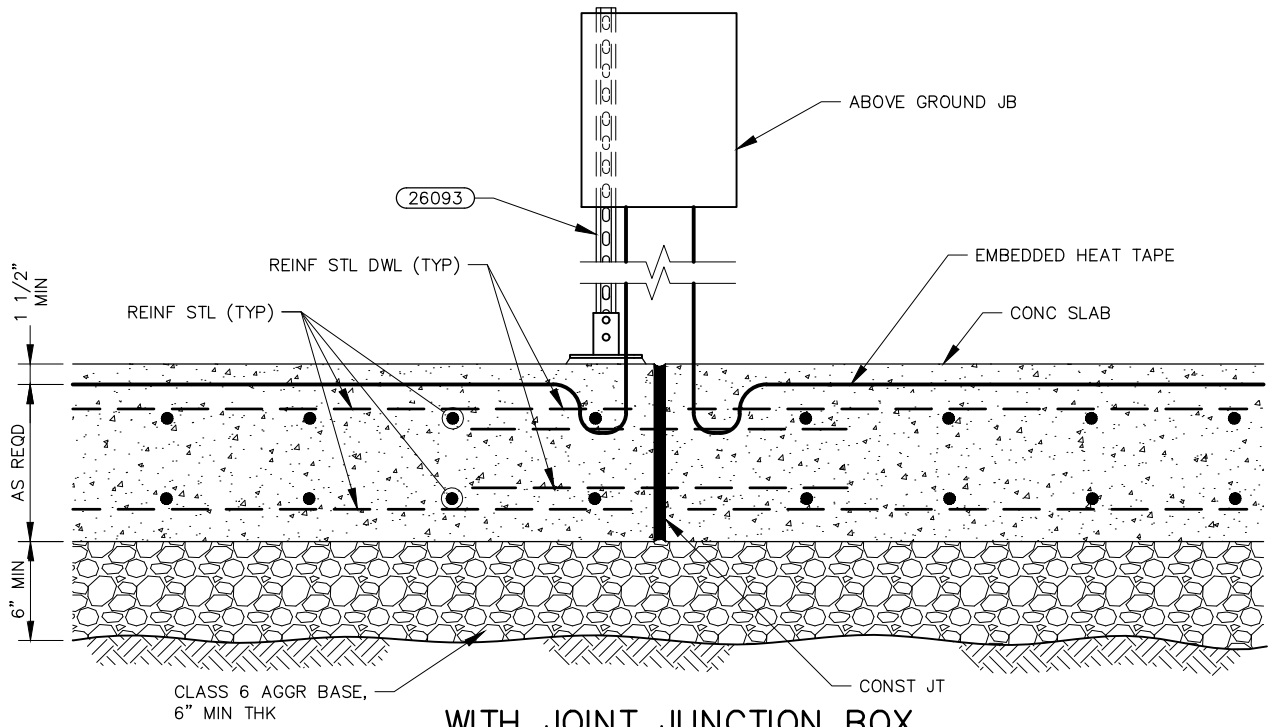
ELECTRICAL SCHEMATIC FOR 3 PHASE HEATING ELEMENT, 1 PHASE FAN MOTOR, 120V CONTROL TRANSFORMER AND FAN RELAY WITH EXTERNAL THERMOSTAT AND SUMMER FAN SWITCH.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

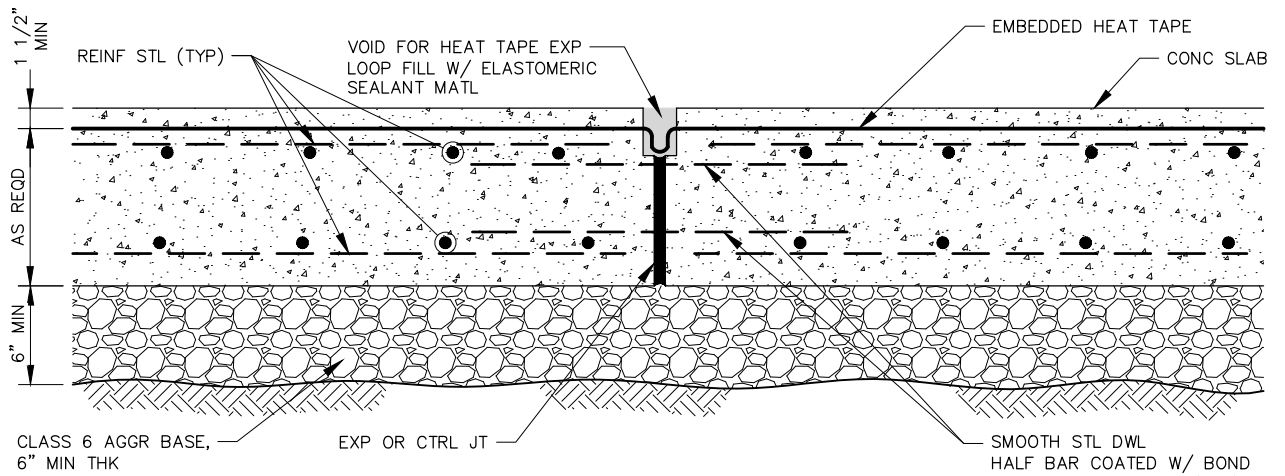
26231
ELECTRIC UNIT HEATER
CONTROL SCHEMATIC



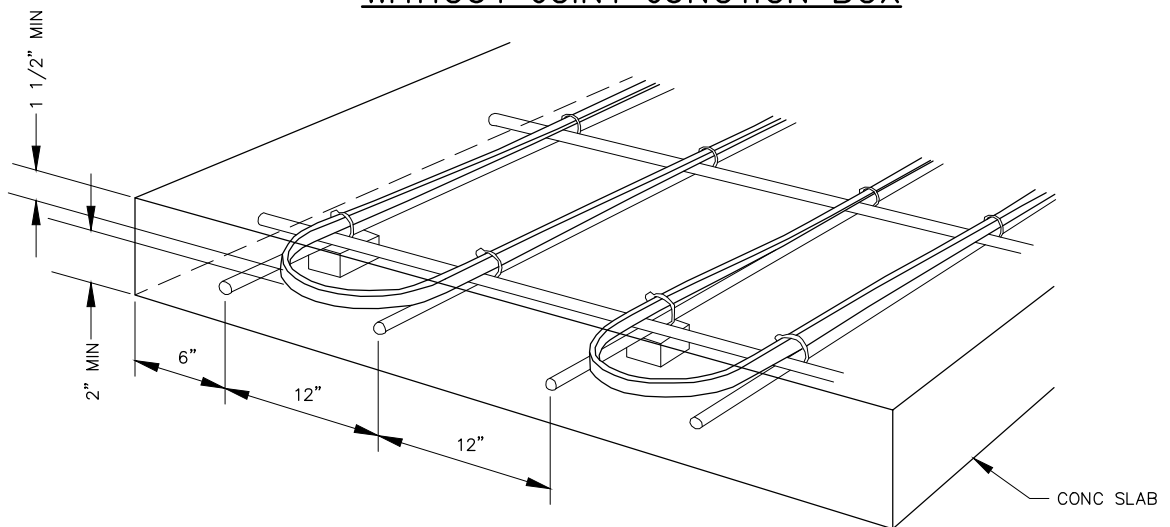
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WITH JOINT JUNCTION BOX



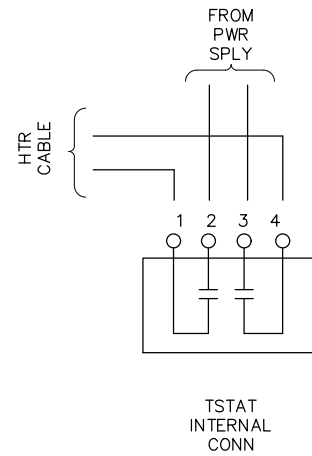
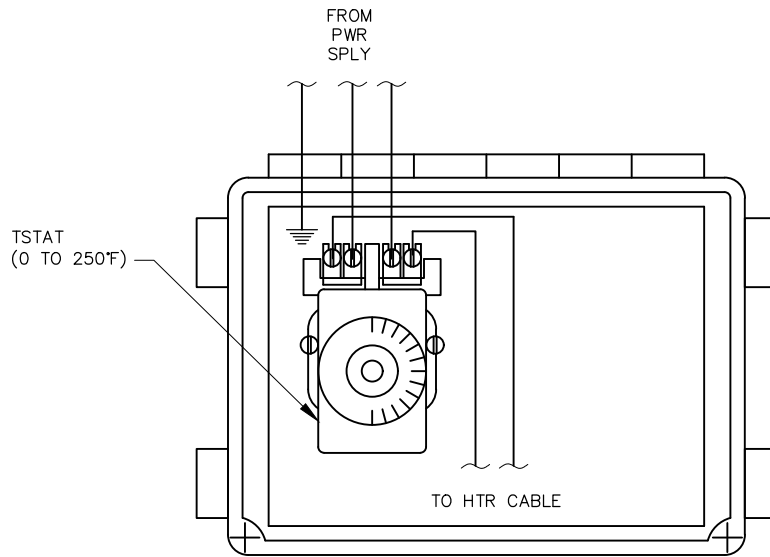
WITHOUT JOINT JUNCTION BOX



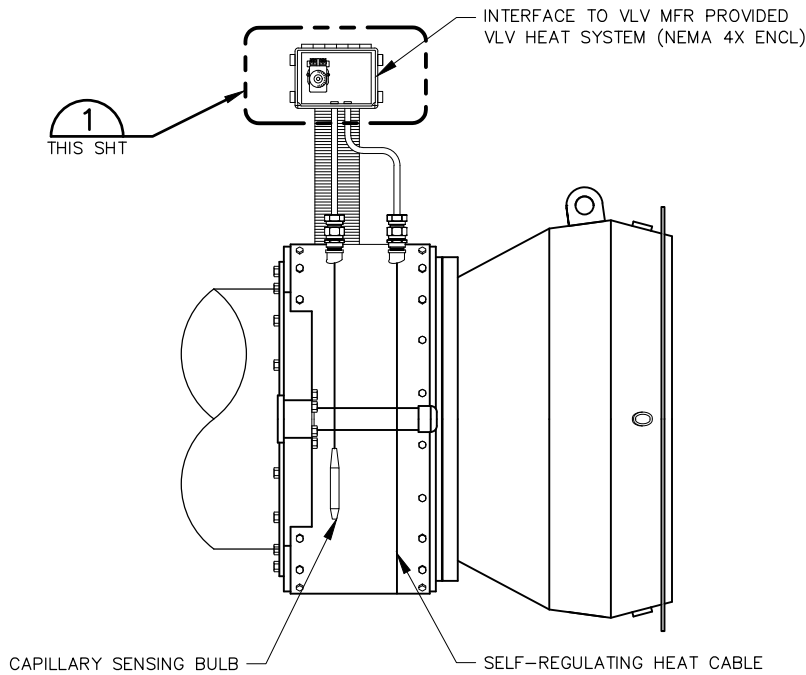
DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26232
EMBEDDED HEAT TAPE


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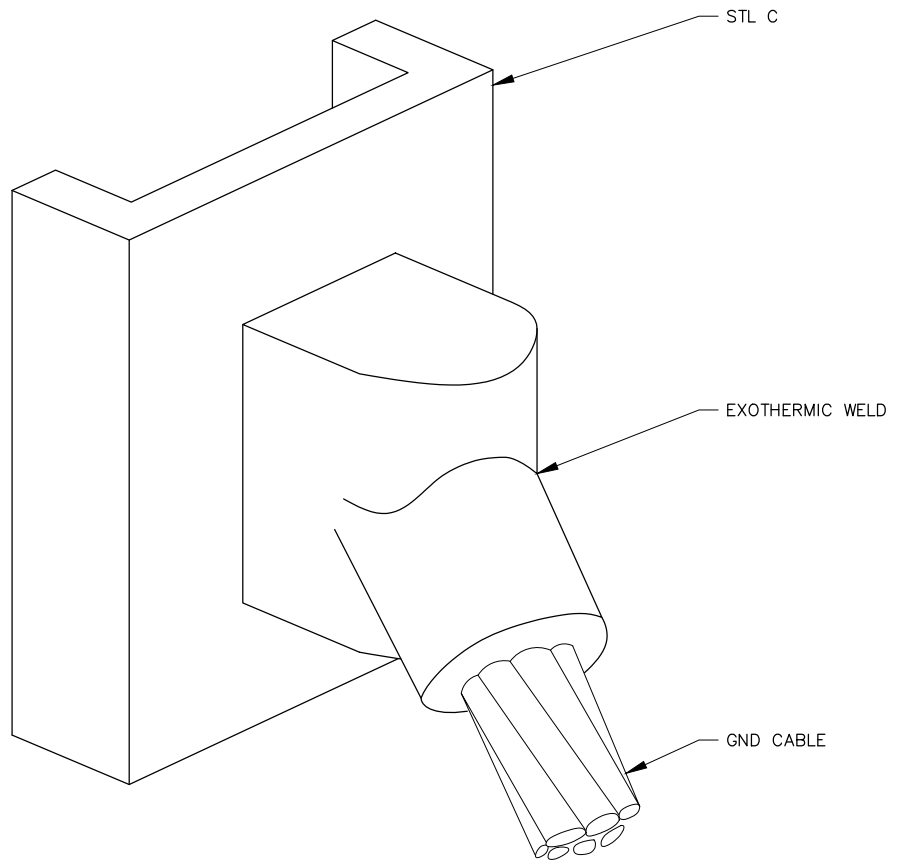
DETAIL 1
THIS SHT



DRAWN BY: BERKNESS
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
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26233
DISCHARGE VALVE (RING JET)
HEAT SYSTEM

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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

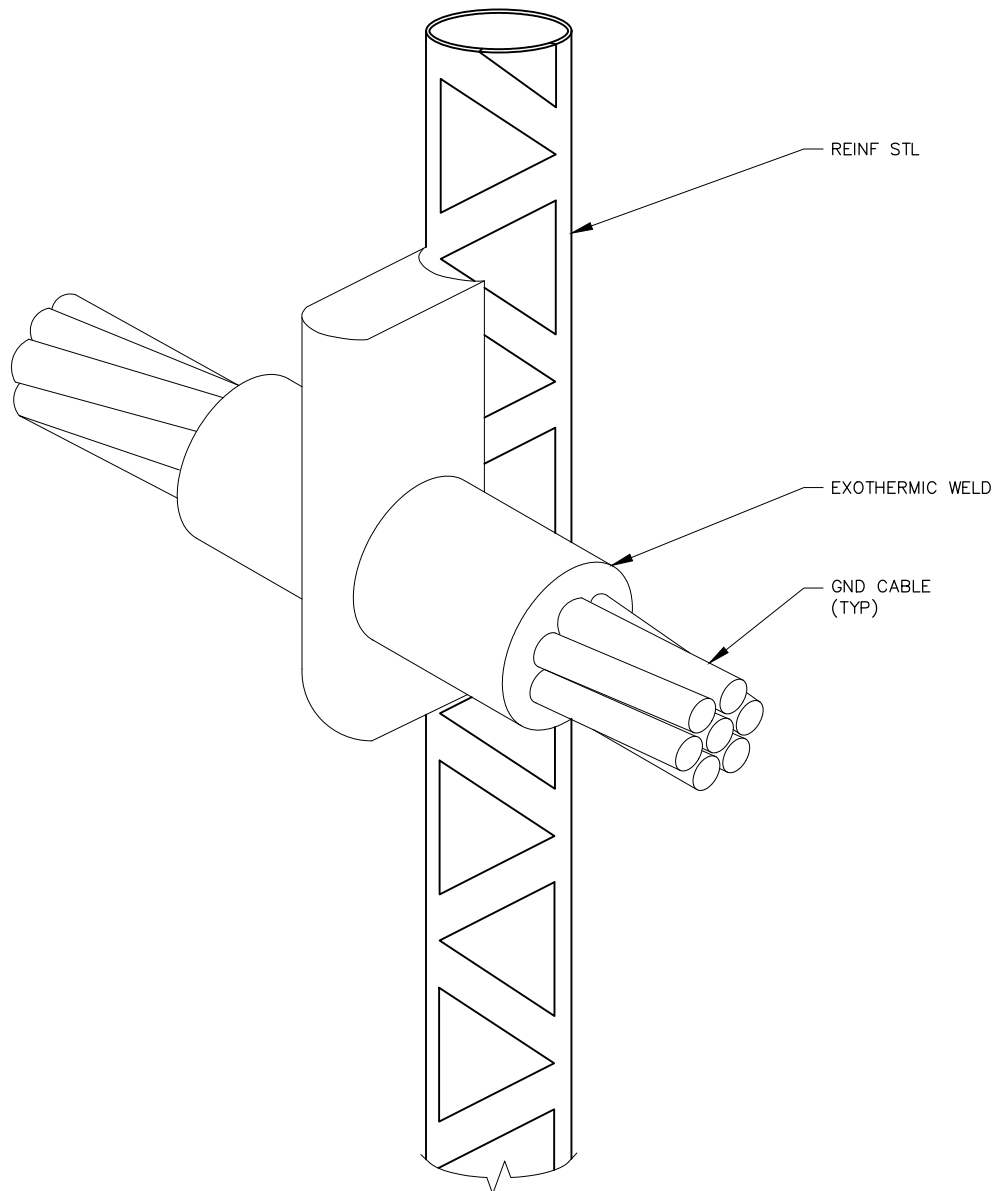
ORIGINATION DATE: JULY 2021

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**26260
GROUND CABLE TO
CHANNEL CONNECTION**



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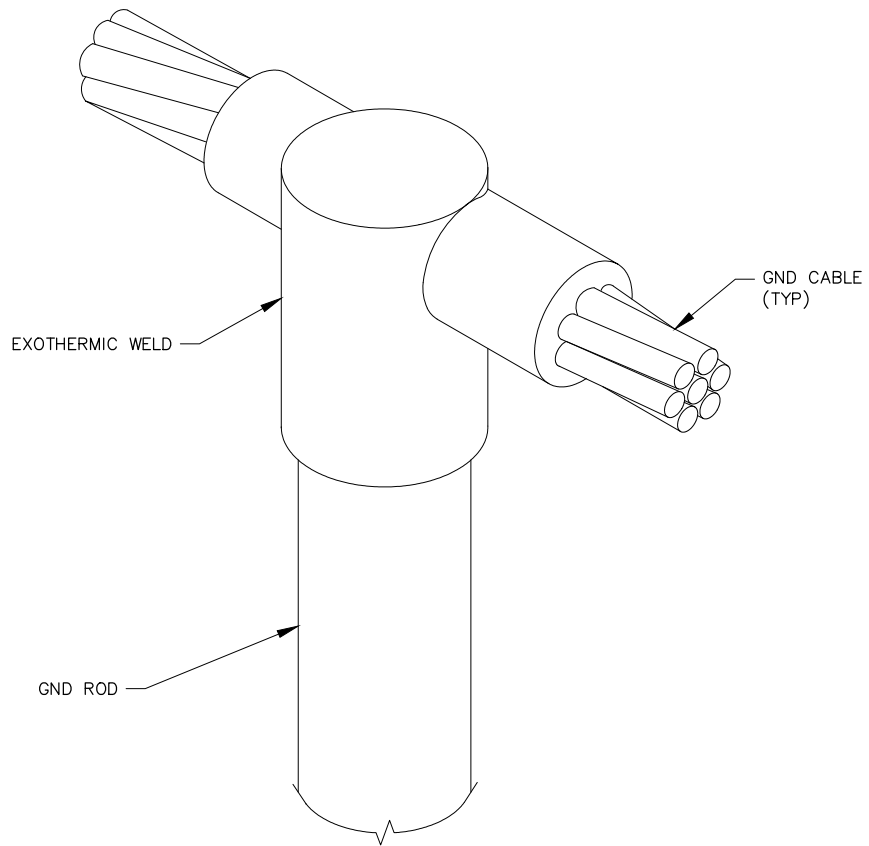


DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

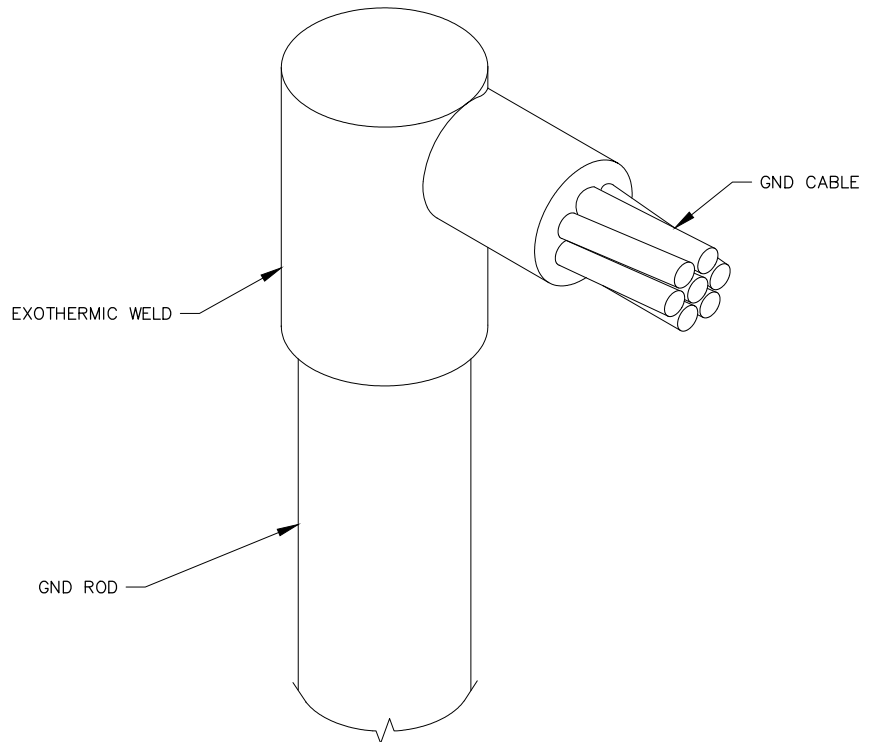
26261
GROUND CABLE
CONNECTION TO
REINFORCING STEEL

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THROUGH CABLE
TYPE A



END CABLE
TYPE B

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

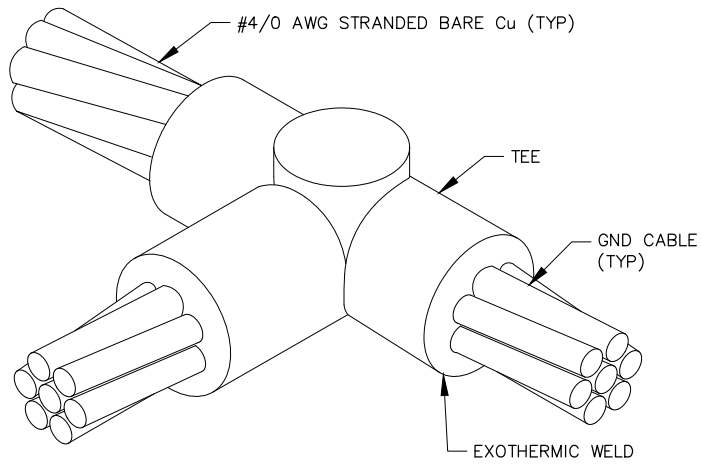
ORIGINATION DATE: JULY 2021

REVISION DATE:

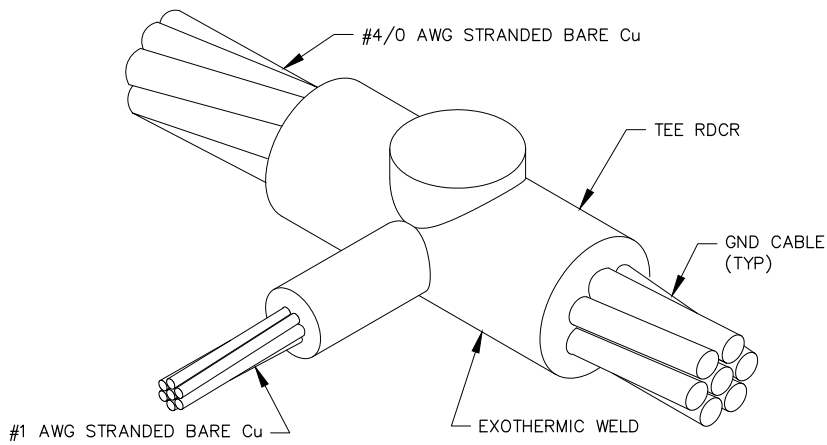
26262
GROUND ROD CONNECTION



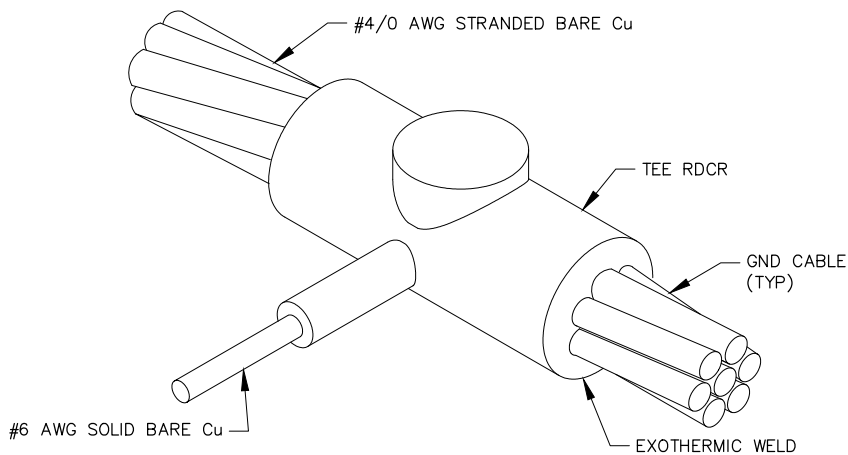
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#4/0 AWG
TYPE A



#1 AWG
TYPE B



#6 AWG
TYPE C

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

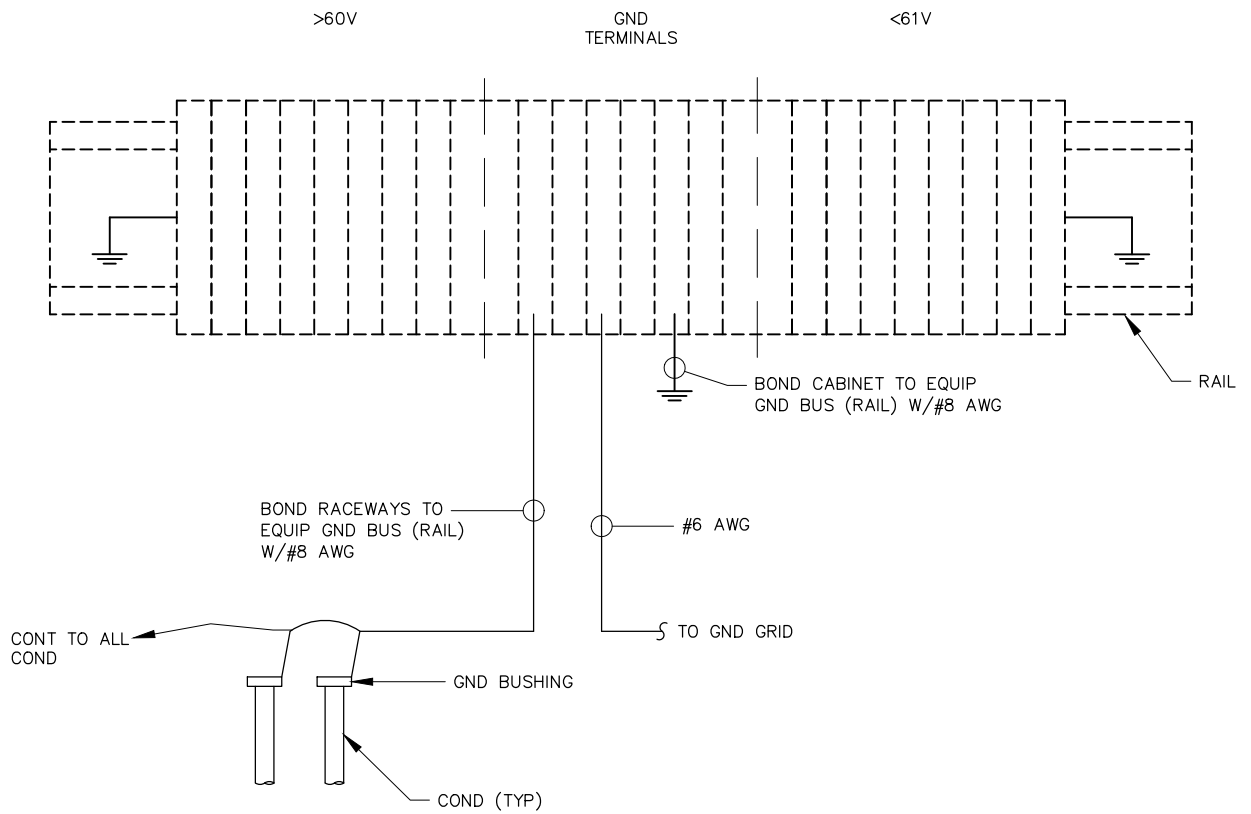
ORIGINATION DATE: JULY 2021

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26263
GROUND GRID CABLE
TEE AND TEE REDUCER



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NOTE:

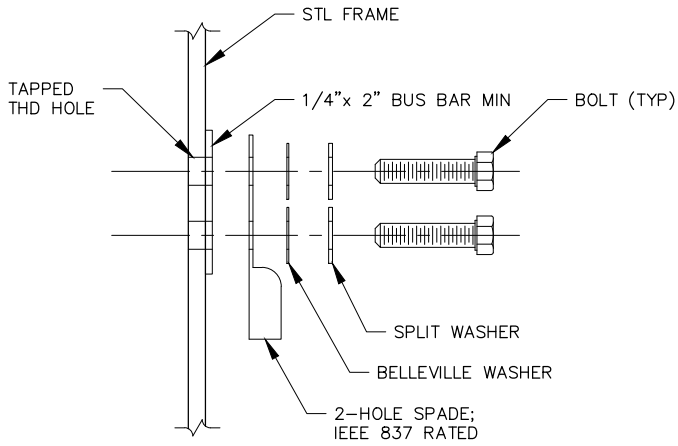
ONLY INSERTION BRIDGES SHALL BE USED TO CONNECT MULTIPLE TERMINAL BLOCKS.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

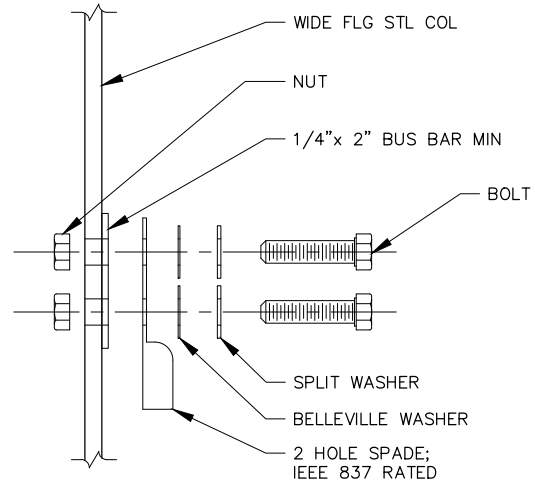
**26265
CONTROL PANEL TERMINAL
BLOCK GROUNDING**

D DENVER WATER

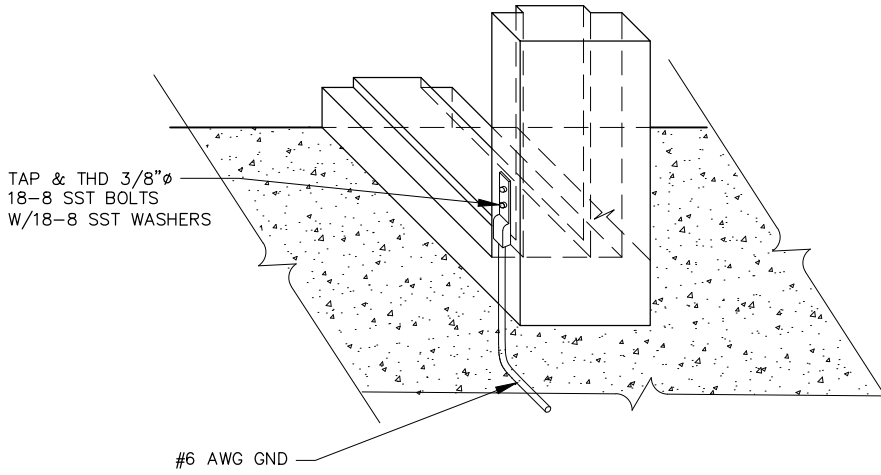
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FRAME
TYPE A



COLUMN
TYPE B



DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

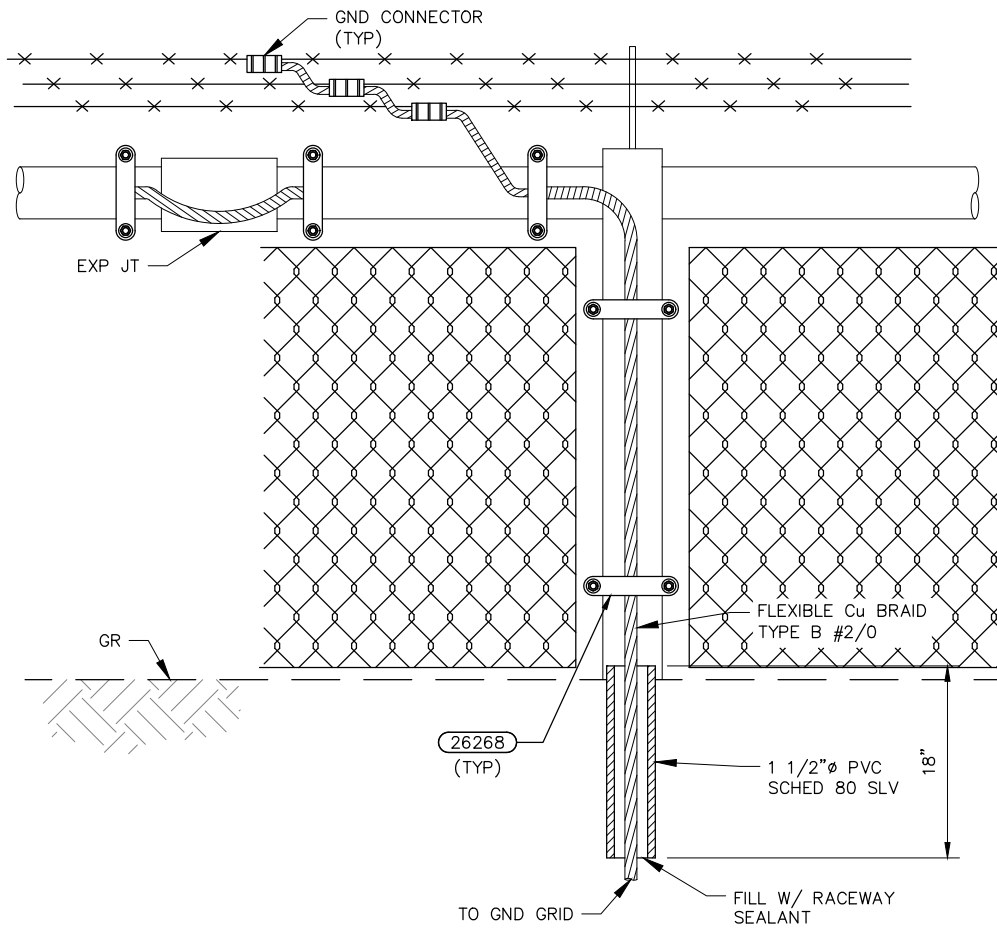
ORIGINATION DATE: JULY 2021

REVISION DATE:

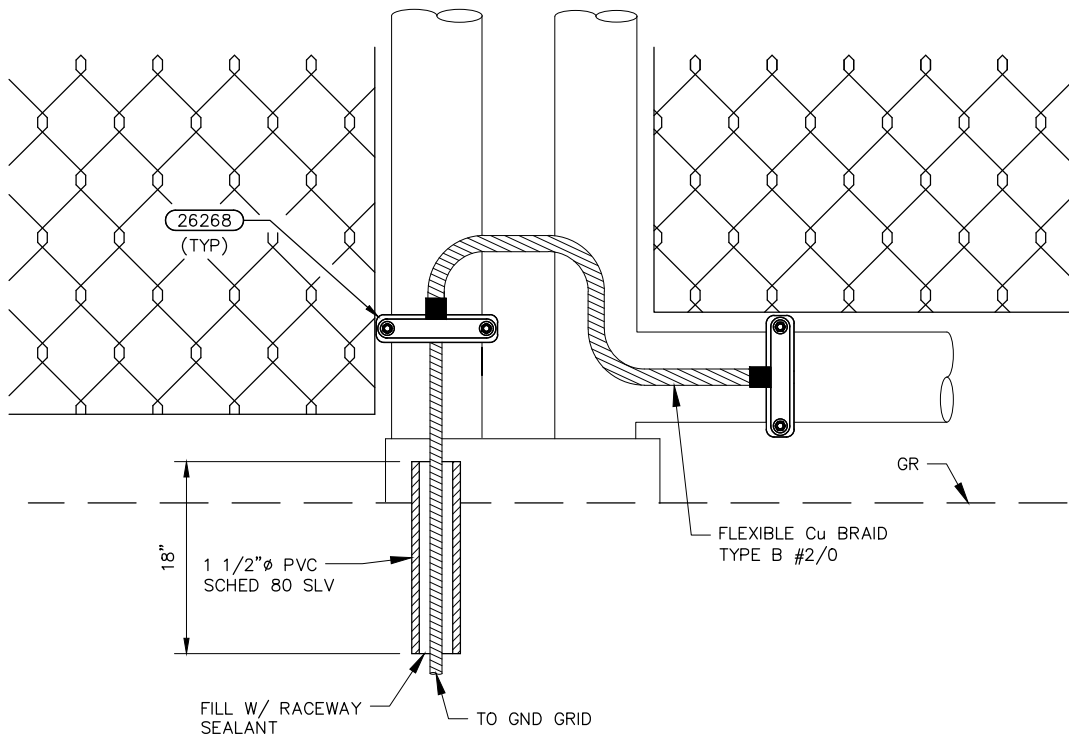
26266
COLUMN AND FENCE
GROUNDING



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denverwater.org



FENCE



GATE

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

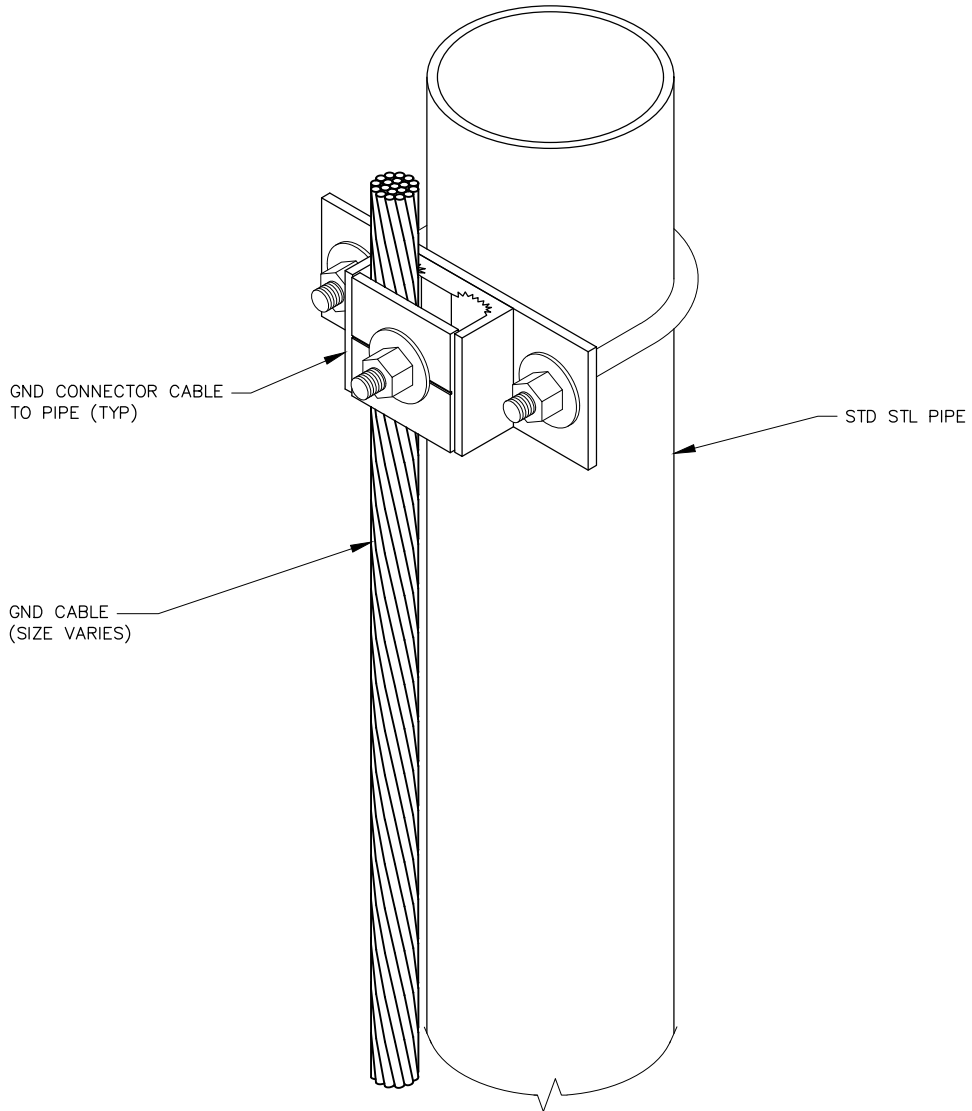
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26267
FENCE AND GATE
GROUNDING**



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

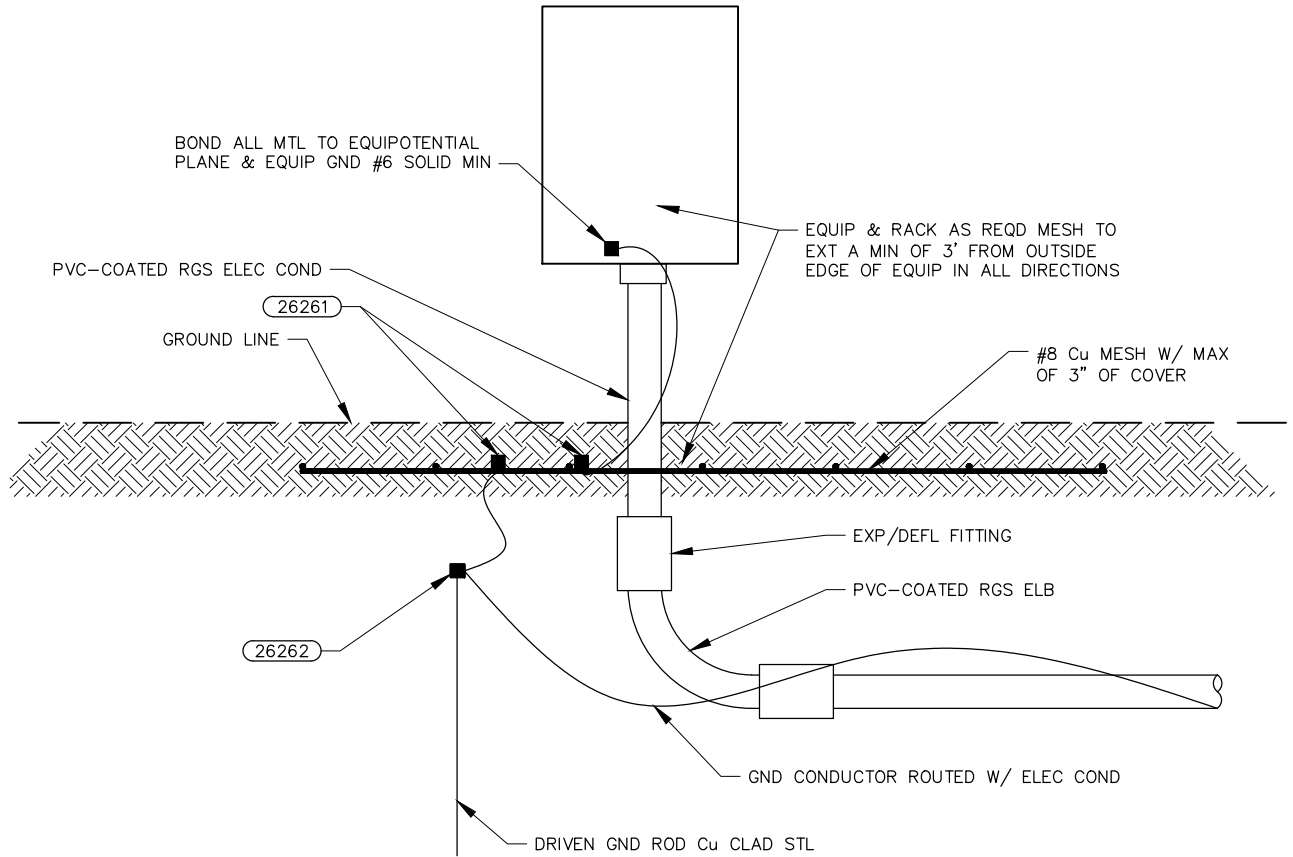
ORIGINATION DATE: JULY 2021

REVISION DATE:

26268
RAILING AND POST
GROUNDING

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NOTE:

PROVIDE EQUIPOTENTIAL PLANE MEETING THE REQUIREMENTS OF NATIONAL ELECTRICAL CODE 682.33.

DRAWN BY: <i>BERKNESS</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**26269
EQUIPOTENTIAL PLANE FOR
EQUIPMENT**

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STD MTG OF THE BK PNL TO THE BK WALL OF THE ENCL

USE A WIRE BRUSH TO REMOVE PAINT FROM THREADS TO ALLOW A GND CONN

BK WALL OF ENCL

BOLT MTG OF A GND BUS OR A CHASSIS TO THE BK PNL

GND BUS OR MTG BRACKET (TYP)

SCRAPE PAINT & USE A STAR WASHER

WELDED STUD

OR

STAR WASHER (TYP)

NUT (TYP)

FLAT WASHER

BOLT

TAPPED HOLE

STUD MTG OF A GND BUS OR A CHASSIS TO THE BK PNL

SCRAPE PAINT

BK PNL

WELDED STUD

COMPRESSION GND LUG (TYP)

ENCL WALL

(INSIDE)

(OUTSIDE)

BOLT MTG OF A GND BUS OR A CHASSIS TO ENCL WALL

EQUIP GROUNDING CONDUCTOR (TYP)

BOLT

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

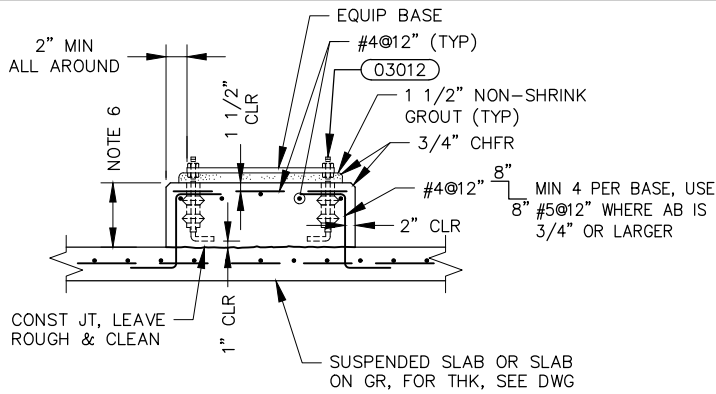
ORIGINATION DATE: JULY 2021

REVISION DATE:

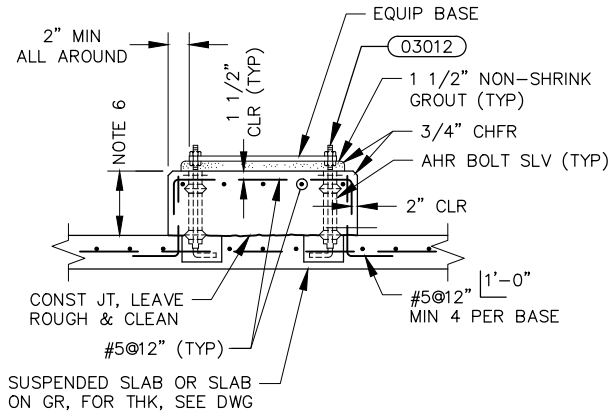
26270 ENCLOSURE GROUNDING DETAILS



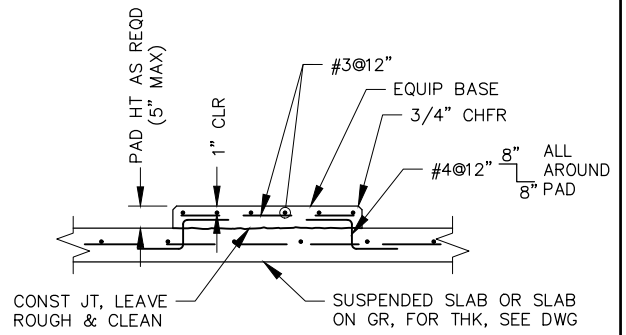
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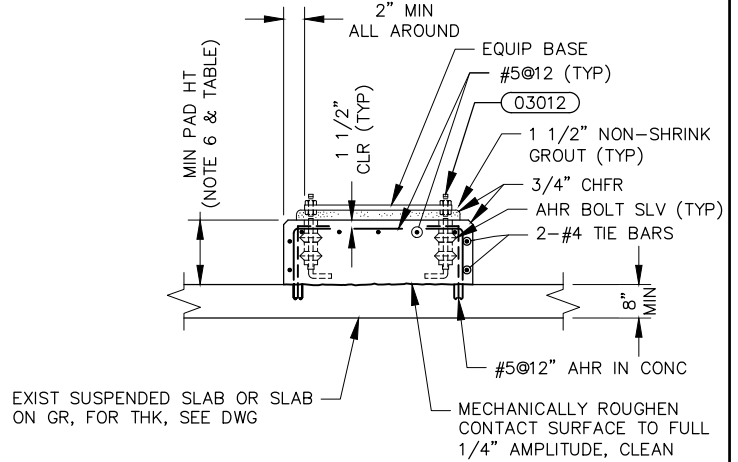
TYPE A



TYPE C



TYPE B



TYPE D

NOTES:

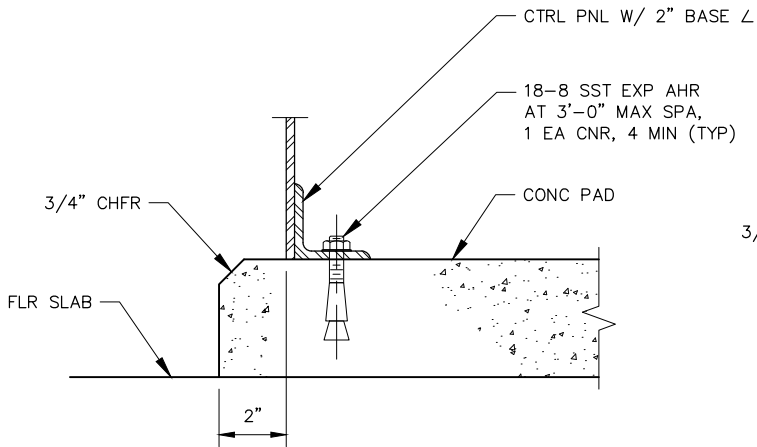
- PAD SIZE SHALL BE MINIMUM INDICATED OR AS SHOWN ON THE DRAWINGS OR AS INDICATED BY THE MANUFACTURER.
- THE SIZE, NUMBER, TYPE, LOCATION, AND THREAD PROJECTION OF THE ANCHOR BOLTS SHALL BE DETERMINED BY THE EQUIPMENT MANUFACTURER, AND SHALL BE AS APPROVED BY THE ENGINEER. ANCHOR BOLTS SHALL BE HELD IN POSITION WITH A ONE-PIECE TEMPLATE, MATCHING THE BASE PLATE, WHILE PAD IS BEING POURED.
- ANCHOR BOLT SLEEVES SHALL BE USED TO PROVIDE THE ANCHOR BOLT A MINIMUM MOVEMENT OF 1/2 INCH IN ALL DIRECTIONS.
- EQUIPMENT BASES SHALL BE INSTALLED LEVEL.
- WEDGES OR SHIMS SHALL BE USED TO SUPPORT THE BASE WHILE THE NON-SHRINK GROUT IS PLACED. TEMPORARY LEVELING NUTS SHALL BE BACKED OFF. IF LEFT IN, THE WEDGES OR SHIMS SHALL NOT BE EXPOSED TO VIEW.
- HEIGHT OF PADS SHALL BE THE MINIMUM REQUIRED FOR ANCHOR BOLT CLEARANCE. PROVIDE PROPER ANCHOR BOLT PROJECTION OUT OF SLAB (SEE TABLE BELOW). WHERE EQUIPMENT OR PIPING ELEVATION REQUIRE A PAD HEIGHT LESS THAN THE MINIMUM SHOWN, USE TYPE B WITH BLOCKOUT.

AB ϕ	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 3/8"	1 1/2"	1 3/4"	2"
MIN PAD HT	7"	8 1/2"	10"	11"	12 1/2"	15"	16 1/2"	18"	21"	24"

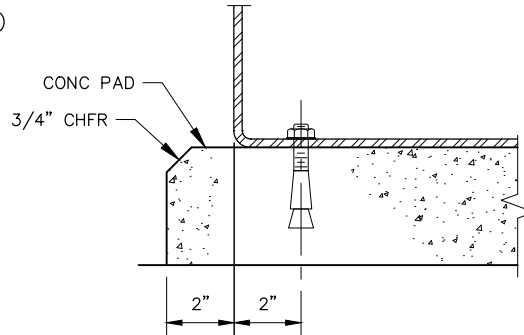
DRAWN BY: ALVARADO
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

**26300
 CONCRETE
 EQUIPMENT PADS**

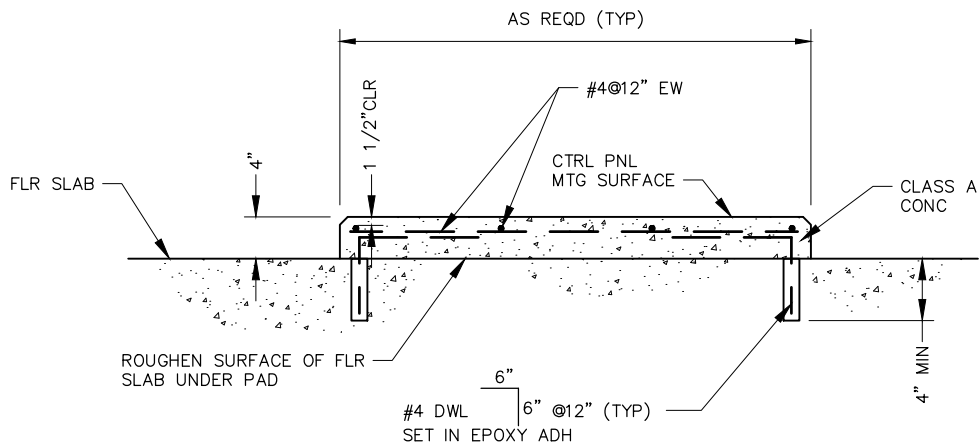
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OPEN BOTTOM PANEL



ENCLOSED BOTTOM PANEL



CONCRETE PAD

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

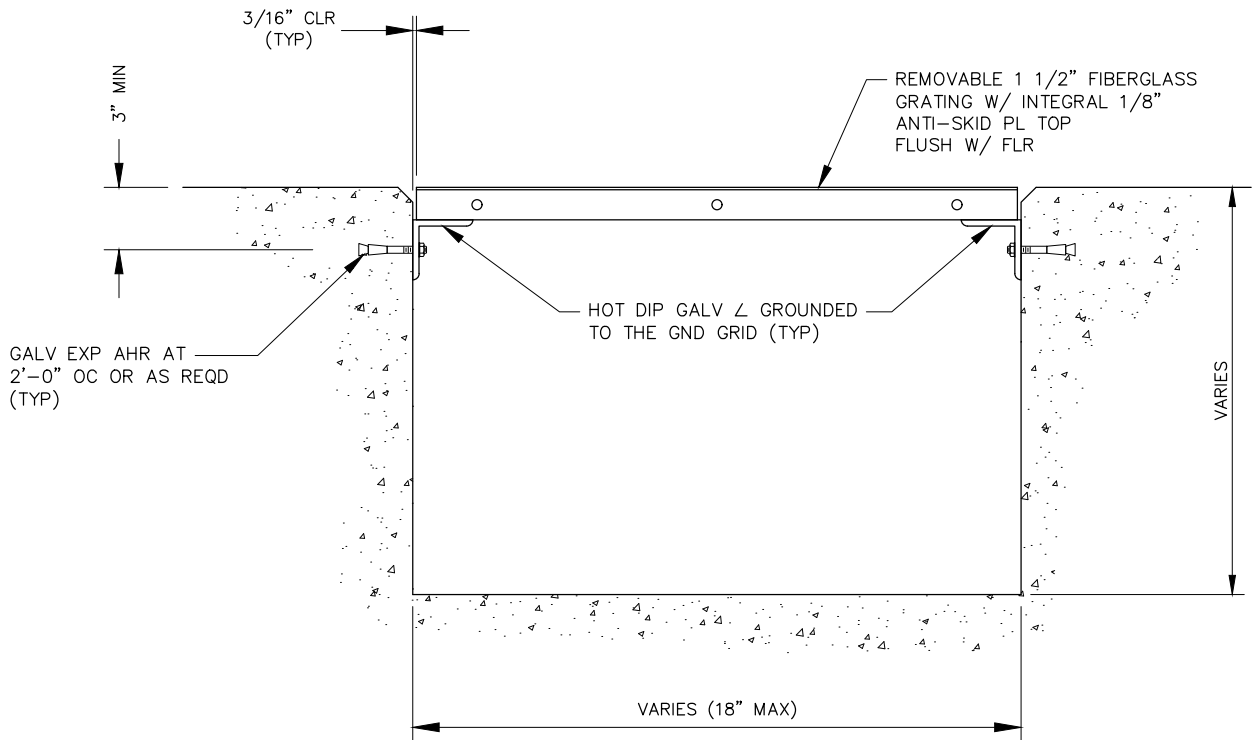
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26301
FREESTANDING EQUIPMENT
MOUNTING ON CONCRETE
PAD**



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

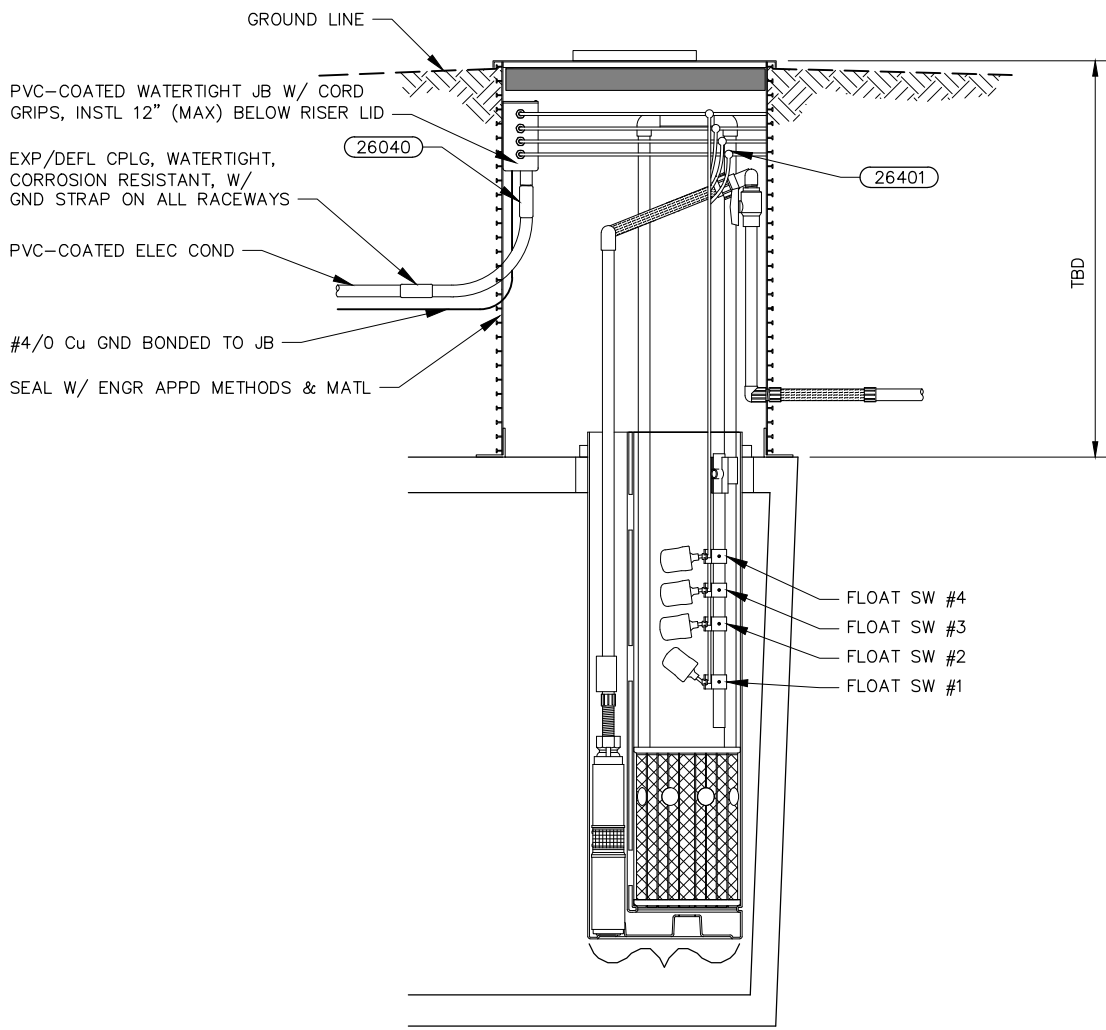
ORIGINATION DATE: JULY 2021

REVISION DATE:

26310 CABLE FLOOR TRENCH



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FLOAT SWITCH	FUNCTION
FLOAT SW #4 LSHA	HIGH WATER ALARM
FLOAT SW #3 LSHH	LAG PUMP ON, HIGH WATER ALARM
FLOAT SW #2 LSH	LEAD PUMP ON
FLOAT SW #1 LSL	PUMP OFF

DRAWN BY: *BOWMAN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

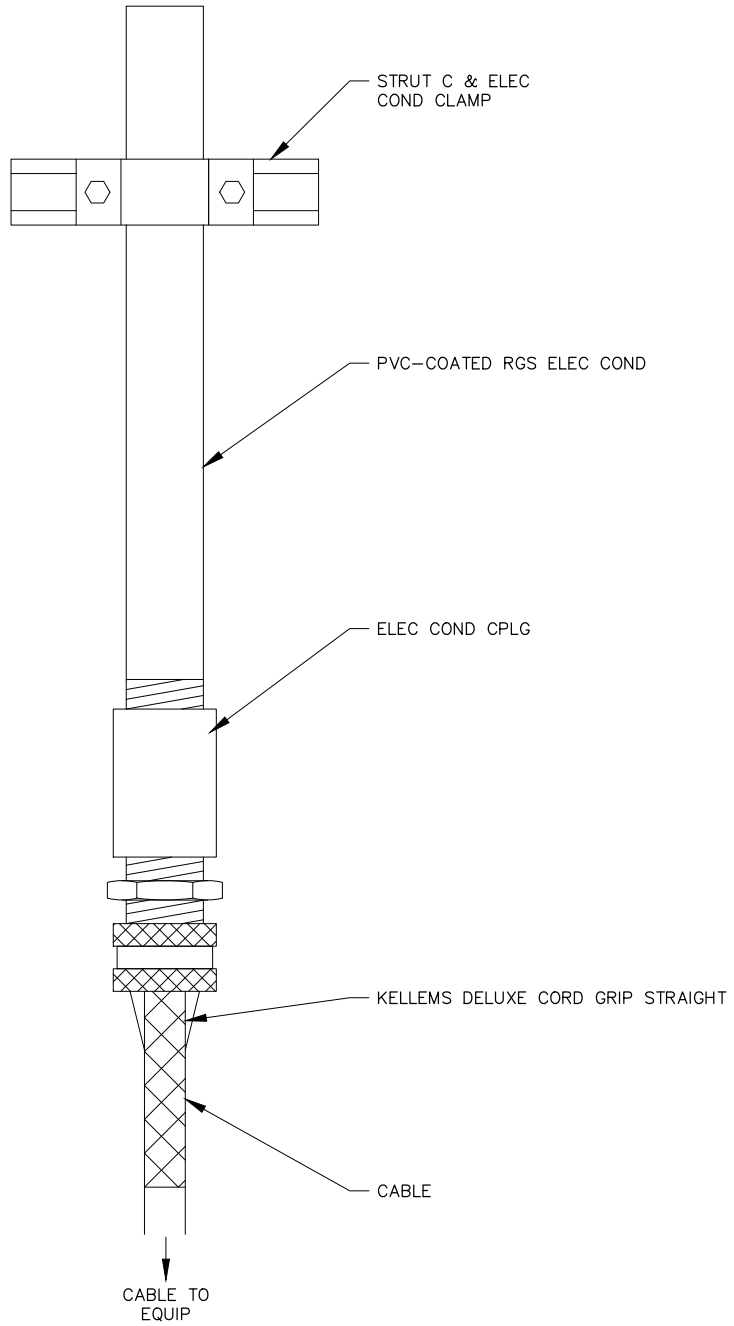
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

26400 SUMP PIT CABLE SUPPORT

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DRAWN BY: *BOWMAN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

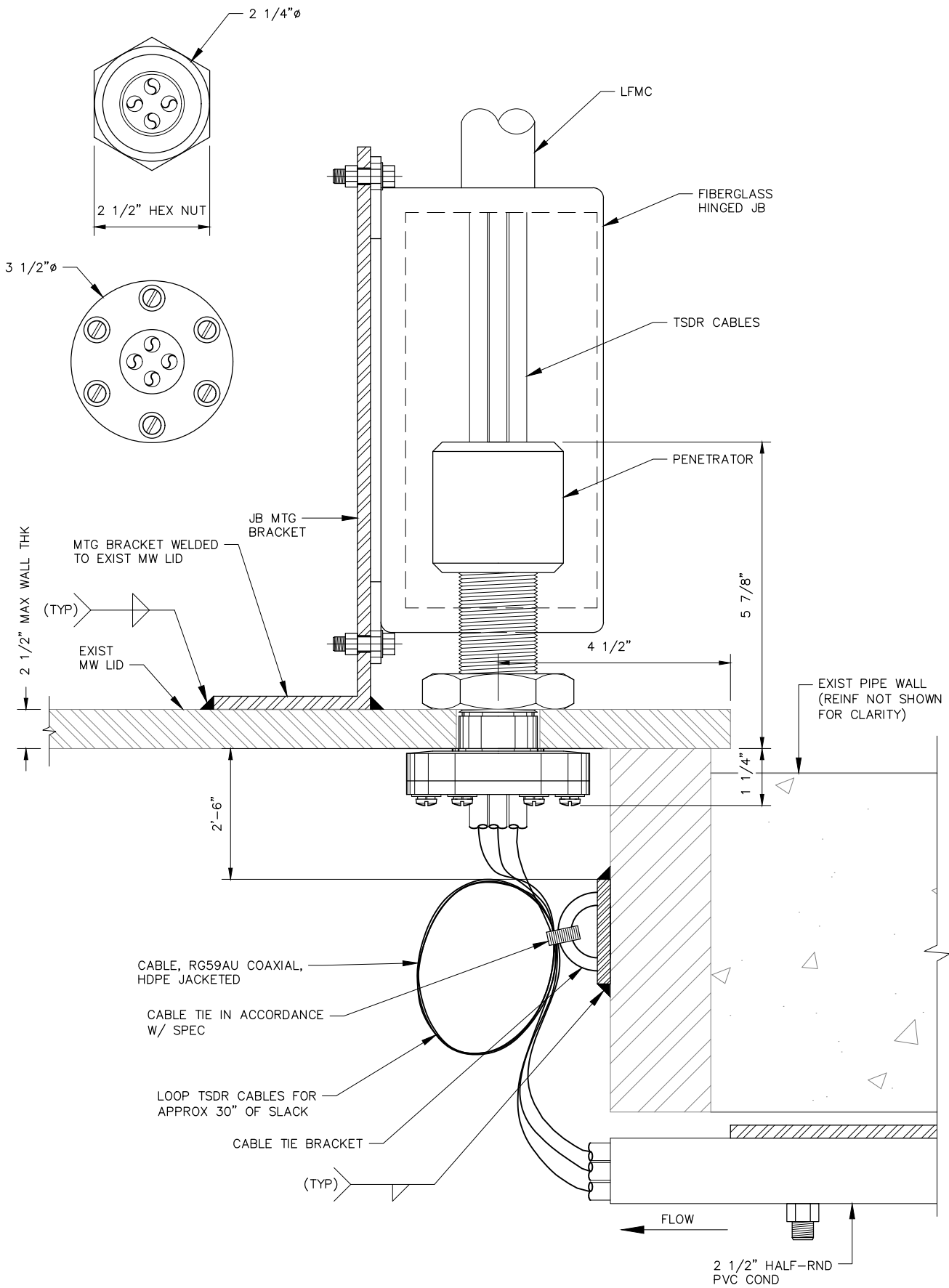
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

26401 CABLE SUPPORT



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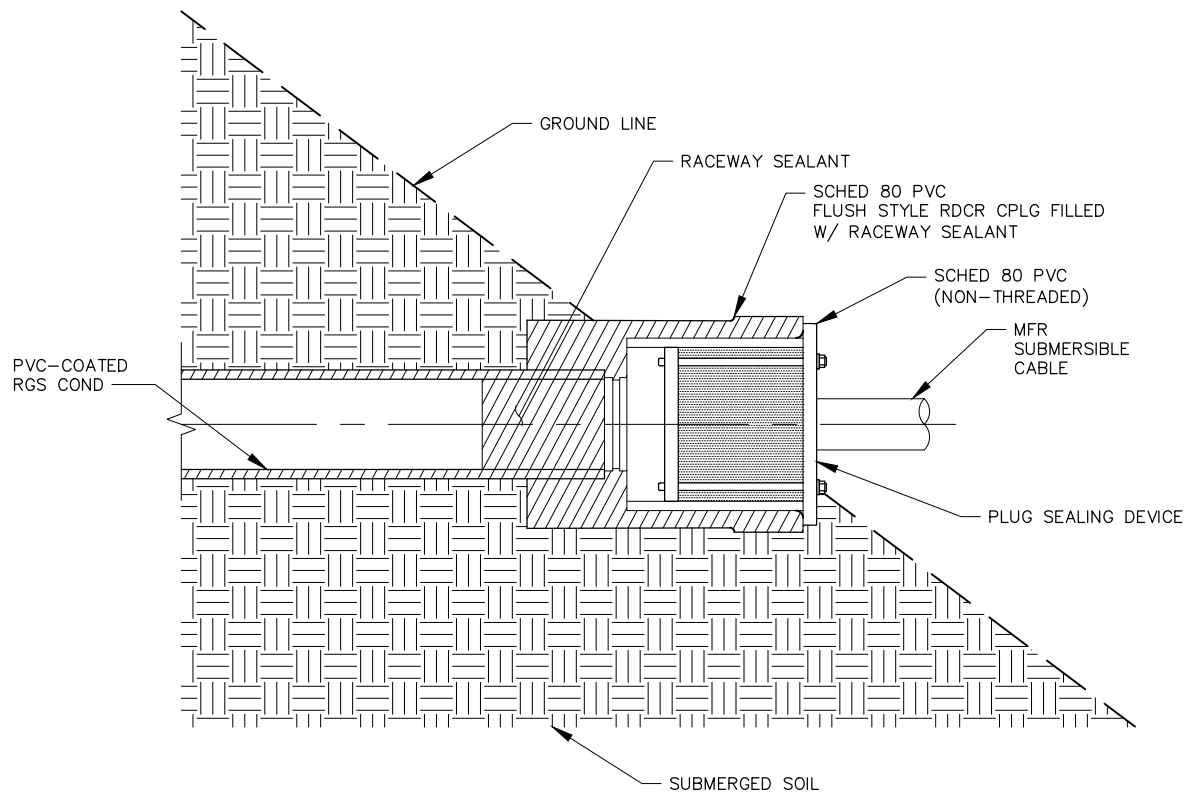


DRAWN BY: ROMERO
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26402 PENETRATOR INSTALLATION

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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

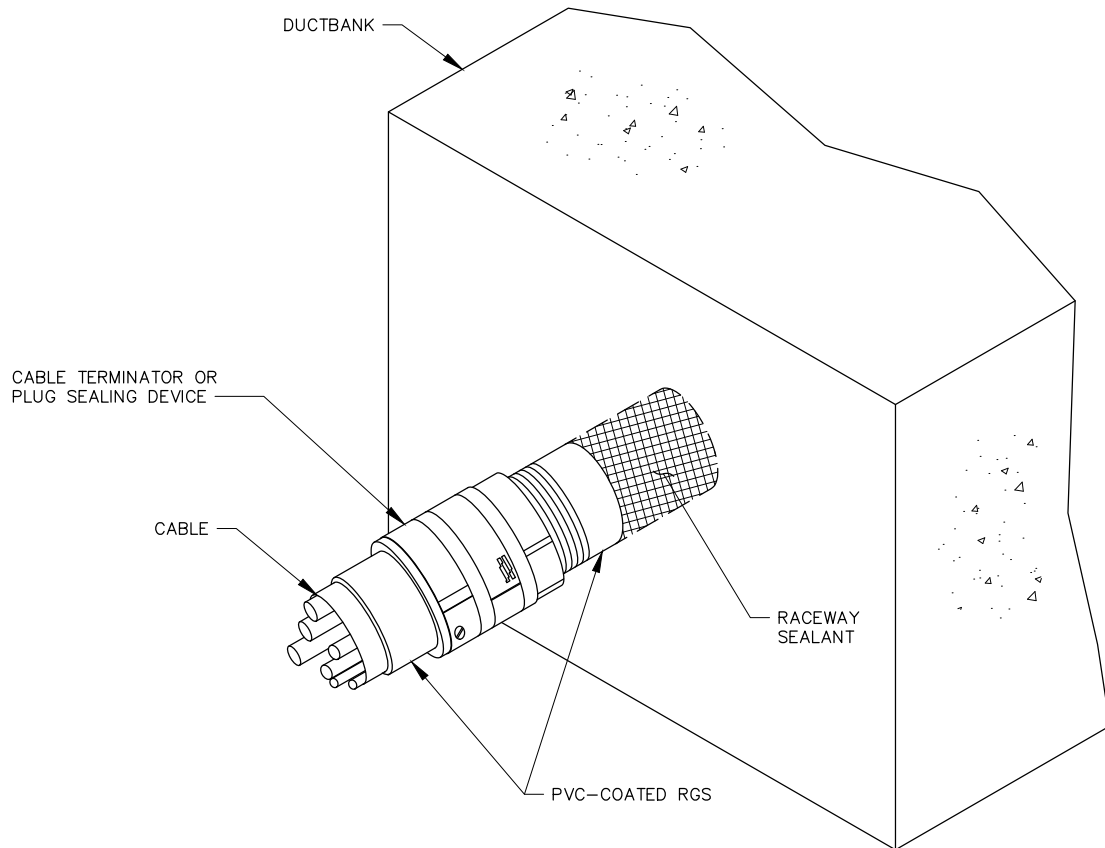
ORIGINATION DATE: JULY 2021

REVISION DATE:

26403
DIRECT BURIED
CONDUIT-RESERVOIR
INTERFACE



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NOTE:

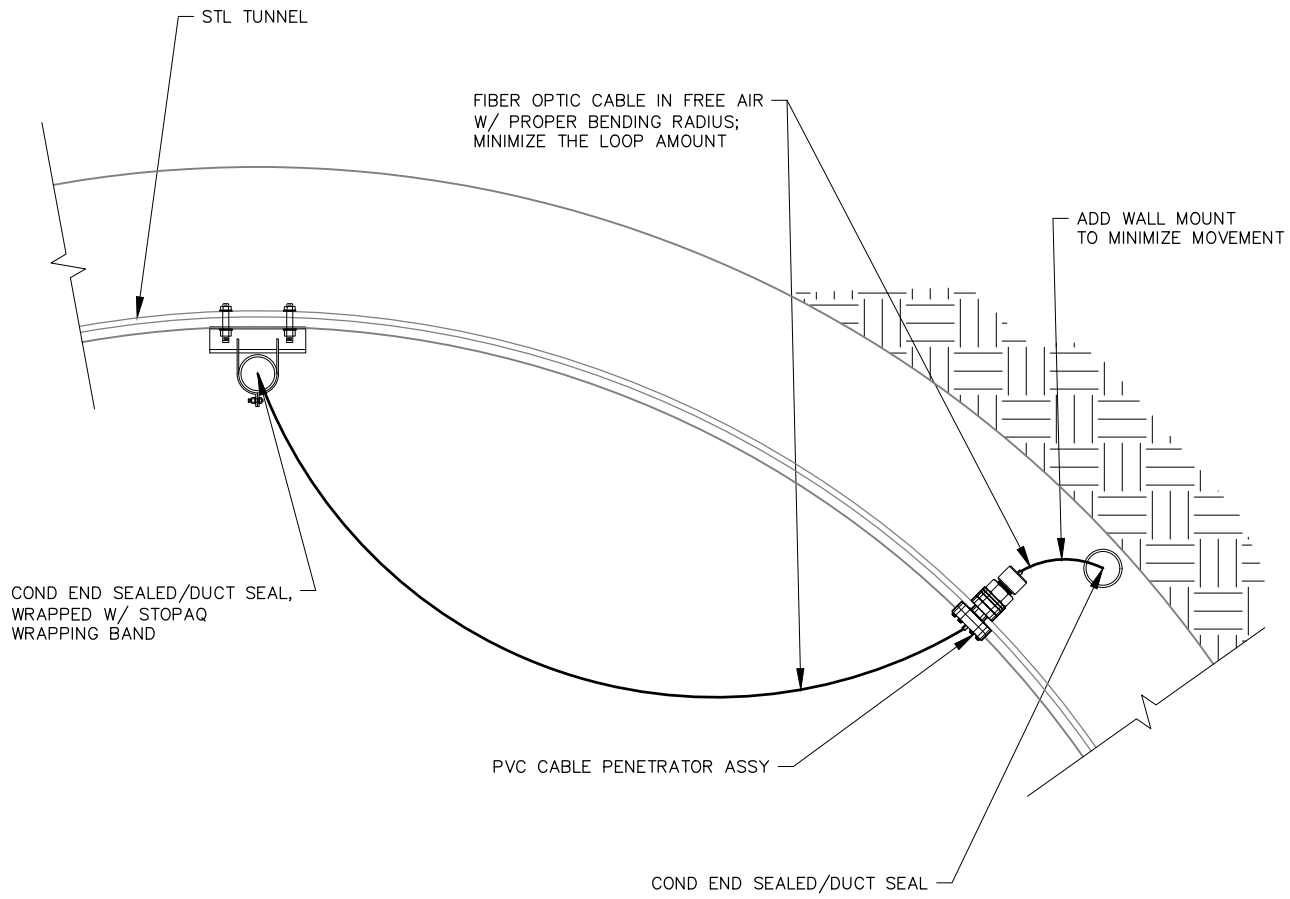
EXIT OUT OF THE CONCRETE ENCASED DUCTBANK IN THE RESERVOIR.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26404
DUCTBANK – RESERVOIR
INTERFACE



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NOTE:

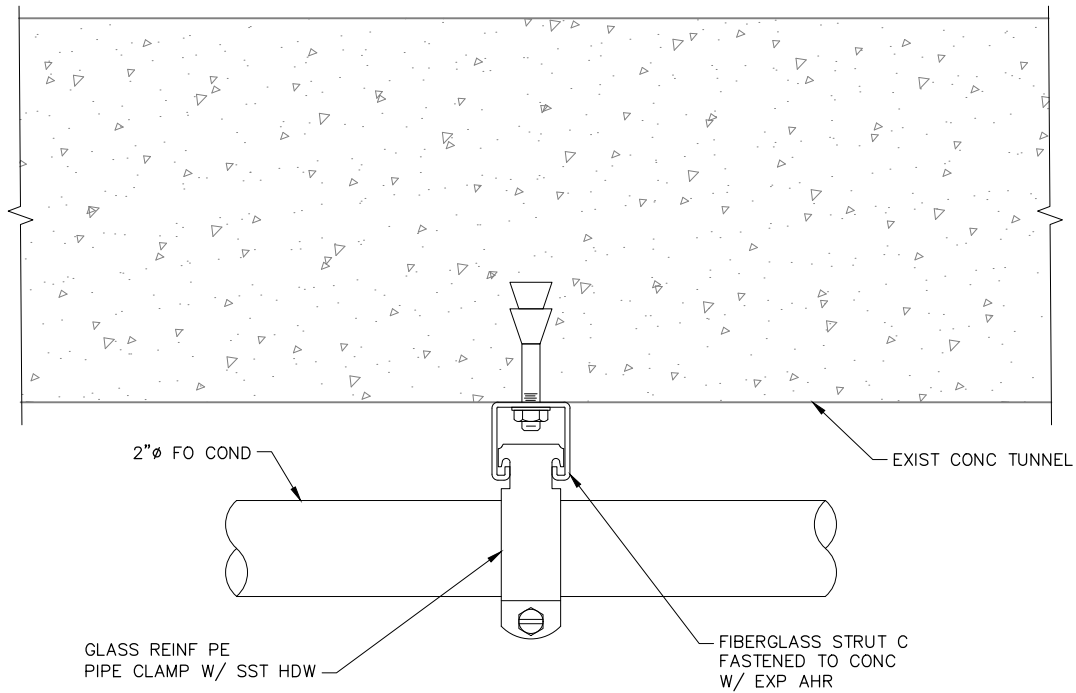
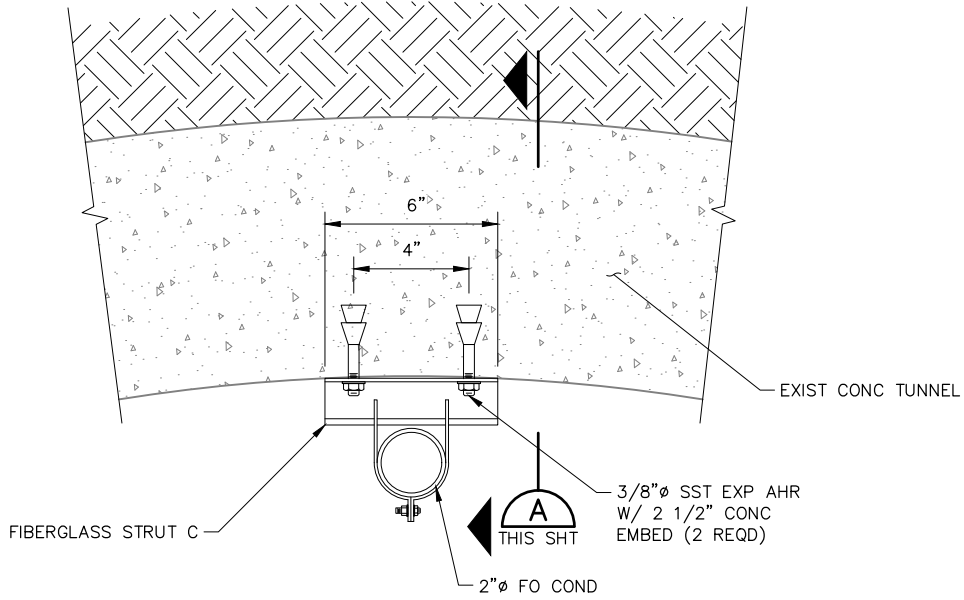
MOUNT PENETRATOR NEAR EXTERIOR WALL FOR EASY MOUNTING AND MINIMUM DISTANCE TO ENTER RIGID CONDUIT.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

26406
FIBER OPTIC CABLE ROUTING

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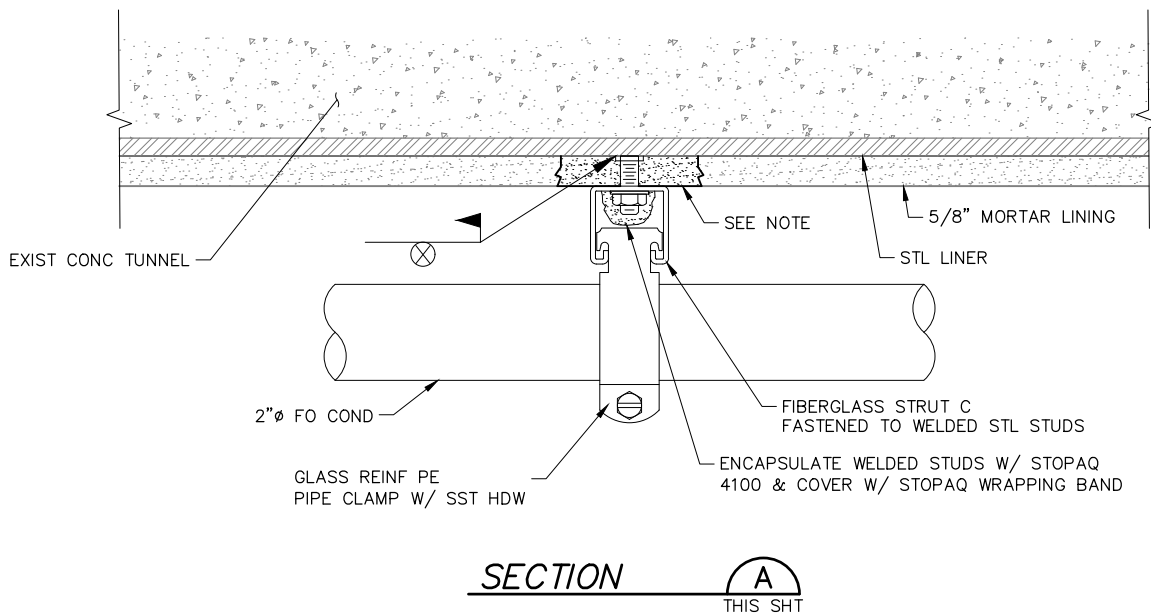
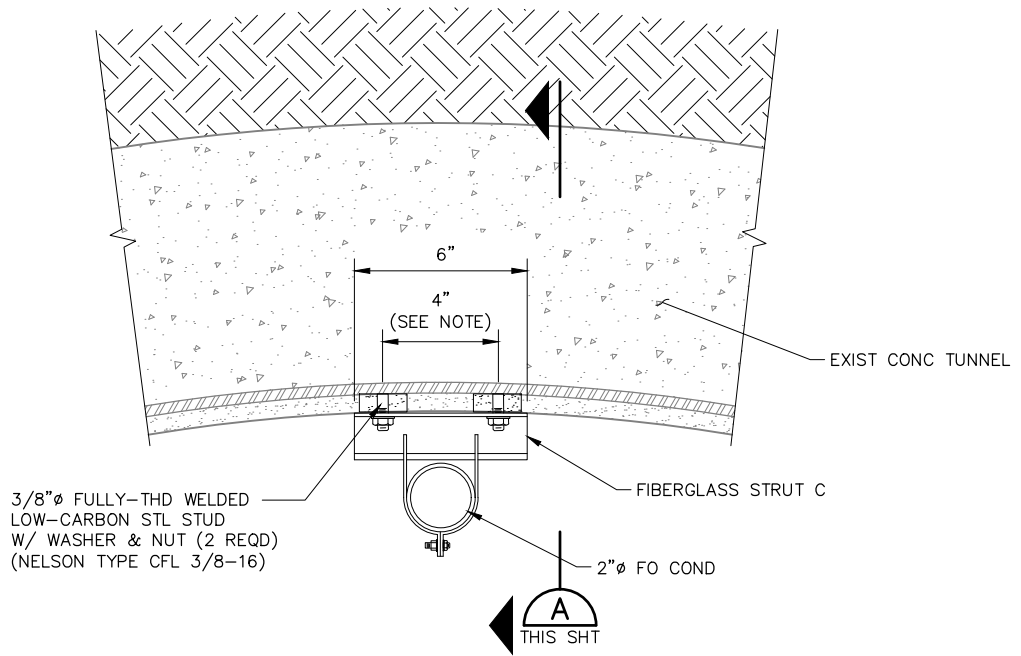
SECTION A
THIS SHT

DRAWN BY: SCHULTE
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

26407
 CONDUIT MOUNT AT
 CONCRETE TUNNEL



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NOTE:

REMOVE CEMENT MORTAR LINING AS REQUIRED TO INSTALL WELDED STUDS TO STEEL LINER PLATE. REPAIR LINING TO MATCH EXISTING IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.03 PRIOR TO INSTALLING FIBERGLASS STRUT CHANNELS.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

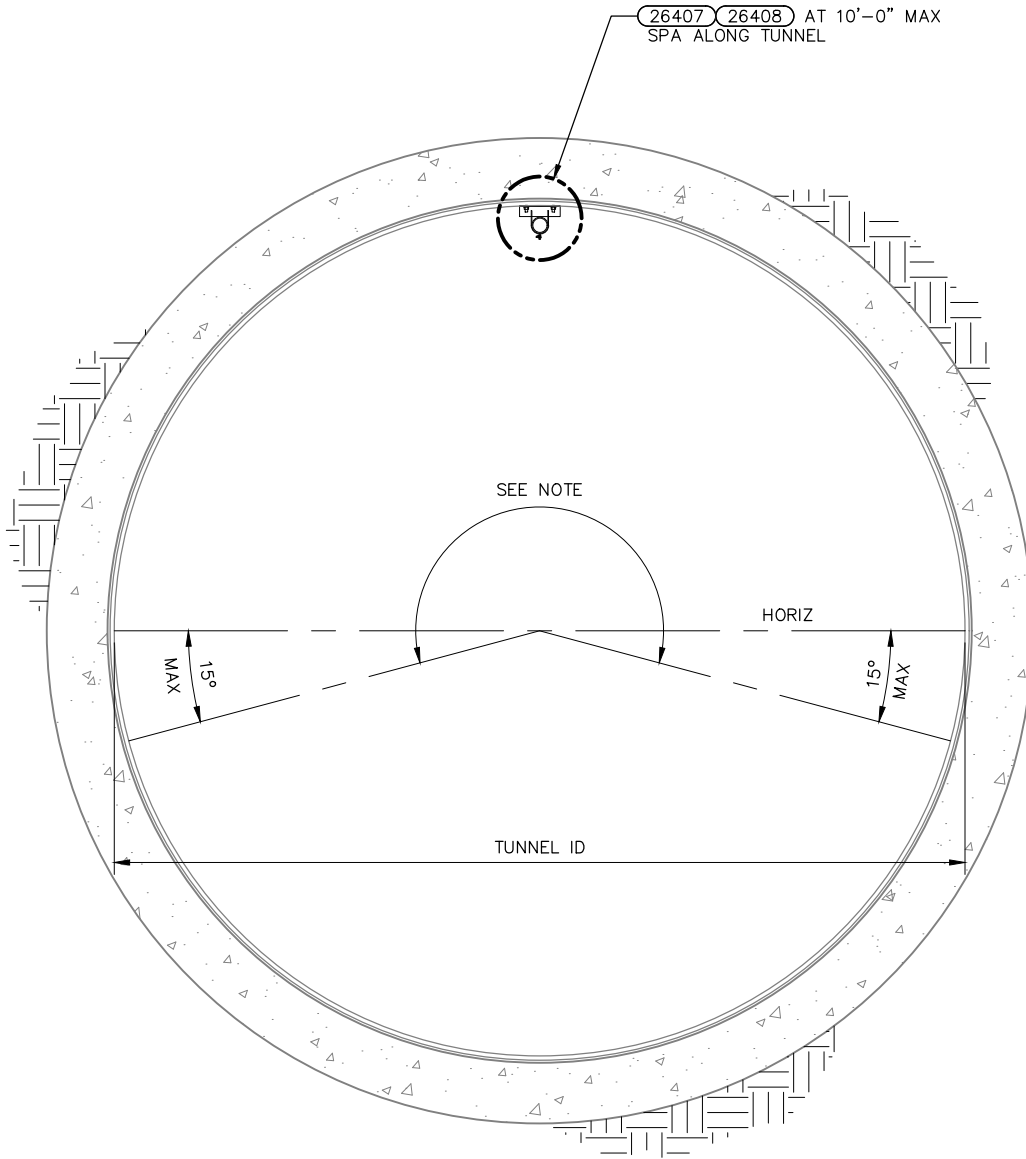
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26408
CONDUIT MOUNT AT
STEEL LINED TUNNEL**



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NOTE:

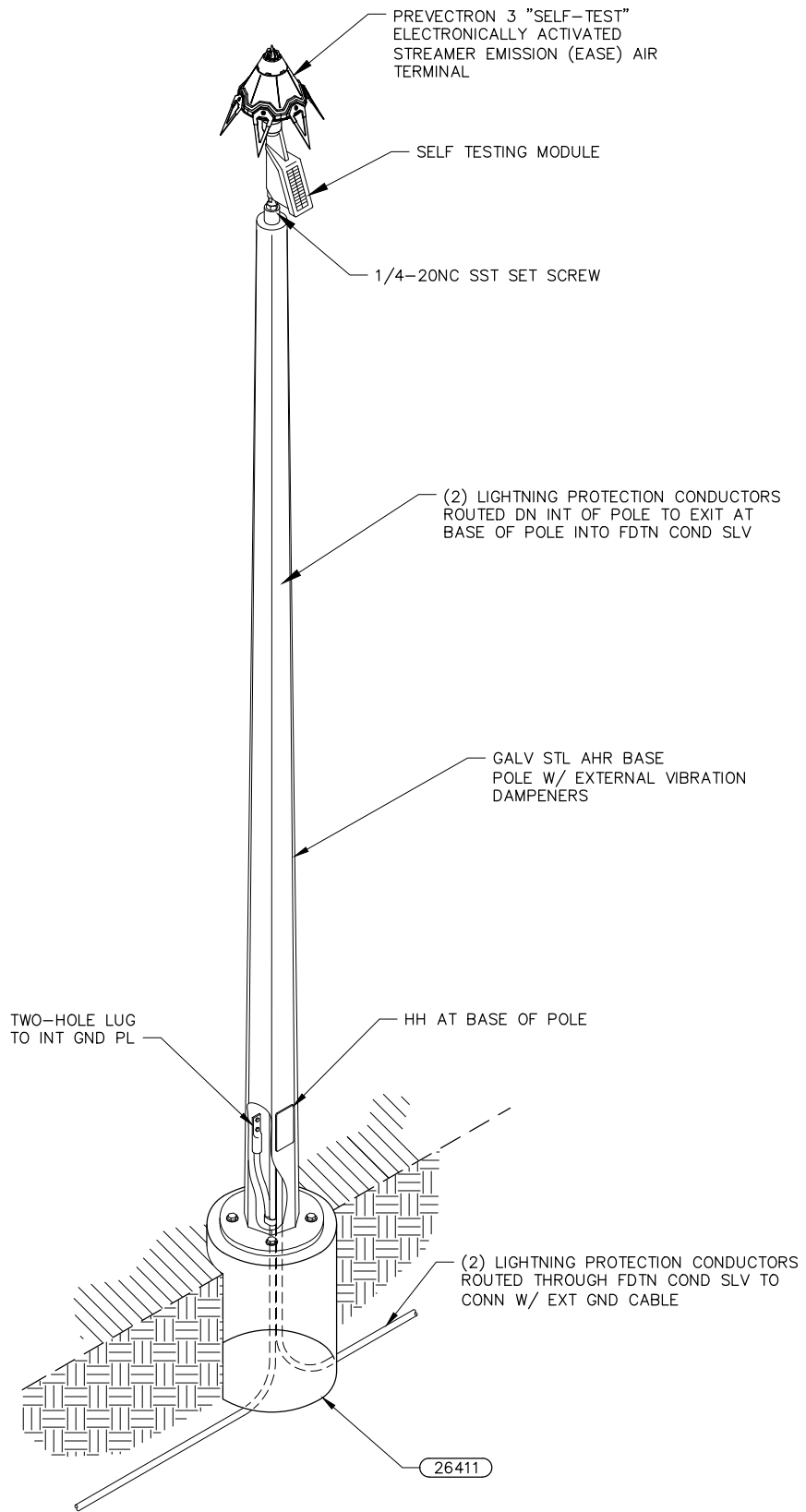
REMOVE CEMENT MORTAR LINING AS REQUIRED TO INSTALL WELDED STUDS TO STEEL LINER. PLATE. REPAIR LINING TO MATCH EXISTING IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.03 PRIOR TO INSTALLING FIBERGLASS STRUT CHANNELS.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORINATION DATE: JULY 2021
REVISION DATE:

**26409
CONDUIT MOUNT
LOCATION SECTION**



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

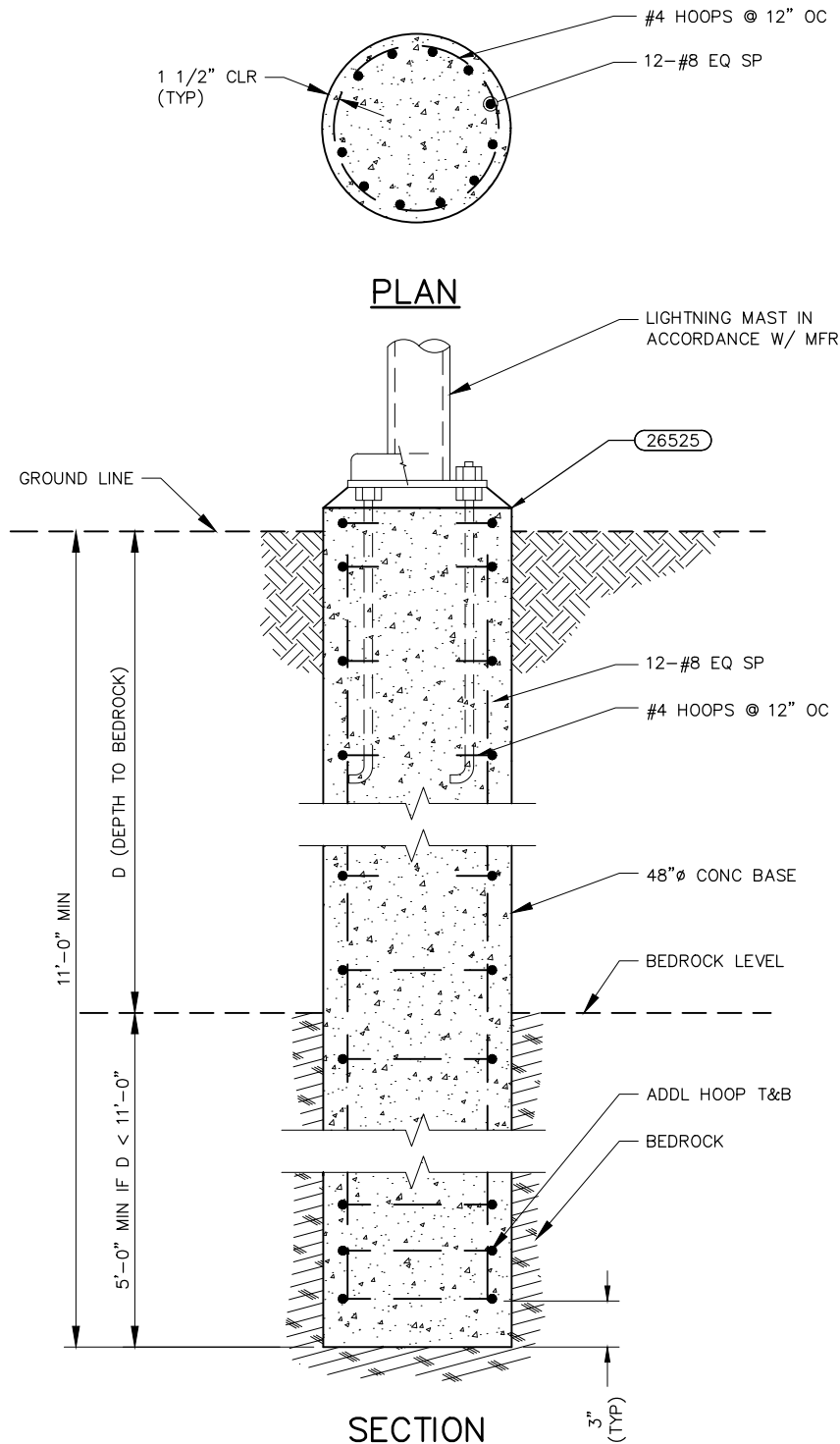
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26410
LIGHTNING
PROTECTION SYSTEM
NON-HINGED MAST**



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NOTES:

1. THE LIGHTNING PROTECTION INSTALLATION DETAILS ARE THE MINIMUM ESTIMATED REQUIREMENTS.
2. CALCULATIONS FOR CONCRETE BASE DIMENSIONS, REINFORCING STEEL SIZES, AND ANCHOR BOLT SIZES SHALL BE APPROVED BY ENGINEER, AUTHORITY HAVING JURISDICTION, AND MANUFACTURER. CALCULATIONS FOR CONCRETE BASE SHALL BE BASED ON 110-MILES PER HOUR WIND SPEED OR AS REQUIRED BY AUTHORITY HAVING JURISDICTION.

DRAWN BY: BOWMAN

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

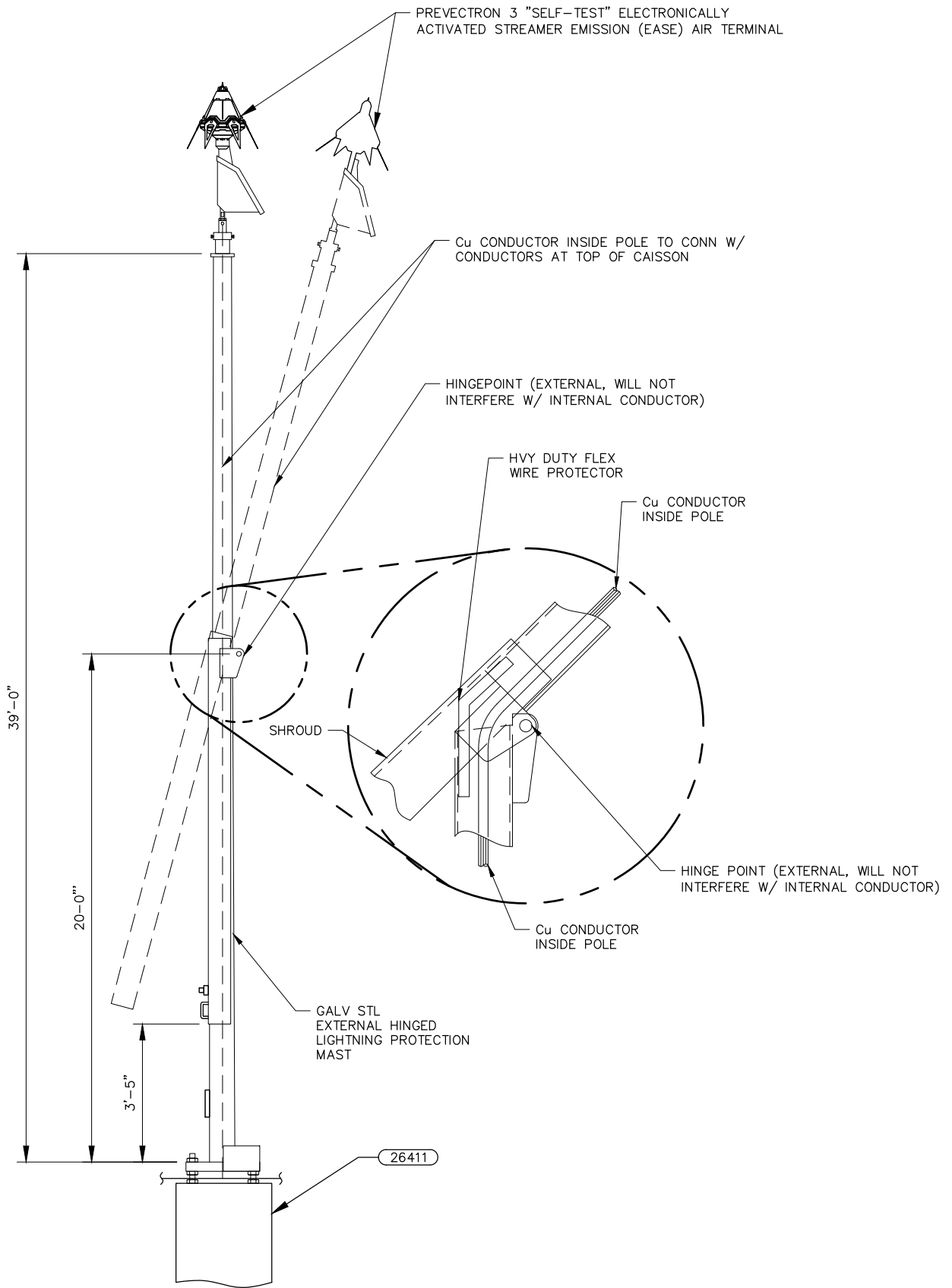
ORIGINATION DATE: JULY 2021

REVISION DATE:

**26411
 LIGHTNING PROTECTION
 MAST SUPPORT**



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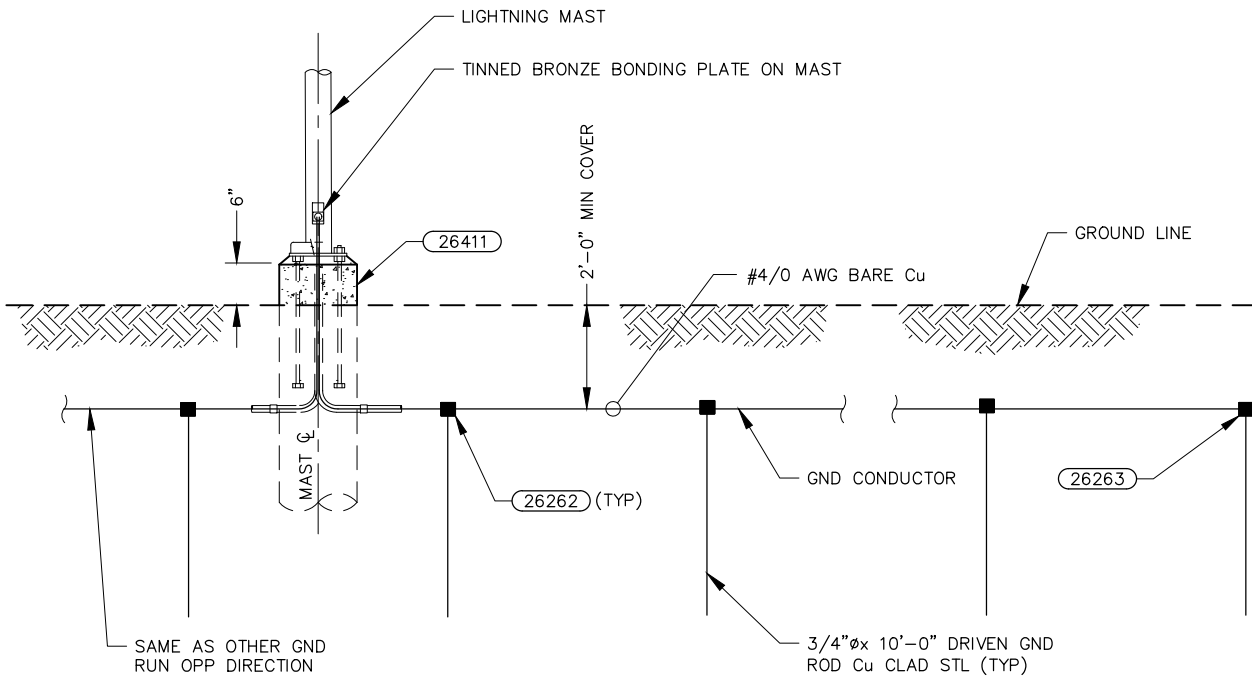


DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

26412
LIGHTNING PROTECTION
HINGED MAST

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NOTE:

A MINIMUM OF 7 GROUND RODS PER DOWN CONDUCTOR SHALL BE INSTALLED AT 7 FEET SPACING MINIMUM.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

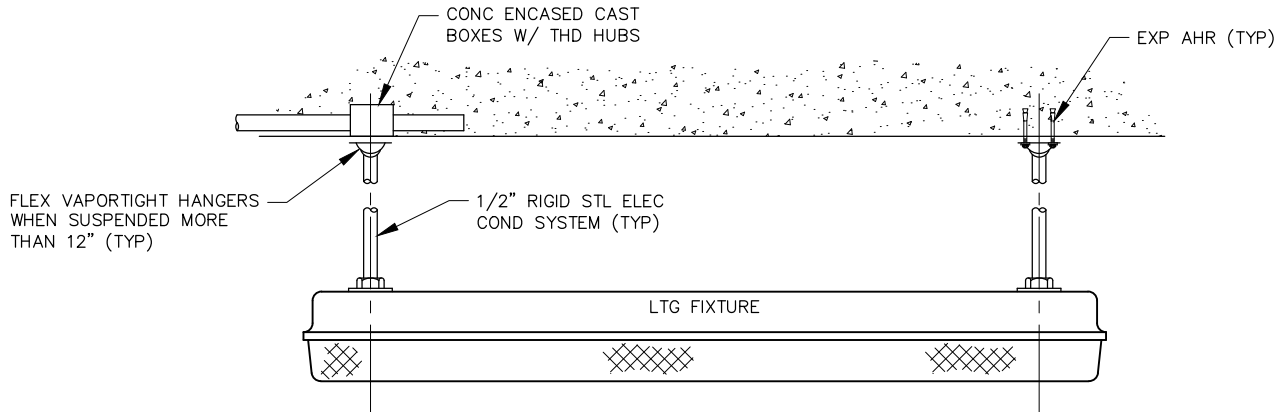
ORIGINATION DATE: JULY 2021

REVISION DATE:

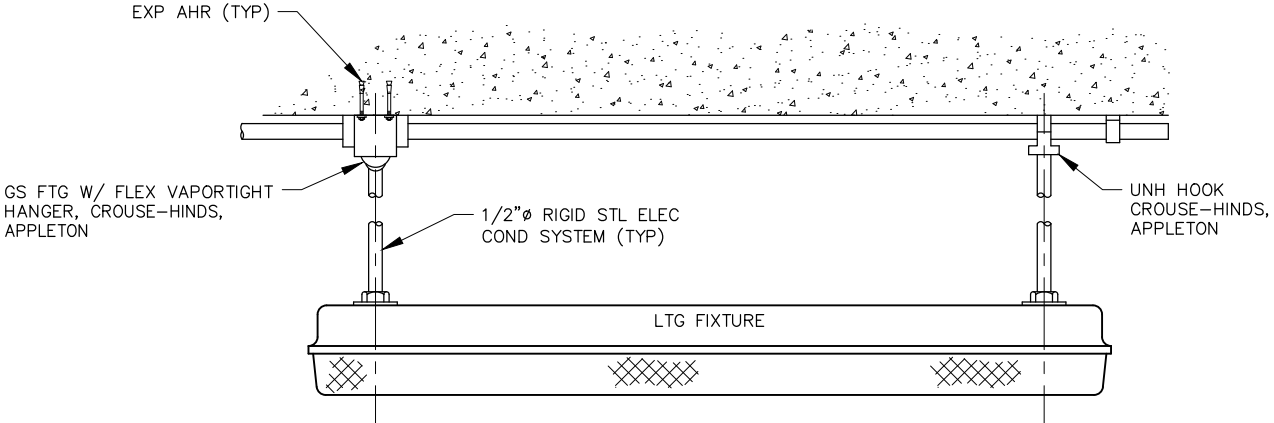
**26413
LIGHTNING PROTECTION
MAST GROUNDING**



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CONCEALED COND

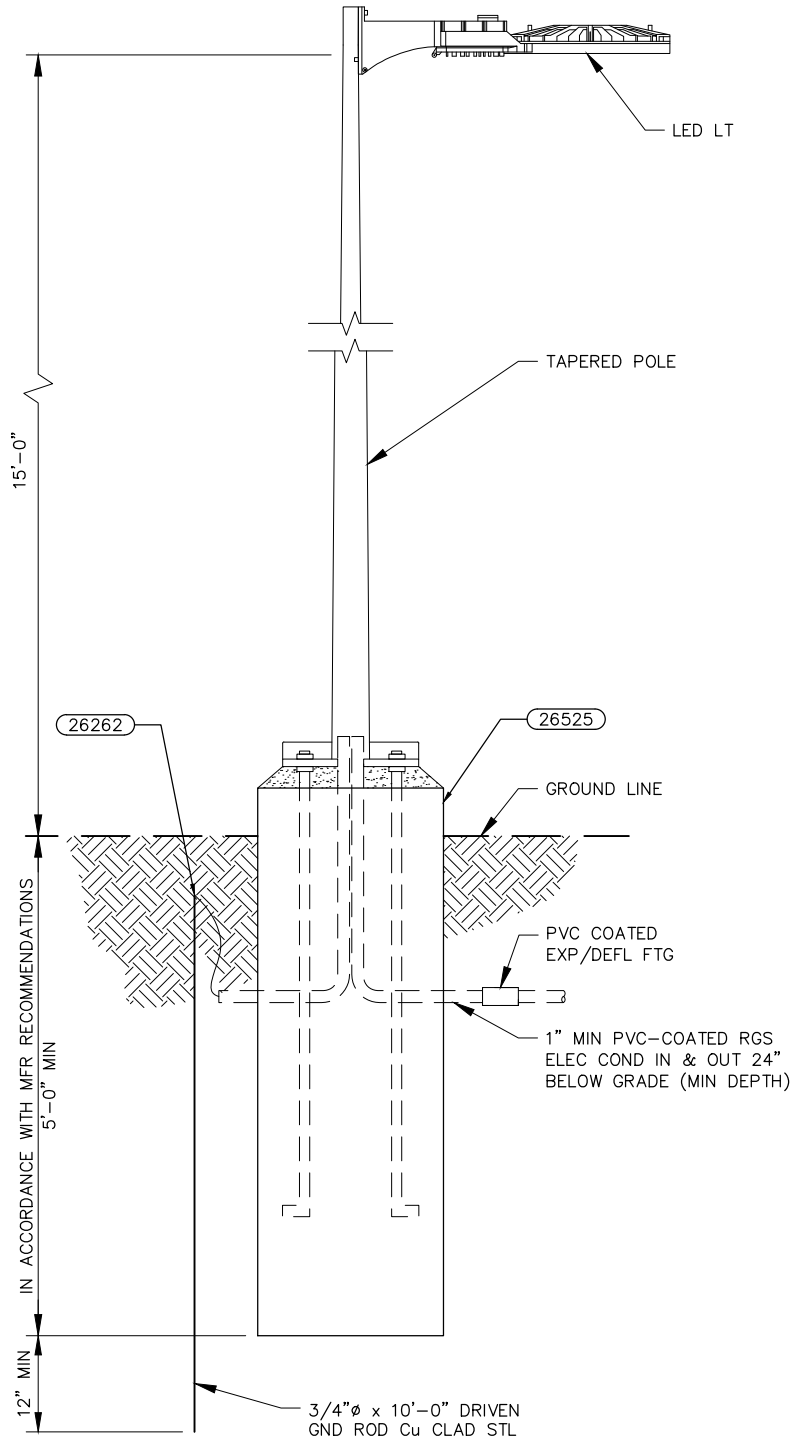


EXPOSED COND

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26501
FLUORESCENT FIXTURE
CEILING MOUNTED


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NOTES:

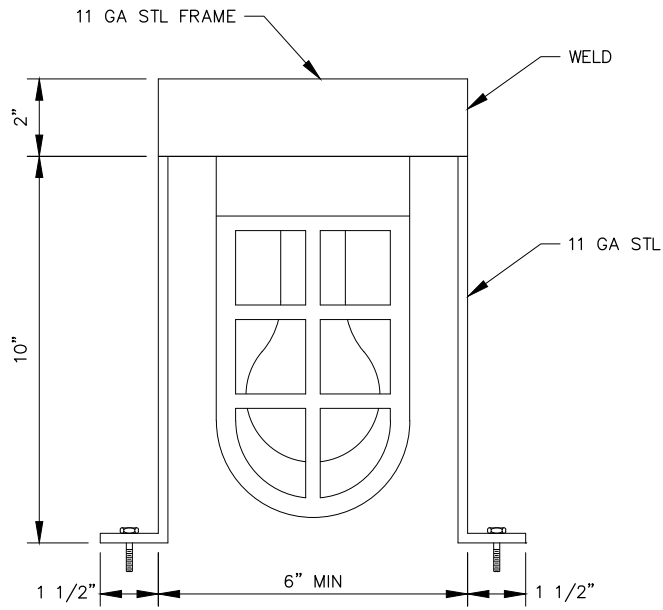
1. PLACE MOUNTING AND LEVELING BOLTS IN ACCORDANCE WITH MANUFACTURERS TEMPLATE. PROVIDE BOLT COVERS. FILL MOUNTING PLATE VOID WITH NON-SHRINK GROUT AFTER LEVELING.
2. CALCULATIONS FOR CONCRETE BASE DIMENSIONS, REINFORCING STEEL SIZES, AND ANCHOR BOLT SIZES SHALL BE APPROVED BY ENGINEER, AUTHORITY HAVING JURISDICTION, AND MANUFACTURER. CALCULATIONS FOR CONCRETE BASE SHALL BE BASED ON 110-MILES PER HOUR WIND SPEED OR AS REQUIRED BY AUTHORITY HAVING JURISDICTION.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

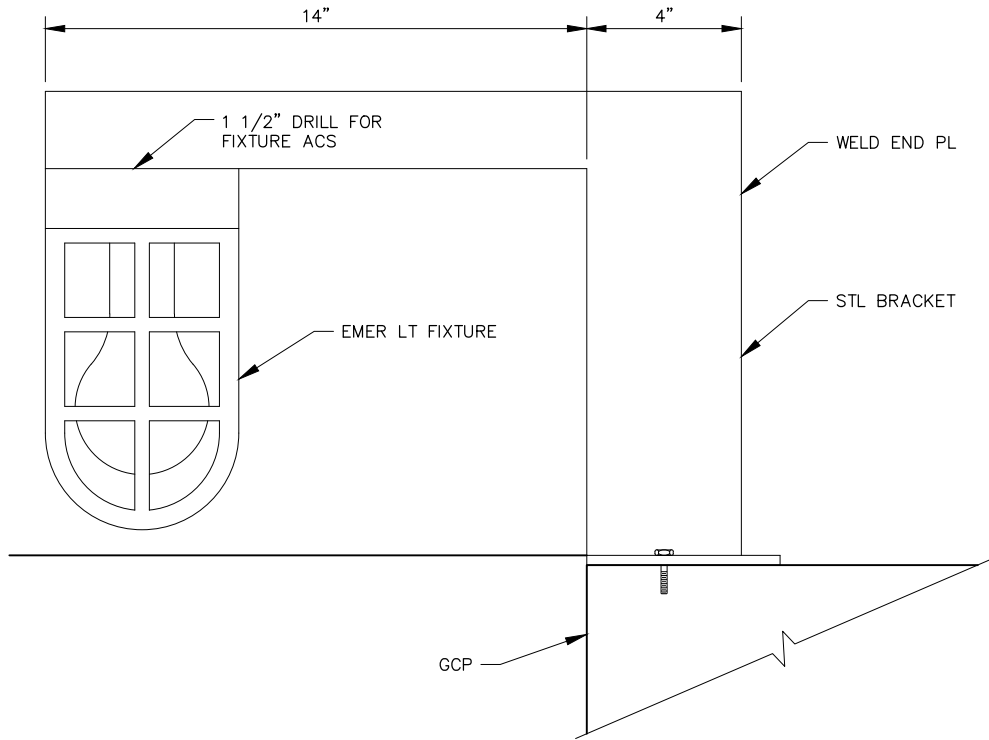
**26502
LED LIGHT POLE**



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FRONT



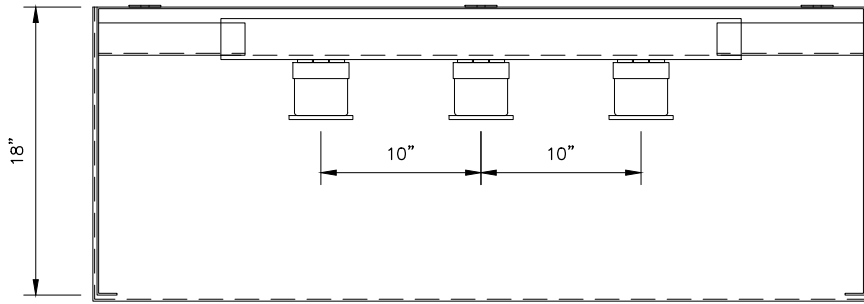
SIDE

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

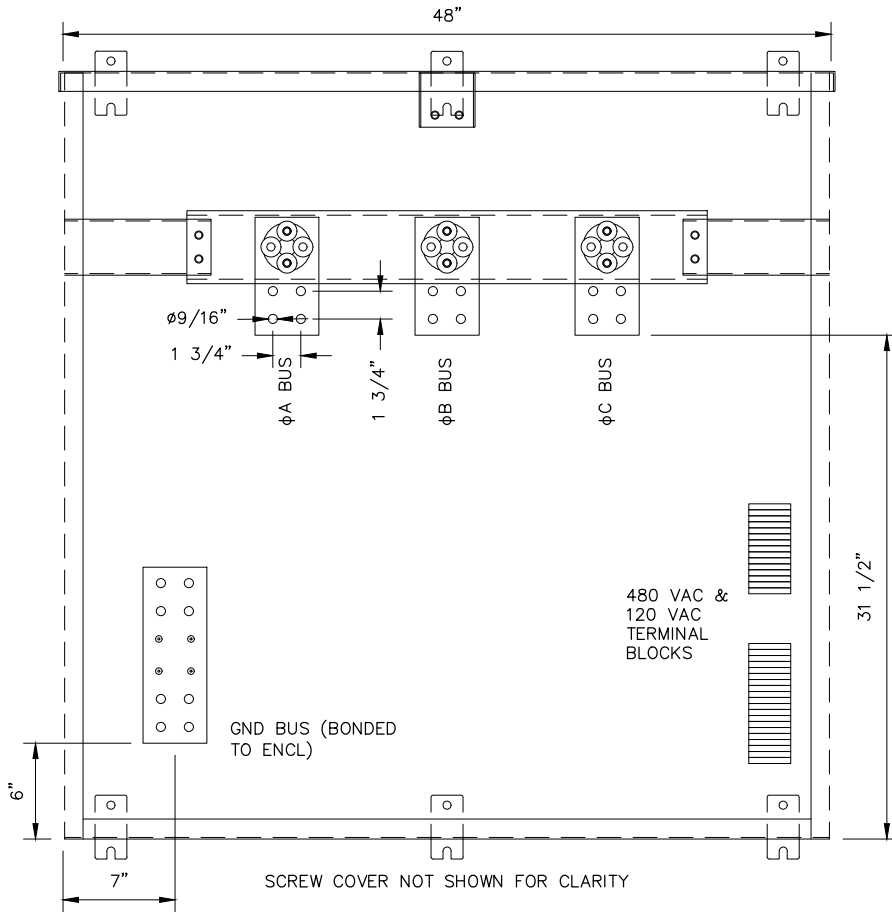
**26504
GENERATOR CONTROL
PANEL EMERGENCY
LIGHT FIXTURE BRACKET**

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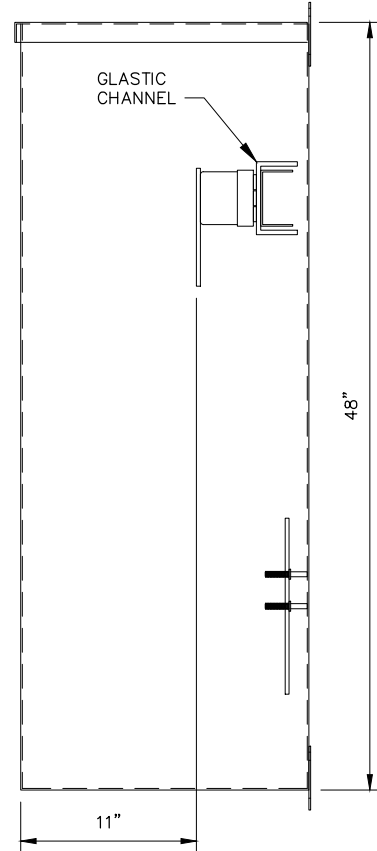
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TOP



FRONT EL



SIDE EL

NOTES:

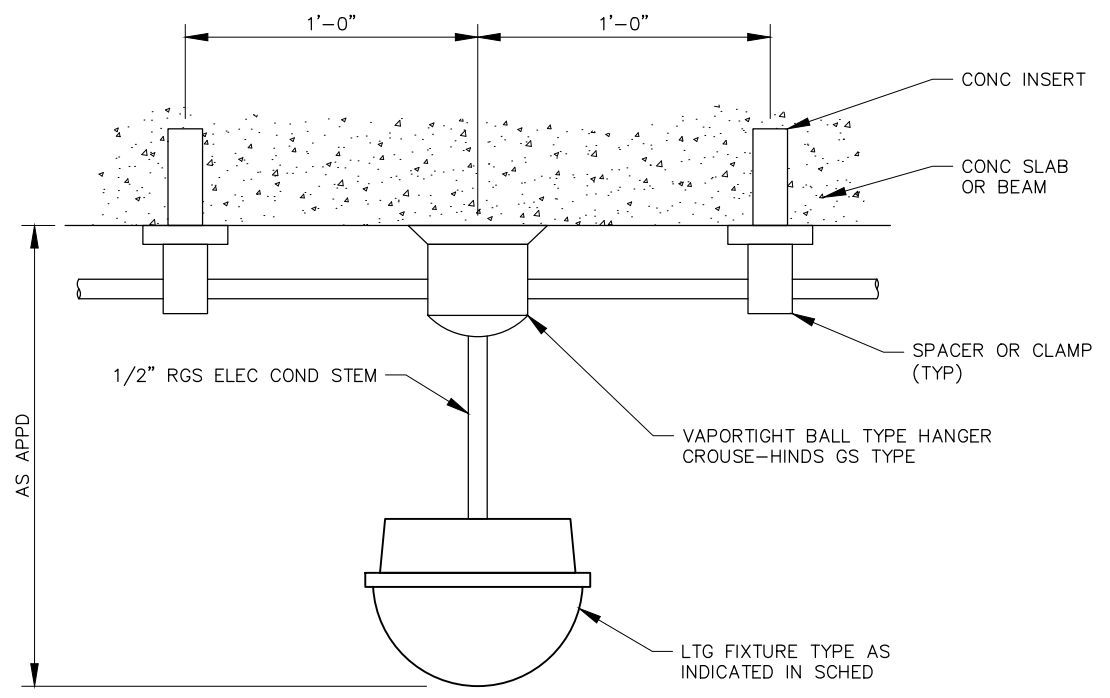
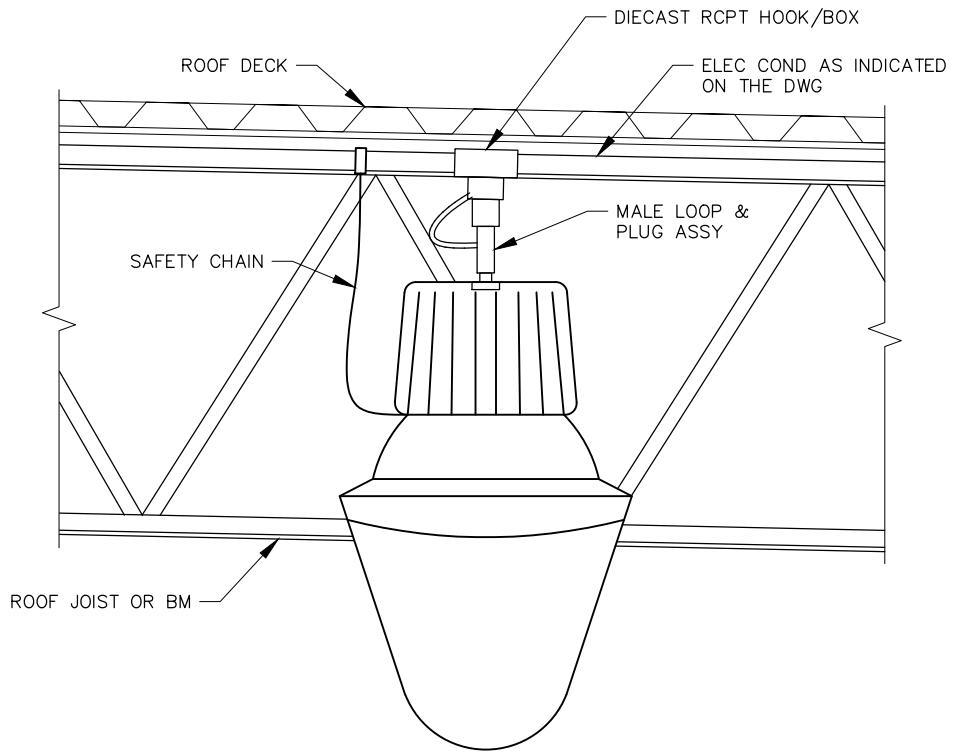
1. TYPE 3R ENCLOSURE, POWDER COATED ANSI 61 GREY, 12 GAUGE COLD ROLLED STEEL.
2. 5kVA RATED, 600A COPPER SILVER PLATED 1/4-INCH BY 4-INCHES COPPER BUS TYPICAL.
3. ADD BOTTOM ACCESS PANELS FOR POWER AND CONTROL HOOKUPS.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26505
GENERATOR JUNCTION BOX**



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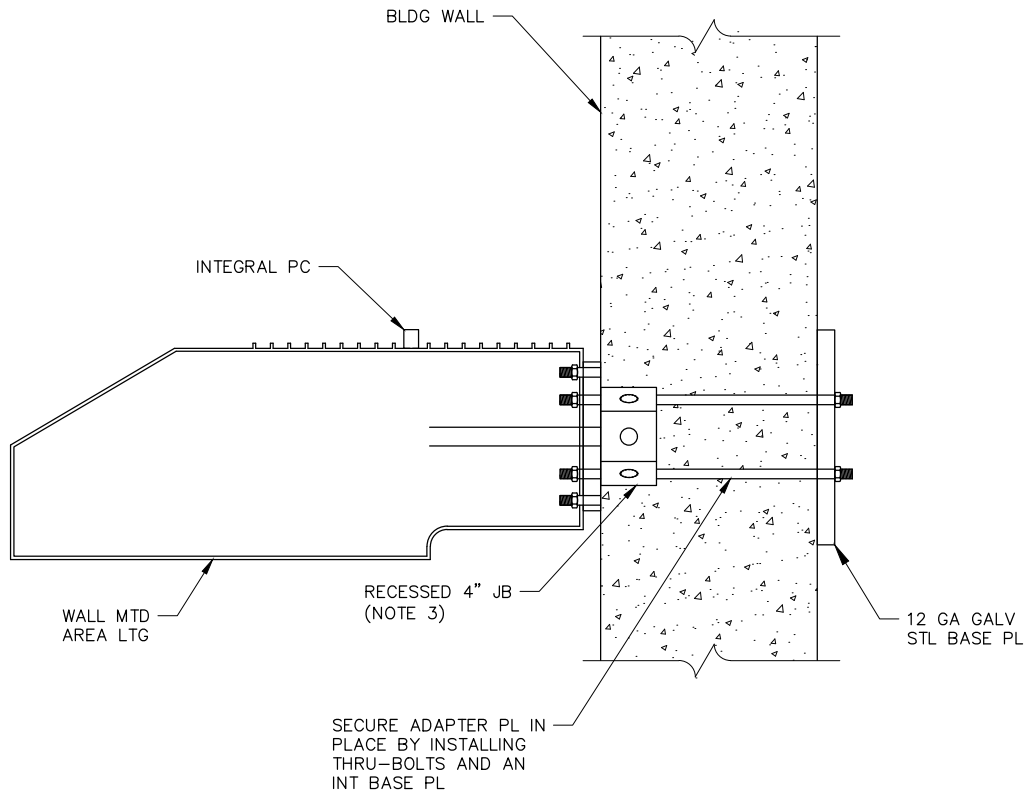


DRAWN BY: BERKNES
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26509
LOW-HIGH BAY LIGHT
FIXTURE INSTALLATION

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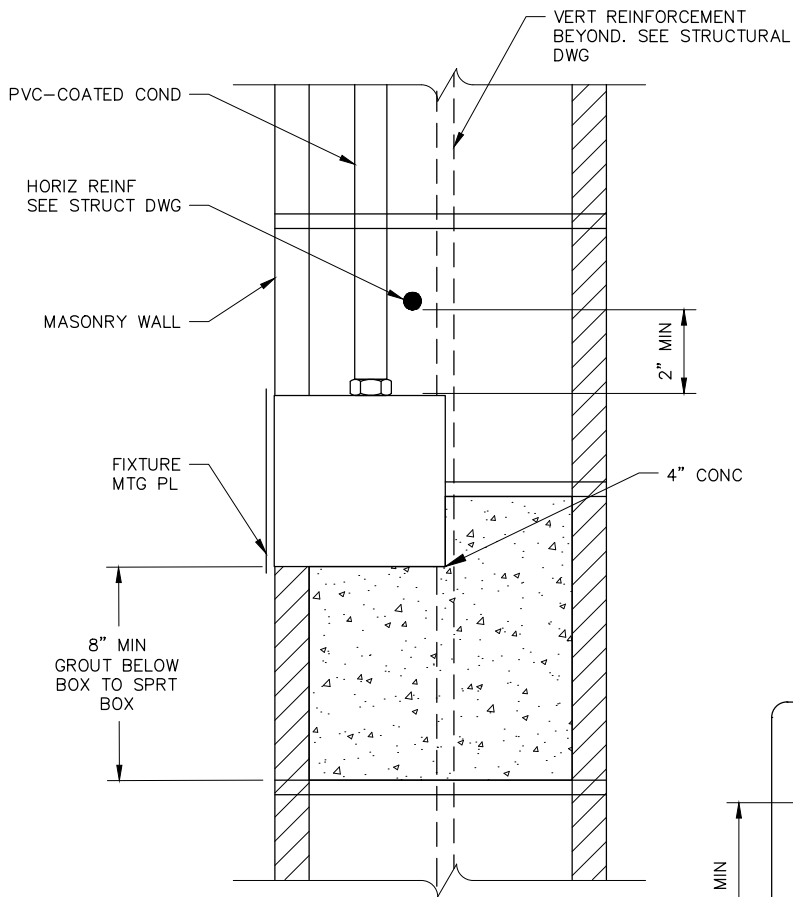
1. MOUNT LUMINAIRE NEAR LINE OF BUILDING.
2. DETAILS ARE TYPICAL. ACTUAL CONDITIONS MAY VARY. CONTRACTOR IS REQUIRED TO SUBMIT ALL DRAWINGS FOR APPROVAL BEFORE CONSTRUCTION.
3. JUNCTION BOX IN WALL MUST PROVIDE ADEQUATE FIXTURE SUPPORT.

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

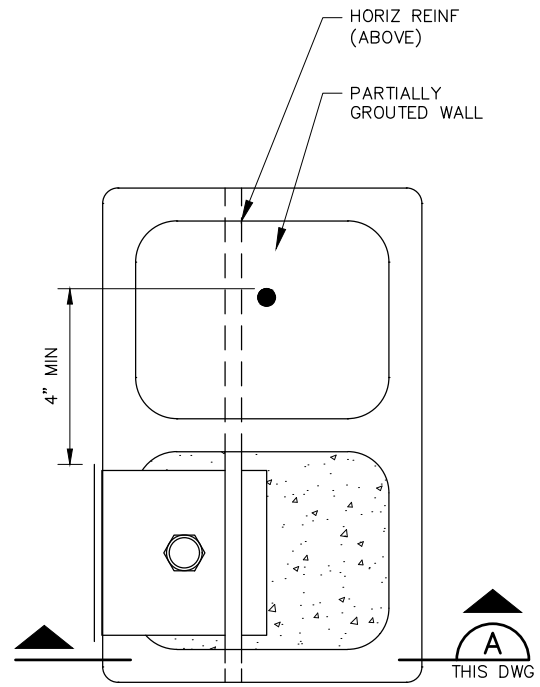
26511
WALL MOUNT AREA LIGHT



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SECTION A
THIS DWG



PLAN

NOTE:

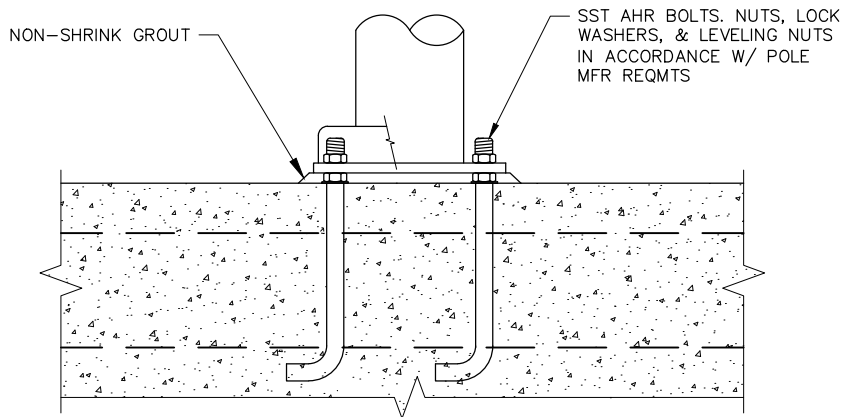
REFER TO STRUCTURAL DRAWING FOR ADDITIONAL GROUT REQUIREMENTS.

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

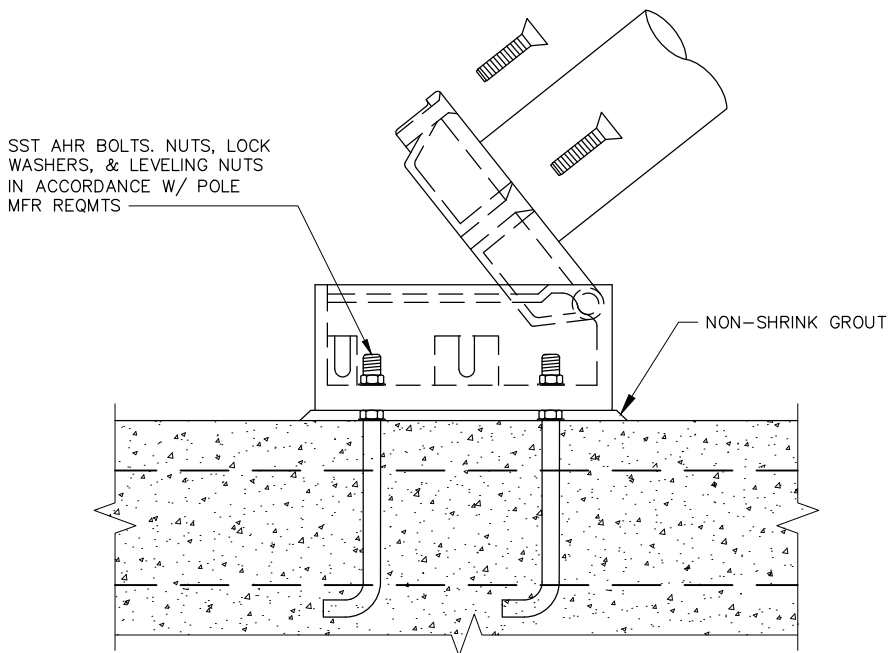
**26515
LIGHTING BOX IN
CONCRETE MASONRY
UNIT WALL**



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ONE-PIECE POLE



HINGED POLE

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

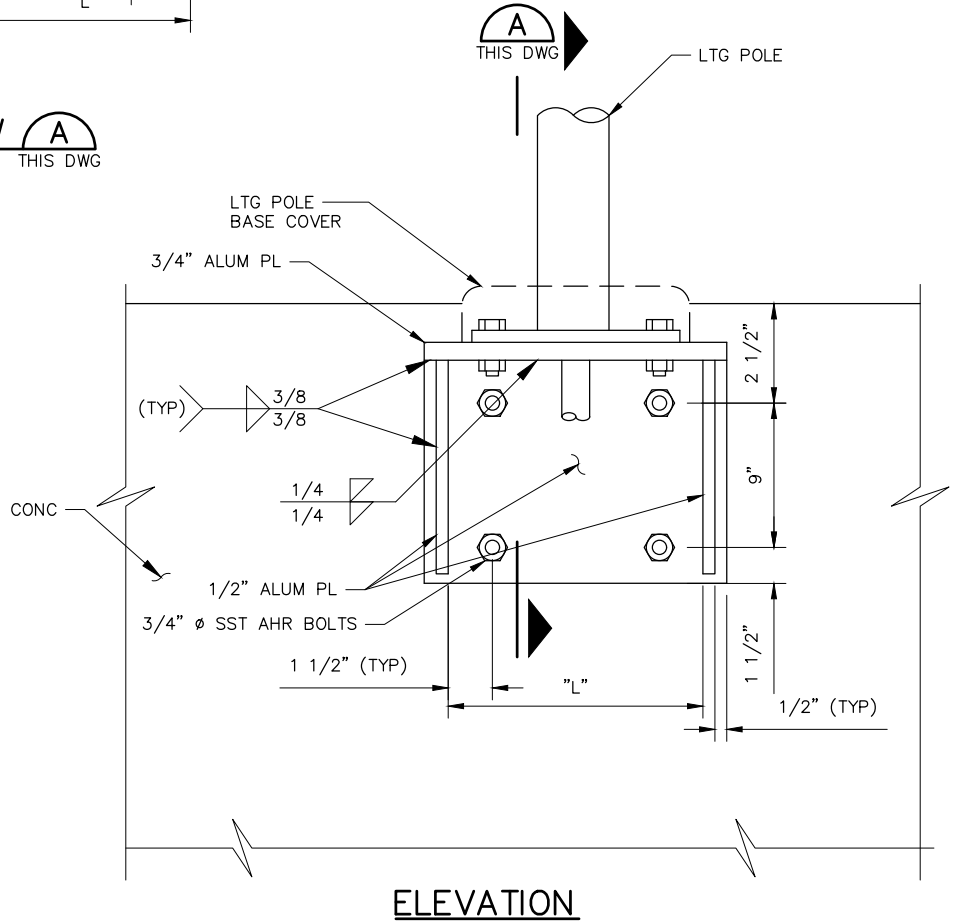
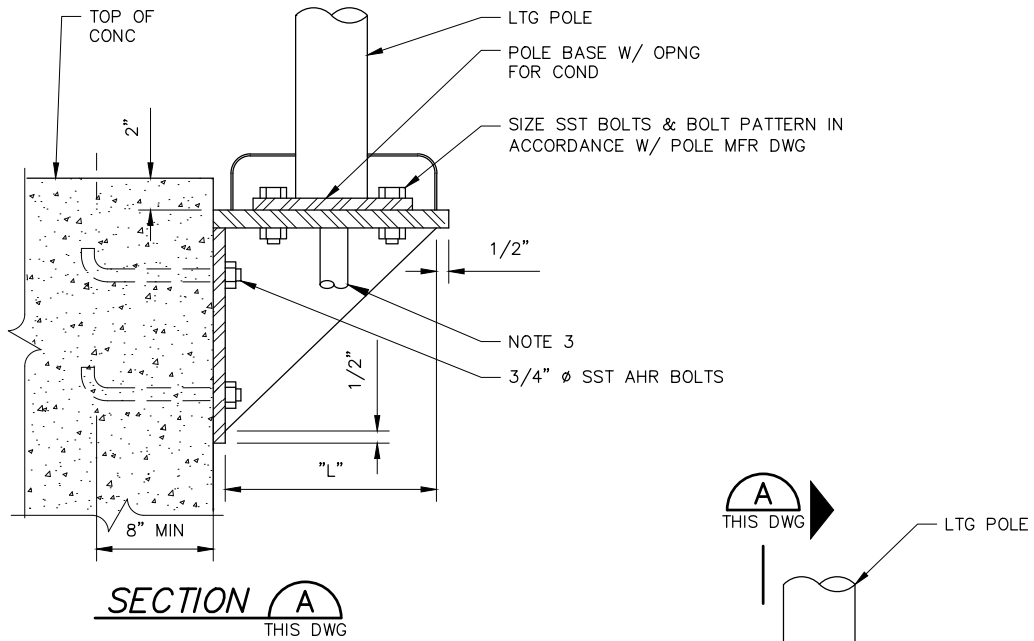
ORIGINATION DATE: JULY 2021

REVISION DATE:

26517
**ANCHOR BASE FOR LIGHT
 POLE MOUNTED ON SLAB**



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NOTES:

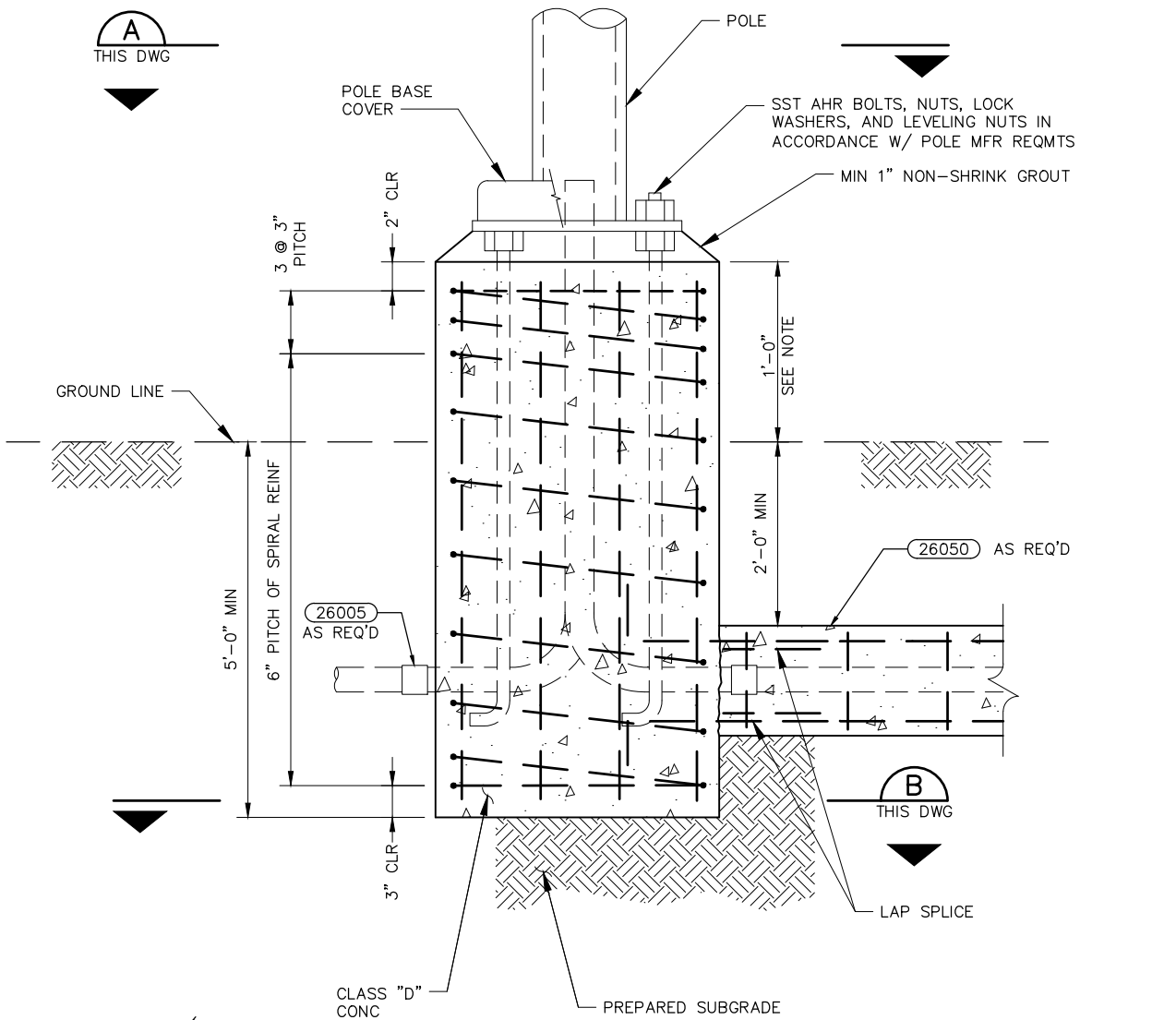
1. COAT ALUMINUM SURFACES IN CONTACT WITH CONCRETE IN ACCORDANCE WITH SPECIFICATIONS.
2. "L" = LARGER OF EITHER OUTSIDE DIAMETER OF LIGHT POLE BASE (BASE COVER IF USED) PLUS 1 INCH OR 12 INCHES.
3. SEE ELECTRICAL DRAWING FOR CONDUIT ROUTING. PROVIDE HOLE IN BRACKET TOP PLATE WITH HOLE DIAMETER EQUAL TO CONDUIT OUTSIDE DIAMETER PLUS 1/2 INCH.

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

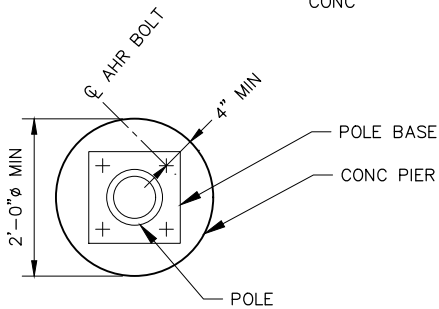
**26519
LIGHT POLE BRACKET
ON CONCRETE**

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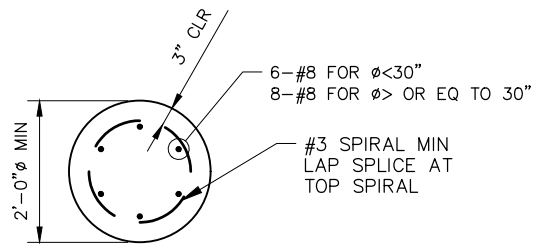
A
THIS DWG



ELEV



SECTION A
NO SCALE THIS DWG



SECTION B
NO SCALE THIS DWG

NOTE:

IN TRAFFIC AREAS CONCRETE PIER SHALL BE 3 FEET ABOVE GRADE MINIMUM.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26525
LIGHT POLE FOUNDATION**



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WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

0'-5" Arc Flash Boundary
0.2 cal/cm² Incident Energy Arc Flash Hazard at 18 Inches

Recommended Protection

Protective clothing, nonmelting or untreated fiber; Long-sleeve shirt and pants or coverall;
Face shield for projectile protection (AN); Safety glasses or safety goggles (SR);
Heavy-duty leather gloves, or rubber insulating gloves with leather protectors (AN);
AN: As needed, SR: Selection required.
Reference NFPA 70E 2018 Table 130.5(G) for Additional Details.

0.48 kV Shock Hazard when cover is removed - Class 0 Voltage Gloves
3'-6" Limited Approach
1'-0" Restricted Approach

Equipment Name and Label Number: SPLICE 1 AF TO COME

Fed by: DP5 MAIN

WARNING: Changes in the system configuration or equipment settings may invalidate the label values and PPE requirements.

Sep-18

NOTES:

1. LABEL VALUES, EQUIPMENT NAME, AF####, AND SOURCE FEED NAME SHALL BE AS DETERMINED BY THE ELECTRICAL SYSTEMS ANALYSIS AND ENGINEER.
2. LABELS SHALL MEET ANSI Z535 REQUIREMENTS INCLUDING ORANGE COLOR IN WARNING RECTANGLE, AND YELLOW COLOR IN TRIANGLE.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

REVISION DATE:

26700
ARC FLASH LESS THAN OR
EQUAL TO 1.2 cal/cm² LABEL



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WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

3'-11" Arc Flash Boundary
5.9 cal/cm² Incident Energy Arc Flash Hazard at 18 Inches

Recommended Protection

Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy; Long-sleeve shirt and pants or coverall or arc flash suit (SR); Arc-rated face shield and arc-rated balaclava or arc flash suit hood (SR); Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner) (AN); Heavy-duty leather gloves, arc-rated gloves, or rubber insulating gloves with leather protectors (SR); Hard hat; Safety glasses or safety goggles (SR); Hearing protection; Leather footwear.

AN: As needed, SR: Selection required.

Reference NFPA 70E 2018 Table 130.5(G) for Additional Details.

0.48 kV Shock Hazard when cover is removed - Class 0 Voltage Gloves
3'-6" Limited Approach
1'-0" Restricted Approach

Equipment Name and Label Number: RVS #1 AF1294

Fed by: F5-1L

WARNING: Changes in the system configuration or equipment settings may invalidate the label values and PPE requirements.

Sept-18

NOTES:

1. LABEL VALUES, EQUIPMENT NAME, AF####, AND SOURCE FEED NAME SHALL BE AS DETERMINED BY THE ELECTRICAL SYSTEMS ANALYSIS AND ENGINEER.
2. LABELS SHALL MEET ANSI Z535 REQUIREMENTS INCLUDING ORANGE COLOR IN WARNING RECTANGLE, AND YELLOW COLOR IN TRIANGLE.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

26701
ARC FLASH GREATER THAN
1.2 TO 12 cal/cm² LABEL



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WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

39'-3" Arc Flash Boundary
28.8 cal/cm² Incident Energy Arc Flash Hazard at 18 Inches

Recommended Protection

Arc-rated clothing with an arc rating equal to or greater than the estimated incident energy; Long-sleeve shirt and pants or coverall or arc flash suit (SR); Arc-rated arc flash suit hood; Arc-rated outerwear (e.g., jacket, parka, rainwear, hard hat liner) (AN); Arc-rated gloves or rubber insulating gloves with leather protectors (SR); Hard hat; Safety glasses or safety goggles (SR); Hearing protection; Leather footwear.

AN: As needed, SR: Selection required.

Reference NFPA 70E 2018 Table 130.5(G) for Additional Details.

13.2 kV Shock Hazard when cover is removed - Class 2 Voltage Gloves
5'-0" Limited Approach
2'-2" Restricted Approach

Equipment Name and Label Number: DS-4 AF1285

Fed by: DP-3 AF1219

WARNING: Changes in the system configuration or equipment settings may invalidate the label values and PPE requirements.

Sep-18

NOTES:

1. LABEL VALUES, EQUIPMENT NAME, AF####, AND SOURCE FEED NAME SHALL BE AS DETERMINED BY THE ELECTRICAL SYSTEMS ANALYSIS AND ENGINEER.
2. LABELS SHALL MEET ANSI Z535 REQUIREMENTS INCLUDING ORANGE COLOR IN WARNING RECTANGLE, AND YELLOW COLOR IN TRIANGLE.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

REVISION DATE:

26702
ARC FLASH GREATER THAN
12 TO 40 cal/cm² LABEL



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WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

39'-11" Arc Flash Boundary
150.5 cal/cm² Incident Energy Arc Flash Hazard at 18 Inches

Recommended Protection

Do Not Work on Energized Equipment

0.48 kV Shock Hazard when cover is removed

Do Not Remove Cover if Equipment is Energized

Equipment Name and Label Number: SWGR1 S2 AF1276

Fed by: 52-G1 AF1441

WARNING: Changes in the system configuration or equipment settings may invalidate the label values and PPE requirements.

Sep-18

NOTES:

1. LABEL VALUES, EQUIPMENT NAME, AF####, AND SOURCE FEED NAME SHALL BE AS DETERMINED BY THE ELECTRICAL SYSTEMS ANALYSIS AND ENGINEER.
2. LABELS SHALL MEET ANSI Z535 REQUIREMENTS INCLUDING ORANGE COLOR IN WARNING RECTANGLE, AND YELLOW COLOR IN TRIANGLE.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

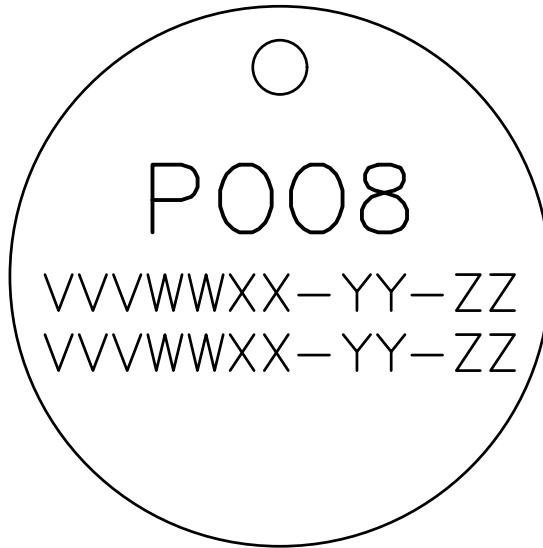
ORIGINATION DATE: JULY 2021

REVISION DATE:

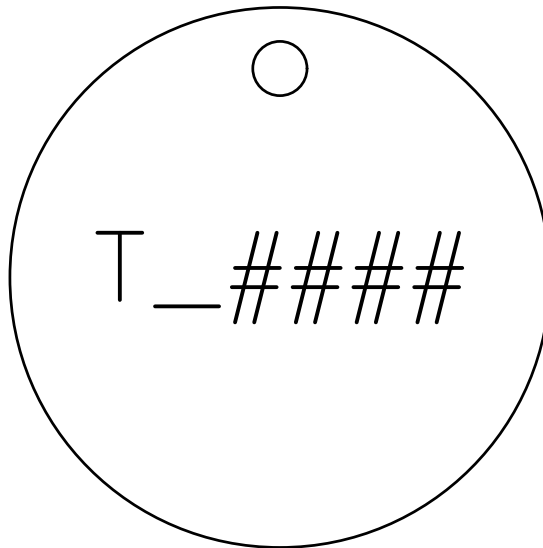
26703
ARC FLASH ABOVE
40 cal/cm² LABEL



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CONDUIT ID



TEST STATION ID

NOTES:

TEXT: 0.188 INCH HEADER
0.11 INCH TEXT
TEXT CENTERED ON TAG

TAG: 0.125 INCH THICKNESS
LASER ENGRAVED STAINLESS STEEL
1.5 INCH DIAMETER

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

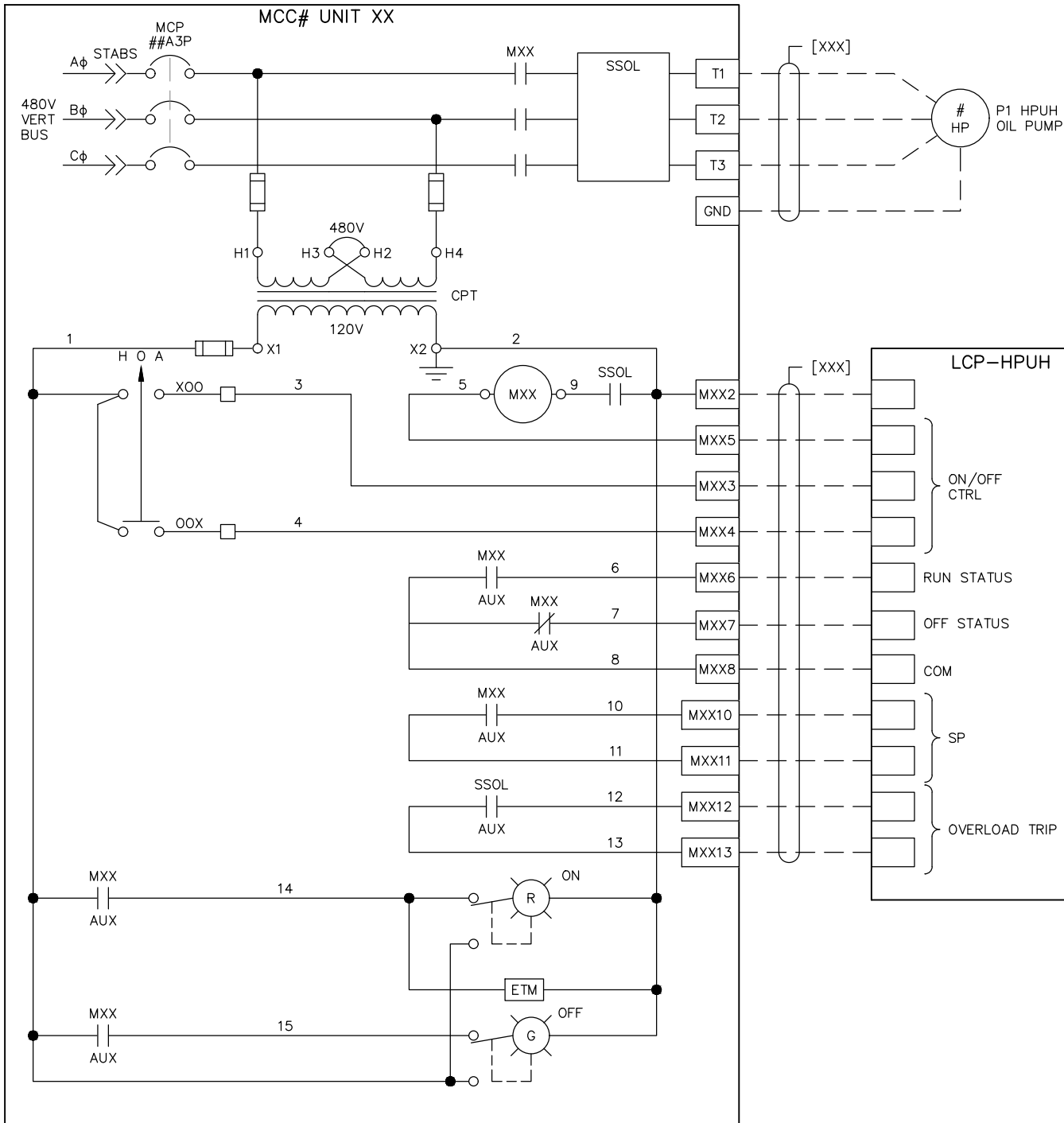
ORIGINATION DATE: JULY 2021

REVISION DATE:

26706
CONDUIT AND TEST STATION
ID TAGS



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CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

26800

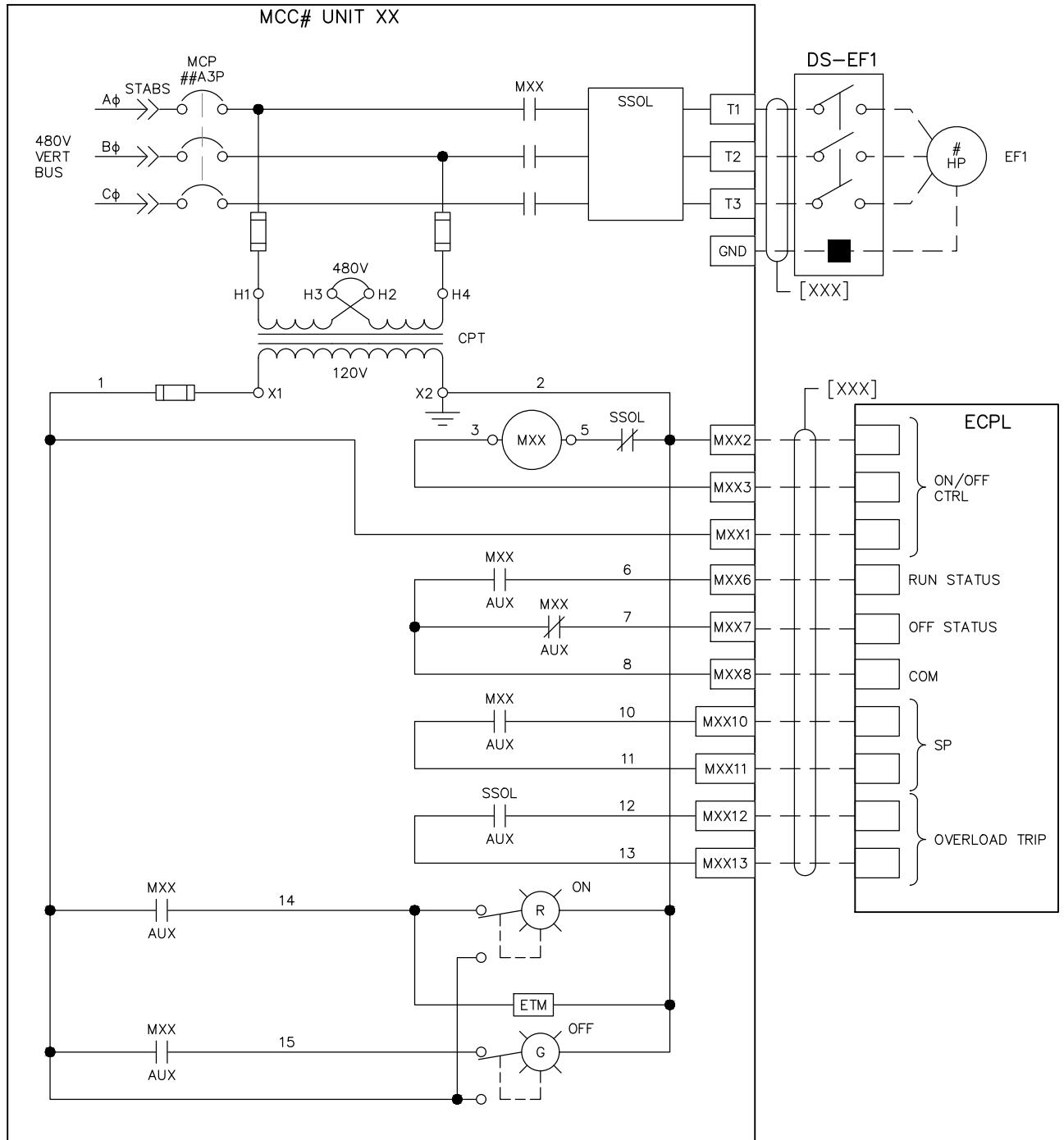
MOTOR CONTROL CENTER

UNIT CONTROL SCHEMATIC

TYPE 1

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CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

26801
 MOTOR CONTROL CENTER
 UNIT CONTROL
 SCHEMATIC TYPE 2



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PUMP
MTR NO 1
M15-01

##HP

[###]

T1
T2
T3

MC1

DV15-01

480VAC
60Hz
3PH

L1
L2
L3

[###]

L1
L2
L3

FEEDER CB

OVAC 120VAC

4

5

[###]

COMMON
60-120V

40

CLOSE

33

MAINTAIN

34

OPEN

35

(S3) LOCAL/REMOTE

10

11

(S1) 100% CLOSED

7

(S6) 10% OPEN

17

S5 HIGH TORQUE

16

S4 LOW BATTERY

12

14

13

MONITOR RELAY

42

42

S7 OVER TEMP

20

24

6

19

42

42

24

PLR

VOR

DVF

CVR

PLR

OVR

DVR

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

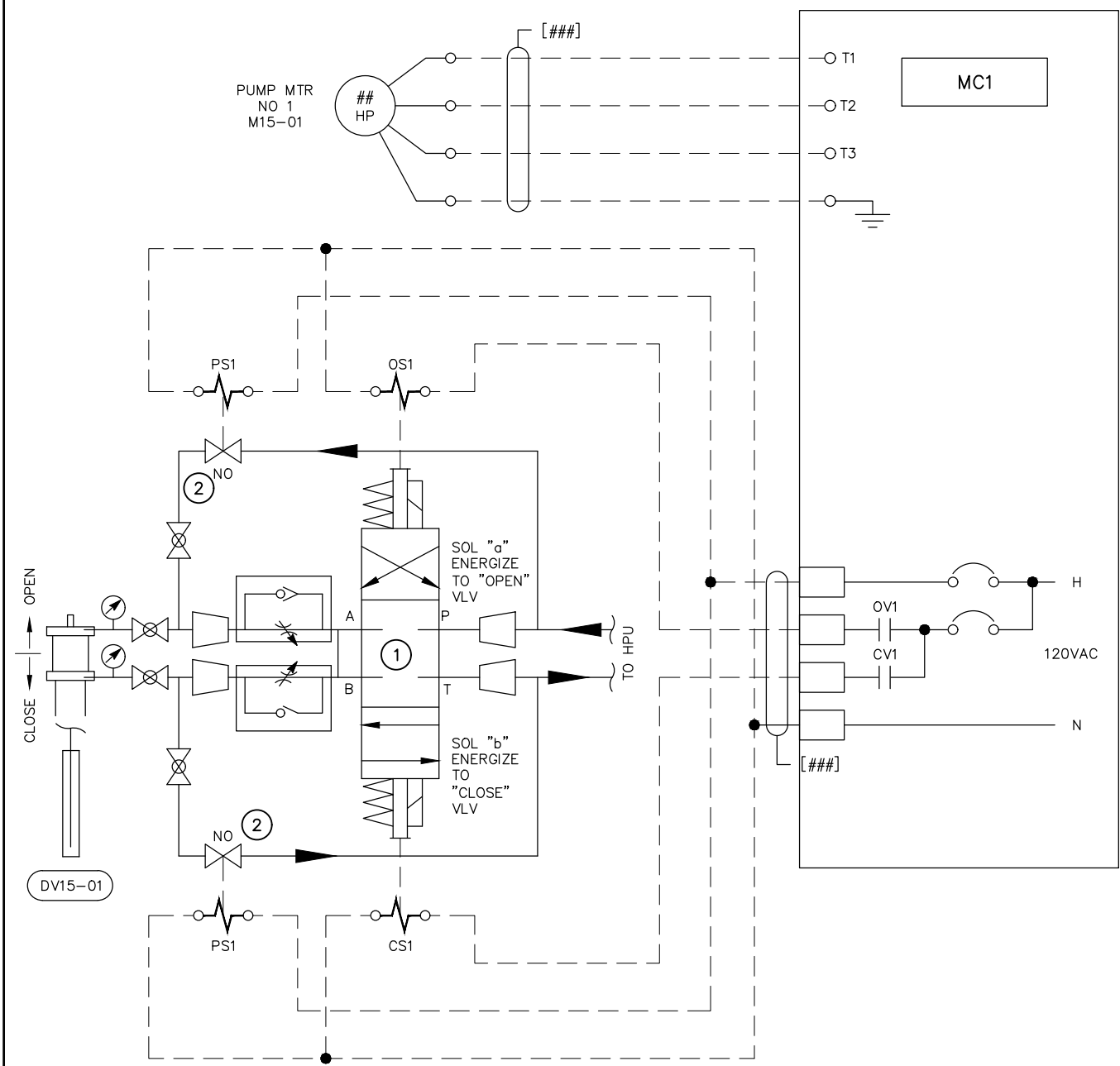
ORIGINATION DATE: JULY 2021

REVISION DATE:

26810
MOTOR CONTROLLER ELECTRIC
DISCHARGE VALVE CONTROL
SCHEMATIC

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KEYED NOTES:

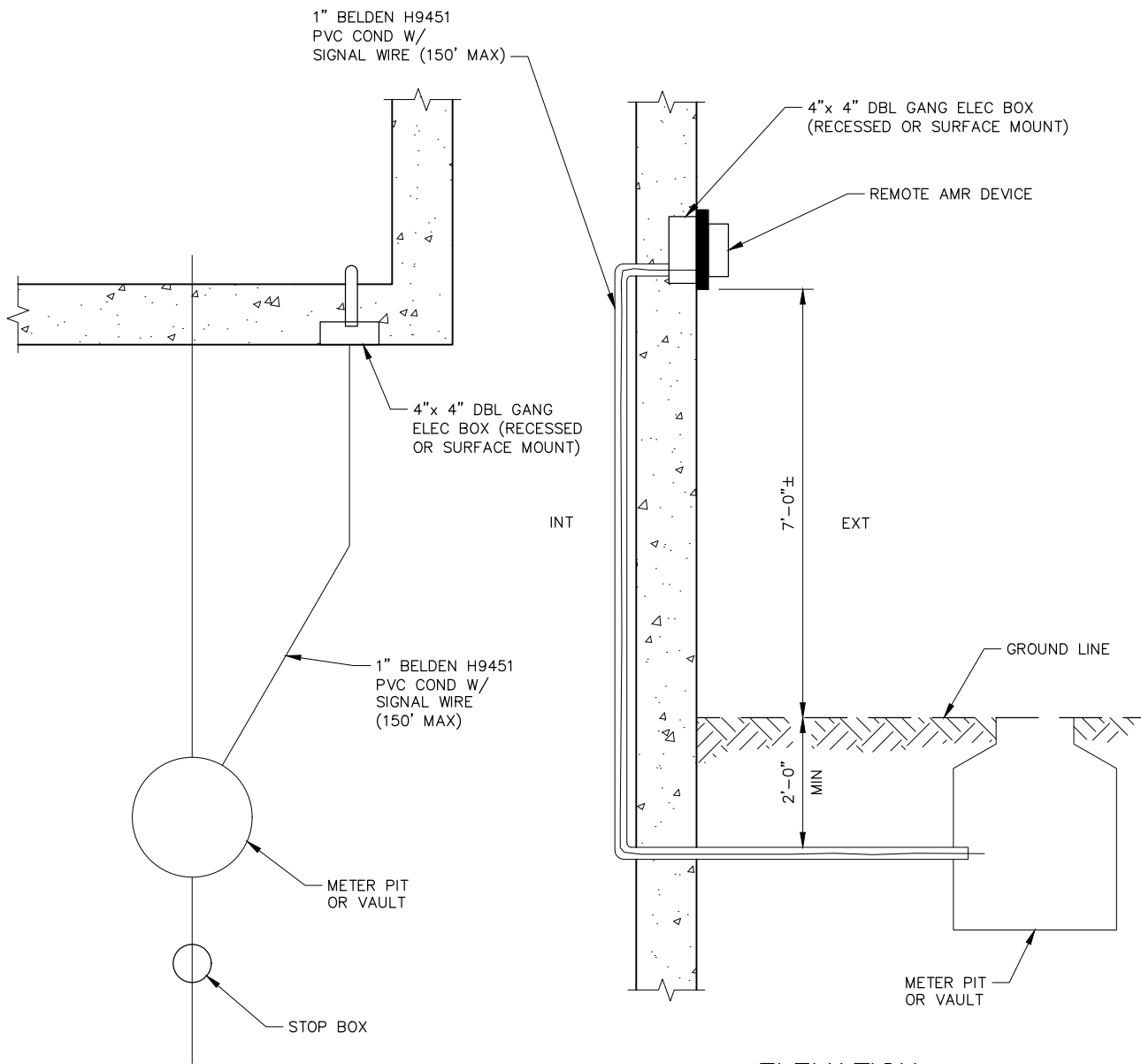
- ① VICKERS DG4S4-012C-BB-60 DIRECTIONAL CONTROL VALVE, 3-POSITION, 4-WAY, DOUBLE SOLENOID SPRING-CENTERED 120V/1 ϕ /60Hz
- ② ASCO 8210B059 SOLENOID VALVE, NORMALLY OPEN, 120V/1 ϕ ,60Hz

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

26811
MOTOR CONTROLLER
HYDRAULIC DISCHARGE VALVE
CONTROL SCHEMATIC

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PLAN

ELEVATION

NOTES:

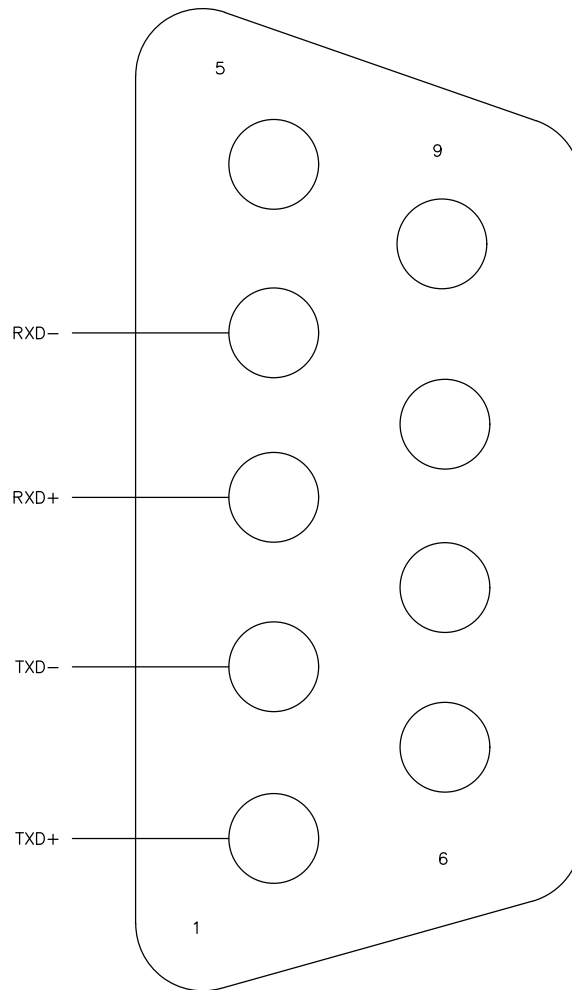
1. THIS DETAIL APPLIES TO OUTSIDE METER SETTINGS AS SHOWN AND TO INSIDE METER SETTINGS.
2. FOR COMPOUND METERS, INSTALL 2 ELECTRICAL BOXES SIDE-BY-SIDE. RUN 2 SIGNAL CABLES IN A SINGLE CONDUIT TO THE METER LOCATION.
3. THE AUTOMATIC METER READING DEVICE MAY BE MOUNTED ON A POST ADJACENT TO THE METER PIT/VAULT WITH DENVER WATER APPROVAL.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**26850
REMOTE AUTOMATIC METER
READING DEVICE
INSTALLATION**



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DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

REVISION DATE:

27010
RS-485 PIN LAYOUT



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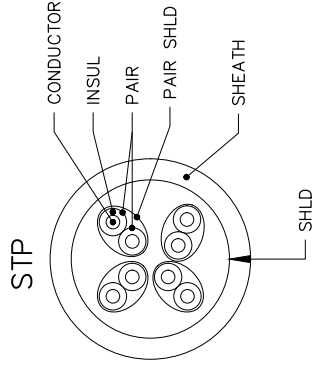
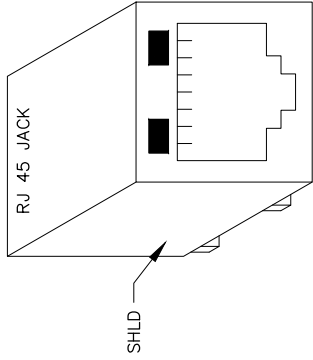
CHANNEL BANDWIDTH

DATA RATE	RECOMMENDED CATEGORY	CHANNEL CLASS	CHANNEL BANDWIDTH
10 Mb/s	Cat 5	Class C	16 MHz
100 Mb/s	Cat 5e or 6	Class D	100 MHz
1 Gb/s to 10Gb/s	Cat 6 and Cat 6a	Class E	250 MHz

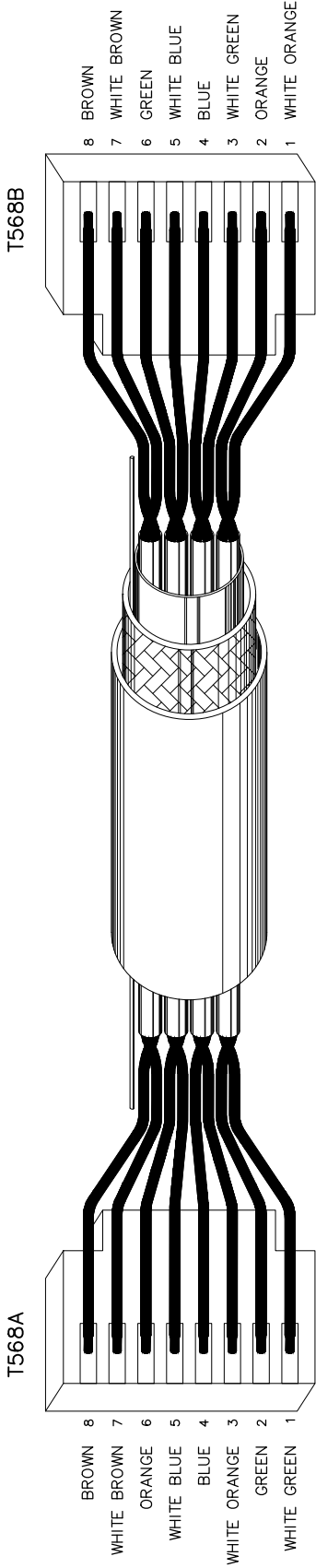
BEND RADIUS

SERVICE	BEND RADIUS	MAX PULL FORCE
CAT 5/5E UTP	8X THE OD OF THE CABLE	25LBS
CAT 5/5E STP	10X THE OD OF THE CABLE	25LBS
CAT 6 UTP	4X THE OD OF THE CABLE	25LBS
CAT 6 STP	4X THE OD OF THE CABLE	25LBS

• DO NOT EXCEED 270 DEGREES IN BENDS IN A CABLE.



CABLE LENGTH < 295 FEET



DRAWN BY: ROMERO
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

27012
ETHERNET CABLE
CONFIGURATION



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PROFIBUS DP CABLE SPECIFICATION TABLE:

BAUD RATE (kbaud)	9.6	19.2	93.75	187.5	500	1500	12000
MAXIMUM SEGMENT LENGTH (METERED)	1200m	1200m	1200m	1000m	400m	200m	100m
MAXIMUM SPUR LENGTH (METERED)	500m	500m	100m	33m	20m	6.6m	0m

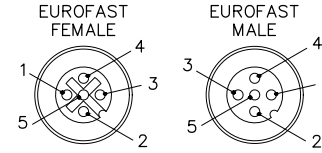
PIN ASSIGNMENT FOR DB9 (9-PIN SUB-D) CONNECTOR:

PIN NO	SIGNAL	SIGNIFICANCE
1	SHIELD	GROUND FOR +24V OUTPUT VOLTAGE
2	M24	SHIELD/FUNCTIONAL GROUND
3	RxD/TxD-P *	RECEIVE/TRANSMIT DATA - PLUS (B WIRE, RED)
4	CNTR-P	REPEATER CONTROL SIGNAL (DIRECTION CONTROL), RTS SIGNAL
5	DGND *	DATA GROUND (REFERENCE POTENTIAL FOR VP)
6	VP *	SUPPLY VOLTAGE - PLUS (P5V)
7	P24	OUTPUT VOLTAGE +24V
8	RxD/TxD-N *	RECEIVE/TRANSMIT DATA - MINUS (A WIRE, GREEN)
9	CNTR-N	REPEATER CONTROL SIGNAL (DIRECTION CONTROL)

* SIGNALS ARE MANDATORY AND MUST BE PROVIDED. OTHER SIGNALS ARE OPTIONAL.

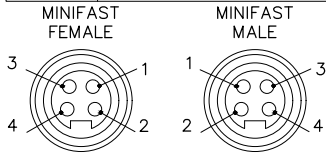
PIN ASSIGNMENT FOR (DP) EUROFAST CONNECTORS:

PIN NO	SIGNAL
1	N/C
2	TxD (A WIRE, GREEN)
3	N/C
4	RxD (B WIRE, RED)
5	SHIELD



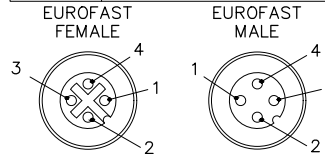
PIN ASSIGNMENT FOR (PA) MINIFAST CONNECTORS:

PIN NO	SIGNAL
1	+ VOLTAGE (BROWN)
2	N/C
3	- VOLTAGE (BLUE)
4	SHIELD



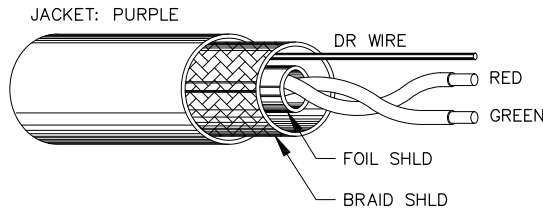
PIN ASSIGNMENT FOR (PA) EUROFAST CONNECTORS:

PIN NO	SIGNAL
1	+ VOLTAGE (BROWN)
2	N/C
3	- VOLTAGE (BLUE)
4	SHIELD

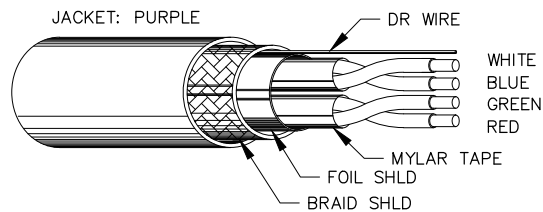


PROFIBUS PA CABLE SPECIFICATION TABLE: 31.25 kbaud

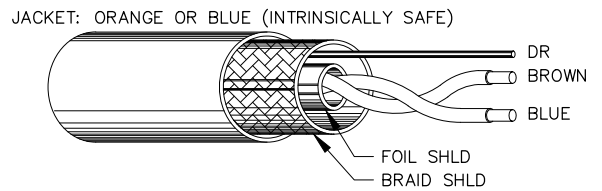
MAXIMUM SEGMENT LENGTH	MAXIMUM SPUR LENGTH				
	# OF DEVICES IN SEGMENT	1 DEVICE PER SPUR	2 DEVICES PER SPUR	3 DEVICES PER SPUR	4 DEVICES PER SPUR
1900m	25-32	1m	1m	1m	1m
	19-24	30m	1m	1m	1m
	15-18	60m	30m	1m	1m
	13-14	90m	60m	30m	1m
	1-12	120m	90m	60m	30m
860m (INTRINSICALLY SAFE)	N/A	N/A	N/A	N/A	N/A



PROFIBUS DP 2C CABLE: 0.335" OVERALL DIAMETER



PROFIBUS DP 4C CABLE: 0.38" OVERALL DIAMETER



PROFIBUS PA, A CABLE: 0.31" OVERALL DIAMETER

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

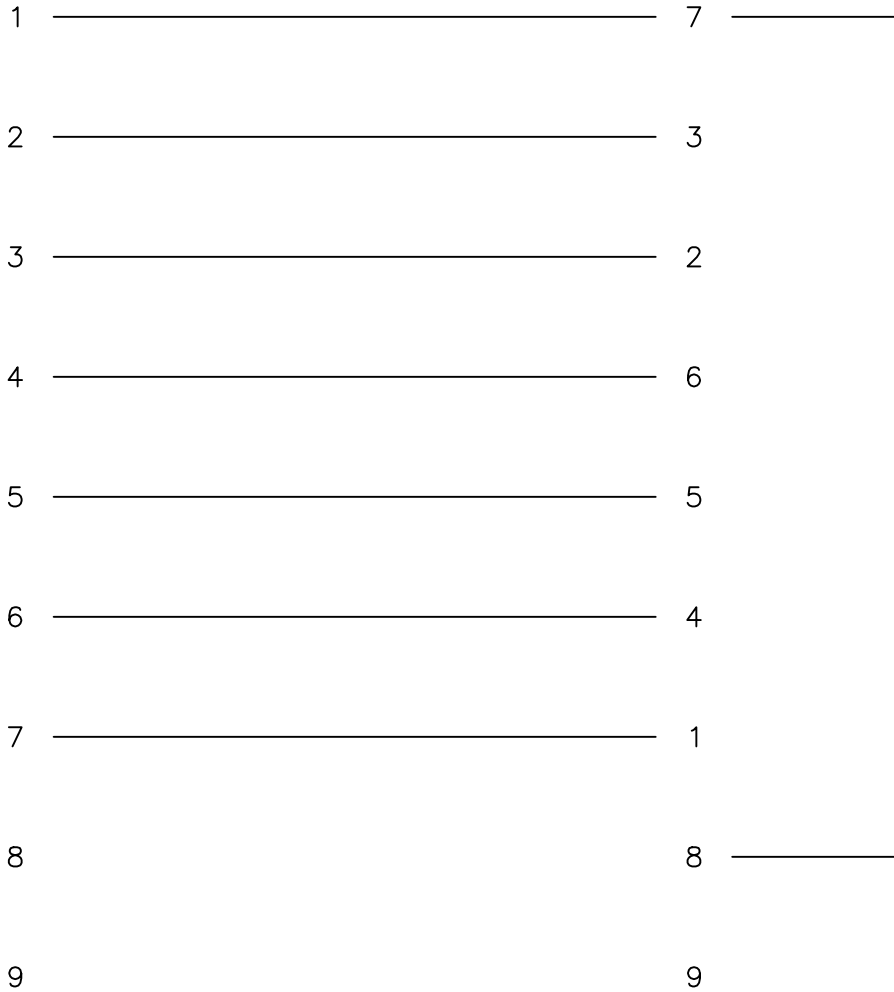
**27015
PROFIBUS CABLE
CONFIGURATION**



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PC OR
CONTROLWAVE
DB9 F

CONTROLWAVE
DB9 F



DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

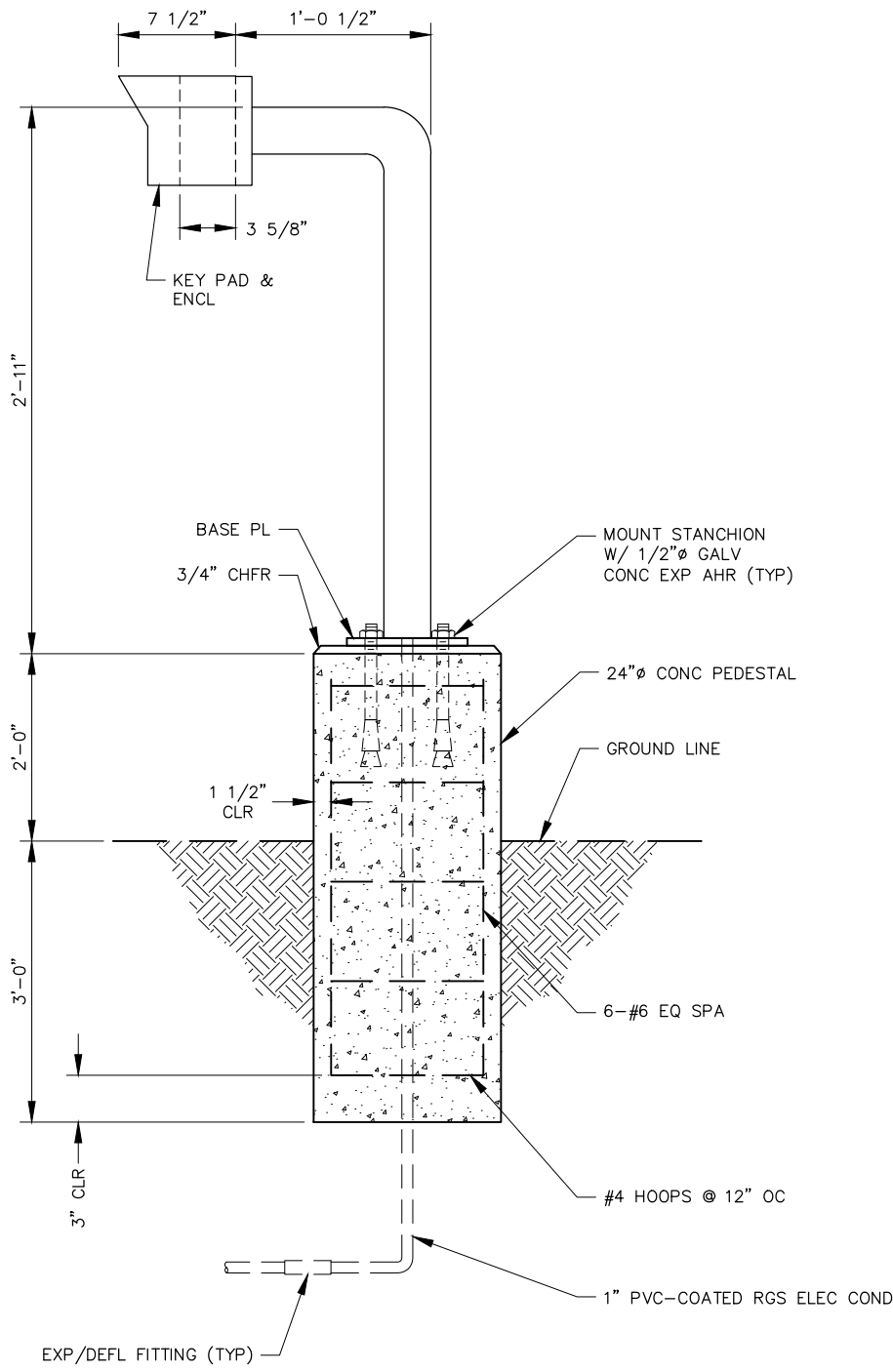
REVISION DATE:

27019

CONTROLWAVE FULL DUPLEX NULL
MODEM PERSONAL COMPUTER TO
PROGRAMMABLE LOGIC
CONTROLLER SERIAL COM CABLE



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DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

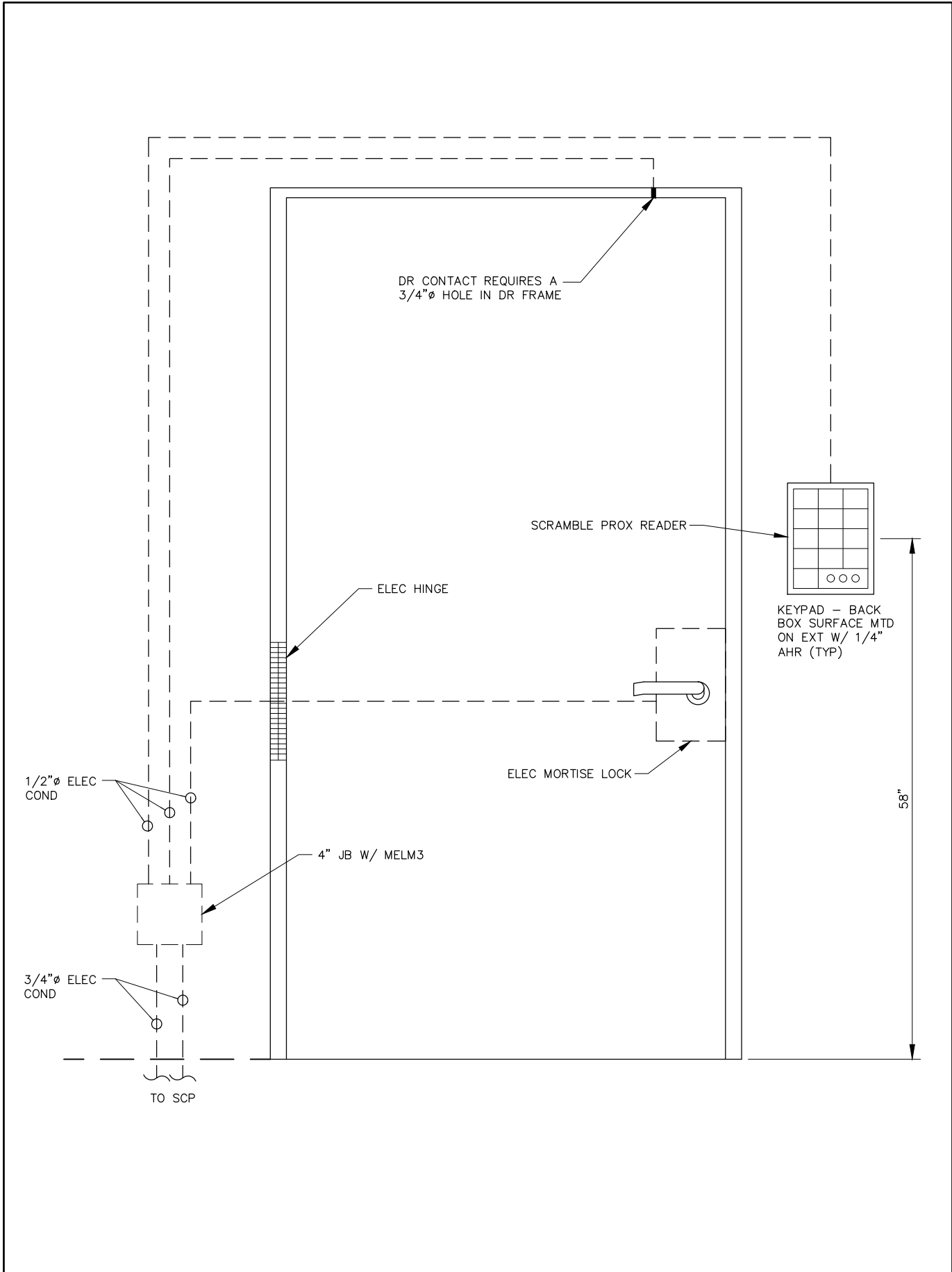
ORIGINATION DATE: JULY 2021

REVISION DATE:

28100 GATE SECURITY KEYPAD

D DENVER WATER

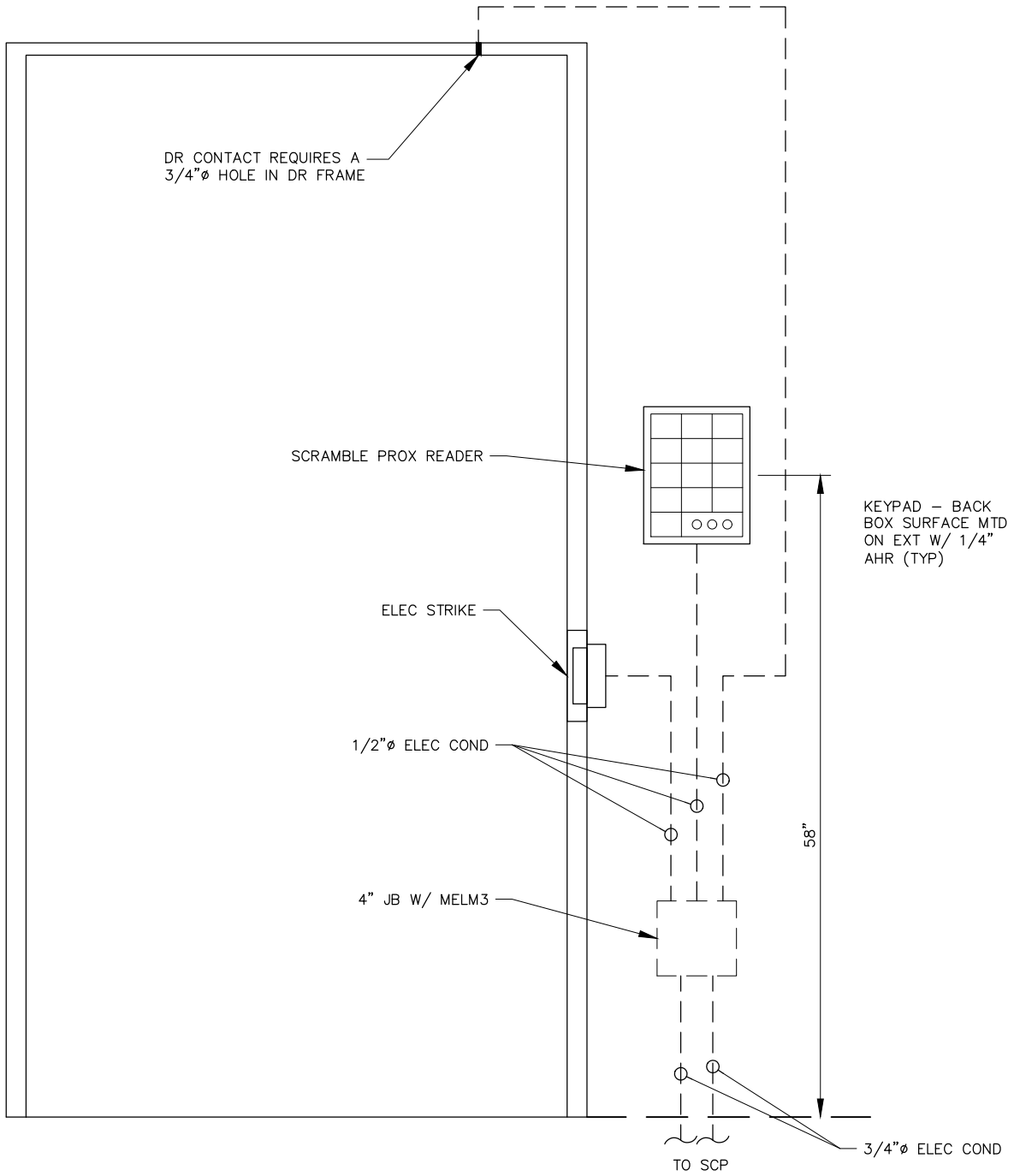
1600 West 12th Ave
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DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

28105
SECURITY-SECURITY
CONTROL PANEL DOOR


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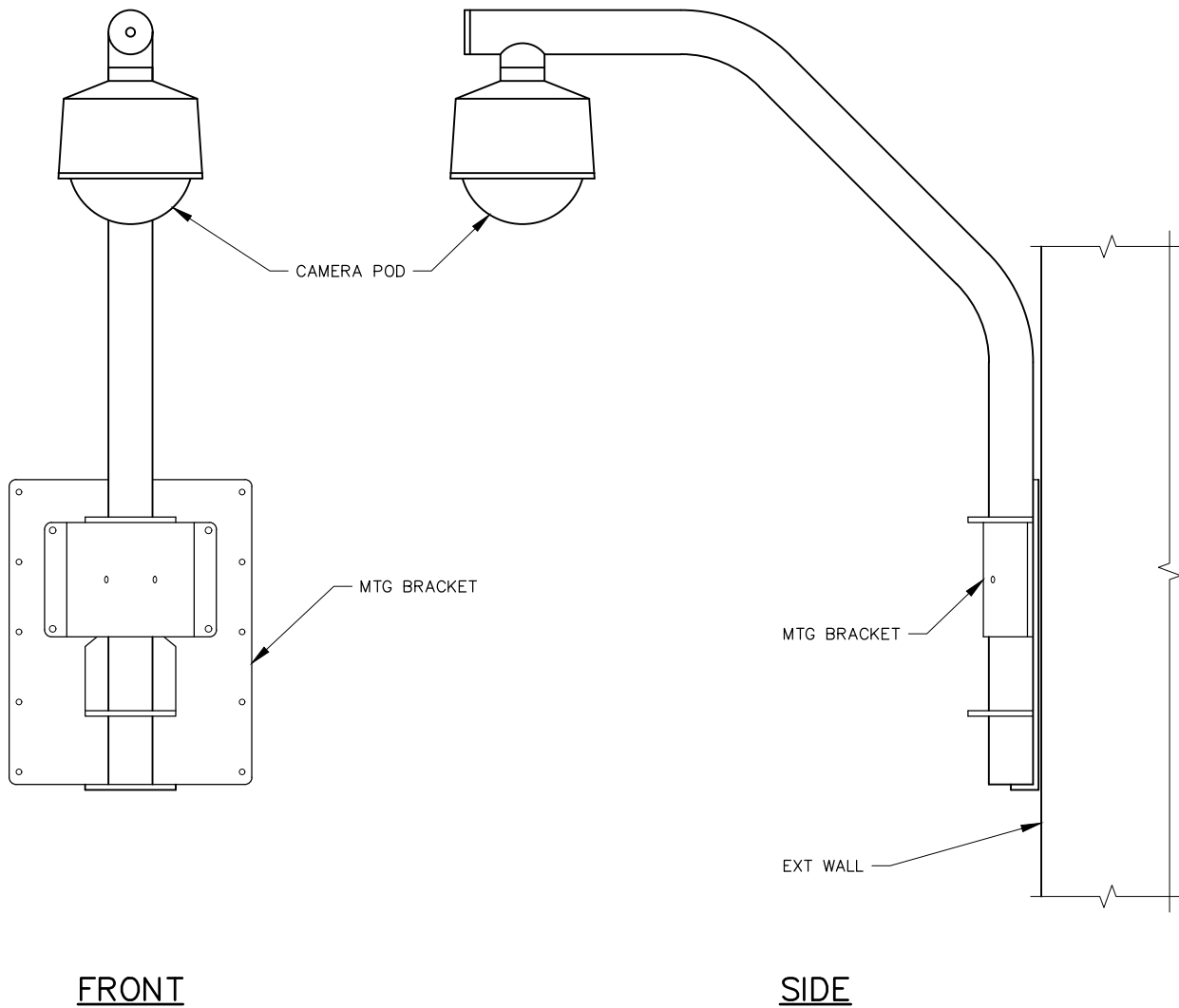


DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**28109
SECURITY DOOR WITH
ELECTRIC STRIKE**

D DENVER WATER

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NOTES:

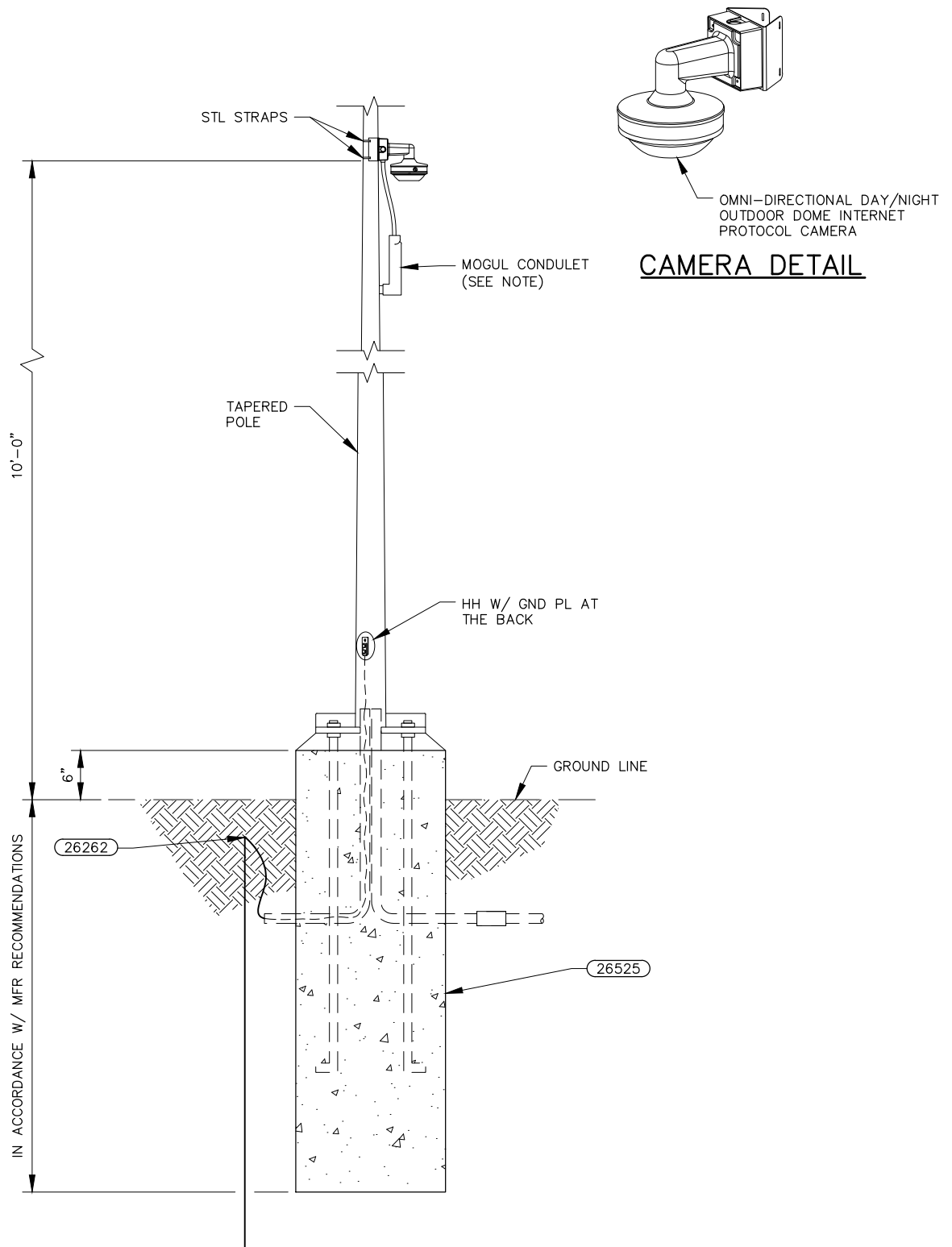
1. MOUNTED AT TOP OF WALL.
2. USE ANGLE BRACKET IF MOUNTED ON CORNER.

DRAWN BY: <i>BOWMAN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**28112
SECURITY CAMERA
WALL MOUNT**

D DENVER WATER

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NOTE:

INSTALL ETHERNET SURGE PROTECTOR INSIDE MOGUL CONDULET. CONNECT THE GROUND STRAP FROM SURGE PROTECTOR TO THE LIGHT POLE GROUND.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

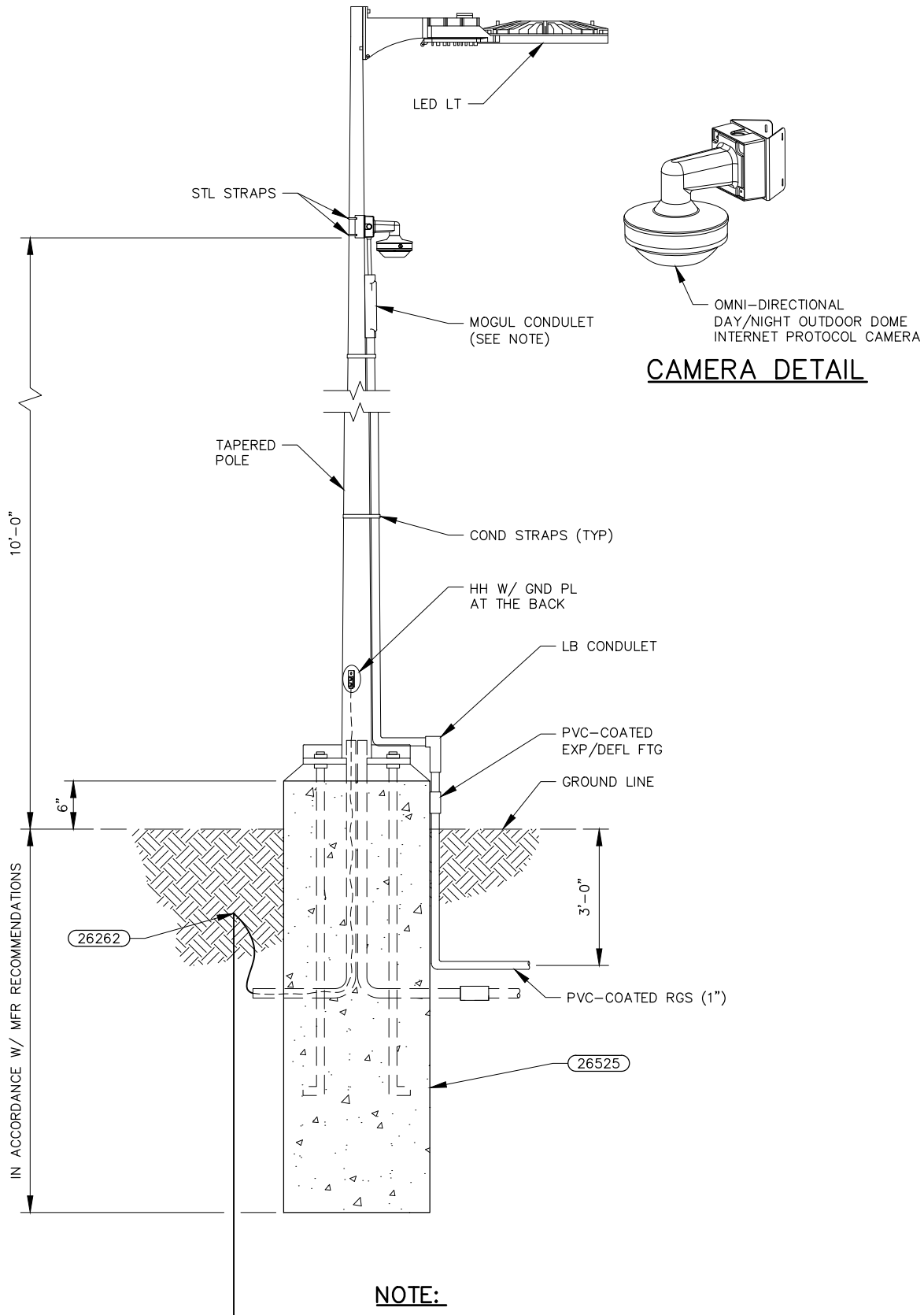
ORIGINATION DATE: JULY 2021

REVISION DATE:

**28113
OUTDOOR POLE MOUNTED
CAMERA**



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NOTE:

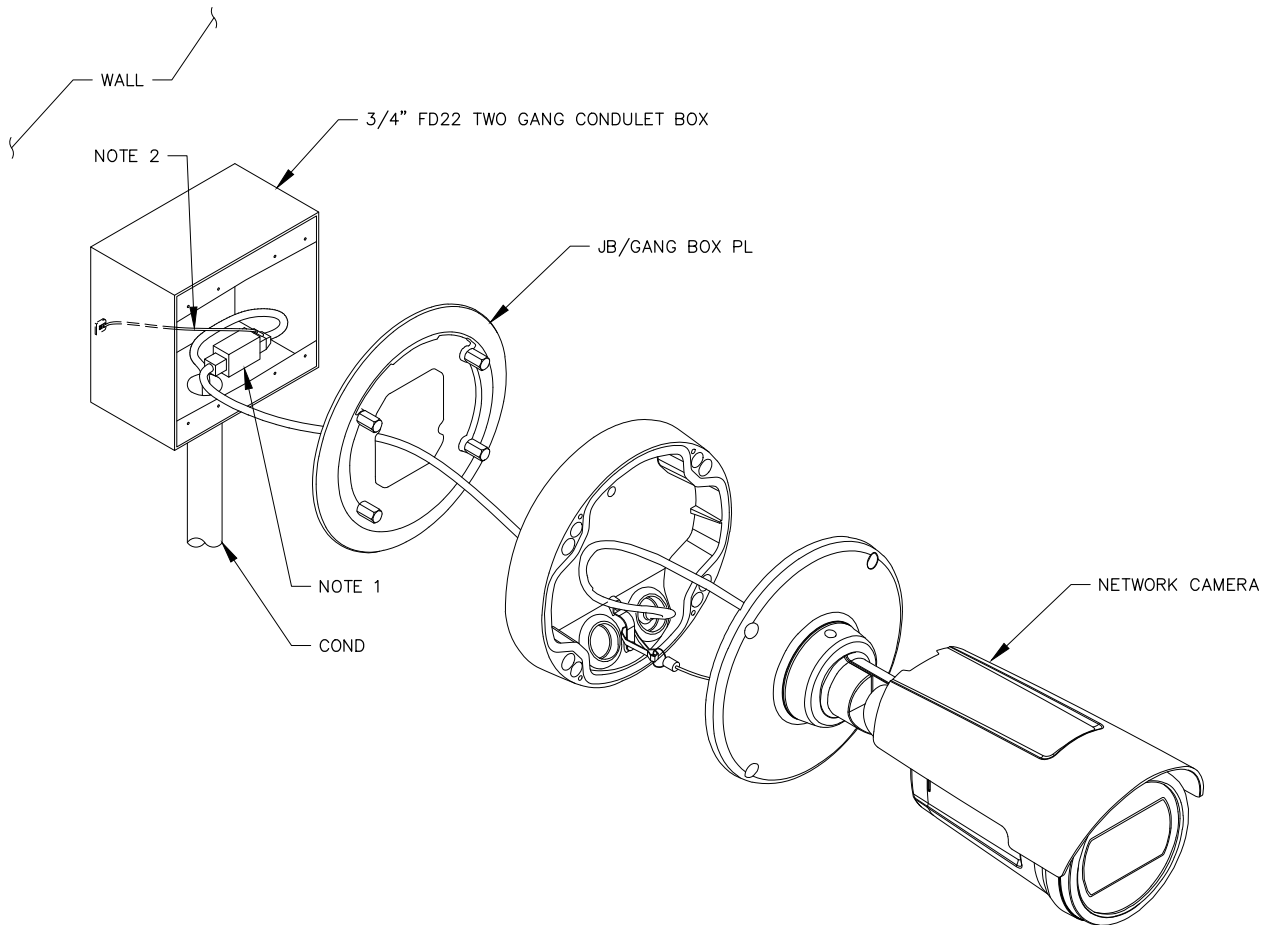
INSTALL ETHERNET SURGE PROTECTOR INSIDE MOGUL CONDULET. CONNECT THE GROUND STRAP FROM SURGE PROTECTOR TO THE LIGHT POLE GROUND.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**28114
OUTDOOR POLE MOUNTED
CAMERA WITH LED LIGHT**



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NOTES:

1. INLINE ETHERNET SURGE PROTECTOR CONNECTORS SHALL BE RJ45 10 BASE-T/100 BASE-TX PoE.
2. INLINE ETHERNET SURGE PROTECTOR AND RJ45 SHIELDS SHALL BE GROUNDED THROUGH RACEWAY SYSTEM AND FD BOX BY #14 AMERICAN WIRE GAUGE STRAND GROUND WITH COMPRESSION TERMINAL CONNECTOR.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

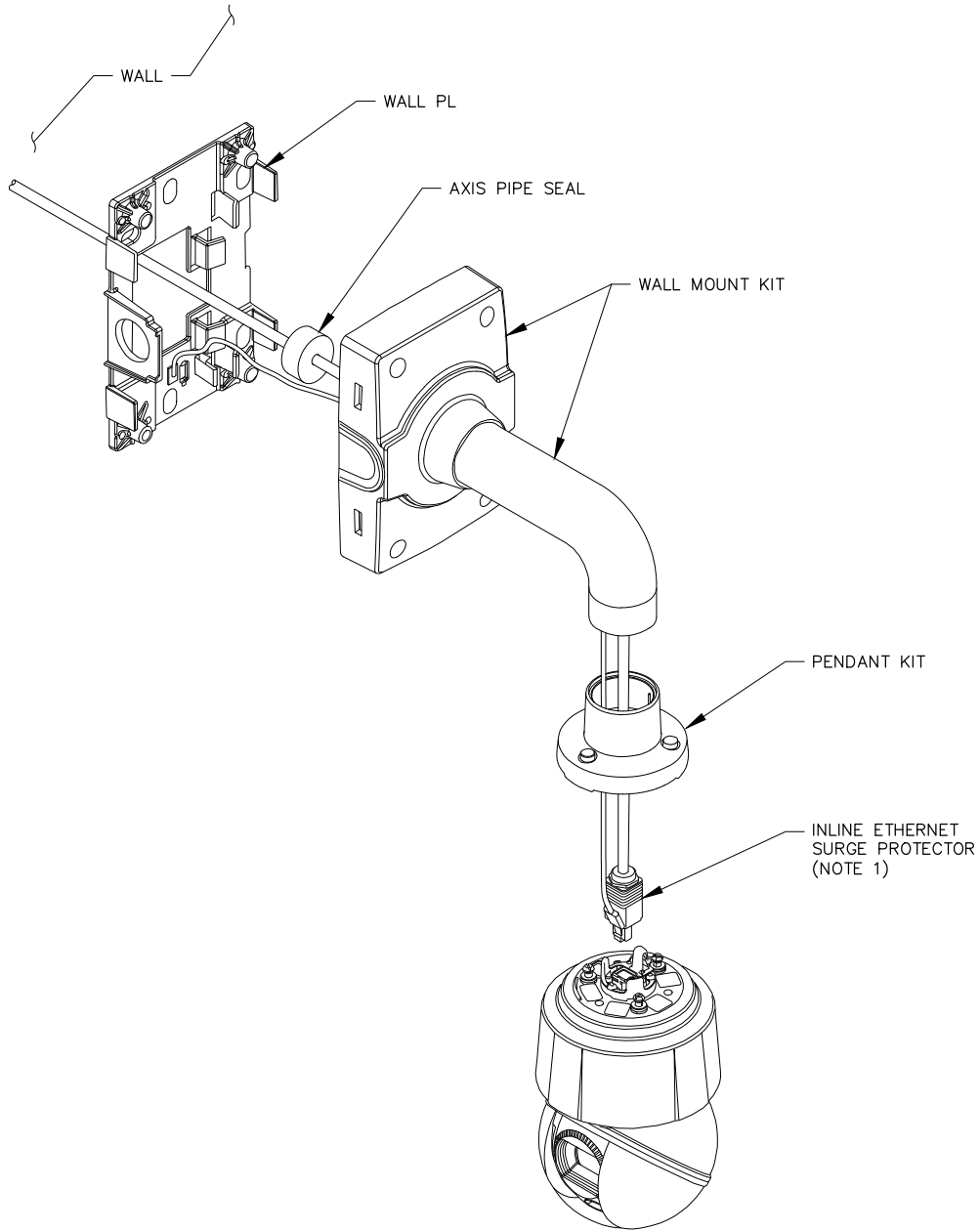
ORIGINATION DATE: JULY 2021

REVISION DATE:

**28115
INDOOR NETWORK CAMERA**



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NOTES:

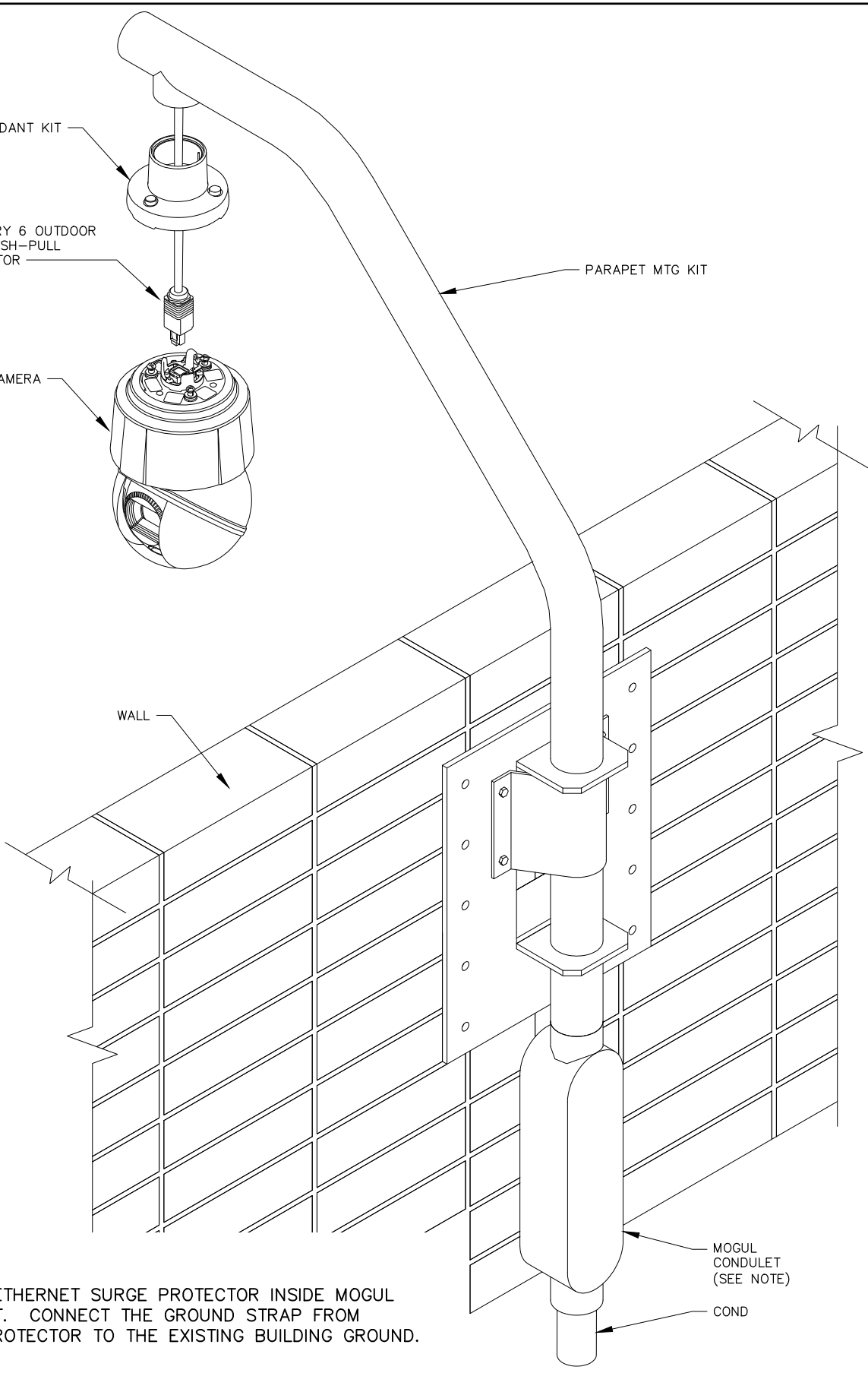
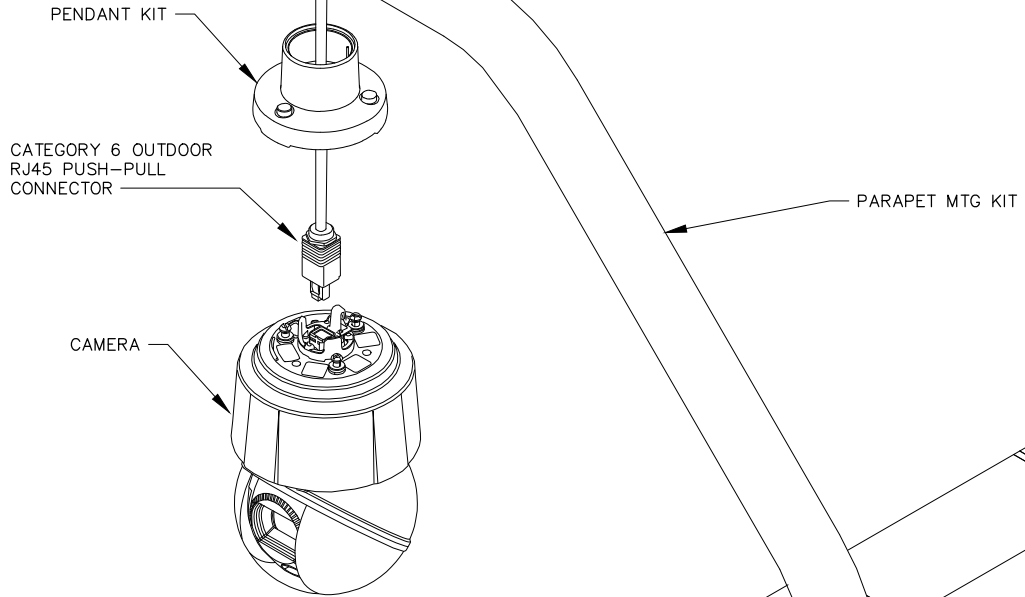
1. INLINE ETHERNET SURGE PROTECTOR CONNECTORS SHALL BE RJ45 10 BASE-T/100 BASE-TX PoE.
2. INLINE ETHERNET SURGE PROTECTOR AND RJ45 SHIELDS SHALL BE GROUNDED THROUGH RACEWAY SYSTEM AND FD BOX BY #14 AMERICAN WIRE GAUGE STRAND GROUND WITH COMPRESSION TERMINAL CONNECTOR.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**28116
OUTDOOR WALL MOUNTED
CAMERA**



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NOTE:

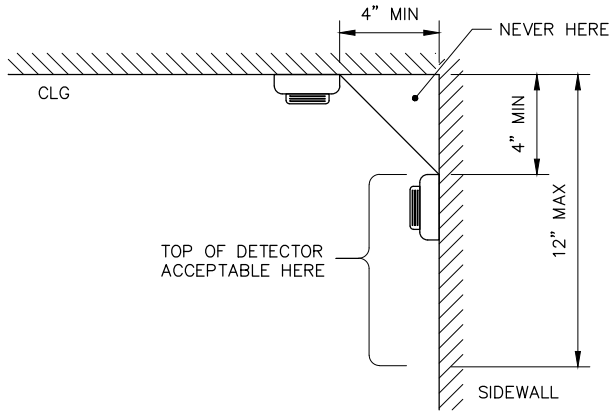
INSTALL ETHERNET SURGE PROTECTOR INSIDE MOGUL CONDULET. CONNECT THE GROUND STRAP FROM SURGE PROTECTOR TO THE EXISTING BUILDING GROUND.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

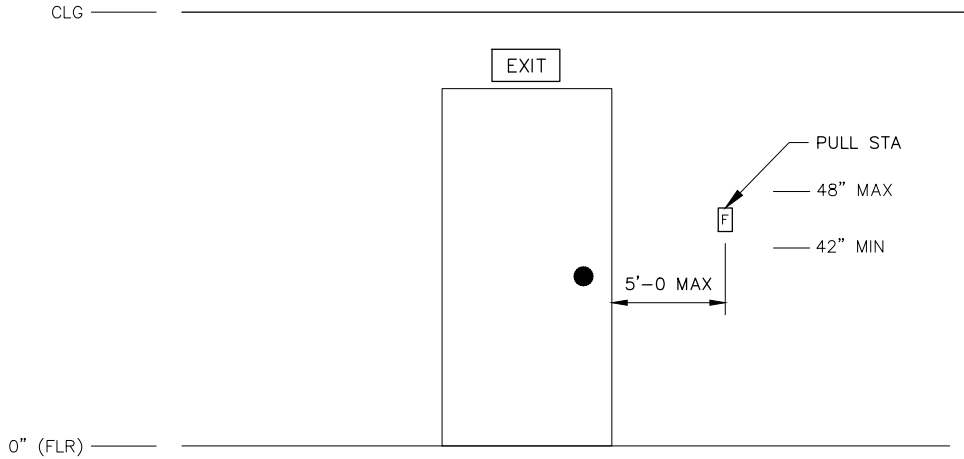
**28117
PARAPET MOUNTED OUTDOOR
CAMERA**

D DENVER WATER

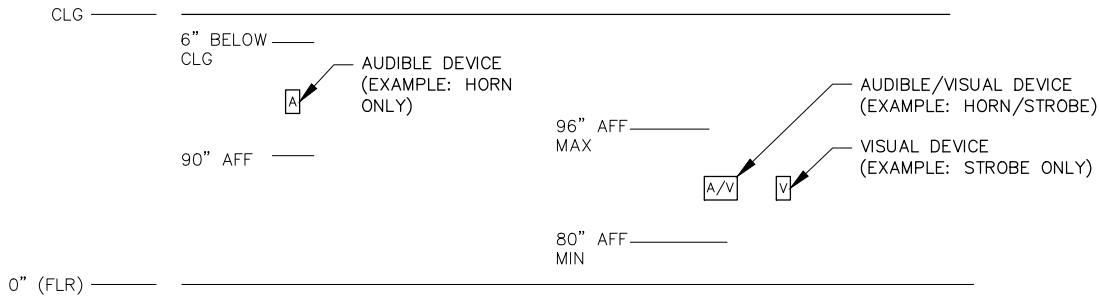
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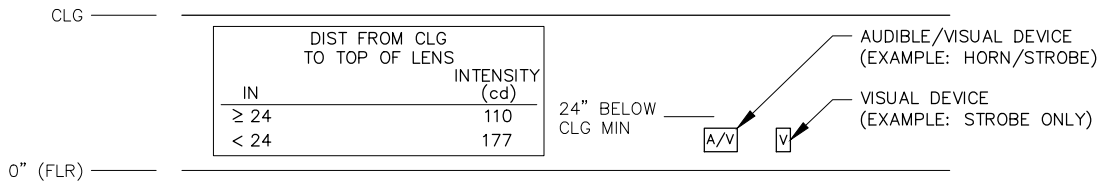
TYPICAL DEVICE MOUNTING FOR DETECTORS



TYPICAL DEVICE MOUNTING FOR PULL STATION



TYPICAL DEVICE MOUNTING FOR NOTIFICATION DEVICES



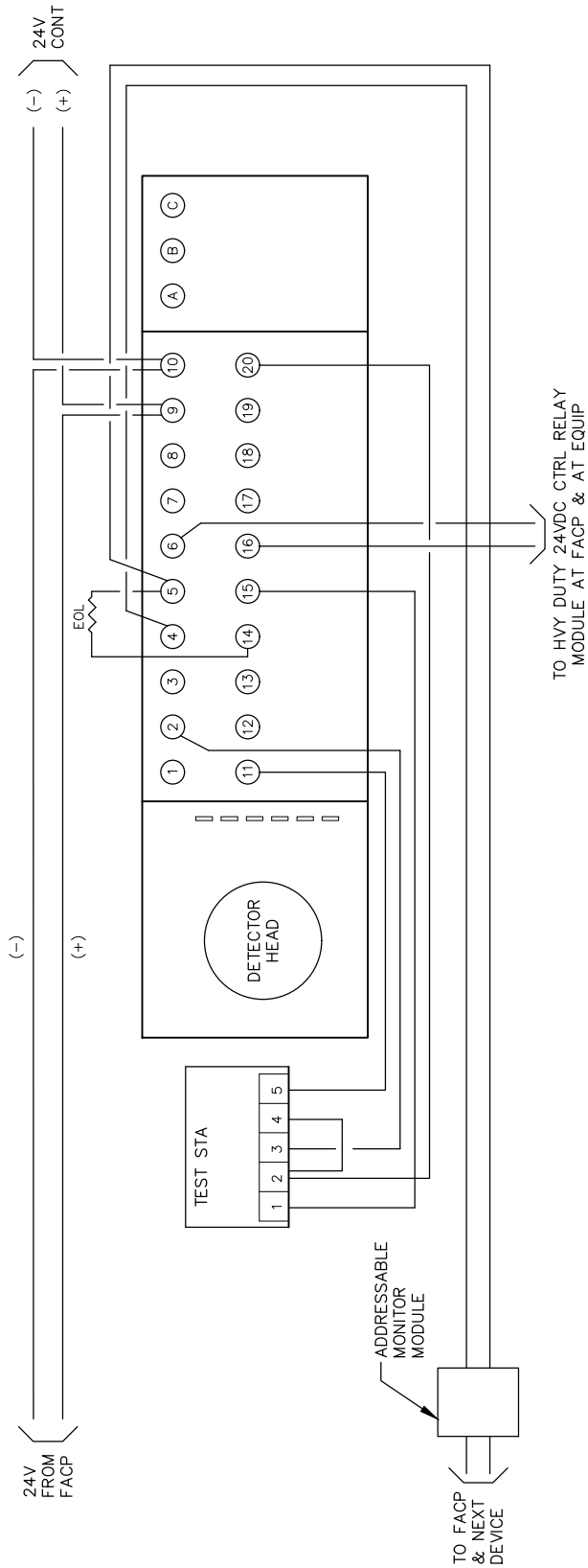
TYPICAL DEVICE MOUNTING FOR NOTIFICATION DEVICES IN ADA ACCESSIBLE SLEEPING ROOMS

DRAWN BY: *BOWMAN*
 CHKD BY: *K ROSS/KLR*
 APPD BY: *[Signature]*
 ORIGINATION DATE: *JULY 2021*
 REVISION DATE:

**28310
 FIRE ALARM SYSTEM
 DEVICE MOUNTING**



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 denverwater.org



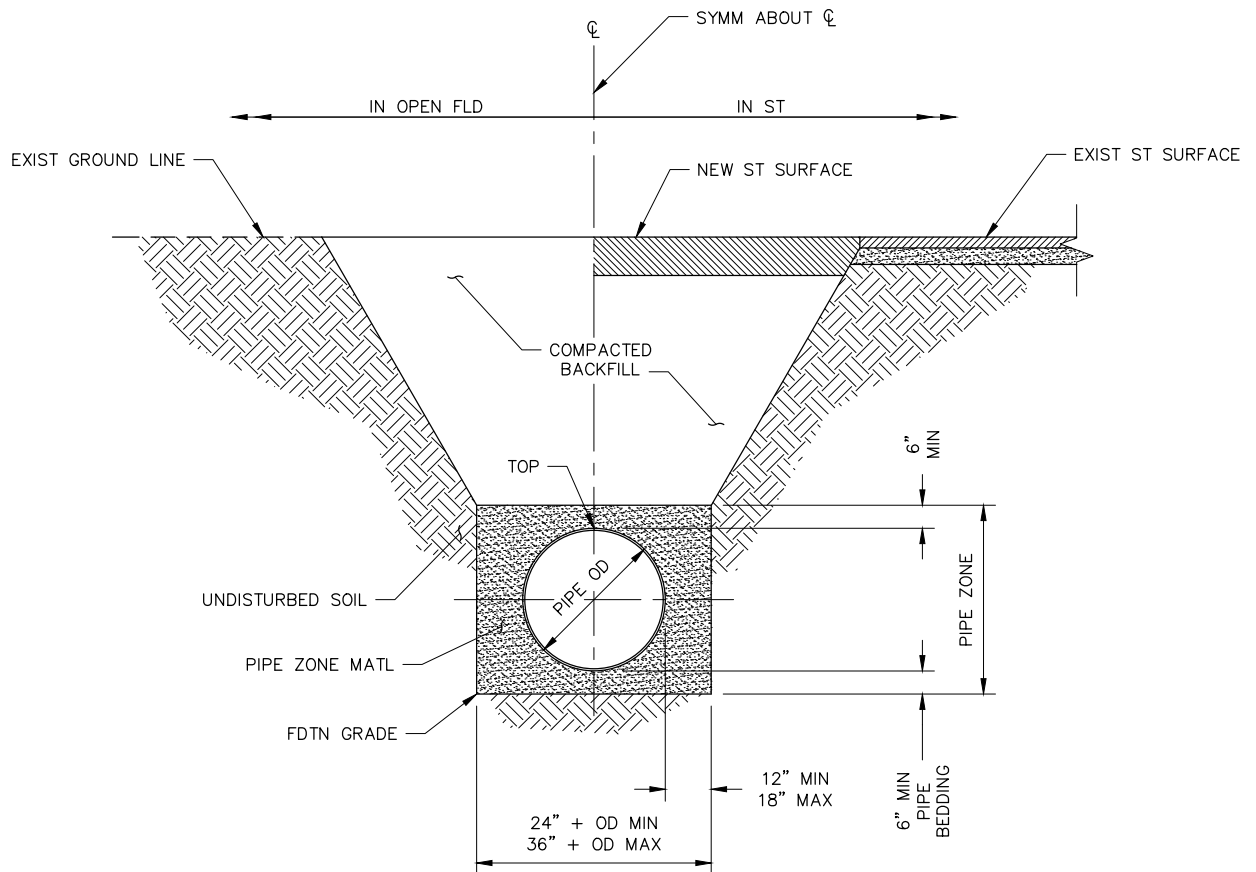
DRAWN BY: <i>BOWMAN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

28311 DUCT DETECTOR



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INTENTIONALLY BLANK



NOTES:

1. TRENCH SHALL CONFORM TO APPLICABLE OSHA REQUIREMENTS.
2. ADDITIONAL CATHODIC PROTECTION MAY BE REQUIRED ALONG THE PIPE IF THERE IS A TRANSITION FROM CONTROLLED LOW STRENGTH MATERIAL TO GRANULAR PIPE ZONE MATERIAL.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

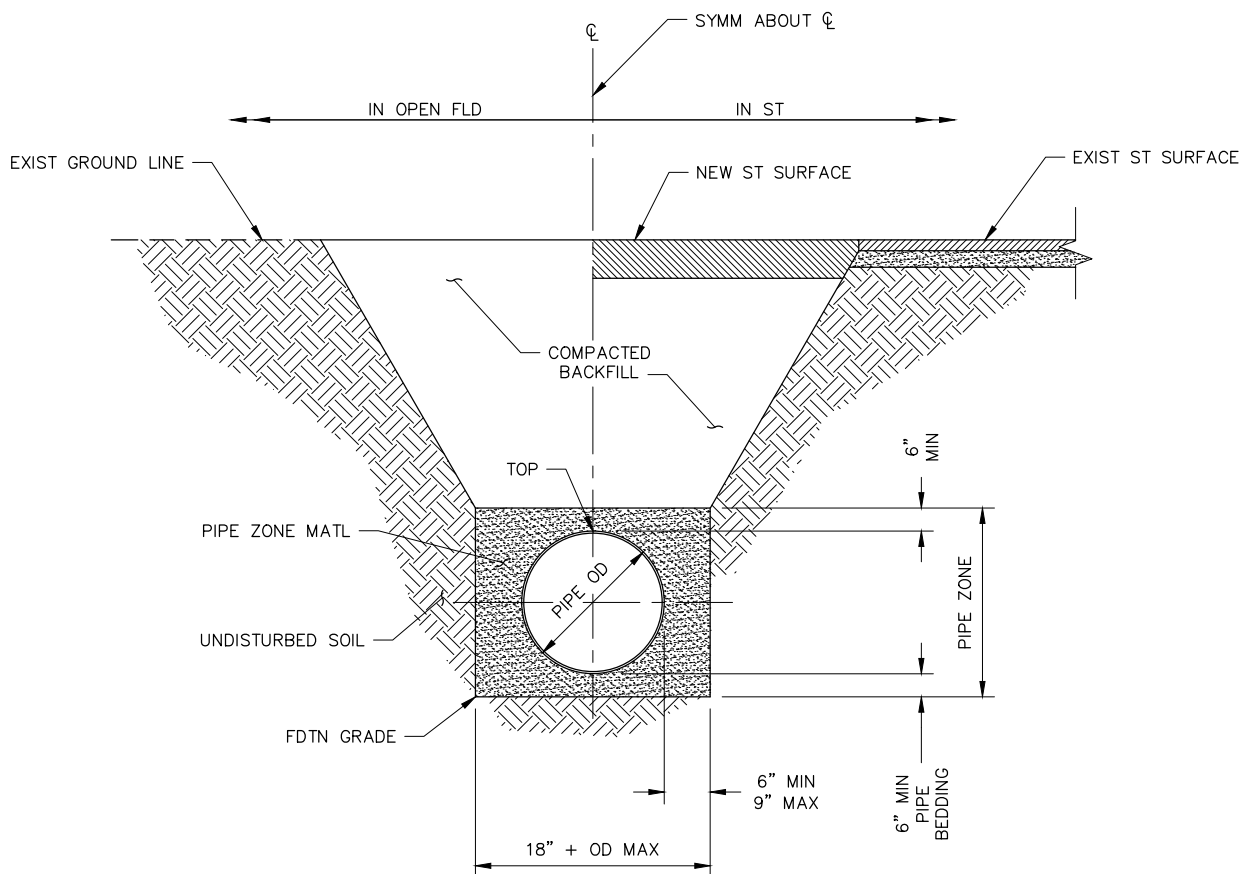
ORIGINATION DATE: JULY 2021

REVISION DATE:

**31001
TYPICAL TRENCH SECTION
FOR PIPE 24"Ø AND LARGER**



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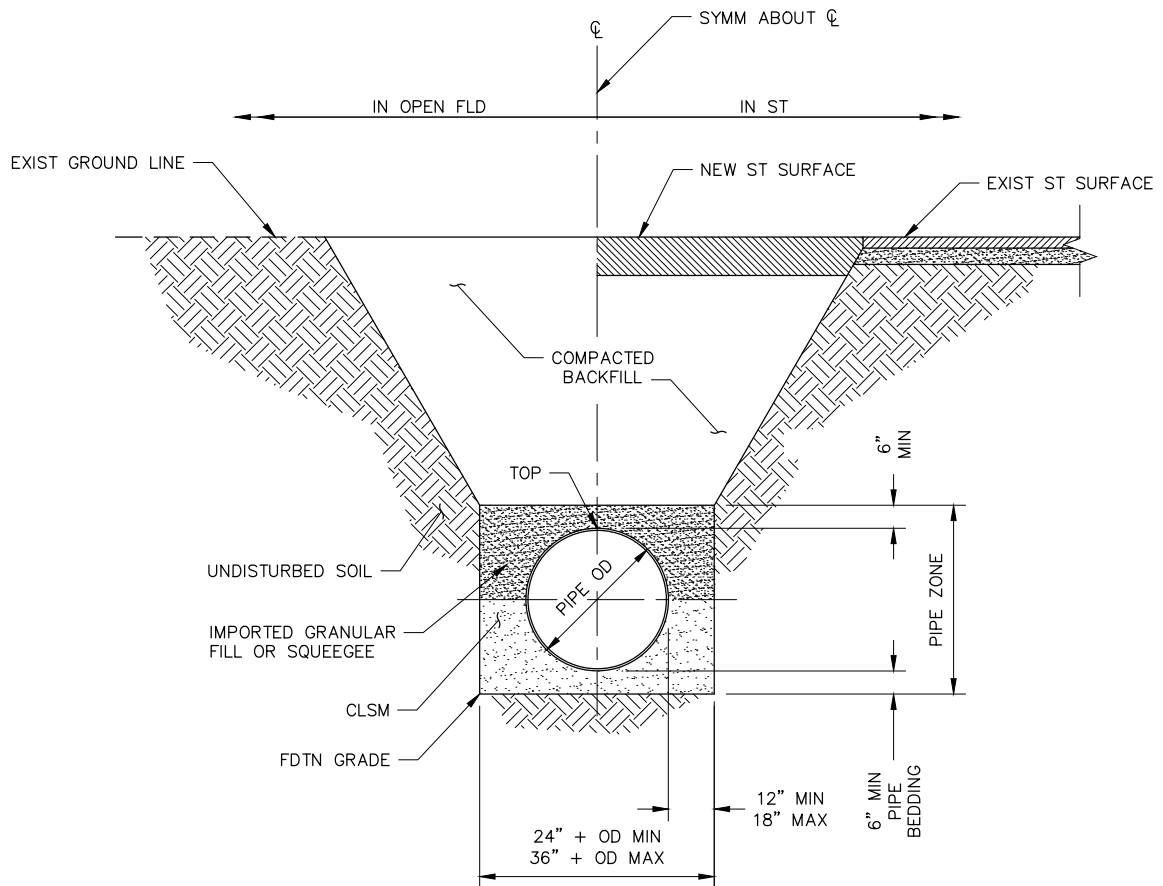
NOTES:

1. MINIMUM COVER SHALL BE 4 FEET 6 INCHES BELOW THE GROUND LINE.
2. TRENCH SHALL CONFORM TO APPLICABLE OSHA REQUIREMENTS.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

31002
TYPICAL TRENCH SECTION
FOR PIPE 20"Ø AND SMALLER


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NOTES:

1. TRENCH SHALL CONFORM TO APPLICABLE OSHA REQUIREMENTS.
2. ENGINEER APPROVAL IS REQUIRED PRIOR TO BACKFILL.

DRAWN BY: BERKNESS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

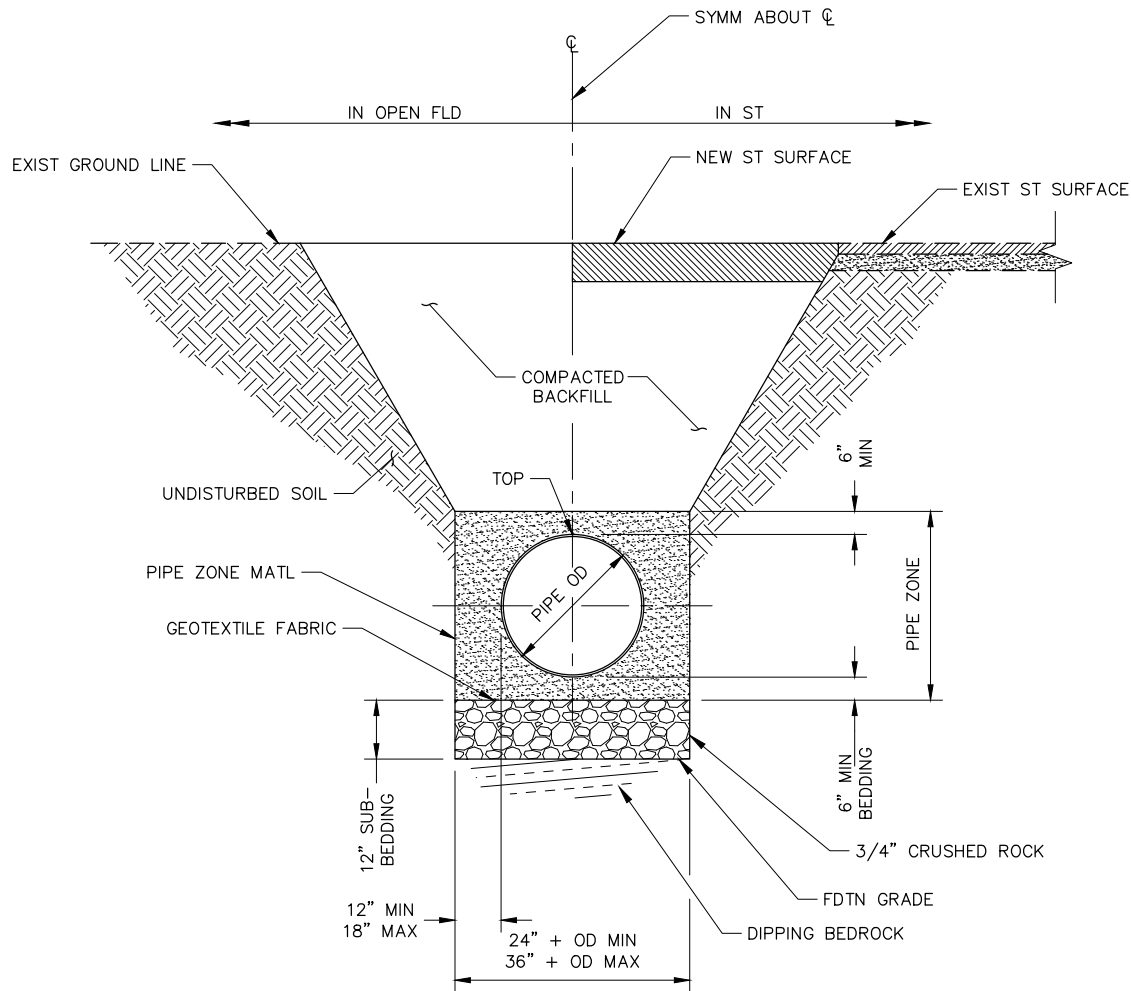
ORIGINATION DATE: JULY 2021

REVISION DATE:

**31003
OPTIONAL TRENCH SECTION
FOR POLYVINYL CHLORIDE
PIPE**



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NOTES:

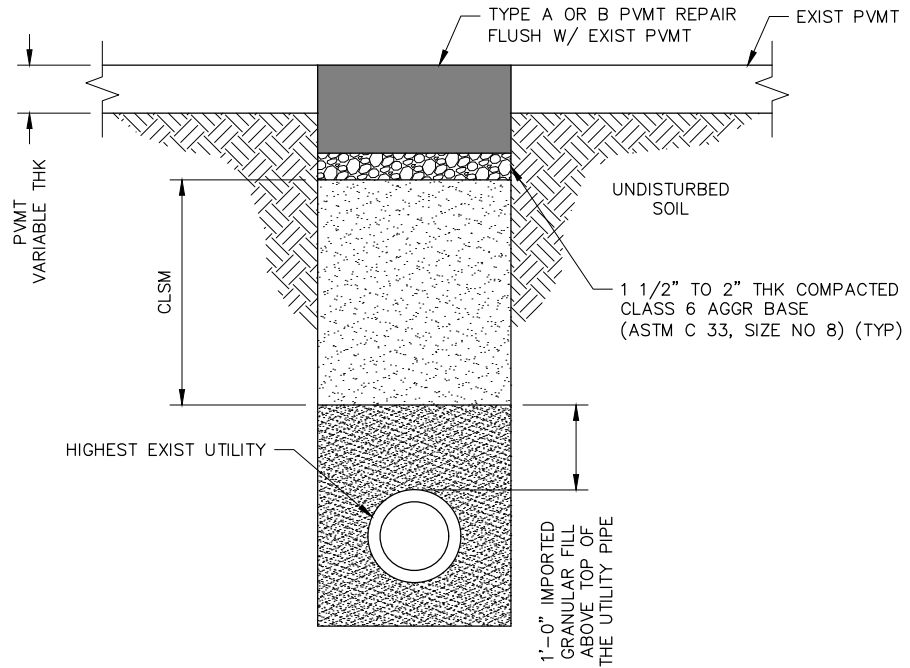
1. TRENCH SHALL CONFORM TO APPLICABLE OSHA REQUIREMENTS.
2. ADDITIONAL CATHODIC PROTECTION MAY BE REQUIRED ALONG THE PIPE AT THE TRANSITION FROM CONTROLLED LOW STRENGTH MATERIAL TO GRANULAR PIPE ZONE MATERIAL.

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

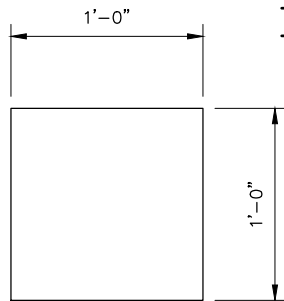
31004
TYPICAL TRENCH
SECTION FOR PIPELINE
IN DIPPING BEDROCK



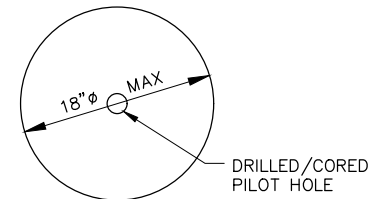
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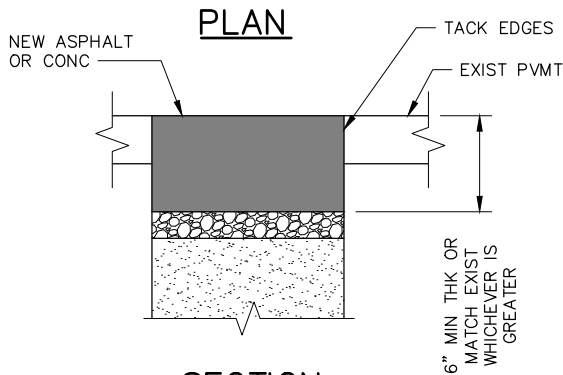
TYPICAL TRENCH SECTION



PLAN

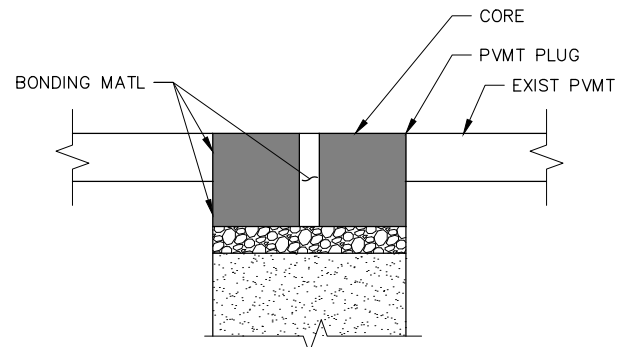


PLAN



SECTION

TYPE A PAVEMENT REPAIR



SECTION

TYPE B PAVEMENT REPAIR

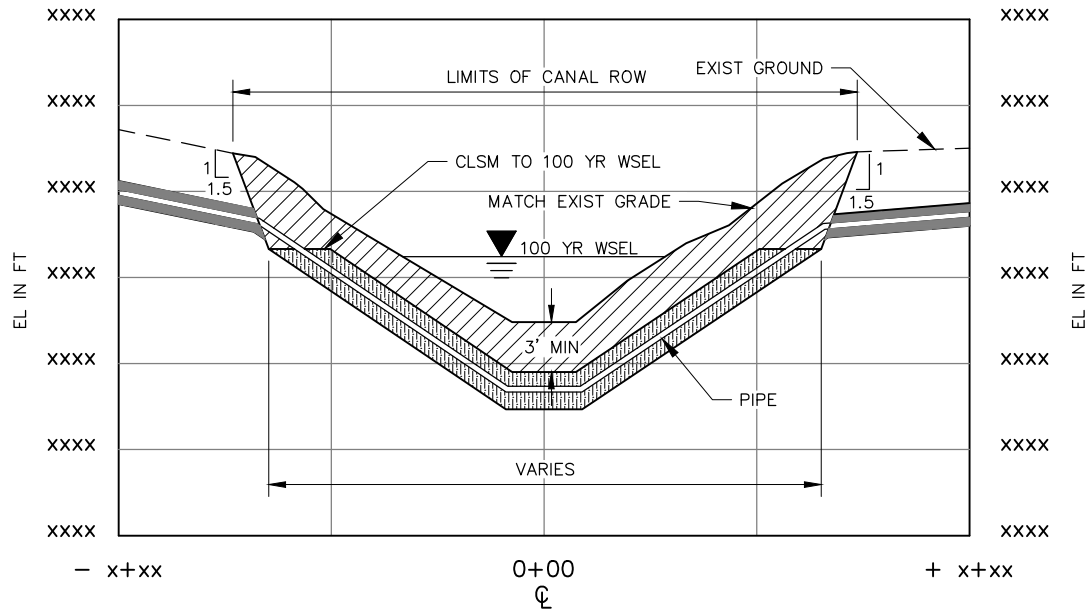
NOTES:

1. DIMENSIONS ARE NOMINAL.
2. EDGES SHALL BE CUT TO A NEAT VERTICAL FACE.

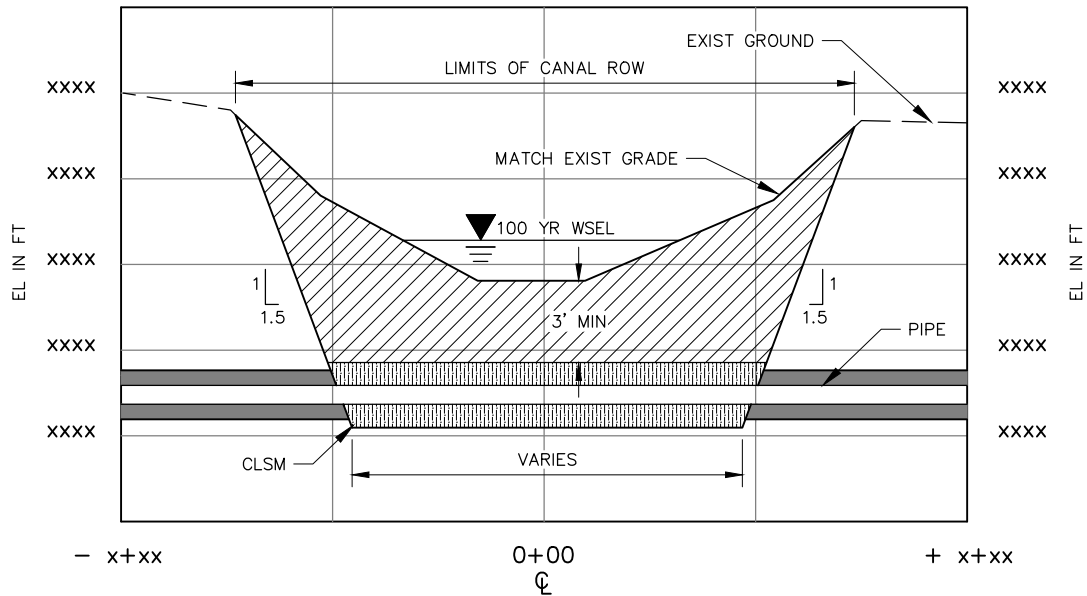
DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**31005
VACUUM EXCAVATION HOLE
PAVEMENT REPAIR**

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TYPICAL SHALLOW CROSSING



TYPICAL DEEP CROSSING

NOTE:

USE (31009) IN CONJUNCTION WITH THIS DETAIL.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

31008
HIGH LINE CANAL CROSSING



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LEGEND



BACKFILL MATERIAL SPECIFICATION:

- NON-GRANULAR
- PLASTICITY INDEX: GREATER THAN 7
- GRADATION: 100% PASSING NUMBER 4 SIEVE
50% MINIMUM PASSING NUMBER 200 SIEVE

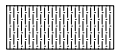
CLSM ALLOWED IF APPROVED BY DENVER WATER

SIEVE:

- 95% COMPACTION DRY DENSITY AS DETERMINED BY ASTM D 698 WITH MOISTURE CONTENT FROM OPTIMUM TO 2% ABOVE OPTIMUM.
- WRITTEN PROOF FROM A CERTIFIED SOILS LAB IS REQUIRED PRIOR TO ANY MATERIAL INSTALLATION AT THE SITE.
- NO ORGANIC FILL IS ALLOWED.
- CLAY MATERIAL MUST ADHERE TO THE ABOVE REFERENCED SPECIFICATIONS & MUST BE INSTALLED THE ENTIRE LENGTH & WIDTH OF EXCAVATION.



PIPE BEDDING PER CPCS SECTION 31.23.33



CLSM – FLOW FILL; IN ACCORDANCE WITH DENVER WATER CPCS SECTION 31.23.33 AS SUMMARIZED BELOW. SEE CPCS SECTION 31.23.33 AND CPCS SECTION. 31.23.16 FOR ADDITIONAL EXCAVATION AN BACKFILL REQUIREMENTS.

1. GENERAL:

- COMPRESSIVE STRENGTH BETWEEN 50 PSI AND 150 PSI AT 28 DAYS WHEN TESTED IN ACCORDANCE WITH ASTM D 4832.
- CLSM PLACED IN PIPE ZONE OR IN AREAS THAT MAY REQUIRE FUTURE EXCAVATION SHALL HAVE RE LESS THAN 1.5, AS CALCULATED BY $RE = \frac{W^{1.5} \times 104 \times C^{0.5}}{10^6}$
- THE MAXIMUM LIFT THICKNESS SHALL BE 3-FEET UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- PROVIDE ADEQUATE CURE TIME FOR FLOW FILL LIFTS BEFORE PLACING SUBSEQUENT LIFTS ABOVE.
- ANY DAMAGE TO PIPES, STRUCTURES, OR SOIL FAILURES CAUSED BY TOO THICK OF LIFTS OR INADEQUATE CURE TIMES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

2. CEMENTITIOUS MATERIALS:

- CEMENT: TYPE II PORTLAND CEMENT IN ACCORDANCE WITH ASTM C 150.
- FLY ASH: CLASS C OR CLASS F, IN ACCORDANCE WITH ASTM C 618.

3. AGGREGATES: GRADING AND QUALITY REQUIREMENTS IN ACCORDANCE WITH ASTM C 33.

4. WATER: IN ACCORDANCE WITH ASTM C 94.

5. ADMIXTURES:

- CHEMICAL ADMIXTURES THAT DO NOT CONTAIN CALCIUM CHLORIDE AND ARE IN ACCORDANCE WITH ASTM C 494 FOR CONCRETE MAY BE USED IN CLSM MIX.
- COMPATIBLE WITH CEMENT AND OTHER ADMIXTURES IN BATCH.

6. PIPE ZONE:

- BEFORE PLACING CLSM, VERIFY WITH THE ENGINEER THAT CP IS ADEQUATE AT TRANSITION AREAS FROM CLSM TO SOIL.
- MAXIMUM AIR CONTENT OF 8%.

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

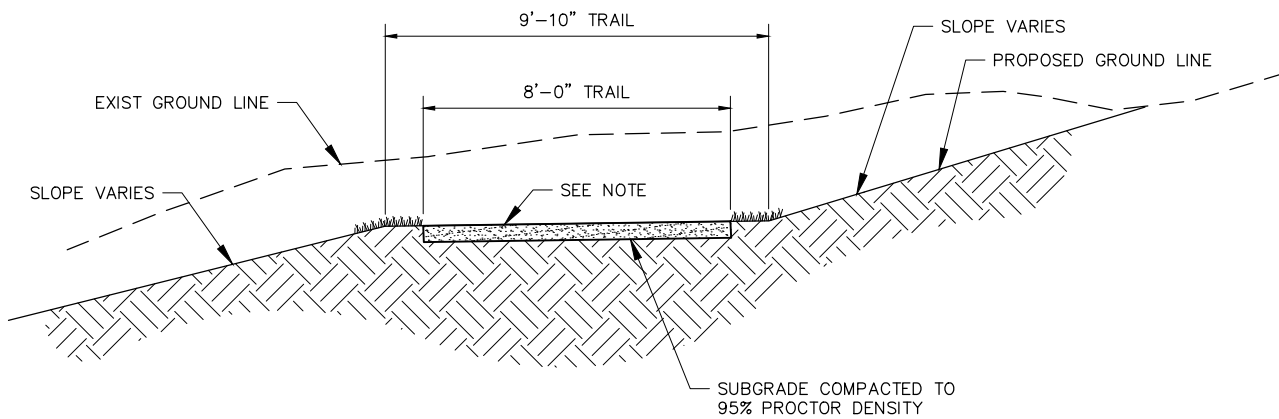
ORIGINATION DATE: JULY 2021

REVISION DATE:

31009 HIGH LINE CANAL CROSSING – NOTES



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NOTE:

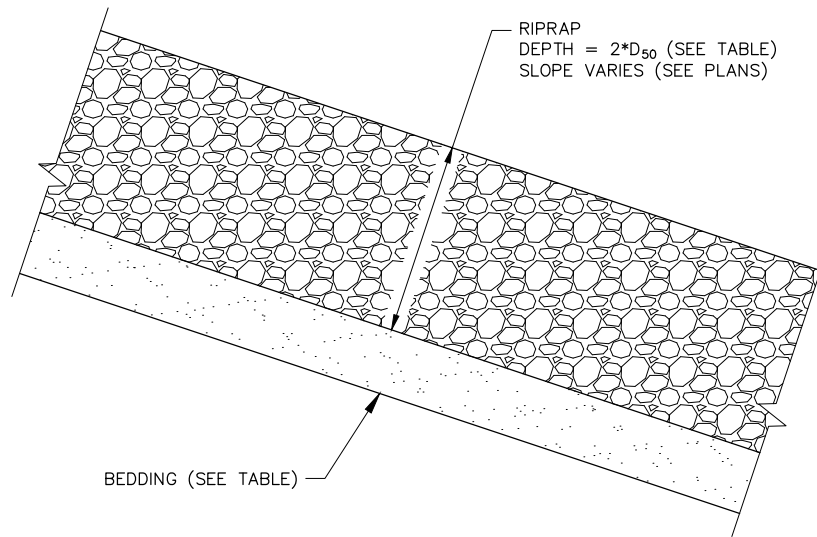
6-INCH CRUSHED FINES TRAIL PATH CUT AND TREADED WITH PRE-EMERGENT GRANULAR HERBICIDE CONTAINING 4% DICHLOBENIL, SUCH AS: OHP INC'S CASORON 4G, PBI GORDON CORP'S BARRIER, OR APPROVED EQUAL.

DRAWN BY: VA/CIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**31010
TRAIL RESTORATION**



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ELEVATION

RIPRAP DETAILS			
RIPRAP TYPE	D ₅₀	RIPRAP DEPTH (2*D ₅₀)	BEDDING
'L'	9"	18"	4" TYPE II BEDDING OVER 4" OF TYPE I BEDDING OR 12" OF TYPE II BEDDING
'M'	12"	24"	4" TYPE II BEDDING OVER 4" OF TYPE I BEDDING OR 12" OF TYPE II BEDDING
'H'	18"	36"	6" TYPE II BEDDING OVER 4" OF TYPE I BEDDING OR 12" OF TYPE II BEDDING

NOTES:

1. REFERENCE GRADING PLANS FOR EXTENTS OF SOIL AND SOIL RIPRAP.
2. REFERENCE DETAIL (31021) FOR TYPICAL SOIL RIPRAP DETAILS.
3. RIPRAP LENGTH SPECIFIED ON PLANS AT CULVERT END SECTIONS IS FOR LENGTH FROM INVERT OUT OF THE END SECTION TO THE END OF RIPRAP. RIPRAP SHALL BE INSTALLED UPSTREAM TO THE START OF THE END SECTION.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

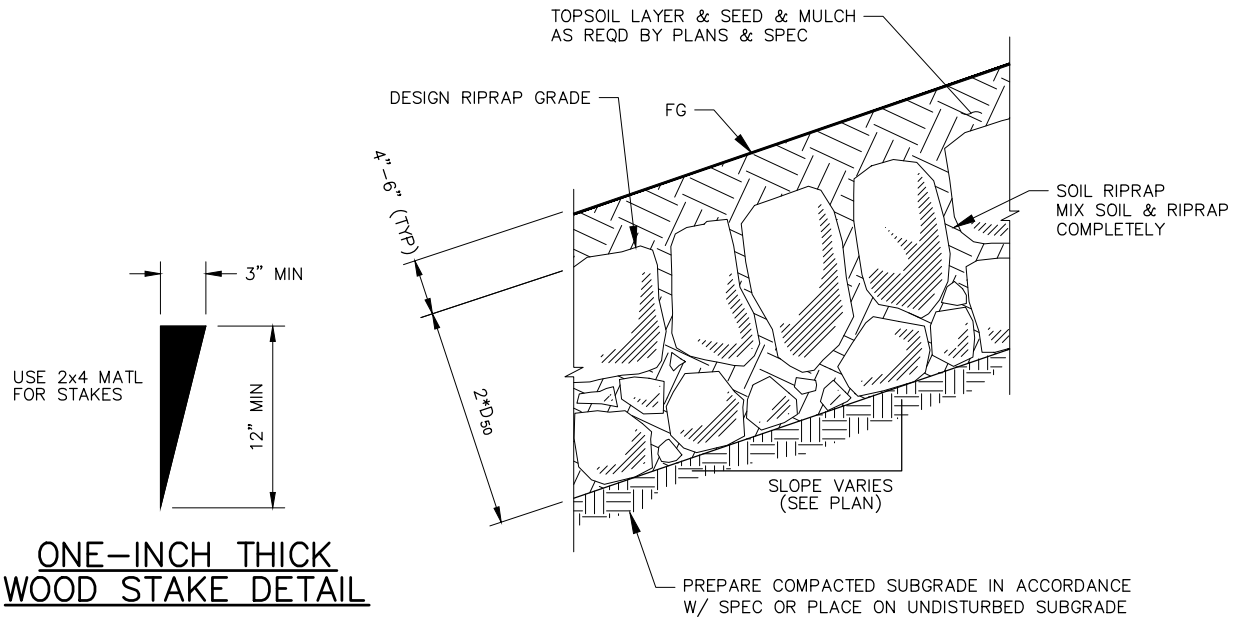
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

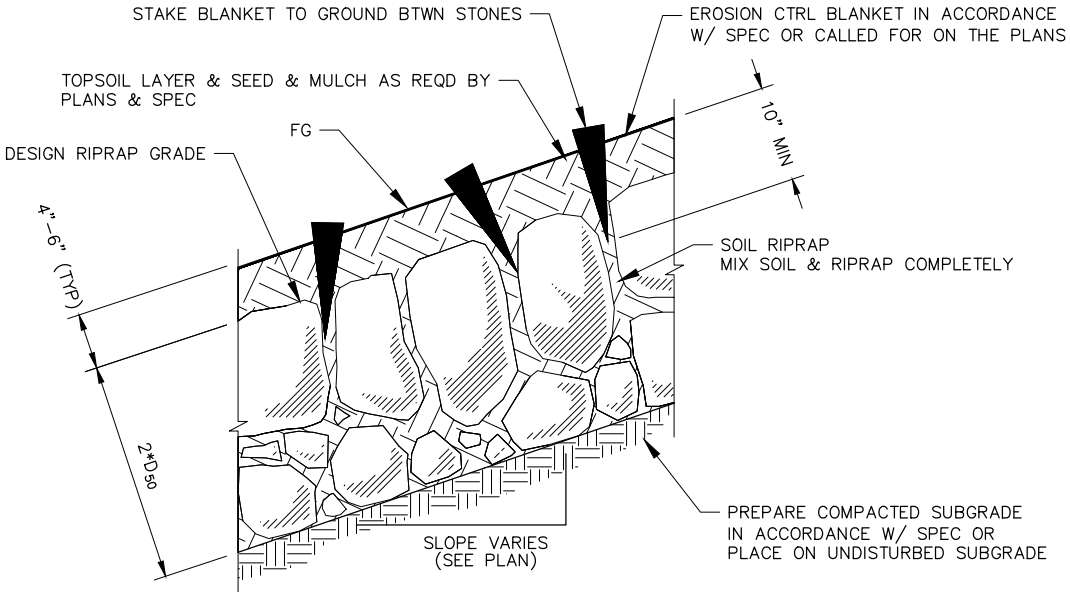
**31020
RIPRAP INSTALLATION**



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TYPICAL SECTION SOIL RIPRAP WITH MULCH



TYPICAL SECTION – SOIL RIPRAP WITH EROSION CONTROL FABRIC

NOTES:

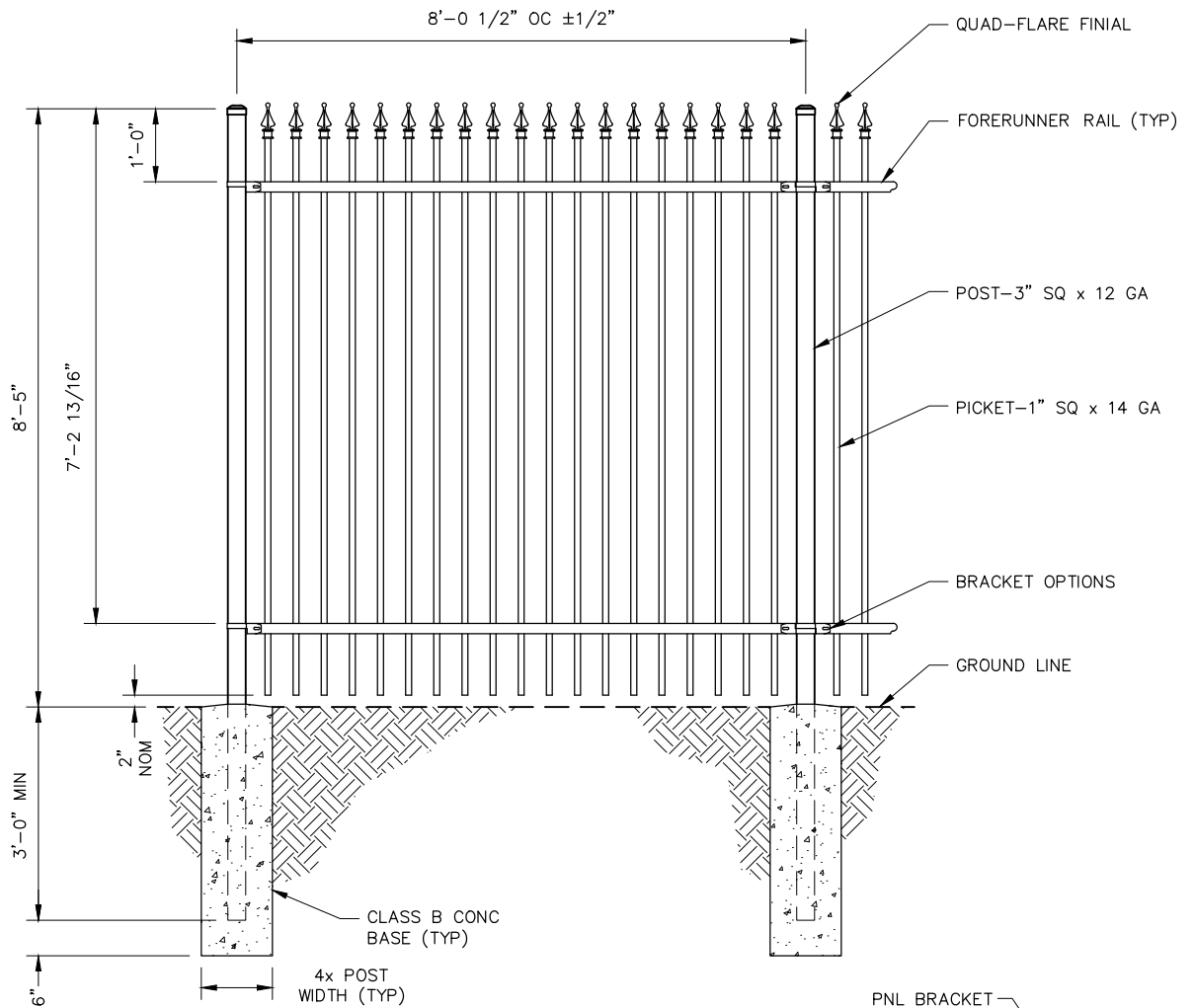
1. SOIL RIPRAP DETAILS ARE APPLICABLE TO SLOPED AREAS. REFER TO THE SITE PLAN ACTUAL LOCATIONS AND LIMITS.
2. MIX UNIFORMLY 65% RIPRAP BY VOLUME WITH 35% OF APPROVED SOIL BY VOLUME PRIOR TO PLACEMENT.
3. PLACE STONES–SOIL MIX TO RESULT IN SECURELY INTERLOCKED ROCK AT THE DESIGN THICKNESS AND GRADE. COMPACT AND LEVEL TO ELIMINATE ALL VOIDS AND ROCKS PROJECTING ABOVE DESIGN RIPRAP TOP GRADE.
4. CRIMP OR TACKIFY MULCH OR USE APPROVED HYDROMULCH AS CALLED FOR IN THE PLANS AND SPECIFICATIONS.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
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REVISION DATE:

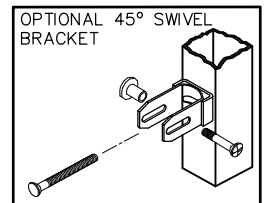
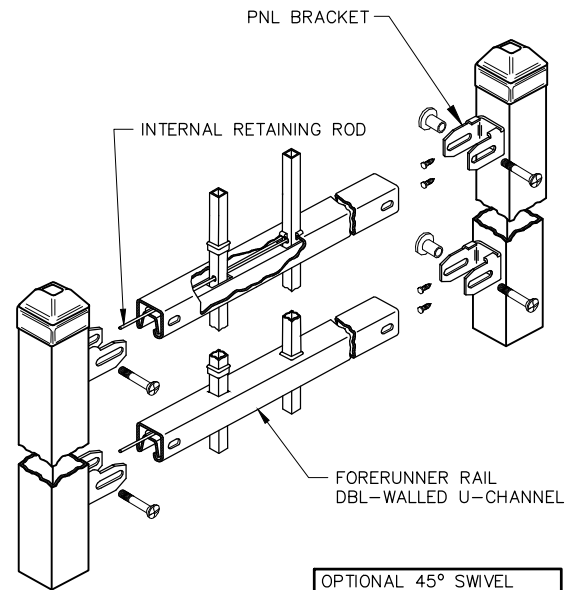
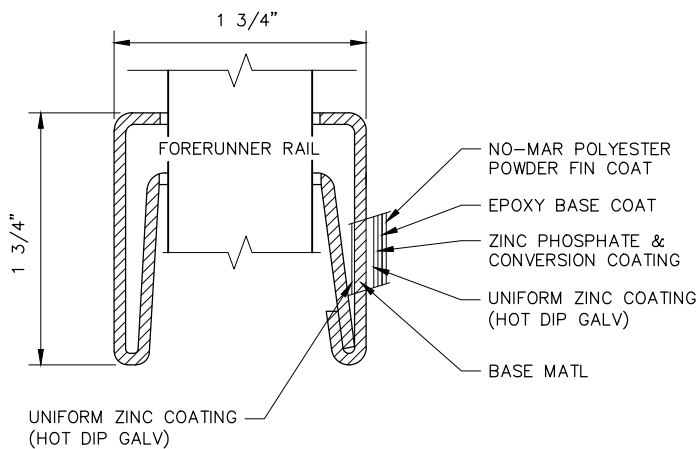
**31021
SOIL RIPRAP INSTALLATION**

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ELEVATION

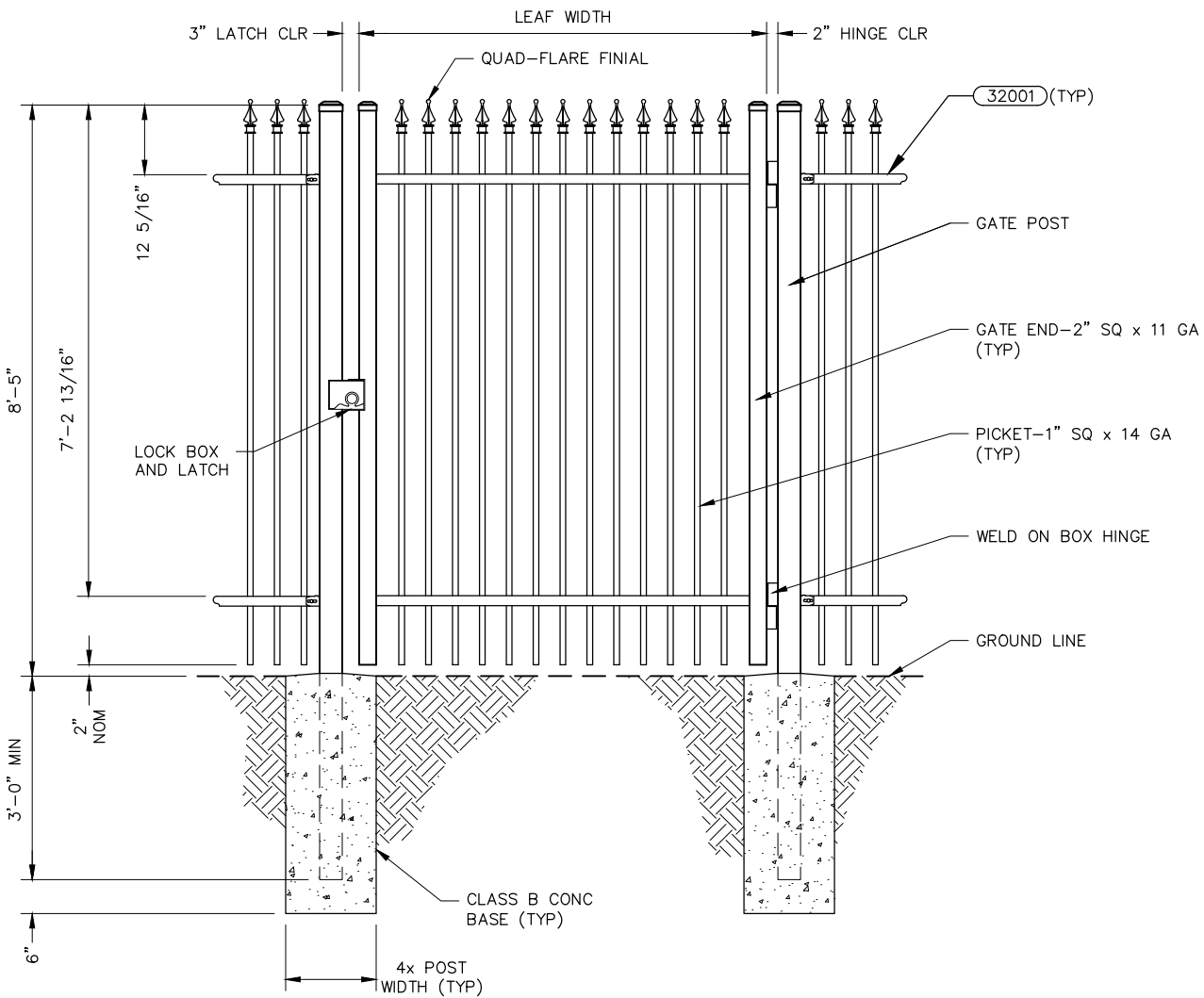


DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

32001
 AMERISTAR
 AEGIS II GENESIS 2-RAIL
 FENCE INSTALLATION



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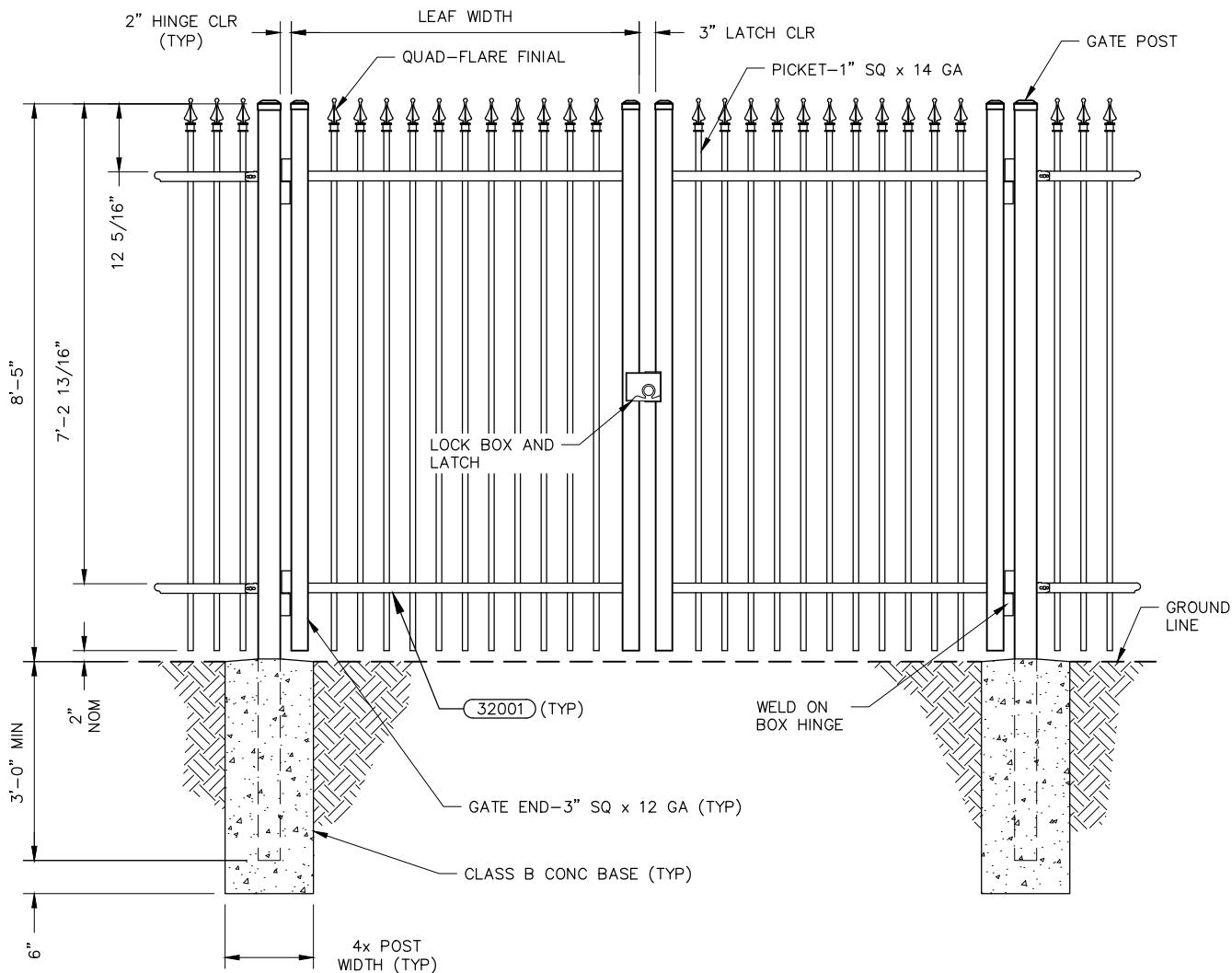
ELEVATION

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

32002
AMERISTAR
AEGIS II GENESIS 2-RAIL
SINGLE GATE INSTALLATION

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ELEVATION

DRAWN BY: MITCHELL

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

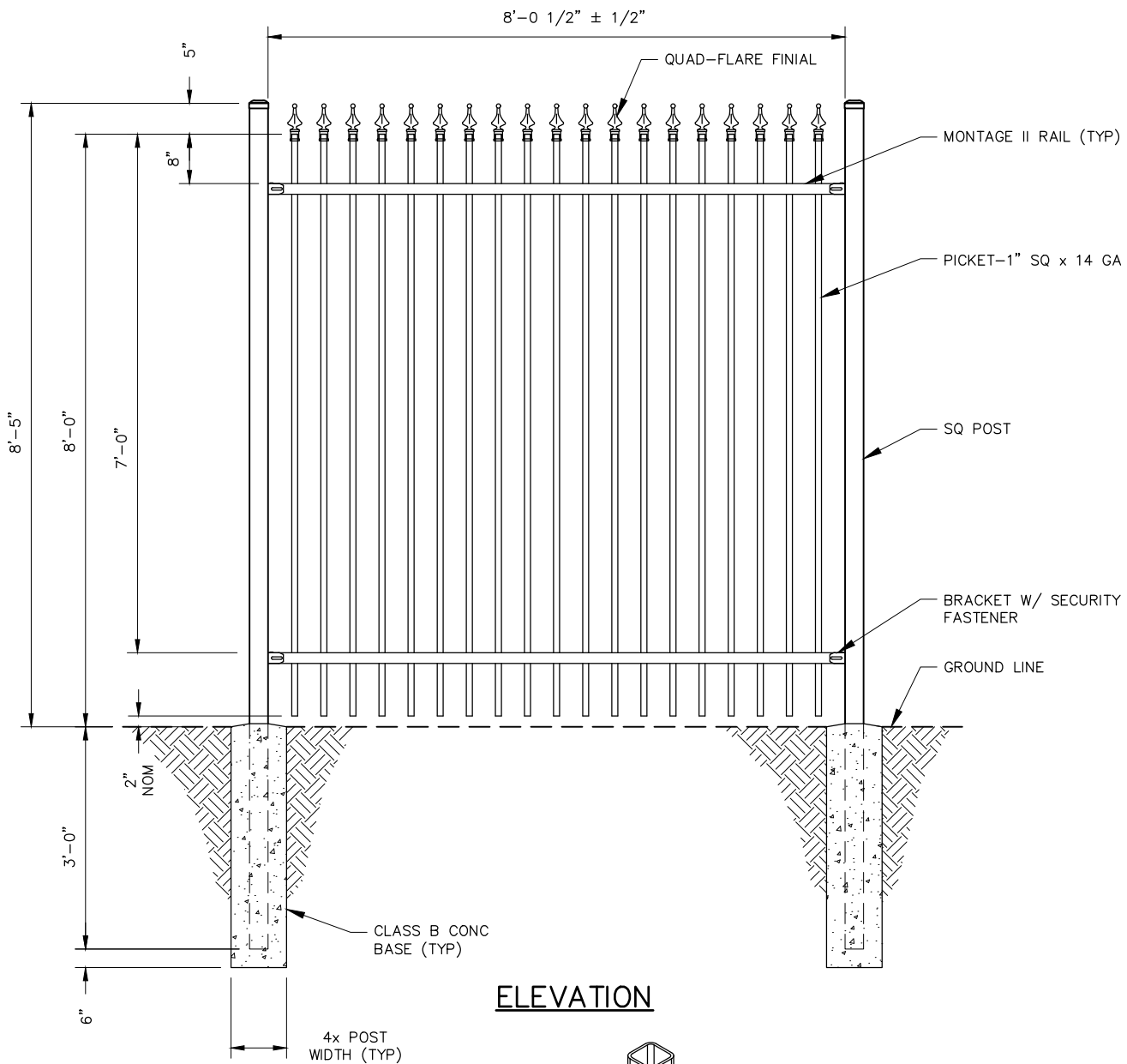
ORIGINATION DATE: JULY 2021

REVISION DATE:

**32003
AMERISTAR
AEGIS II GENESIS 2-RAIL
DOUBLE GATE INSTALLATION**

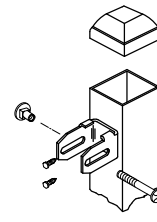
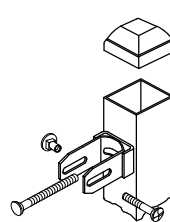
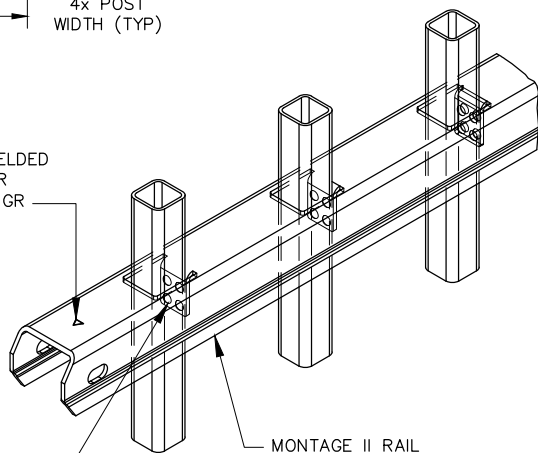


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ELEVATION

RAKING DIRECTIONAL ARROW, WELDED
PNL CAN BE RAKED 2'-6" OVER
8'-0" W/ ARROW POINTING DN GR



DRAWN BY: MITCHELL

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

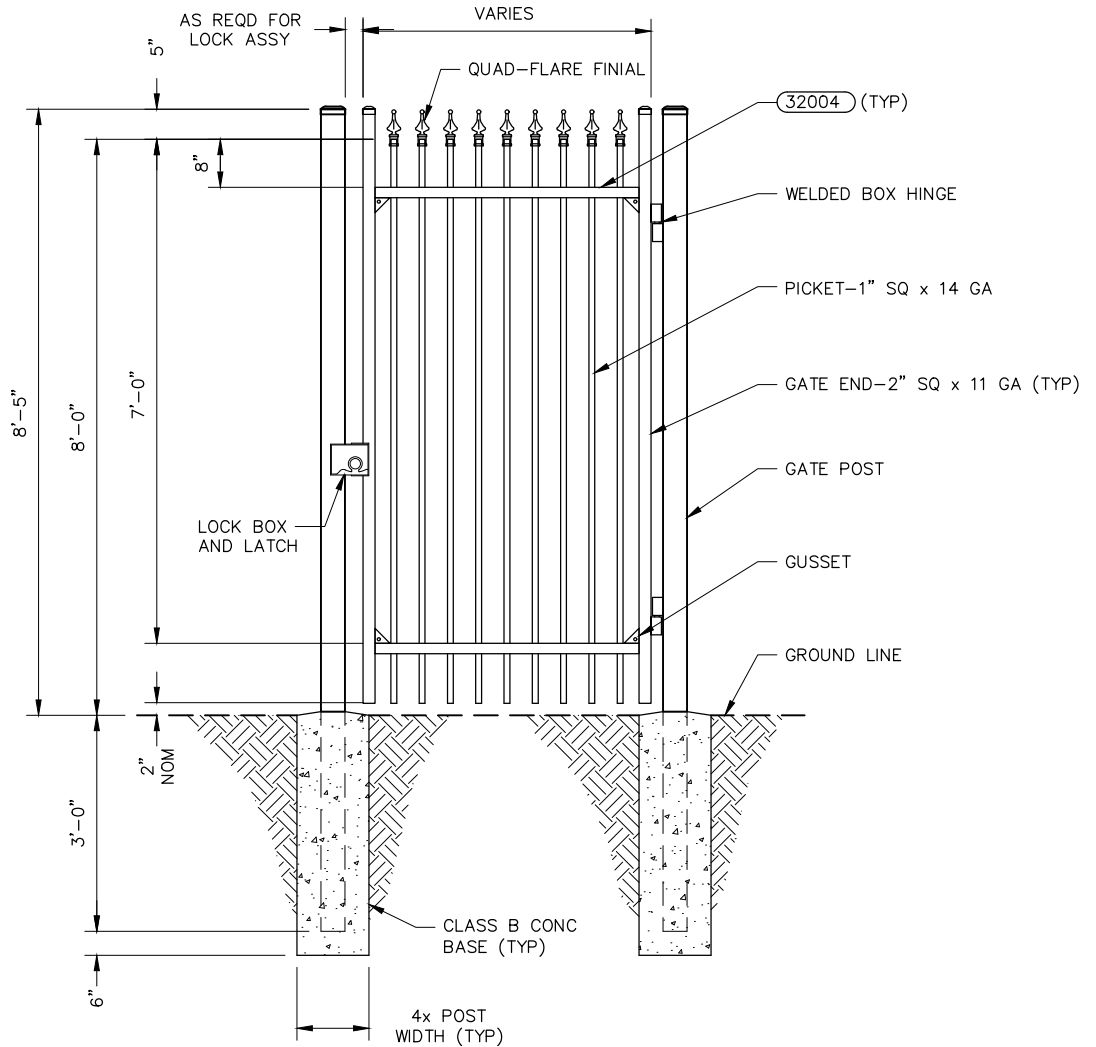
ORIGINATION DATE: JULY 2021

REVISION DATE:

**32004
AMERISTAR
MONTAGE II GENESIS
2-RAIL PANEL**



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ELEVATION

DRAWN BY: MITCHELL

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

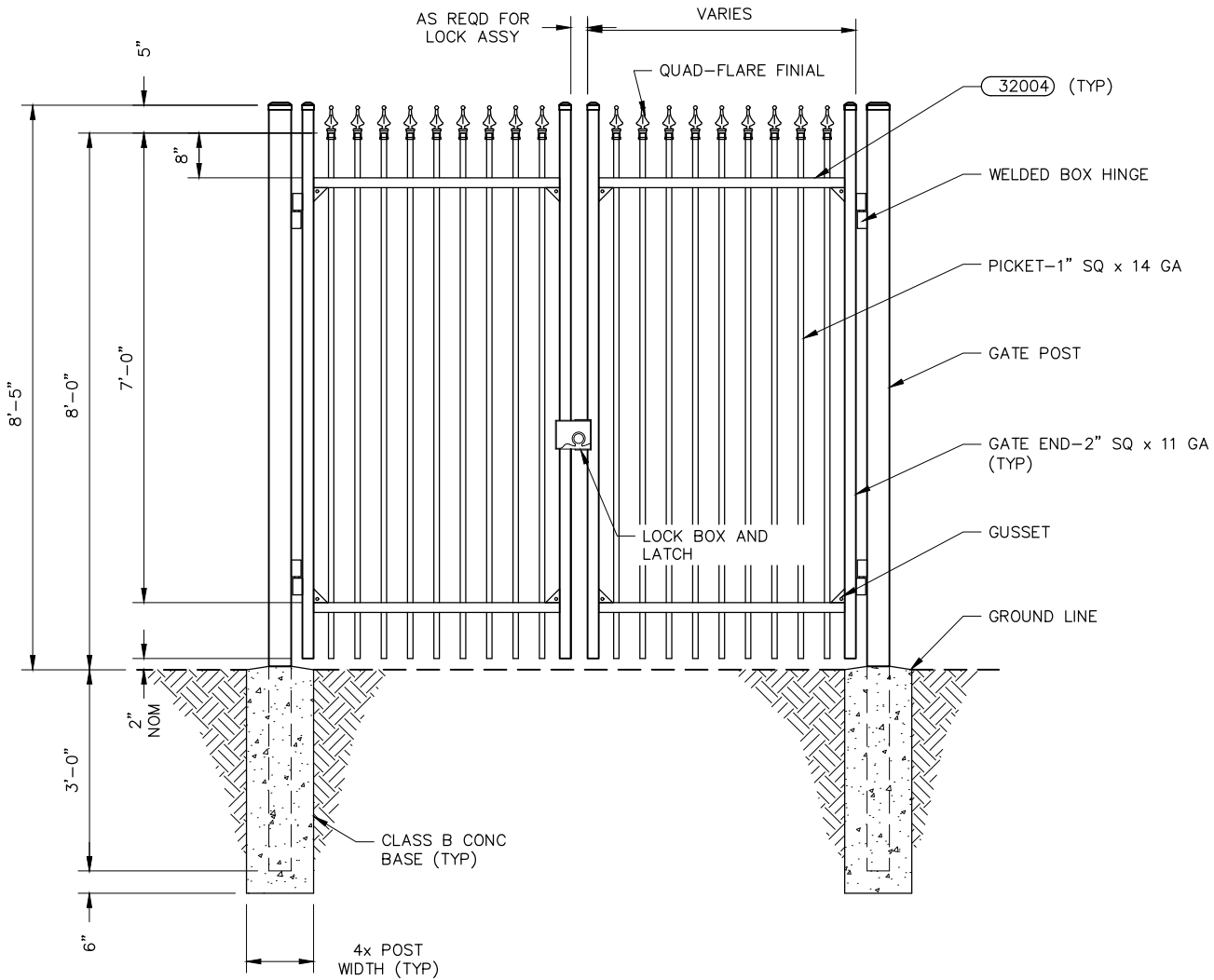
ORIGINATION DATE: JULY 2021

REVISION DATE:

**32005
AMERISTAR
MONTAGE II GENESIS
2-RAIL SINGLE GATE**



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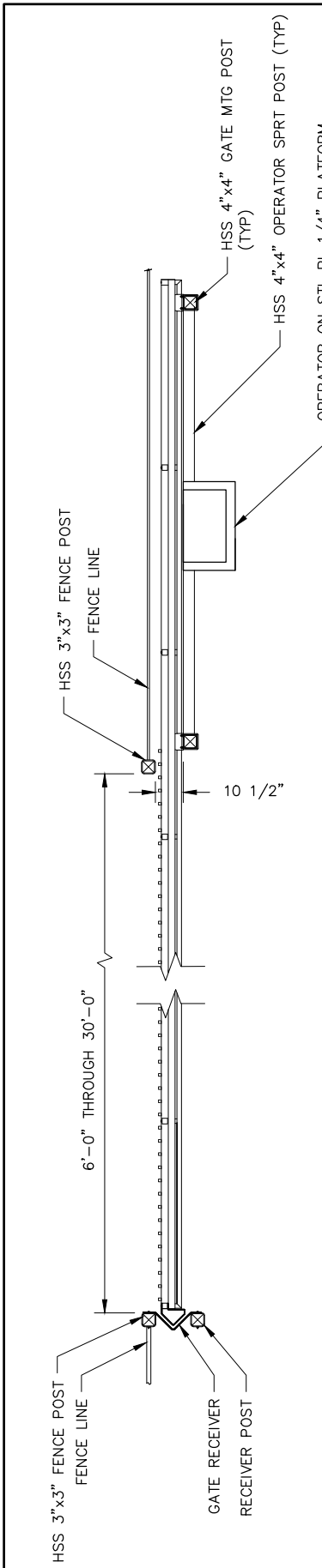
ELEVATION

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

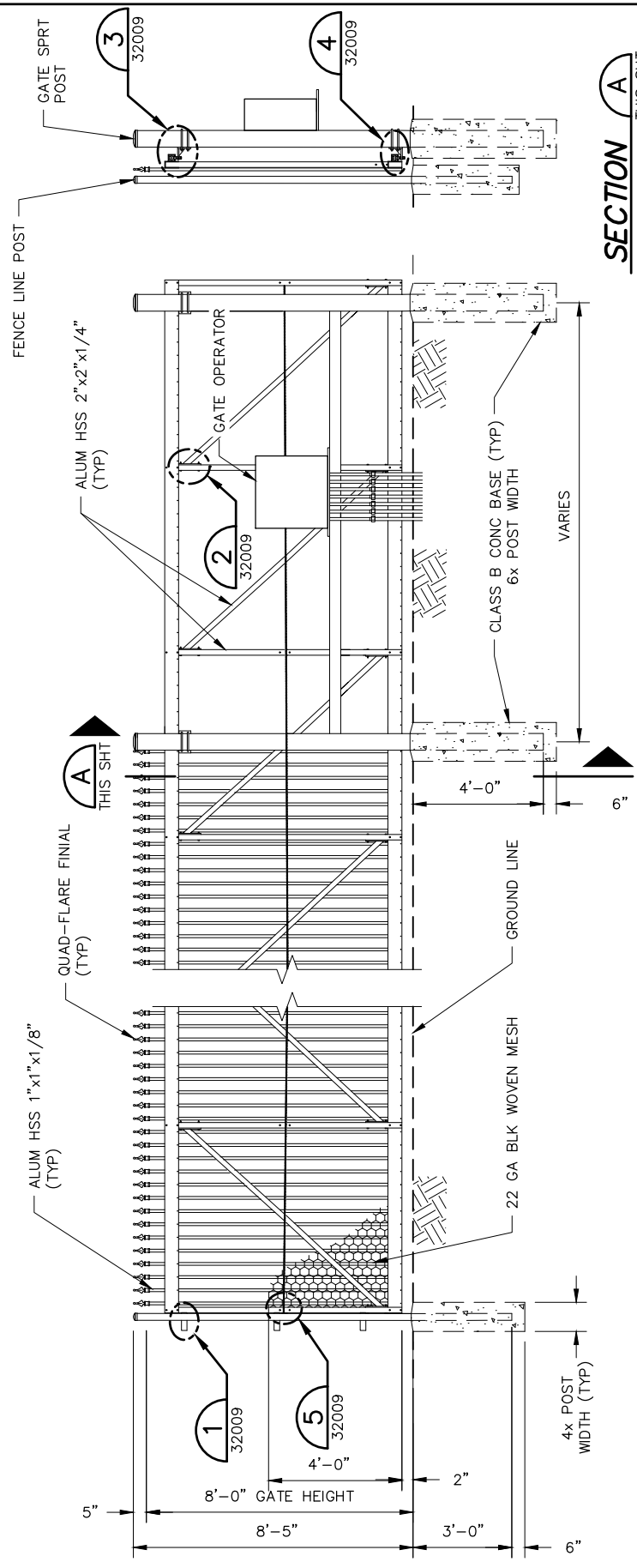
**32006
AMERISTAR
MONTAGE II GENESIS
2-RAIL DOUBLE GATE**



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PLAN



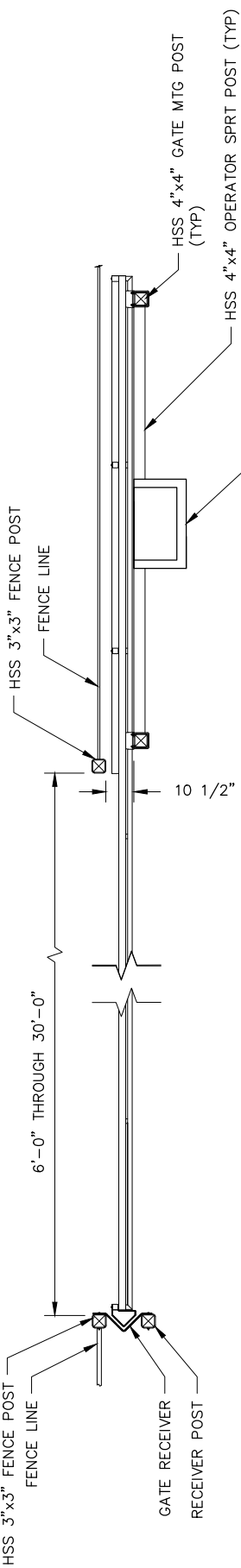
ELEVATION

SECTION A
THIS SHIT

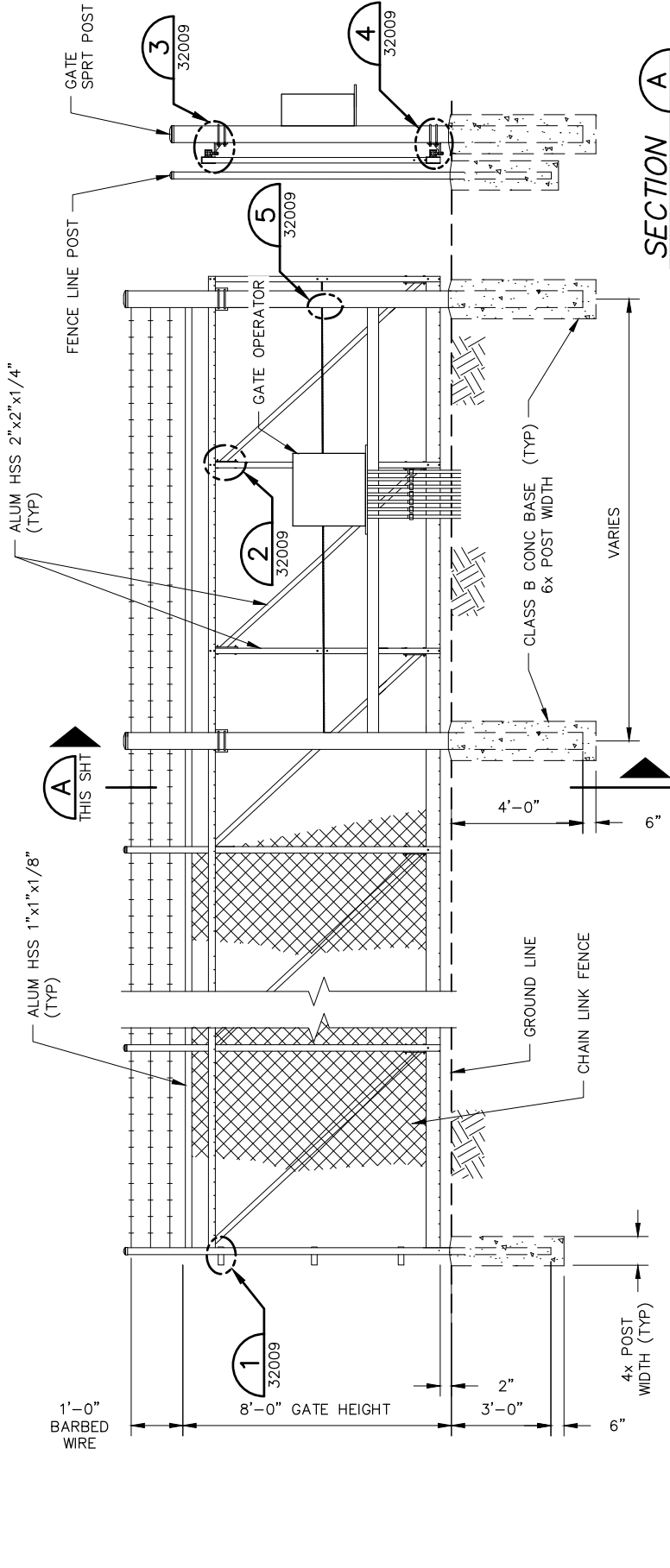
DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

32007
AMERISTAR
TRANSPORT II GENESIS
CANTILEVER GATE SYSTEM


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PLAN



ELEVATION

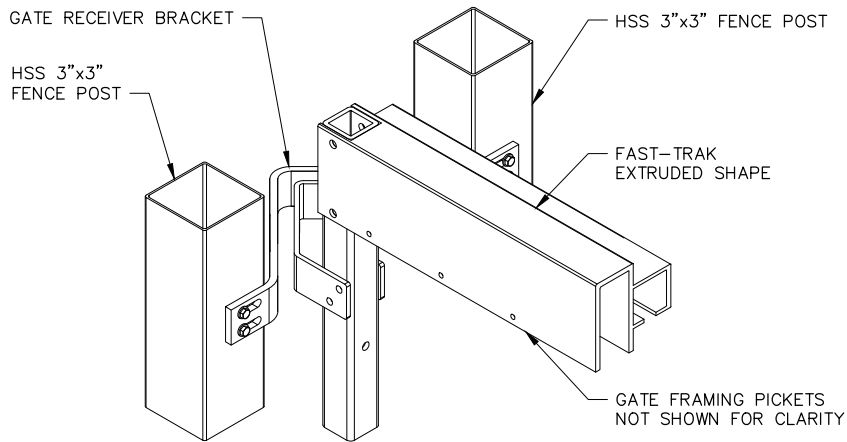
SECTION A
THIS SHIT

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

32008
AMERISTAR
TRANSPORT LINK
CANTILEVER GATE SYSTEM

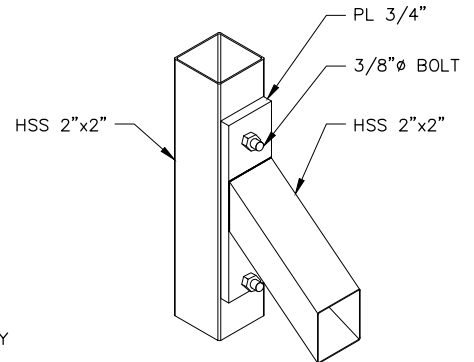

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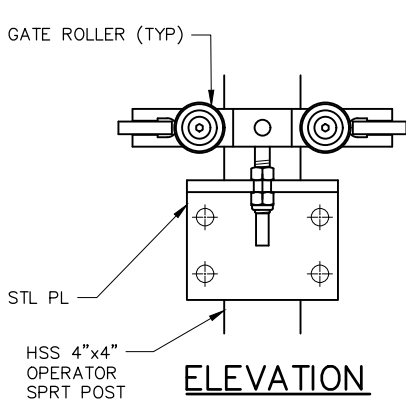
GATE RECEIVER BRACKET 1

32007
32008

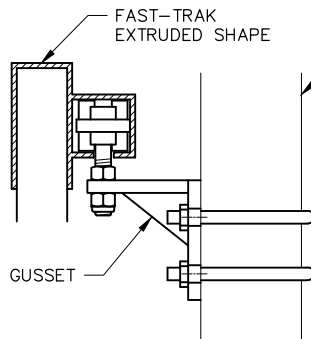


FRAME SUPPORTS 2

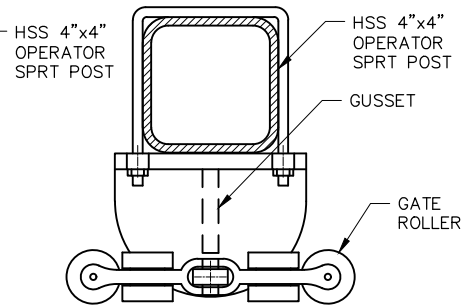
32007
32008



ELEVATION



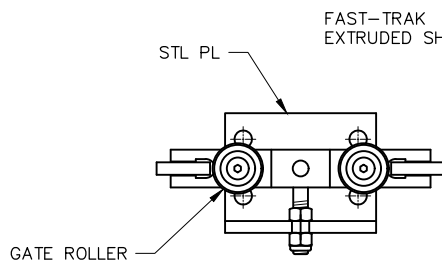
SIDE



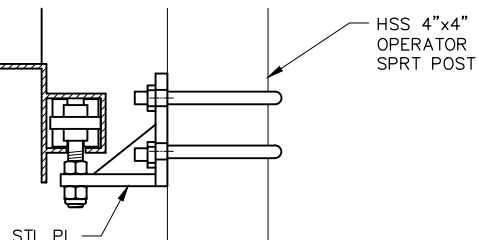
PLAN

GATE ROLLER BEARING - TOP 3

32007
32008



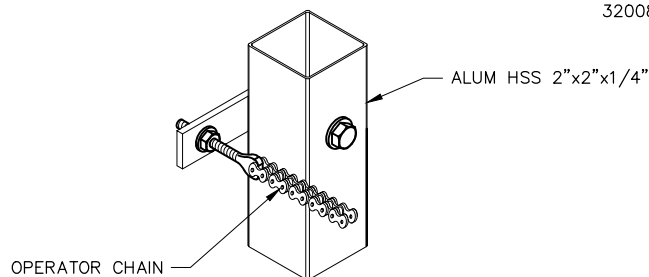
ELEVATION



SIDE

GATE ROLLER BEARING - BOTTOM 4

32007
32008



OPERATOR CHAIN ATTACHMENT 5

32007
32008

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CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

REVISION DATE:

32009
AMERISTAR TRANSPORT II
GENESIS AND TRANSPORT LINK
CANTILEVER GATE SYSTEM
DETAILS



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FENCE MATERIAL						
FABRIC HT	END, CORNER, & LINE BRACE POSTS		LINE POSTS		TOP & BRACE RAILS	
H	ROUND PIPE ID	ROLL-FORMED STL	ROUND PIPE ID	ROLL-FORMED STL	ROUND PIPE ID	ROLL-FORMED STL
3' THRU 6'	2.5"	3.5" x 3.5"	1.5"	1.875" x 1.625"	1.25"	1.25" x 1.625"
> 6' THRU 8'	2.5"	3.5" x 3.5"	2.0"	1.875" x 1.625"	1.25"	1.25" x 1.625"
> 8' THRU 12'	2.5"	3.5" x 3.5"	2.0"	2.250" x 1.625"	1.25"	1.25" x 1.625"

ORDINARY PIPE			
NOMINAL ID	OD	WALL THK	WT (LB/FT)
1.25"	1.660"	0.140"	2.27
1.50"	1.900"	0.145"	2.72
2.00"	2.375"	0.154"	3.65
2.50"	2.875"	0.203"	5.79
3.00"	3.500"	0.216"	7.58
3.50"	4.000"	0.226"	9.11
4.00"	4.500"	0.237"	10.79
5.00"	5.563"	0.258"	14.62
6.00"	6.625"	0.280"	18.97
8.00"	8.625"	0.322"	28.55

GATE MATERIAL				
GATE FRAME WIDTH	STRAIN POST		CONC BASE	
	ROUND ID	ROLL-FORMED	DEPTH	DIA
3' THRU 6'	2.5"	3.5" x 3.5"	36"	12"
> 6' THRU 13'	3.5"	-----	42"	12"
> 13' THRU 18'	6.0"	-----	48"	18"
> 18' THRU 23'	8.0"	-----	48"	24"
GATE FRAME		FRAME PIPE ID	BRACING PIPE ID	
WIDTH	HT			
3' THRU 8'	3' THRU 6'	1.25"	1.25"	
> 8' THRU 23'	6'	1.50"	1.25"	
> 8' THRU 23'	> 6' THRU 12'	1.50"	1.50"	

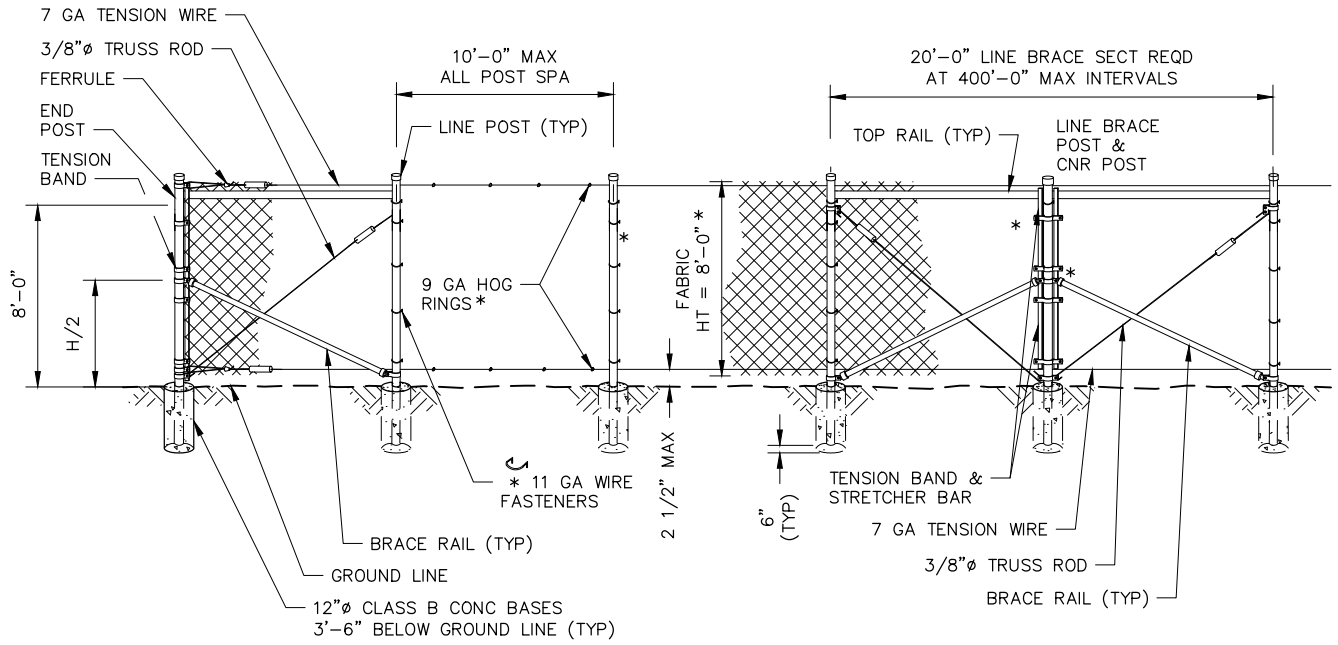
ROLL-FORMED STEEL			
PART	SIZE	THK (GAUGE)	WT (LB/FT)
TOP & BRACE RAILS	1.250" x 1.625"	14	2.08
LINE POST (H: 3' - 6')	1.875" x 1.625"	12	2.75
LINE POST (H: > 6' - 8')	1.875" x 1.625"	11	3.36
LINE POST (H: > 8' - 12')	2.250" x 1.625"	11	4.02
END, CORNER, & LINE BRACE POSTS	3.50" x 3.50"	10	7.59

DRAWN BY: MITCHELL
 CHKD BY: K ROSS/KLR
 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

32010
CHAIN LINK FENCE
POST AND FRAME SIZES



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LEGEND:

* ATTACH FABRIC TO ALL FENCE AND GATE STRUCTURES AT 1'-0" INTERVALS VERTICAL AND AT 1'-8" HORIZONTAL.

 TIGHTENER OR TURNBUCKLE SYMBOL.

NOTES:

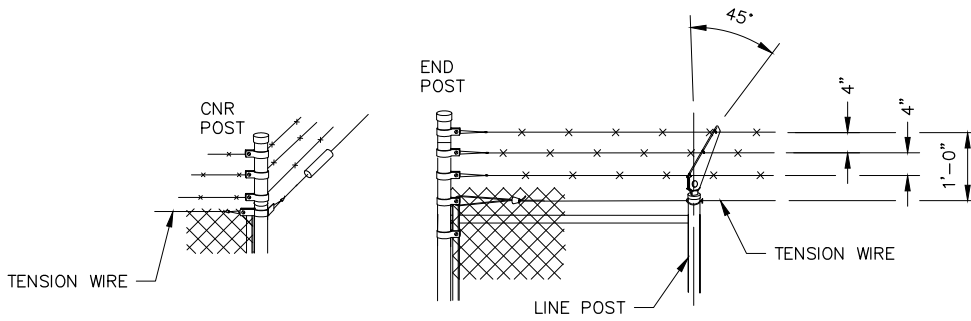
1. CHAIN LINK FENCE, GATE, AND HARDWARE SHALL MEET CDOT STANDARD PLAN NUMBER M-607-2 FOR ROUND PIPE FRAMING.
2. POST AND FRAME SIZES IN ACCORDANCE WITH 32010.

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: 
ORIGINATION DATE: JULY 2021
REVISION DATE:

32011
8' CHAIN LINK FENCE



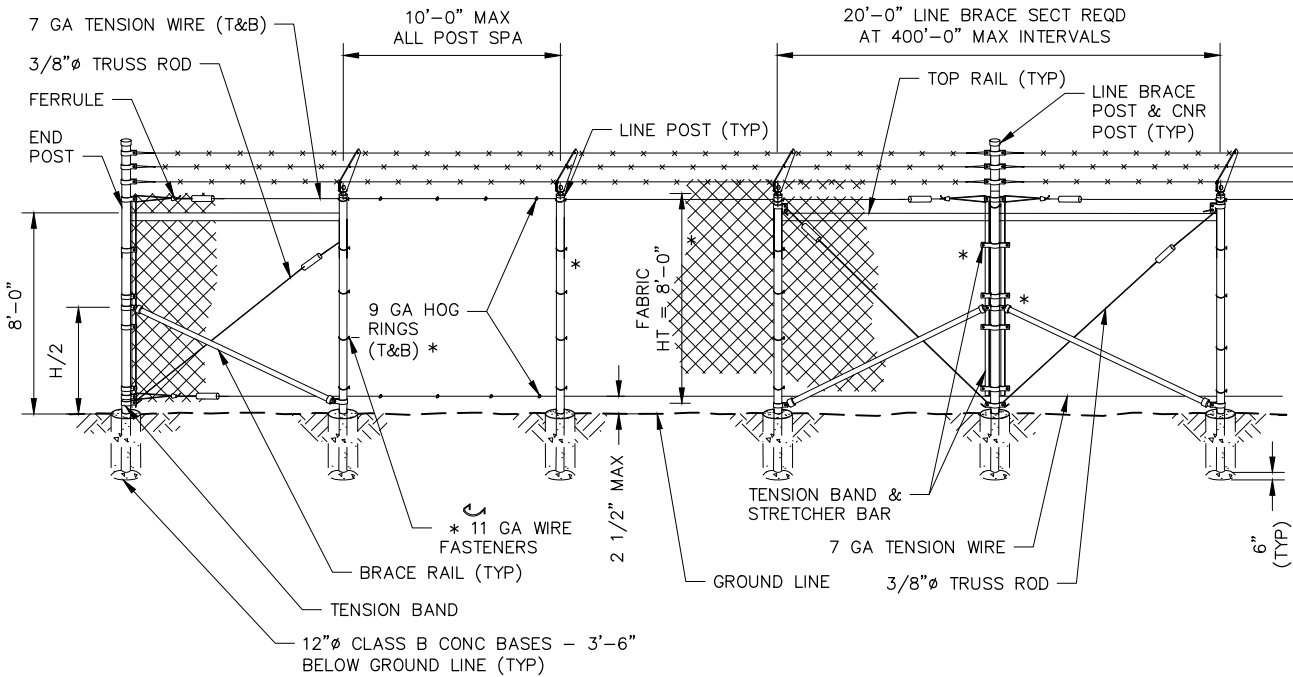
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NOTE:

SLOPE TOP OUT 45 DEGREES.

BARBED WIRE TOP




LEGEND:

* ATTACH FABRIC TO ALL FENCE AND GATE STRUCTURES AT 1'-0" INTERVALS VERTICAL AND AT 1'-8" HORIZONTAL.

 TIGHTENER OR TURNBUCKLE SYMBOL.

NOTES:

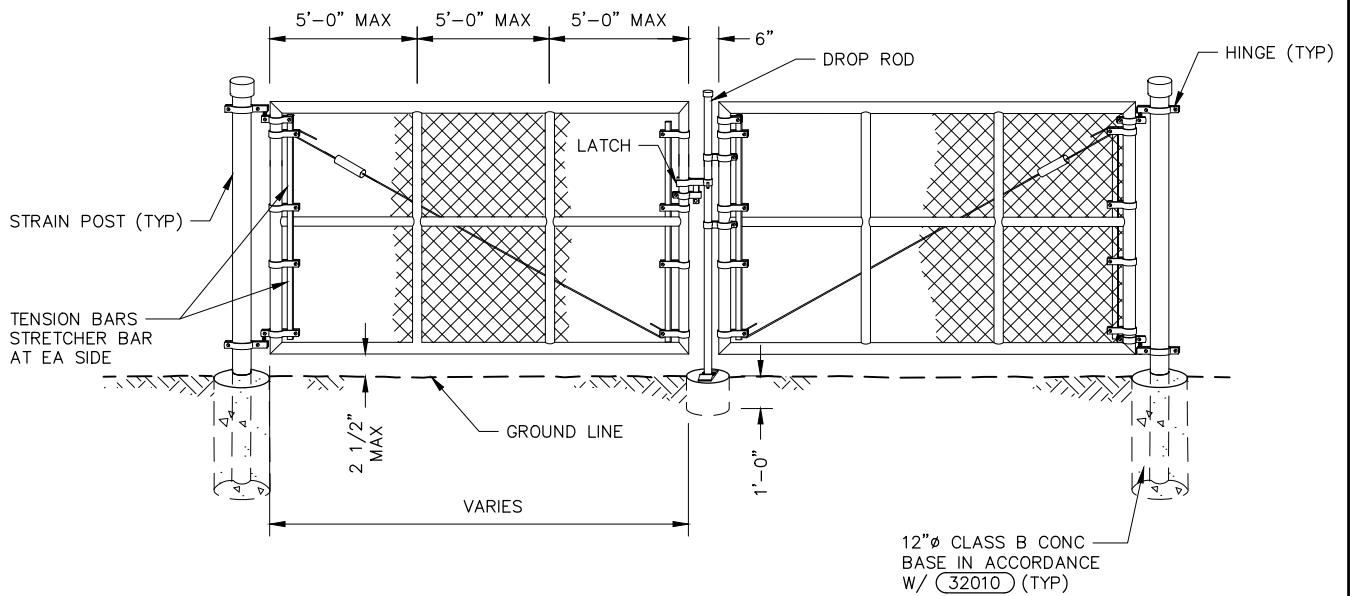
1. CHAIN LINK FENCE, GATE, AND HARDWARE SHALL MEET CDOT STANDARD PLAN NUMBER M-607-2 FOR ROUND PIPE FRAMING.
2. POST AND FRAME SIZES IN ACCORDANCE WITH 32010.

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: 
ORIGINATION DATE: JULY 2021
REVISION DATE:

32012
8' CHAIN LINK FENCE
WITH BARBED WIRE



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NOTE:

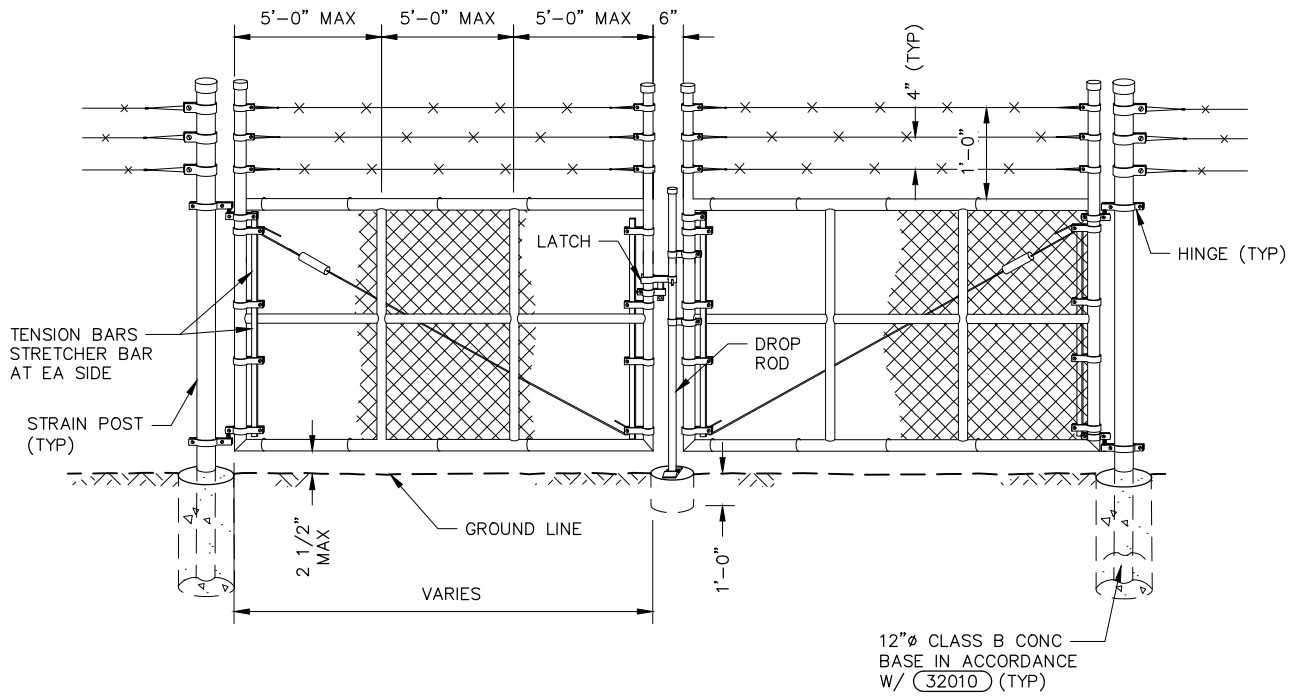
POST, FRAME, AND CONCRETE BASE SIZES IN ACCORDANCE WITH 32010 .

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**32013
DOUBLE SWING GATE**



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12"Ø CLASS B CONC
 BASE IN ACCORDANCE
 W/ (32010) (TYP)

NOTE:

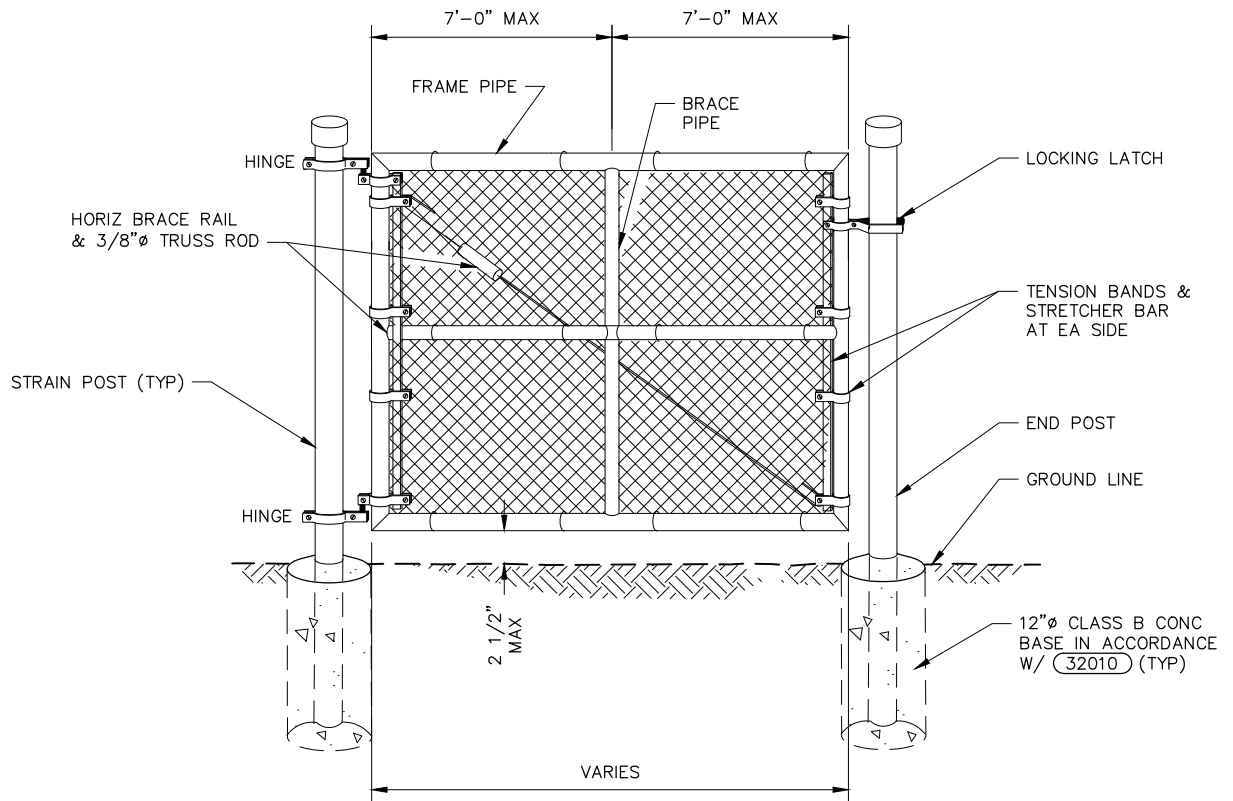
POST, FRAME, AND CONCRETE BASE SIZES IN ACCORDANCE WITH (32010) .

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**32014
 DOUBLE SWING GATE
 WITH BARBED WIRE**

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NOTE:

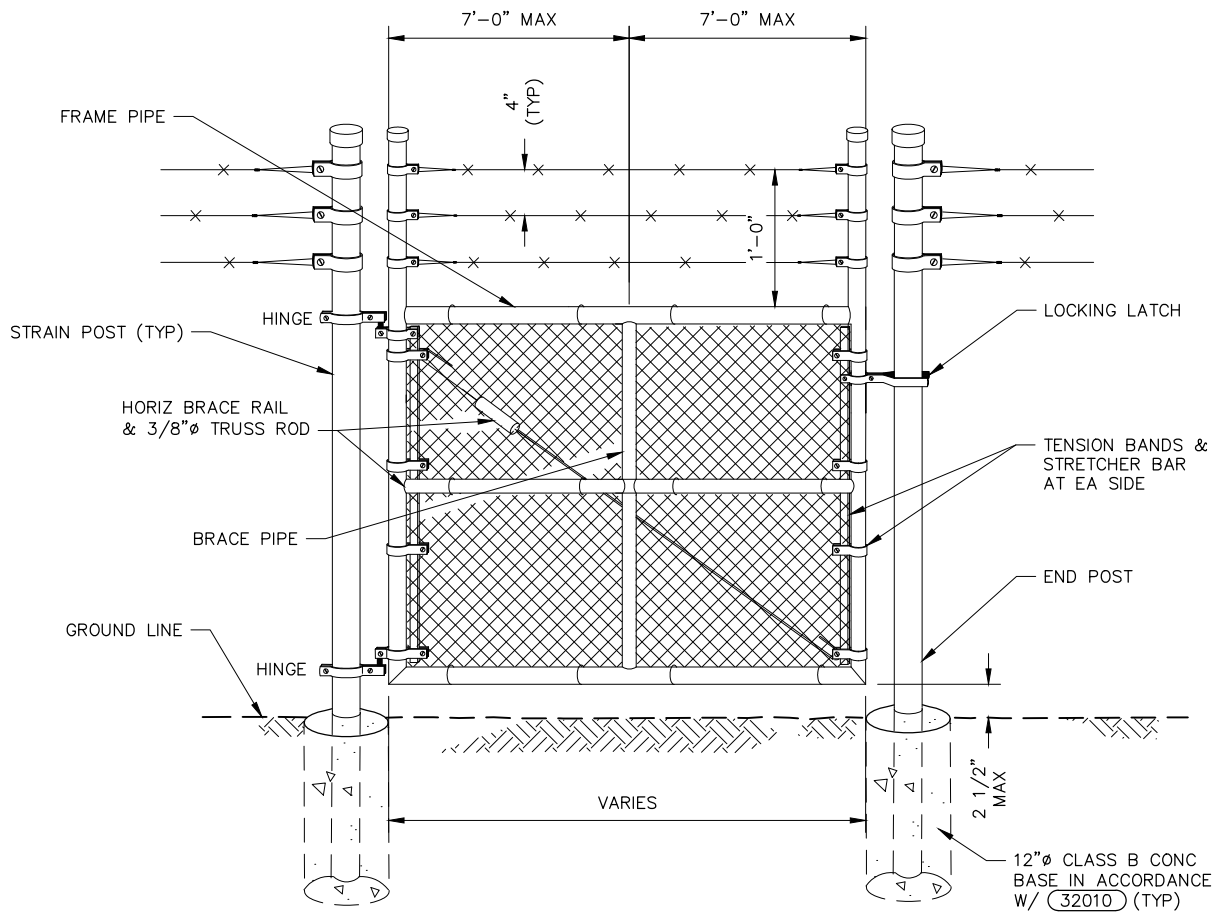
POST, FRAME, AND CONCRETE BASE SIZES IN ACCORDANCE WITH **(32010)**.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

32015 SINGLE SWING GATE



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NOTE:

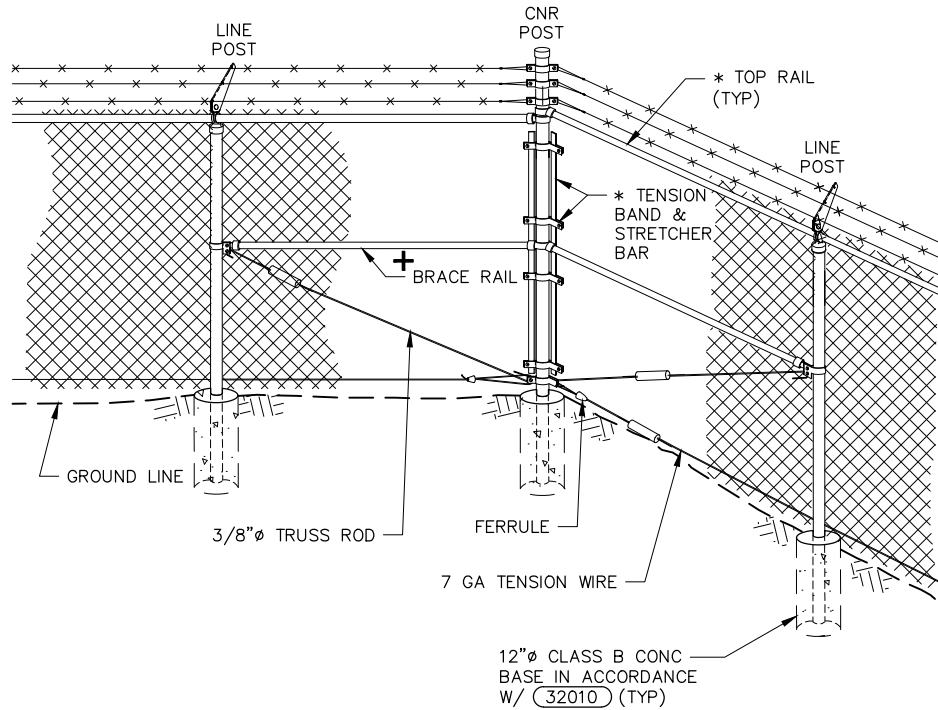
POST, FRAME, AND CONCRETE BASE SIZES IN ACCORDANCE WITH 32010 .

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**32016
SINGLE SWING GATE
WITH BARBED WIRE**




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LEGEND:


* ATTACH FABRIC TO ALL FENCE AND GATE STRUCTURES AT 1'-0" INTERVALS VERTICALLY AND AT 1'-8" HORIZONTALLY

 TIGHTENER OR TURNBUCKLE SYMBOL

+ BRACE RAIL IS NOT REQUIRED FOR 36", 42", OR 48" FABRIC HEIGHTS. BRACE RAIL FOR FENCE WITH ROLL-FORMED STEEL ELEMENTS IS 1'-0" BELOW THE TOP RAIL

NOTES:

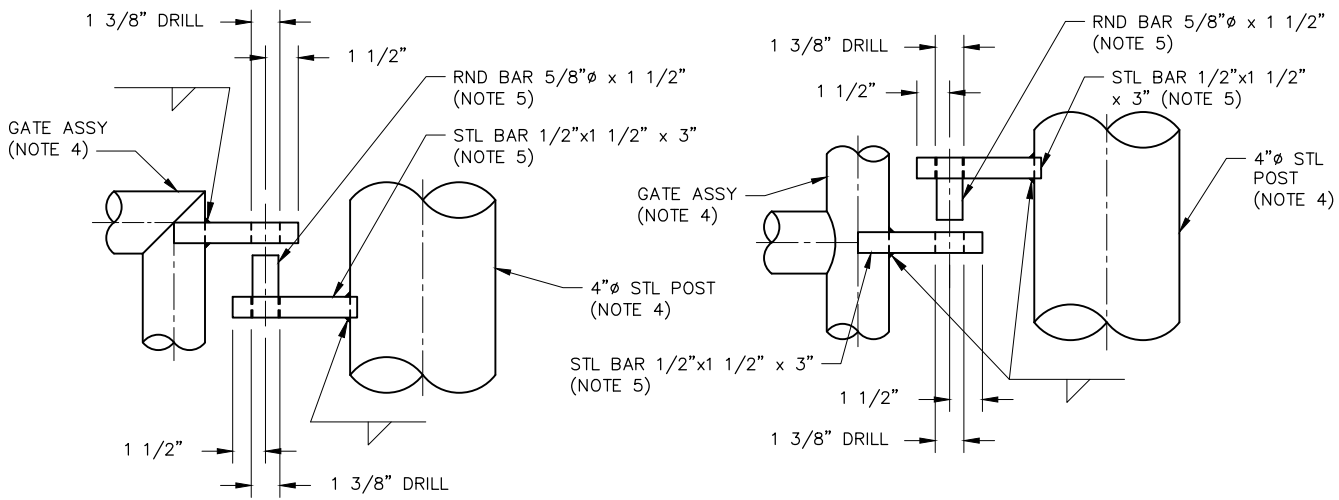
1. CHAIN LINK FENCE, GATE, AND HARDWARE SHALL MEET CDOT STANDARD PLAN NUMBER M-607-2 FOR ROUND PIPE FRAMING.
2. POST AND FRAME SIZES IN ACCORDANCE WITH (32010).

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: 
ORIGINATION DATE: JULY 2021
REVISION DATE:

32017
8' CHAIN LINK FENCE
CORNER POST
WITH BARBED WIRE

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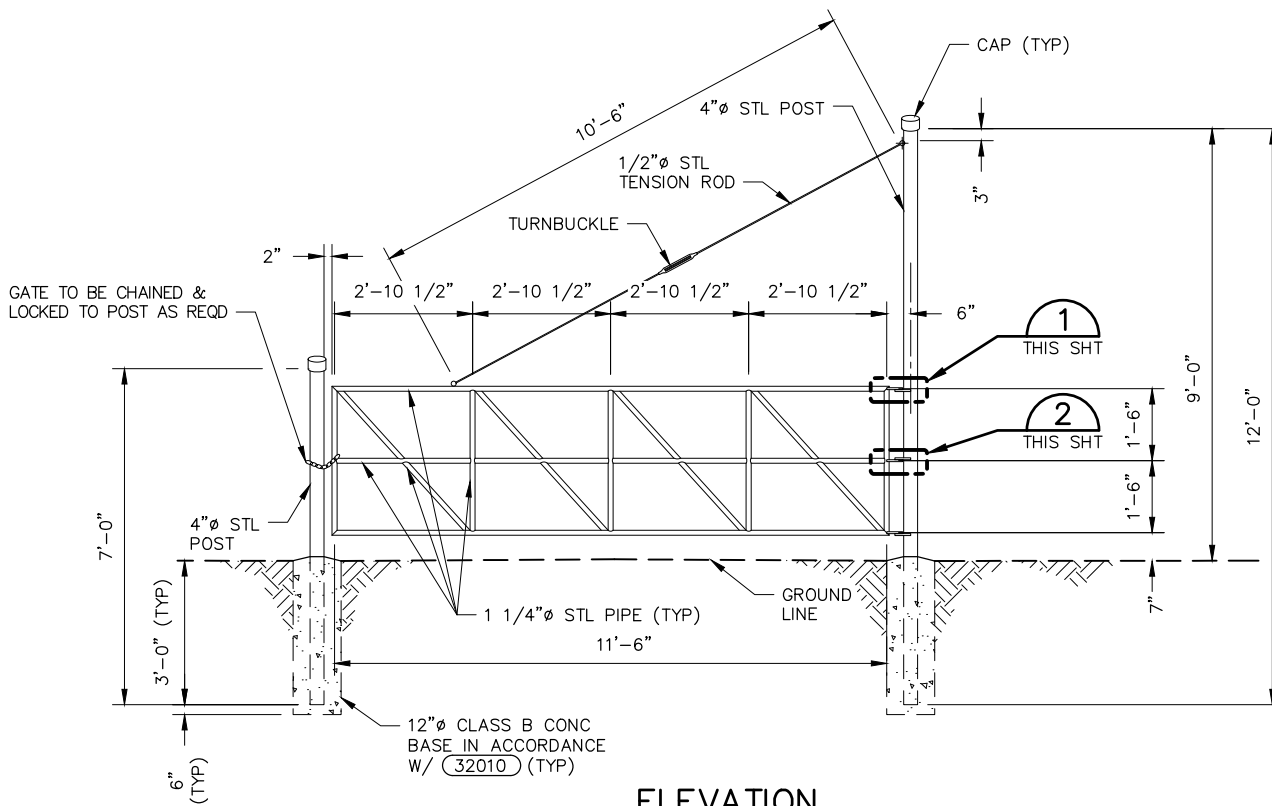


**TOP & BOTTOM
HINGE ASSEMBLY**

1
THIS SHT

MIDDLE HINGE ASSEMBLY

2
THIS SHT



ELEVATION

NOTES:

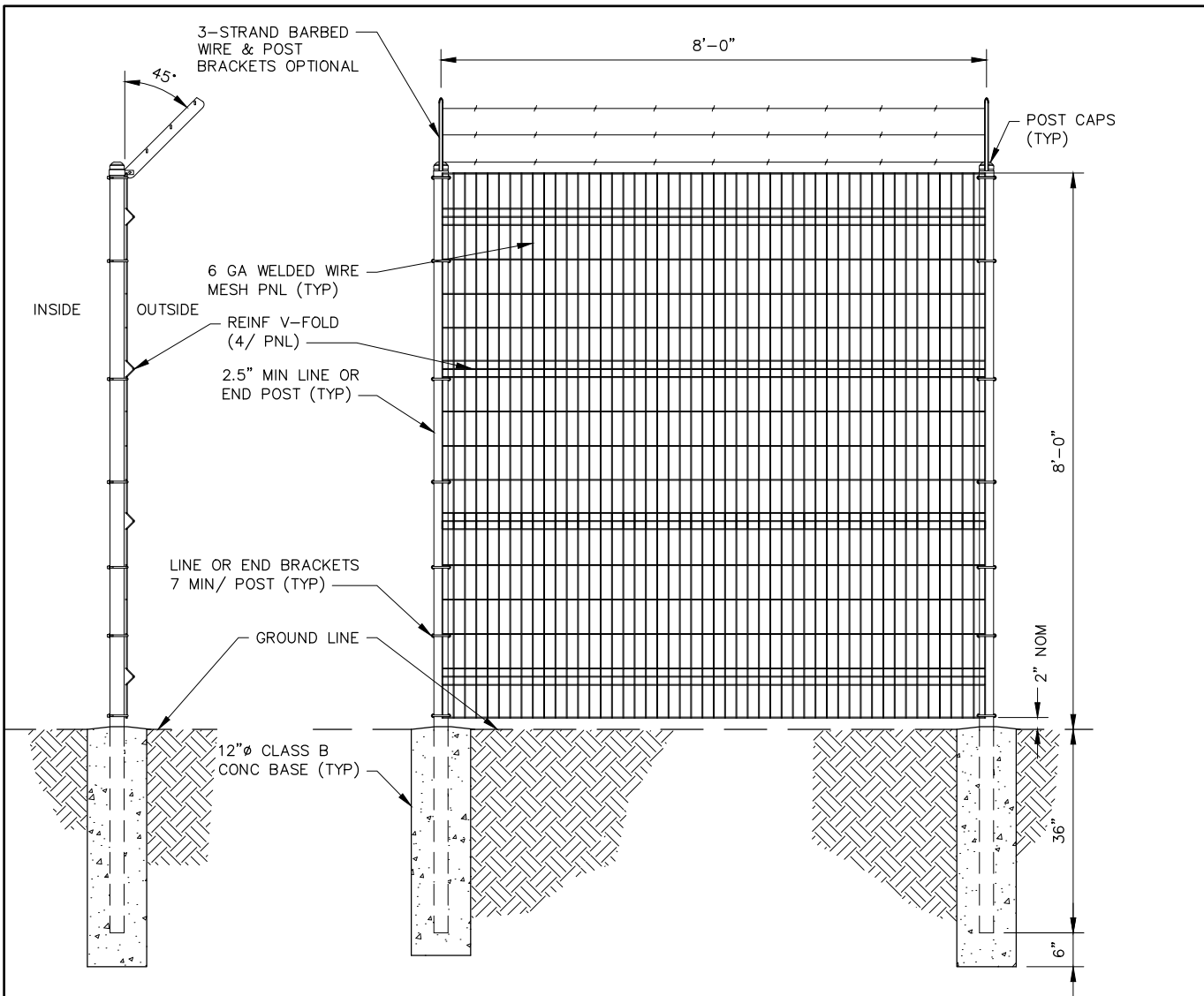
1. GATE AND POSTS SHALL BE PAINTED WITH PITTSBURGH PAINT, TWO PART EPOXY. PART NUMBERS B95-249 AND A95-2402 IN AVOCADO GREEN.
2. HINGES ARE 1/2-INCH BY 1 1/2-INCH FLAT BAR 3 INCHES LONG WITH 5/8-INCH ROUND PIN.
3. 12-FOOT GATE OUTSIDE TO OUTSIDE 11-FOOT 7 5/8-INCH DIAGONAL PIECES AT 3-FOOT 11 5/8-INCH DIAGONAL PIECES CUT AT 48 DEGREES.
4. PLUG WELD INSIDE DIAMETER AFTER PLACING BAR INTO DRILLED HOLE.
5. LOCATE AFTER GATE ASSEMBLY HINGES HAVE BEEN WELDED KEEPING GATE ASSEMBLY LEVEL.

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**32018
ACCESS GATE**

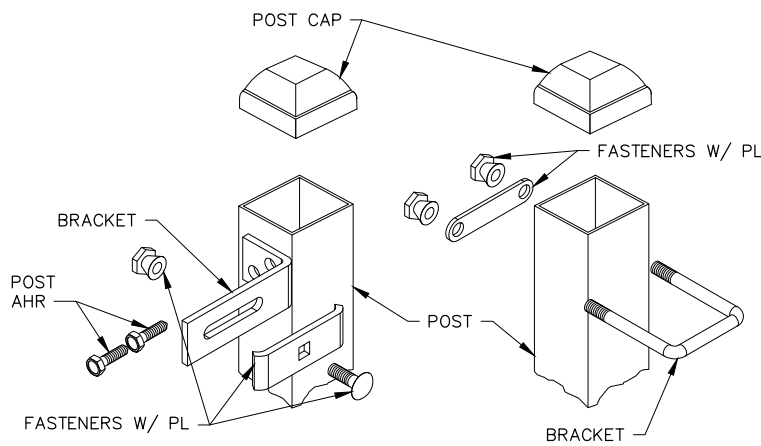


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SIDE

ELEVATION



END/GATE BRACKET ASSEMBLY

LINE BRACKET ASSEMBLY

NOTE:

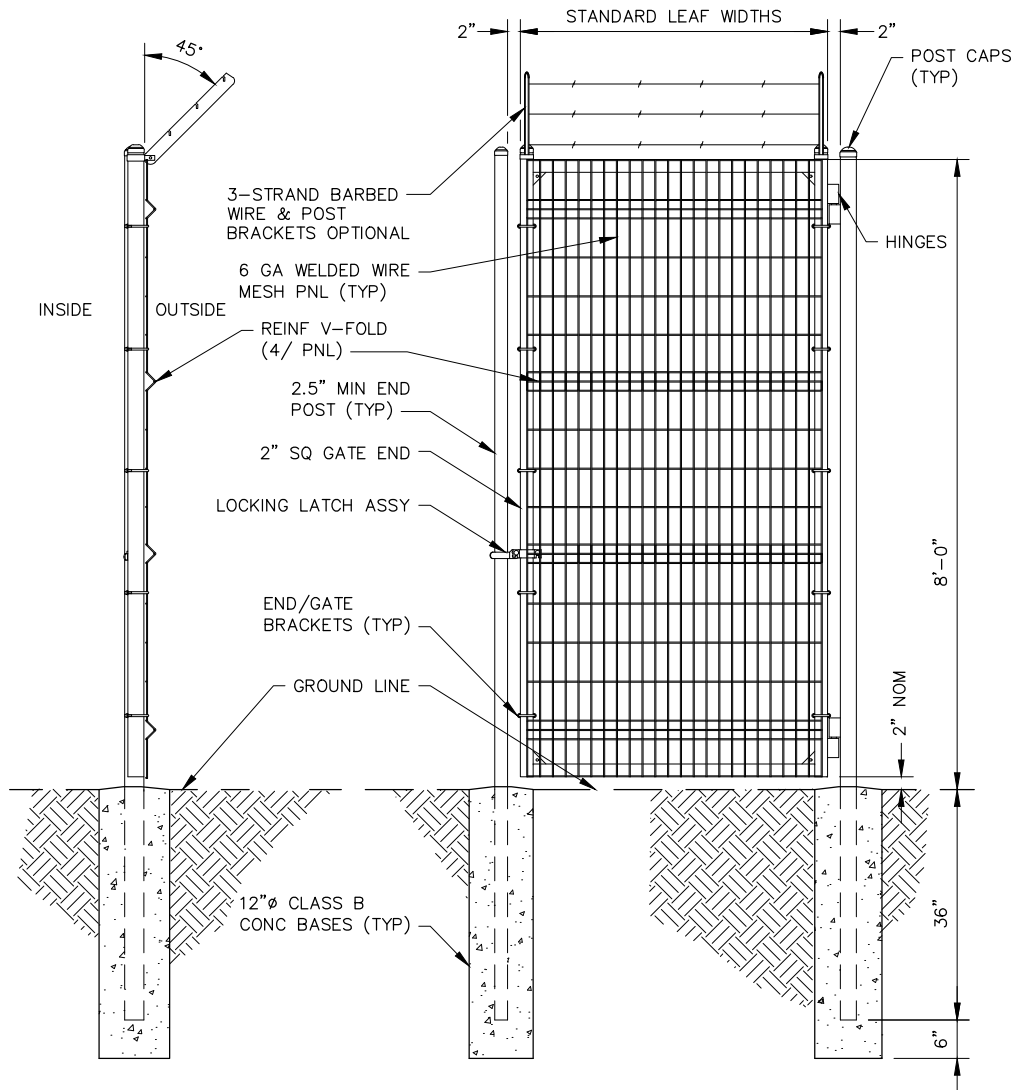
APPROXIMATE WELDED WIRE MESH GRID PATTERN - 2"x 6".

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

32019
ARCHITECTURAL WELDED
WIRE FENCE PANEL

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SIDE

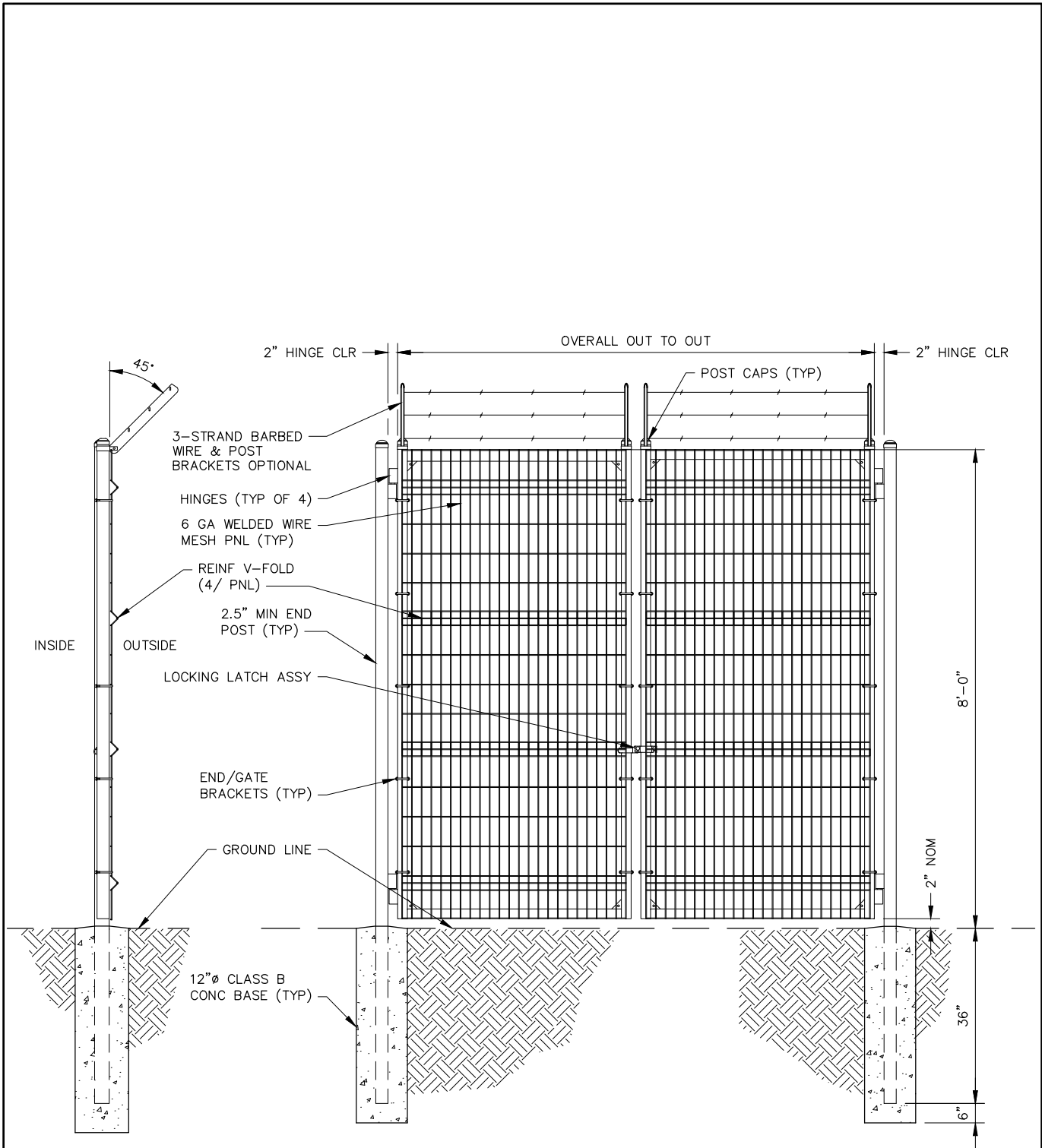
ELEVATION

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

32020
ARCHITECTURAL WELDED WIRE
FENCE – SINGLE GATE


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SIDE

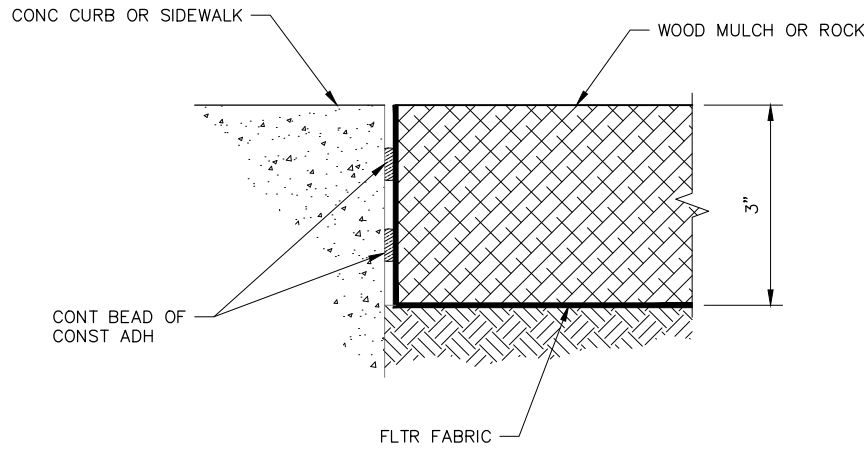
ELEVATION

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

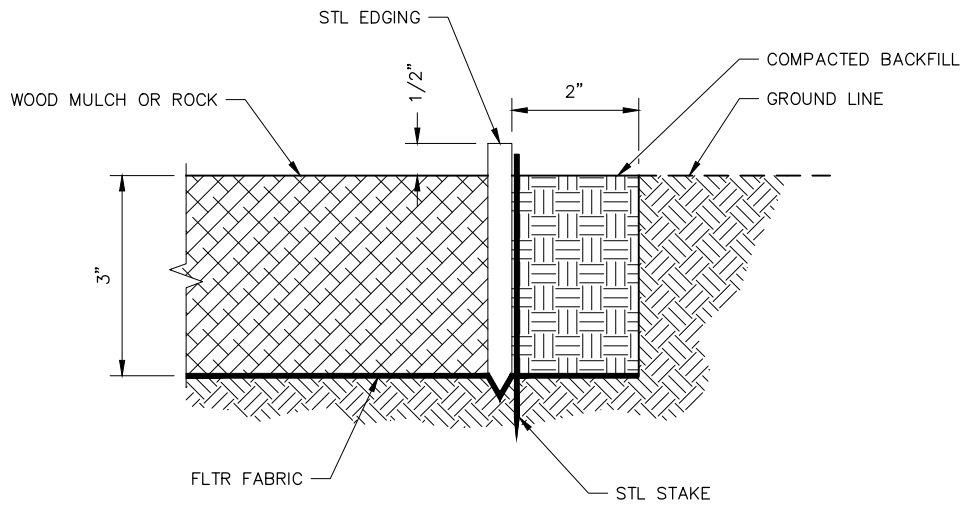
**32021
ARCHITECTURAL WELDED
WIRE FENCE – DOUBLE
GATE**

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HARD EDGE FABRIC



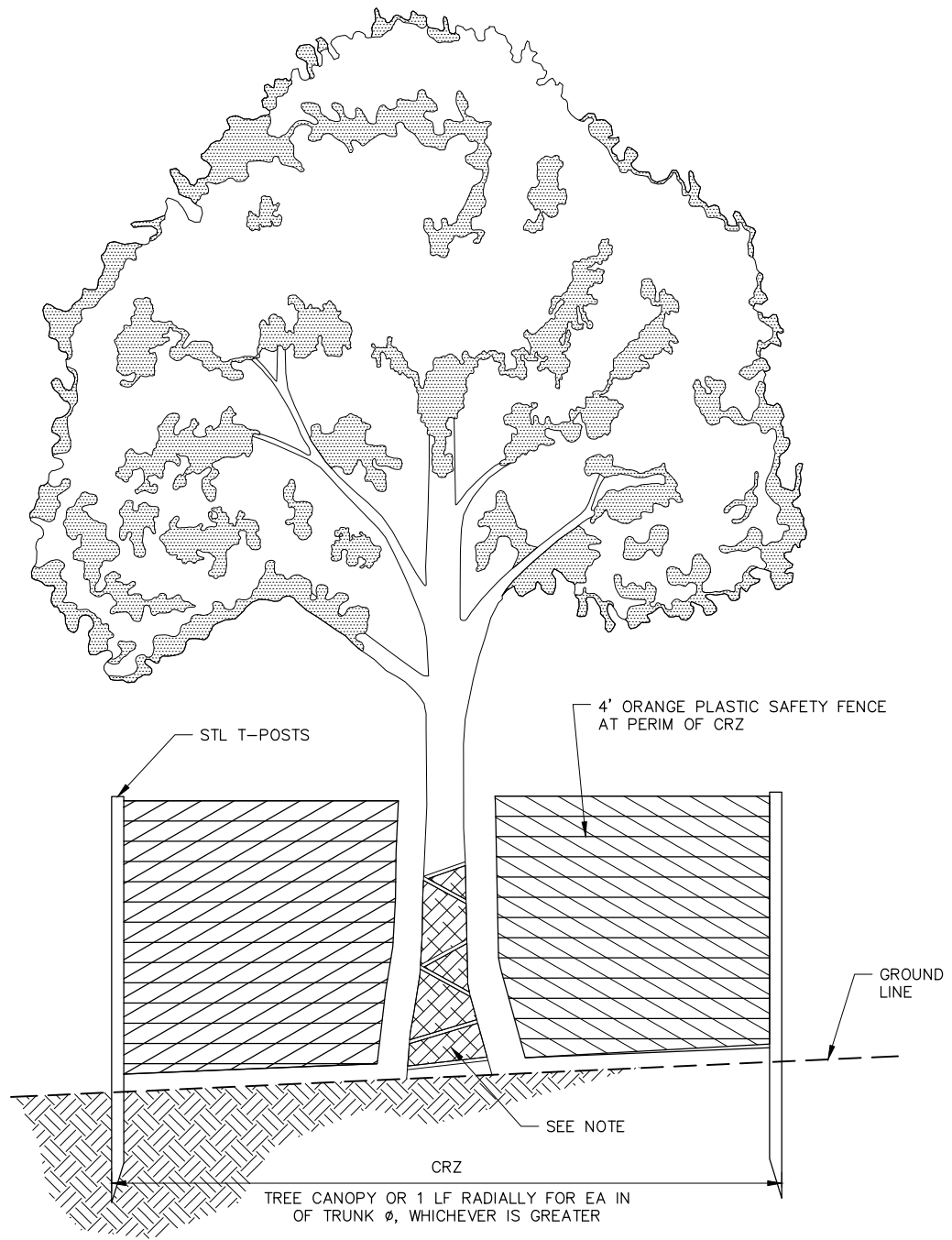
STEEL EDGING AND FABRIC

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**32025
LANDSCAPE EDGING**



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NOTE:

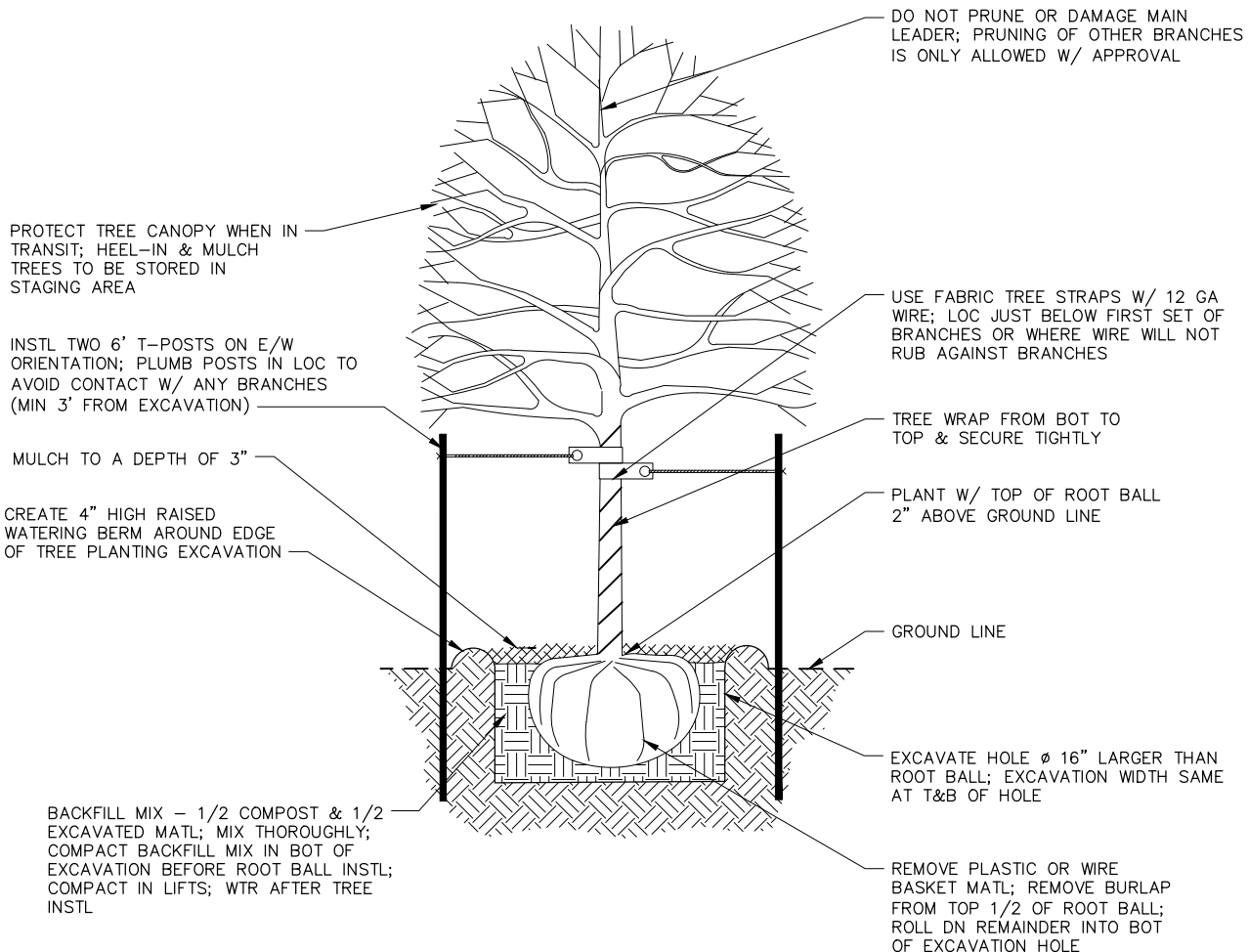
TREE WRAP ONLY REQUIRED IF EXCAVATION IS WITHIN CRITICAL ROOT ZONE.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

32026 TREE PROTECTION FENCE

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DRAWN BY: MITCHELL

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

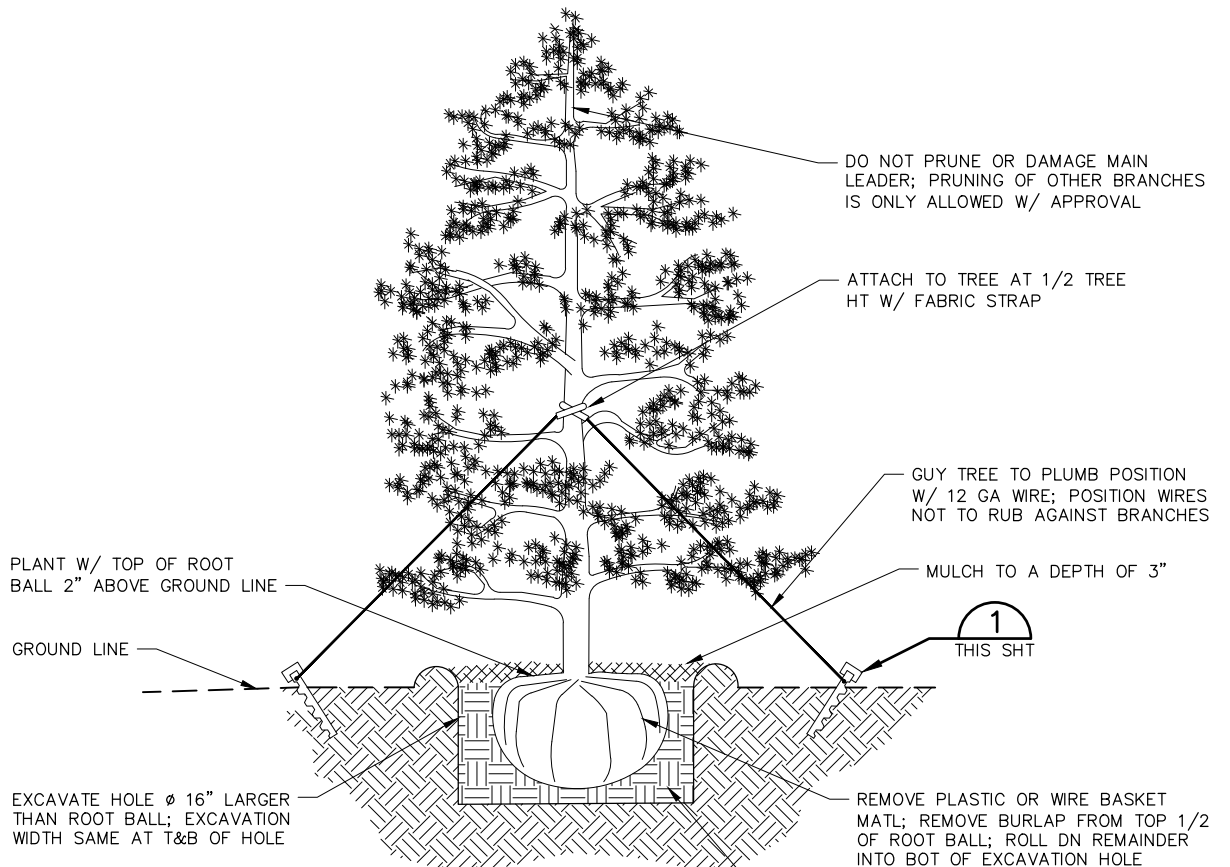
ORIGINATION DATE: JULY 2021

REVISION DATE:

32027 DECIDUOUS TREE PLANTING



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PLANT W/ TOP OF ROOT BALL 2" ABOVE GROUND LINE

GROUND LINE

EXCAVATE HOLE ϕ 16" LARGER THAN ROOT BALL; EXCAVATION WIDTH SAME AT T&B OF HOLE

DO NOT PRUNE OR DAMAGE MAIN LEADER; PRUNING OF OTHER BRANCHES IS ONLY ALLOWED W/ APPROVAL

ATTACH TO TREE AT 1/2 TREE HT W/ FABRIC STRAP

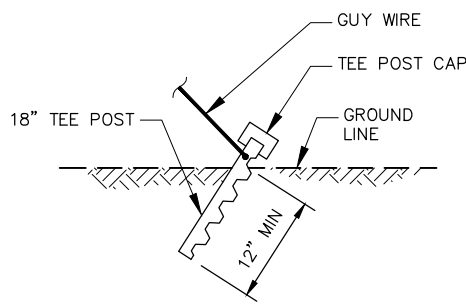
GUY TREE TO PLUMB POSITION W/ 12 GA WIRE; POSITION WIRES NOT TO RUB AGAINST BRANCHES

MULCH TO A DEPTH OF 3"

1
THIS SHT

REMOVE PLASTIC OR WIRE BASKET MATL; REMOVE BURLAP FROM TOP 1/2 OF ROOT BALL; ROLL DN REMAINDER INTO BOT OF EXCAVATION HOLE

BACKFILL MIX - 1/2 COMPOST & 1/2 EXCAVATED MATL; MIX THOROUGHLY; COMPACT BACKFILL MIX AT BOT OF EXCAVATION BEFORE ROOT BALL INSTL; COMPACT IN LIFTS; WTR AFTER EA TREE INSTL



DETAIL

1
THIS SHT

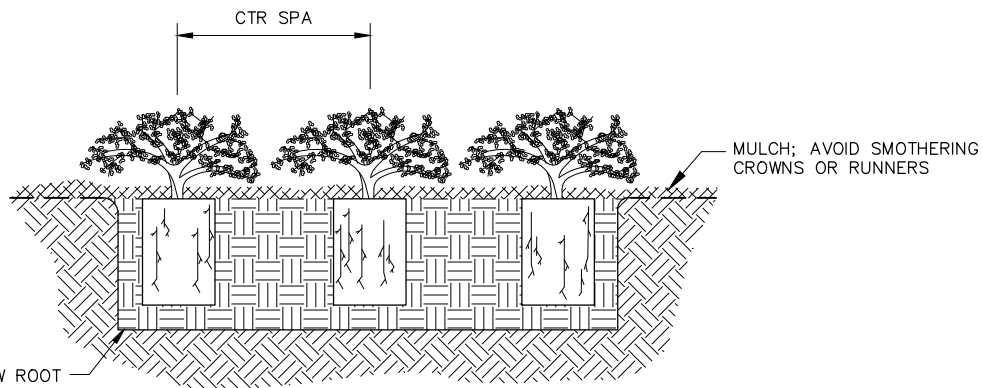
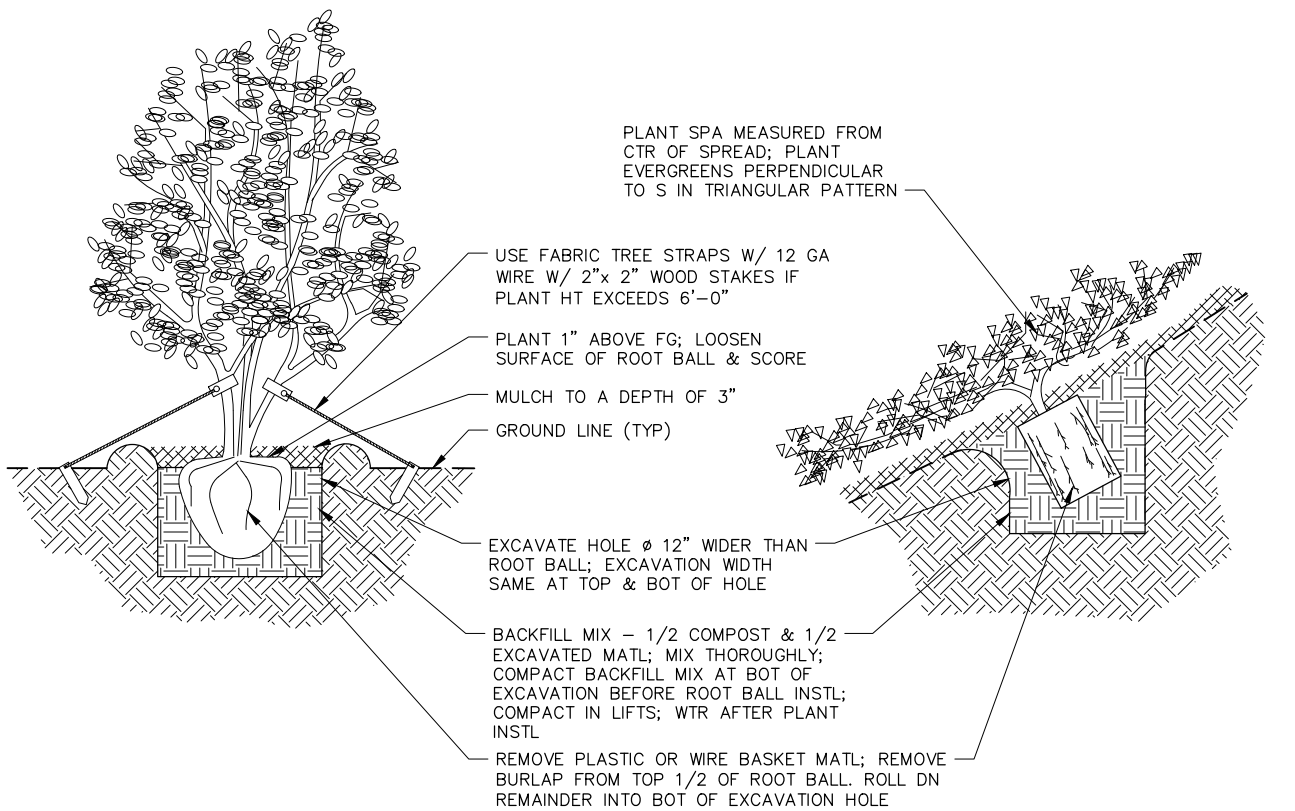
(3 REQD)

DRAWN BY: MITCHELL
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

32028 EVERGREEN TREE PLANTING

D DENVER WATER

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EXCAVATE PLANTING PIT 2" BELOW ROOT BALL; MAINTAIN 1/2 COMPOST TO 1/2 EXIST SOIL MIX; COMPACT AREA BELOW ROOT BALL; PLANT USING ON CTR MEASUREMENTS; WTR THOROUGHLY

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

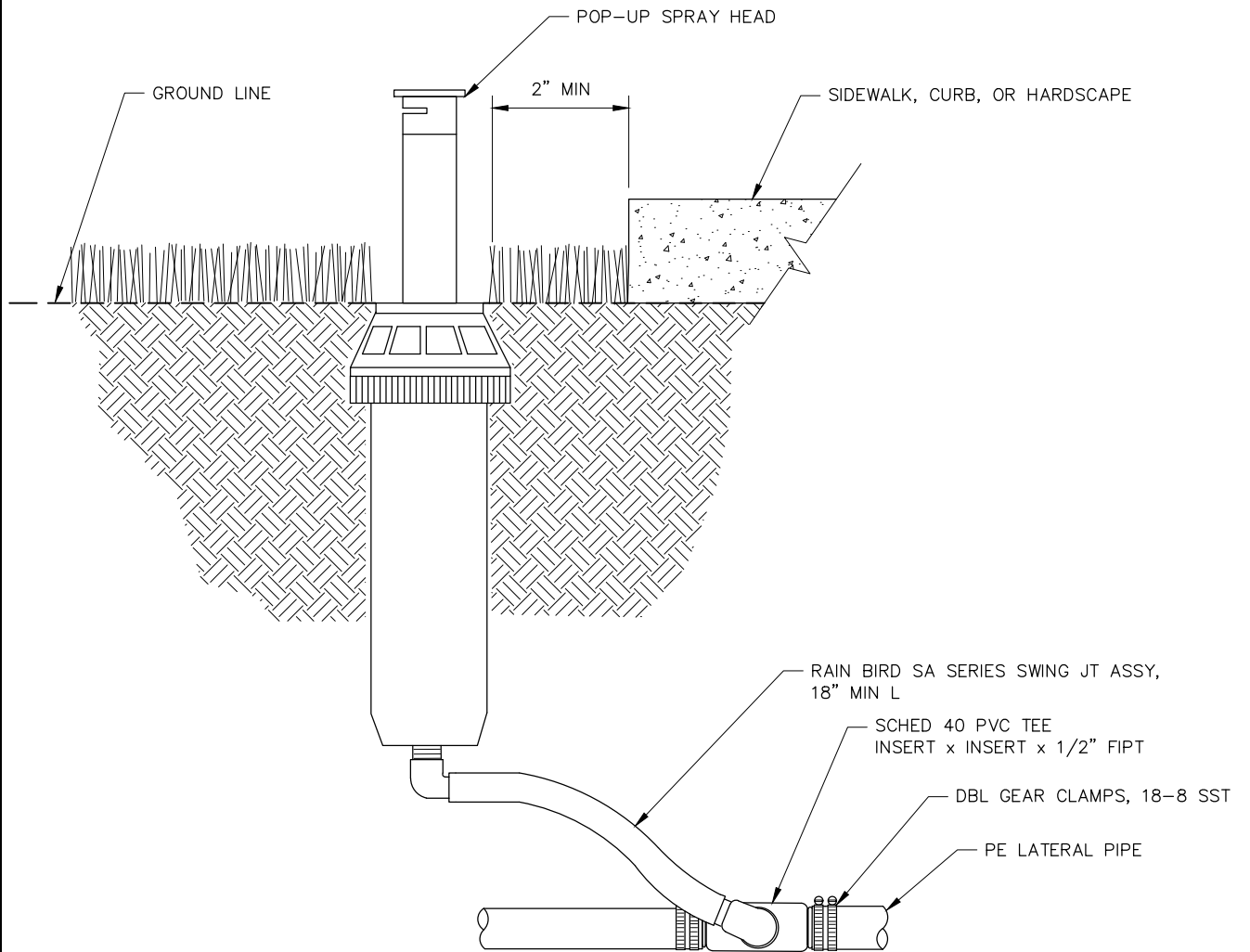
ORIGINATION DATE: JULY 2021

REVISION DATE:

32029 SHRUB AND PERENNIAL PLANTING



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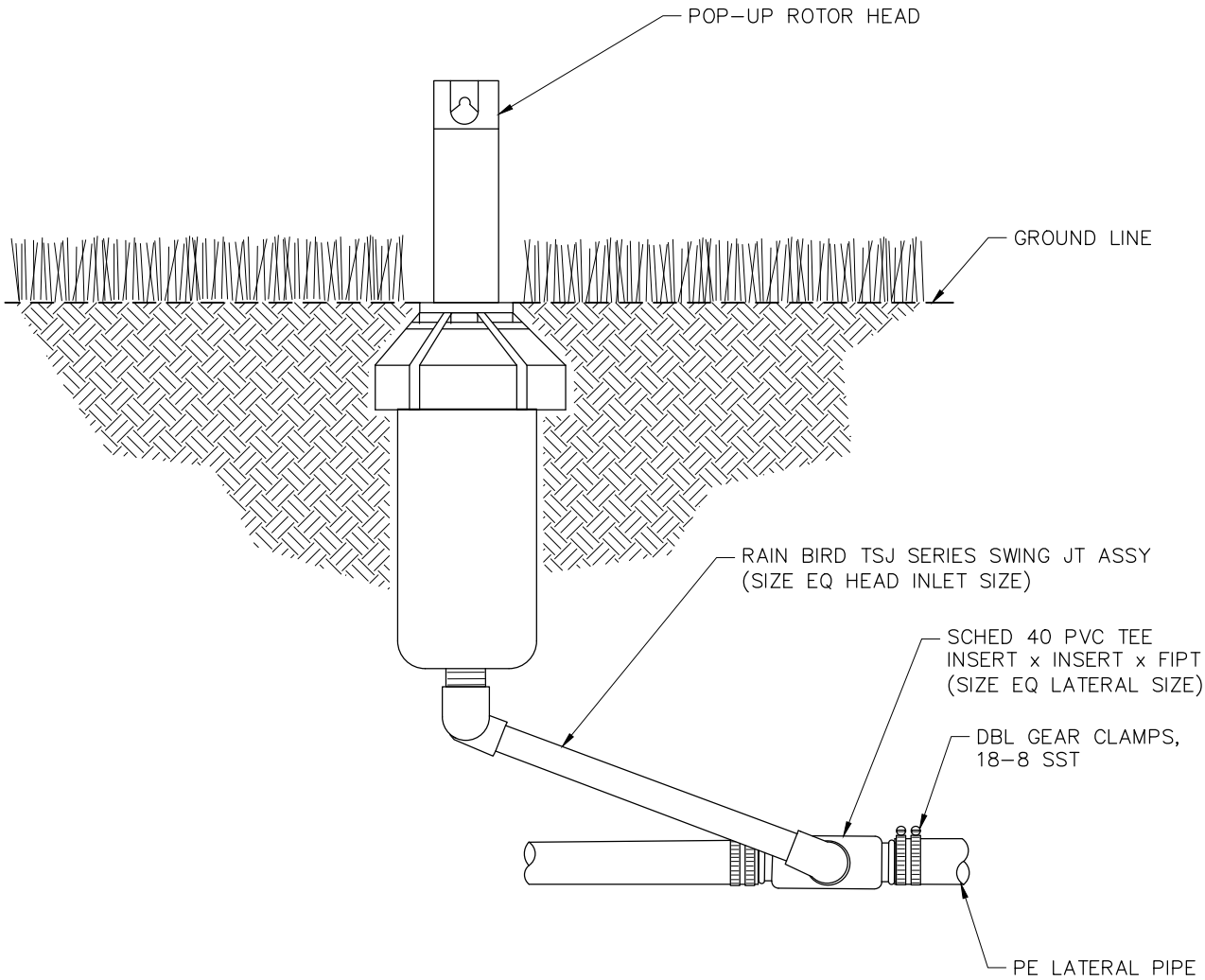
ORIGINATION DATE: JULY 2021

REVISION DATE:

32030 POP-UP SPRAY HEAD



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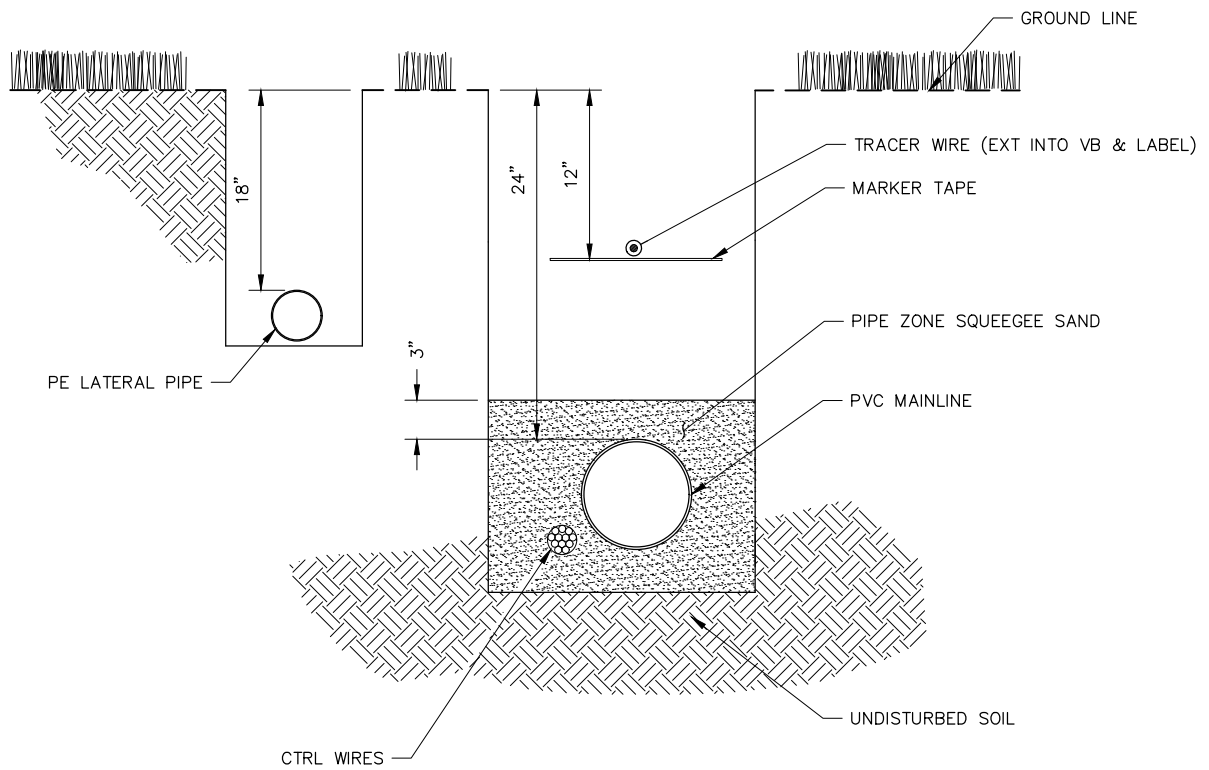
ORIGINATION DATE: JULY 2021

REVISION DATE:

32031 GEAR DRIVEN ROTOR HEAD



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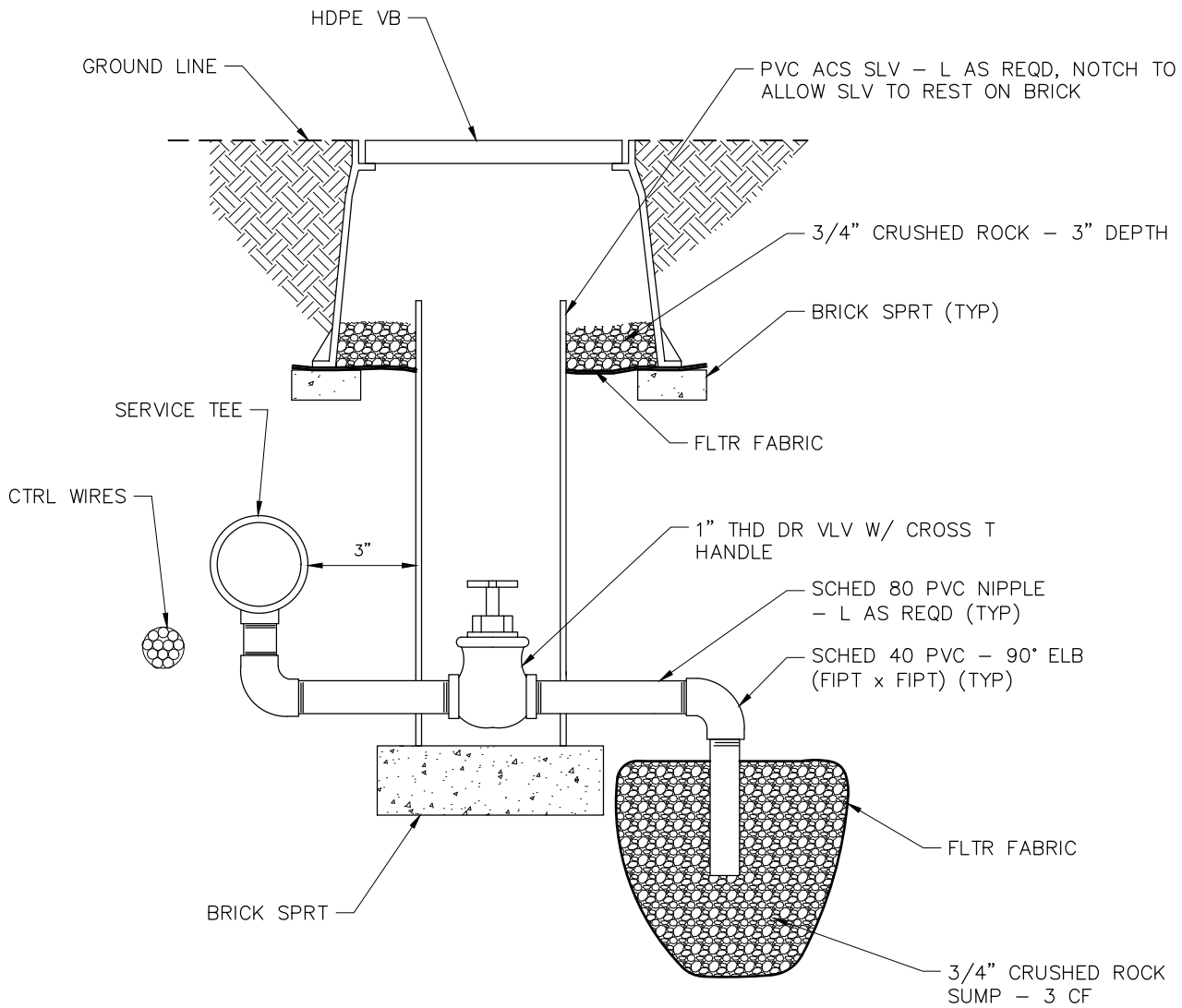
ORIGINATION DATE: JULY 2021

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32032 TYPICAL IRRIGATION PIPE TRENCH



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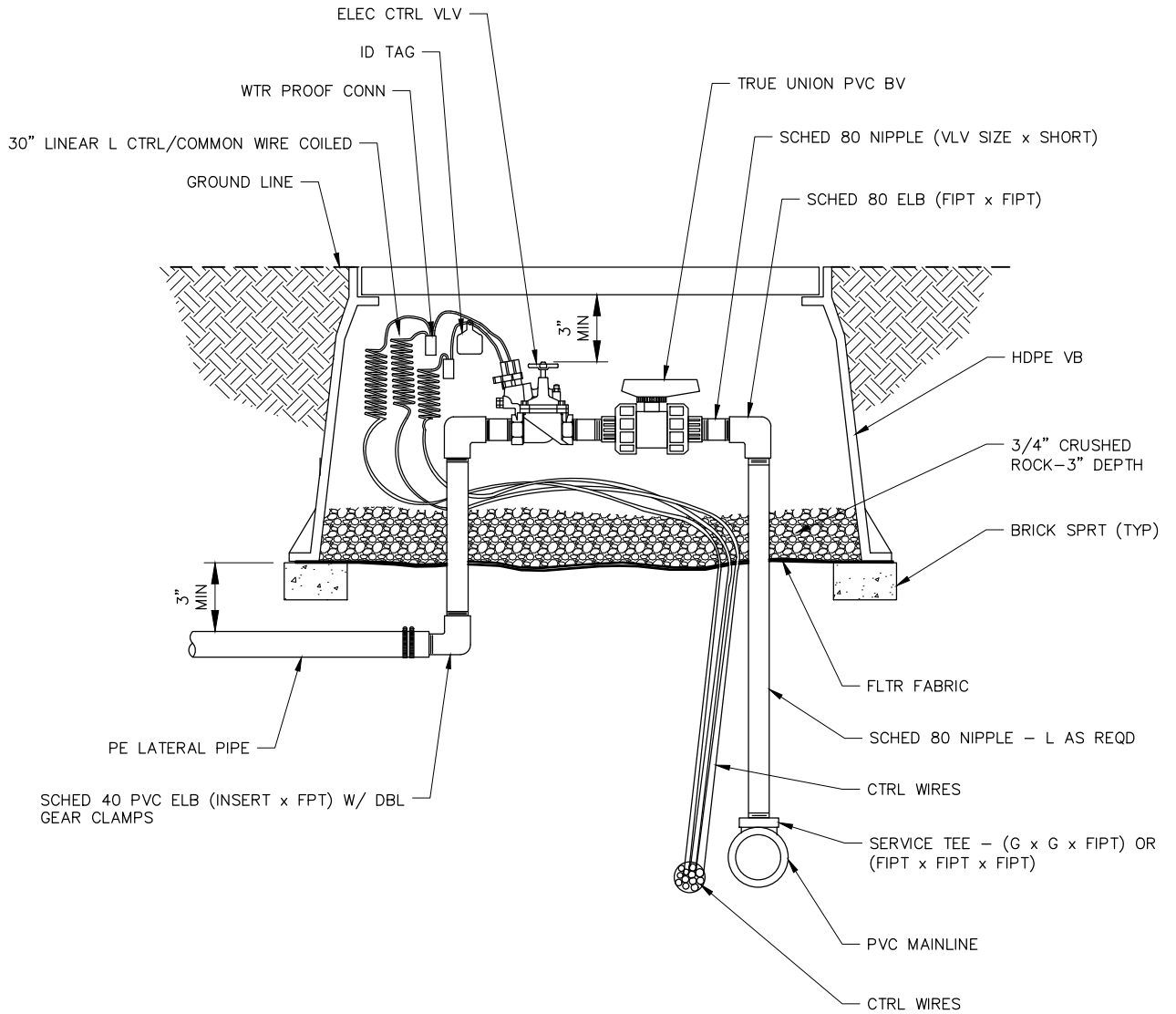


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 ORIGINATION DATE: JULY 2021
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32040 MANUAL DRAIN VALVE



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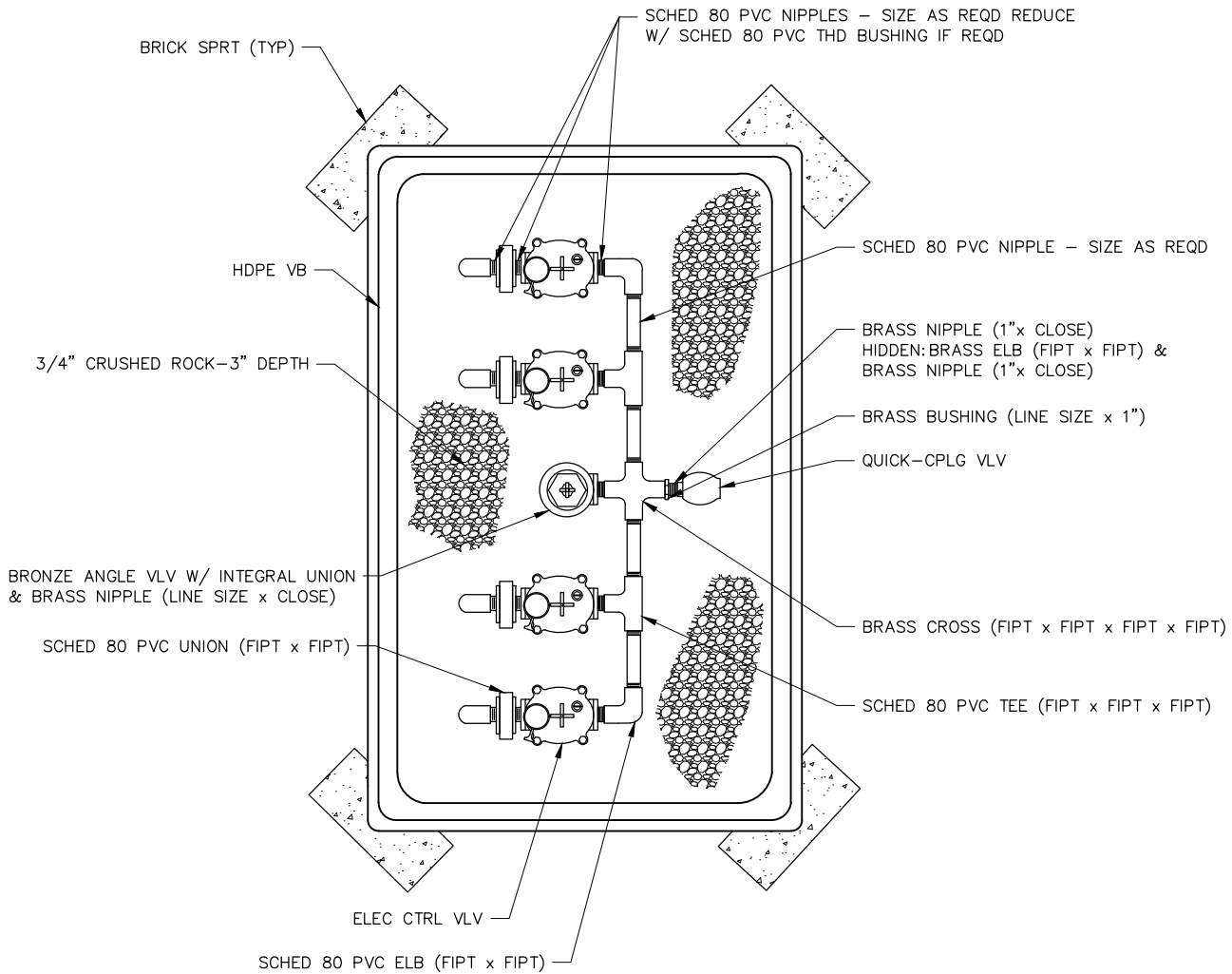
ORIGINATION DATE: JULY 2021

REVISION DATE:

32041 SINGLE CONTROL VALVE



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APPD BY: *[Signature]*

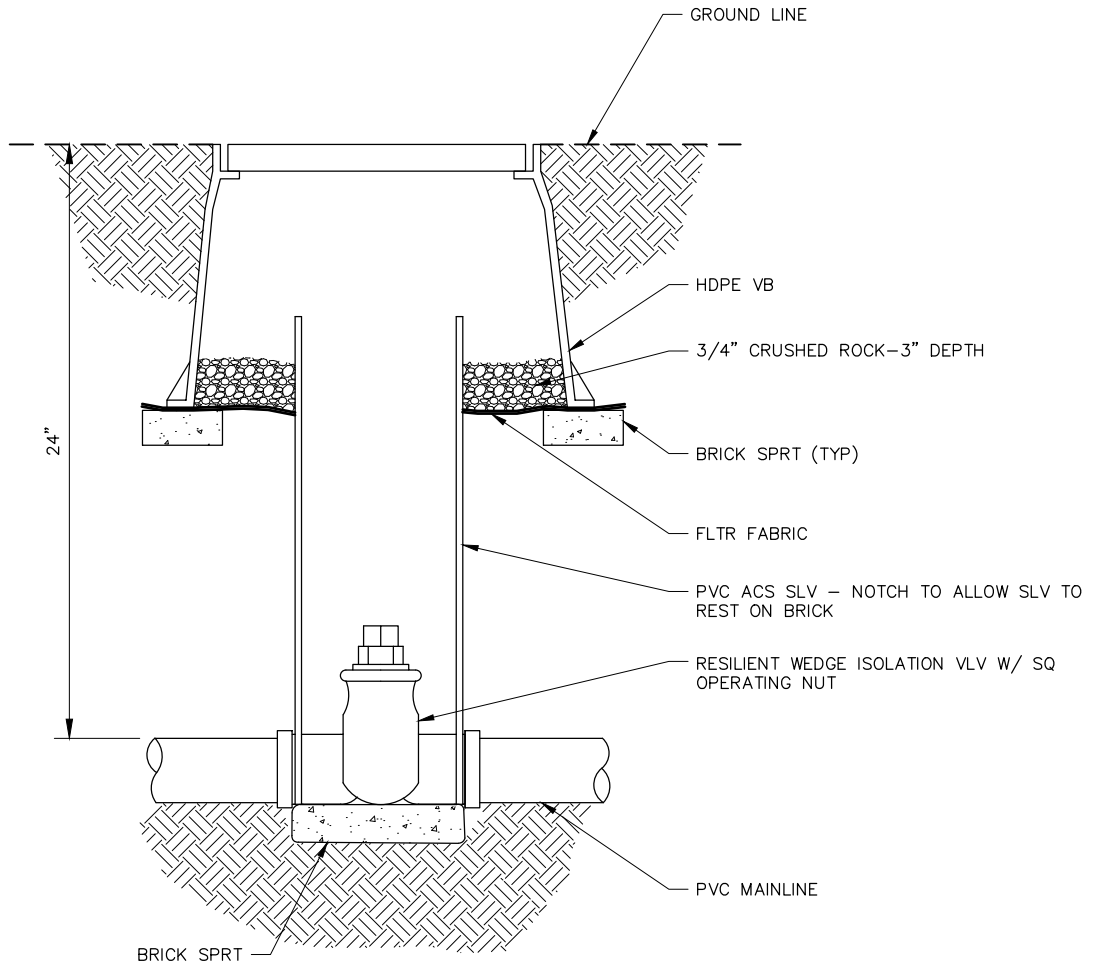
ORIGINATION DATE: JULY 2021

REVISION DATE:

32042
 CLUSTER CONTROL
 VALVE PLAN



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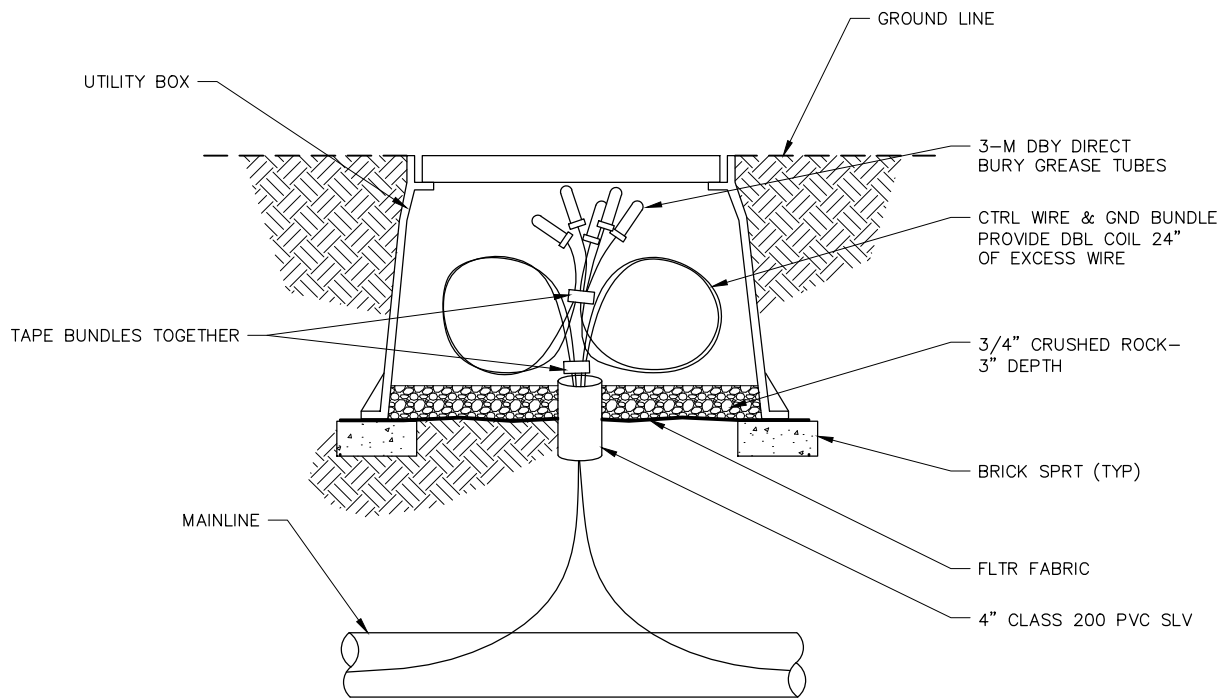


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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**32043
ISOLATION VALVE**

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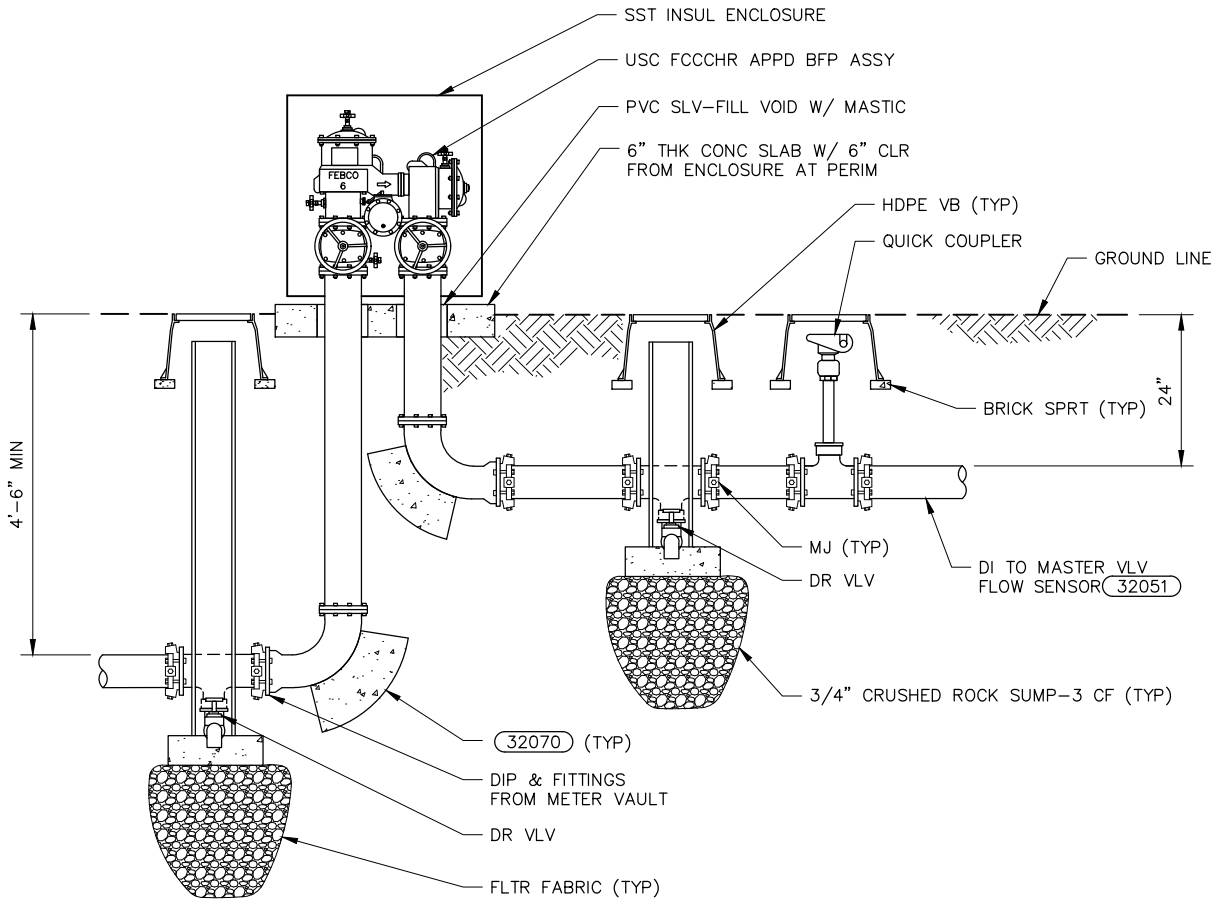


DRAWN BY: ALVARADO
 CHKD BY: K ROSS/KLR
 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

32044
 IRRIGATION WIRE
 SPLICE BOX



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APPD BY: *[Signature]*

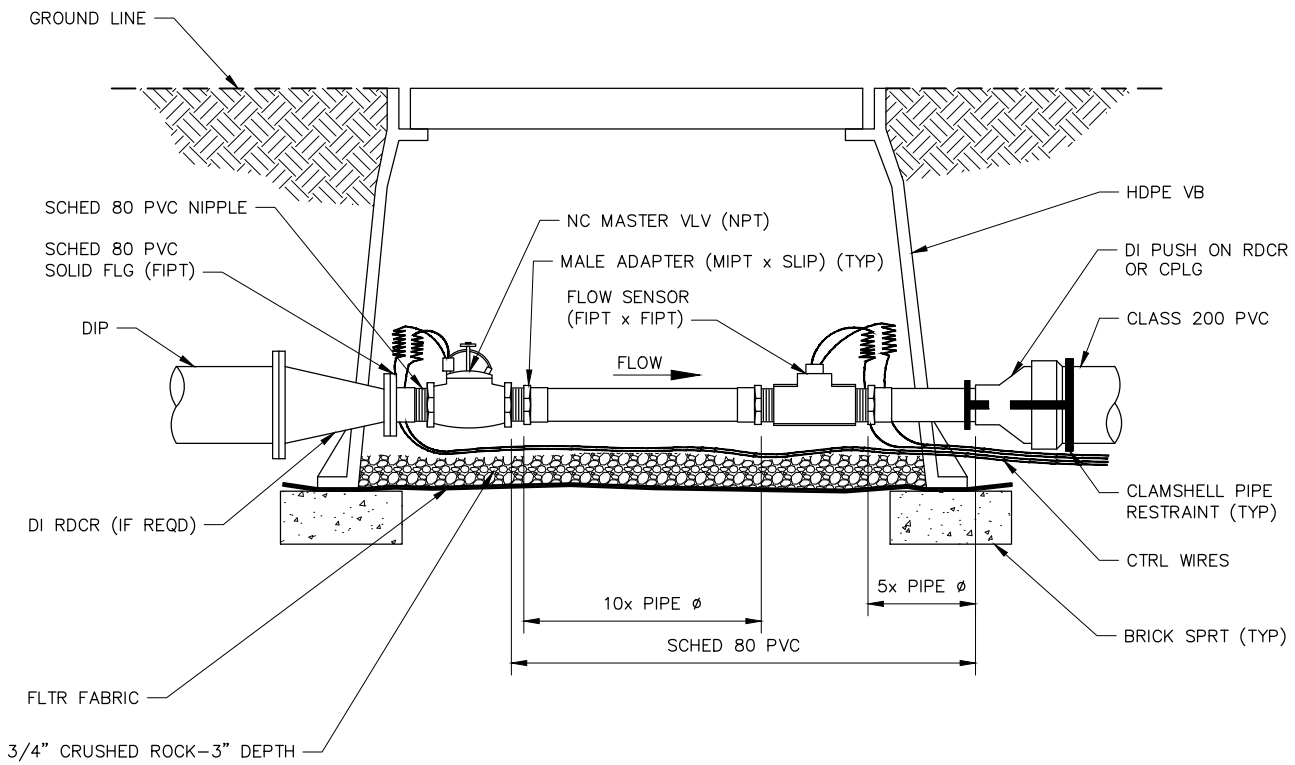
ORIGINATION DATE: JULY 2021

REVISION DATE:

32050
 3"Ø AND LARGER
 BACKFLOW PREVENTER



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NOTE:

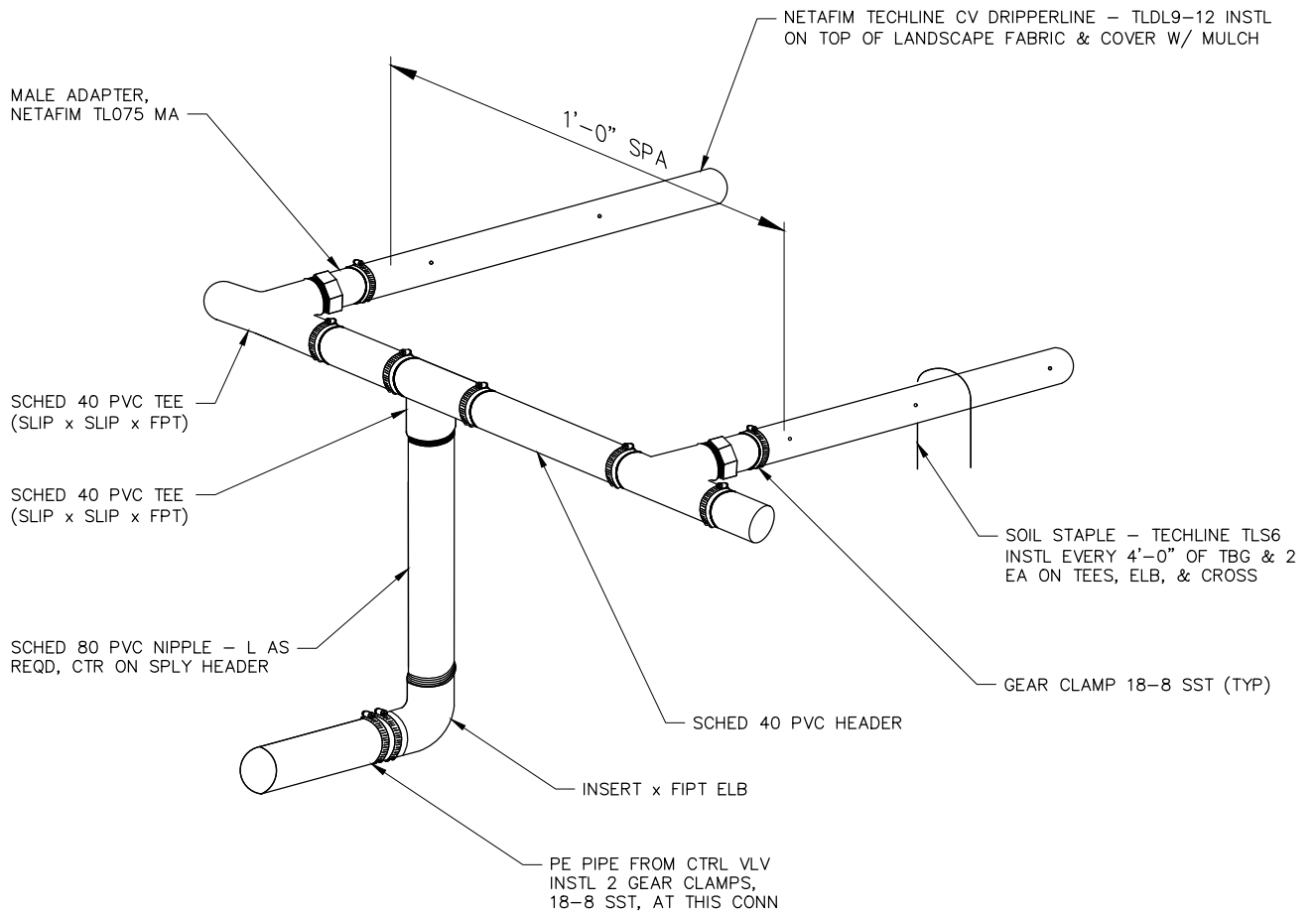
USE TWO HDPE VALVE BOXES FOR SCHEDULE 80 PVC PIPE DIAMETER LARGER THAN 3 INCH.

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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**32051
MASTER VALVE
FLOW SENSOR**



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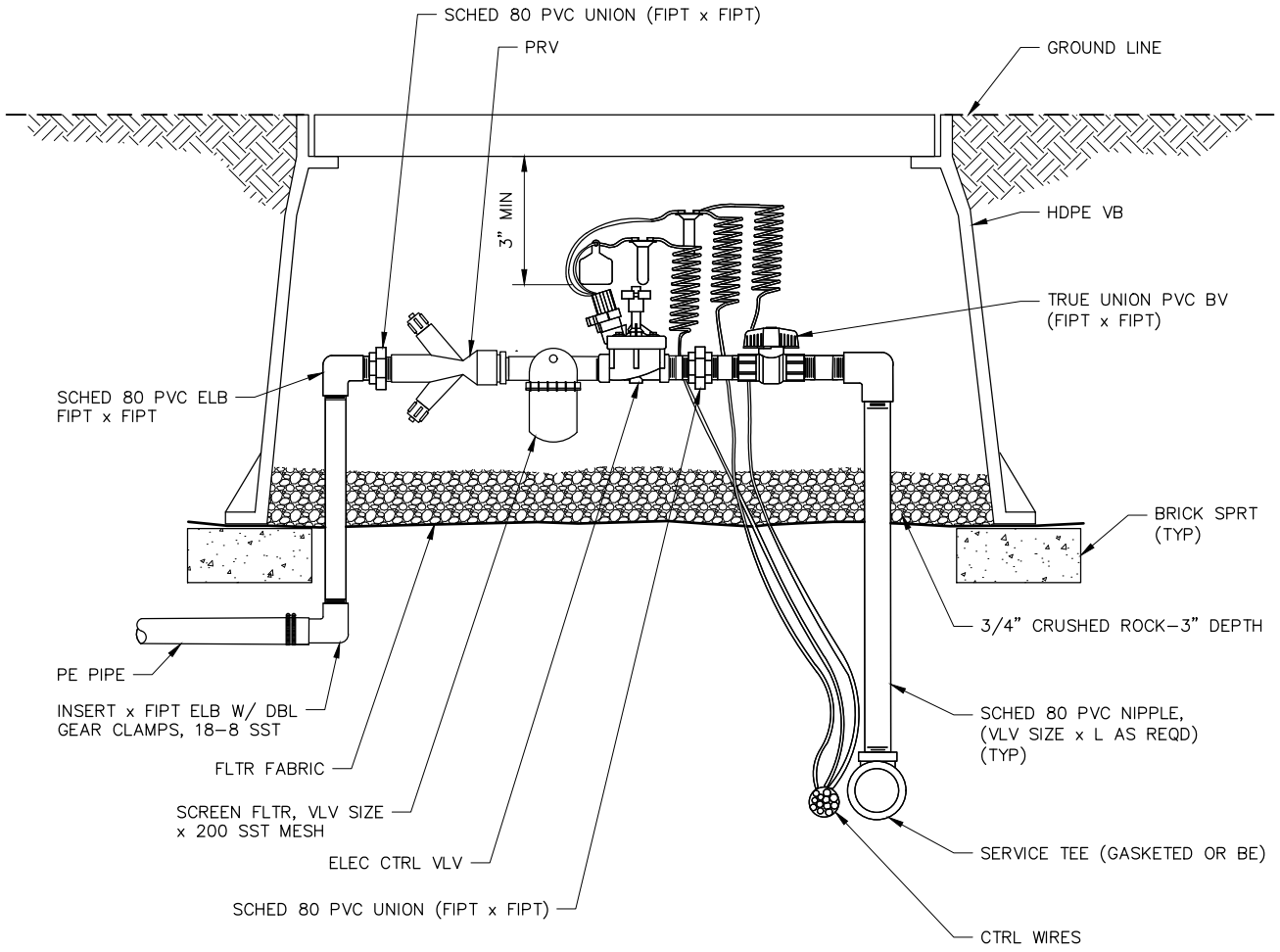
ORIGINATION DATE: JULY 2021

REVISION DATE:

32052 DRIPLINE PIPE



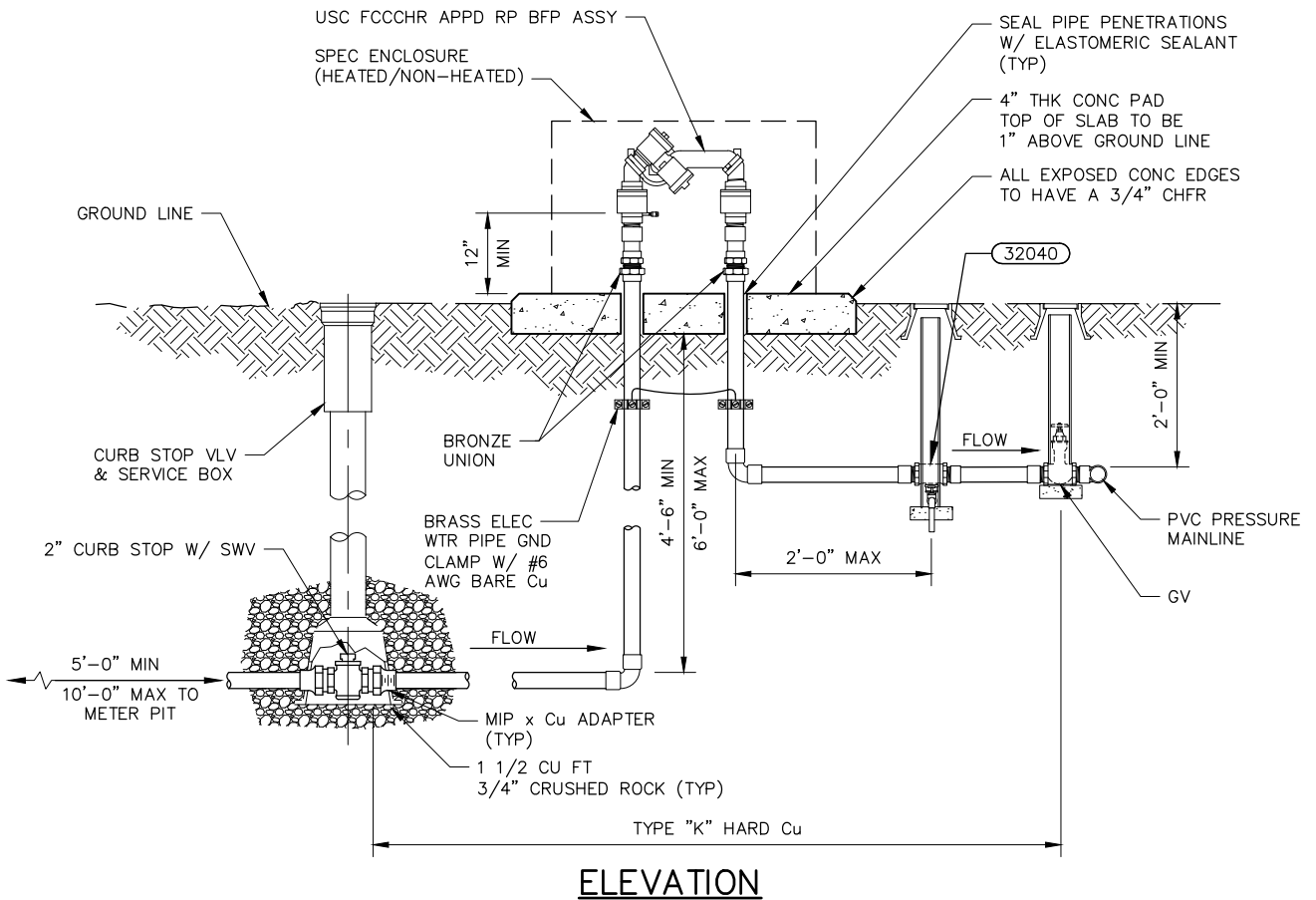
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 ORIGINATION DATE: JULY 2021
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32053
 DRIPLINE CONTROL VALVE

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NOTES:

1. CONCRETE PAD PENETRATIONS SHALL BE 1 INCH LARGER THAN PIPE DIAMETER.
2. DIAMETER OF FITTINGS, NIPPLE, AND TUBING SHALL BE EQUAL IN DIAMETER TO THE BACKFLOW PREVENTER.
3. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR SPECIFIC INSTALLATION INSTRUCTIONS.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

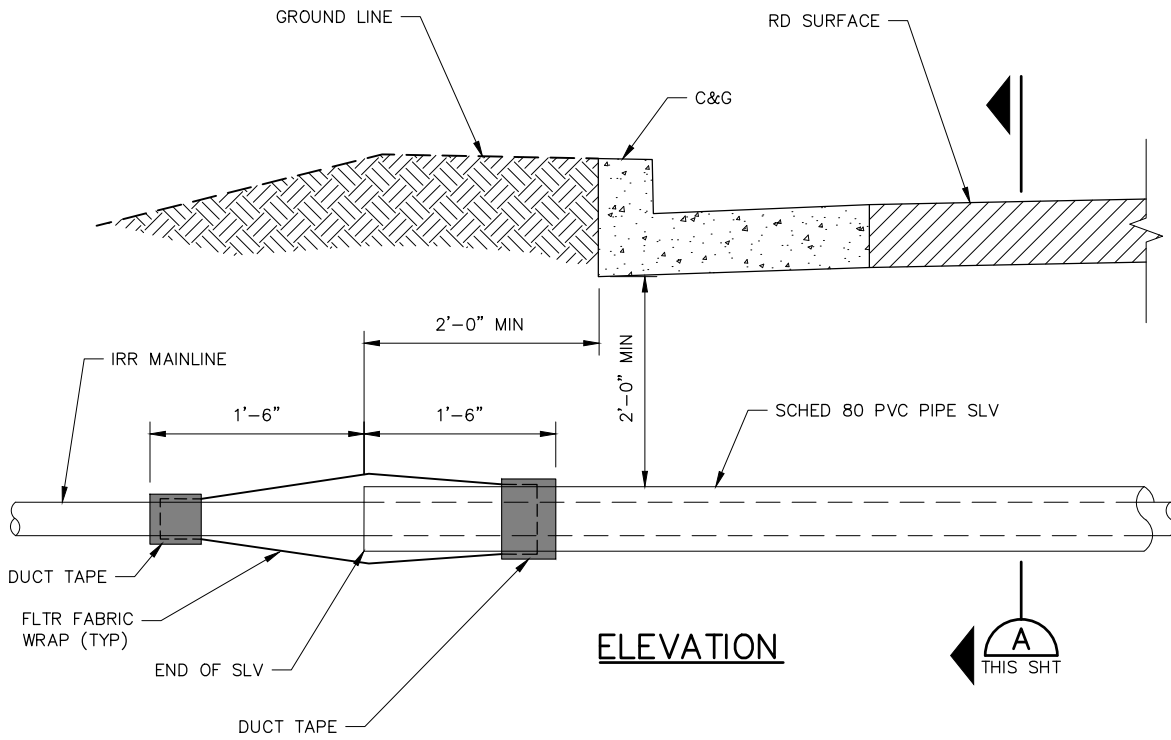
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

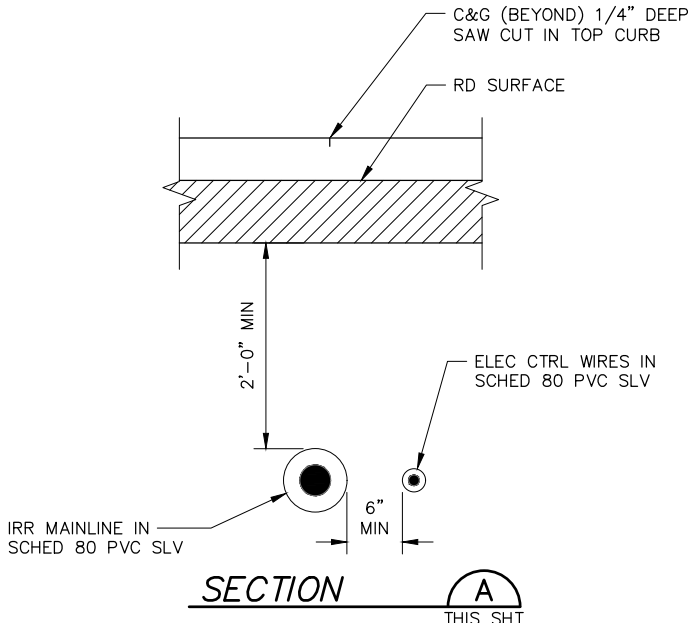
32054
IRRIGATION OUTSIDE SETTING
FOR 2" & SMALLER REDUCED
PRESSURE PRINCIPLE
ASSEMBLY IN ENCLOSURE



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ELEVATION

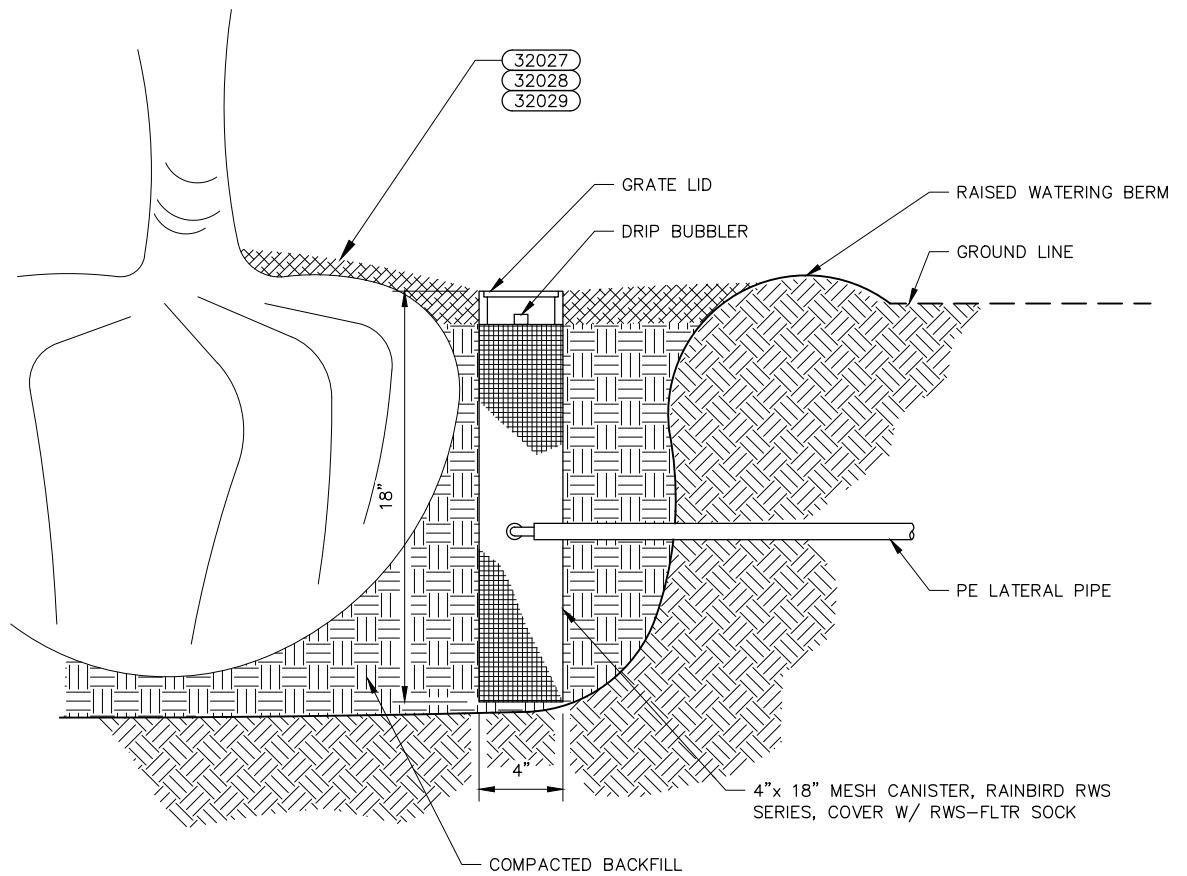


SECTION

DRAWN BY: <i>MCMILLEN</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**32055
IRRIGATION SLEEVE**

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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

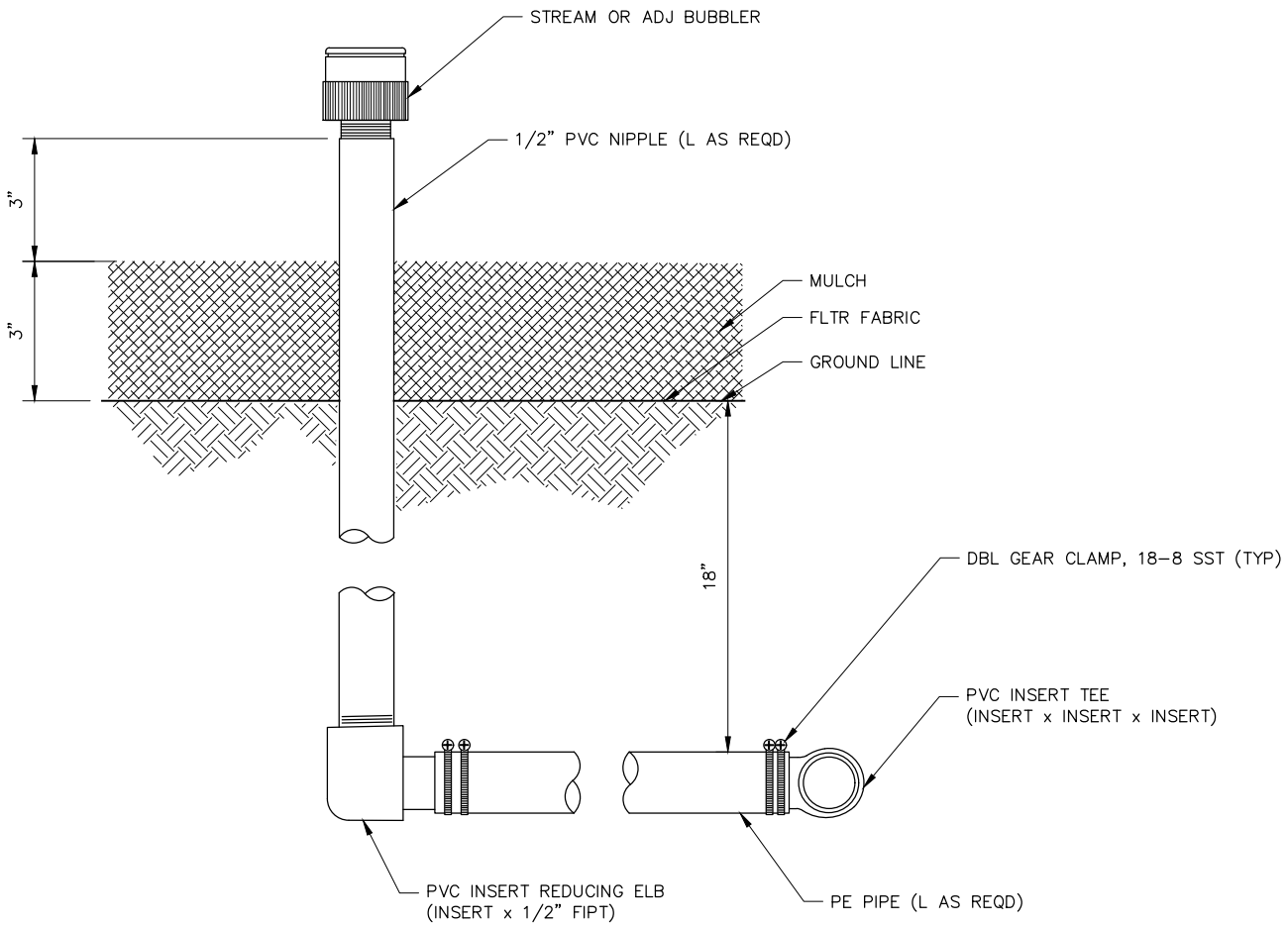
ORIGINATION DATE: JULY 2021

REVISION DATE:

32060 TREE BUBBLER



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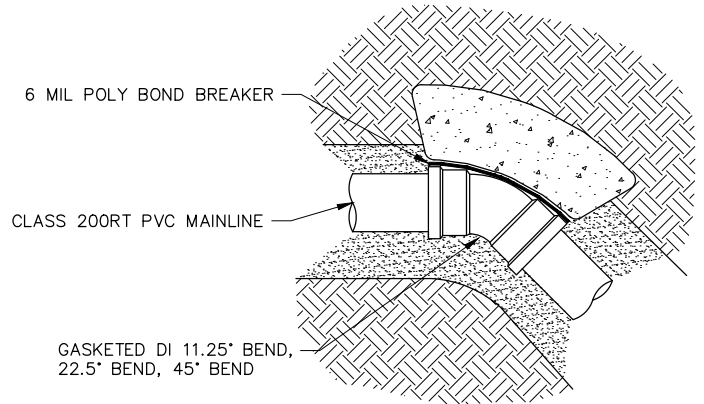
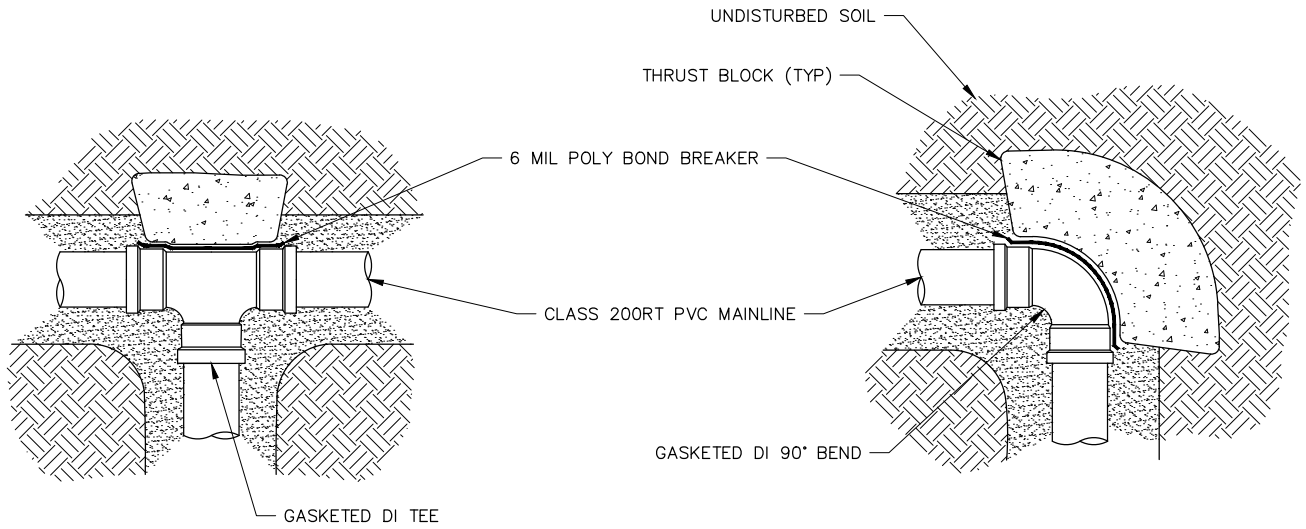


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 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

32061
FIXED RISER BUBBLER



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NOTE:

THRUST BLOCKS SHALL BE SIZED AND PLACED IN ACCORDANCE WITH SPECIFICATION SECTION 32 80 00.

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APPD BY: *[Signature]*

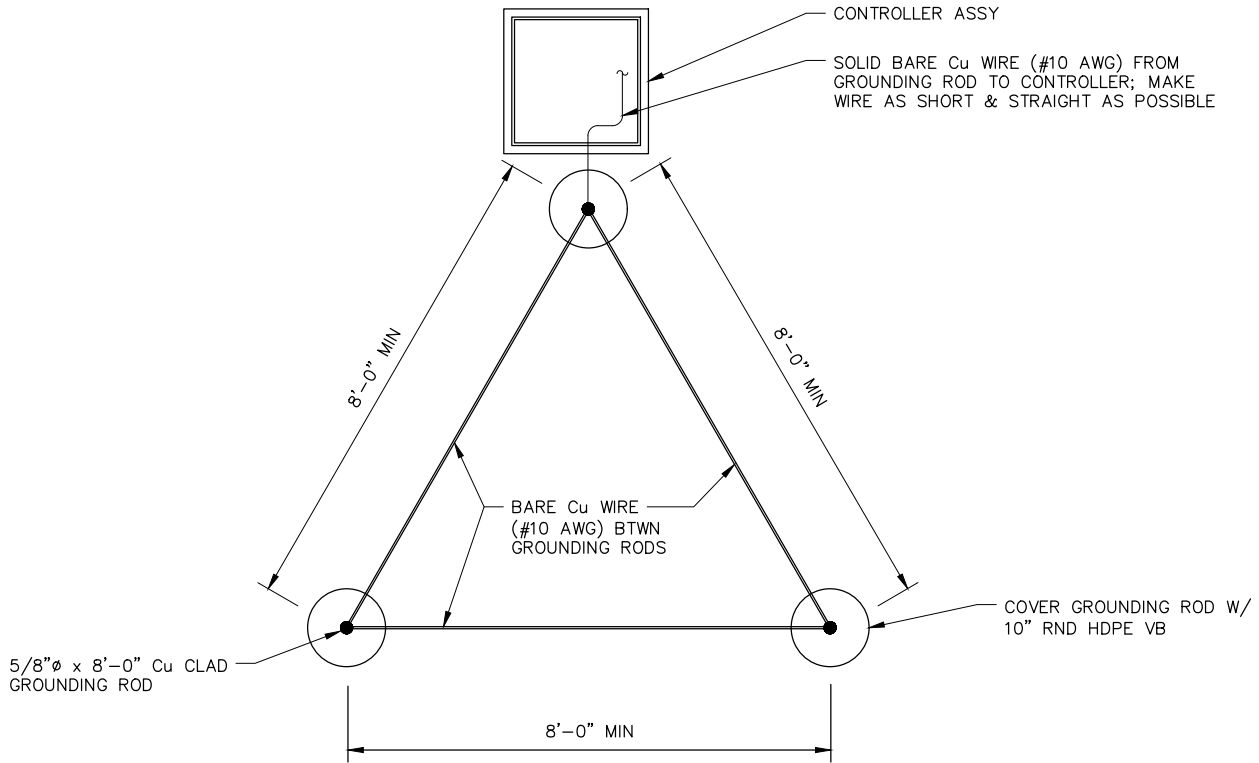
ORIGINATION DATE: JULY 2021

REVISION DATE:

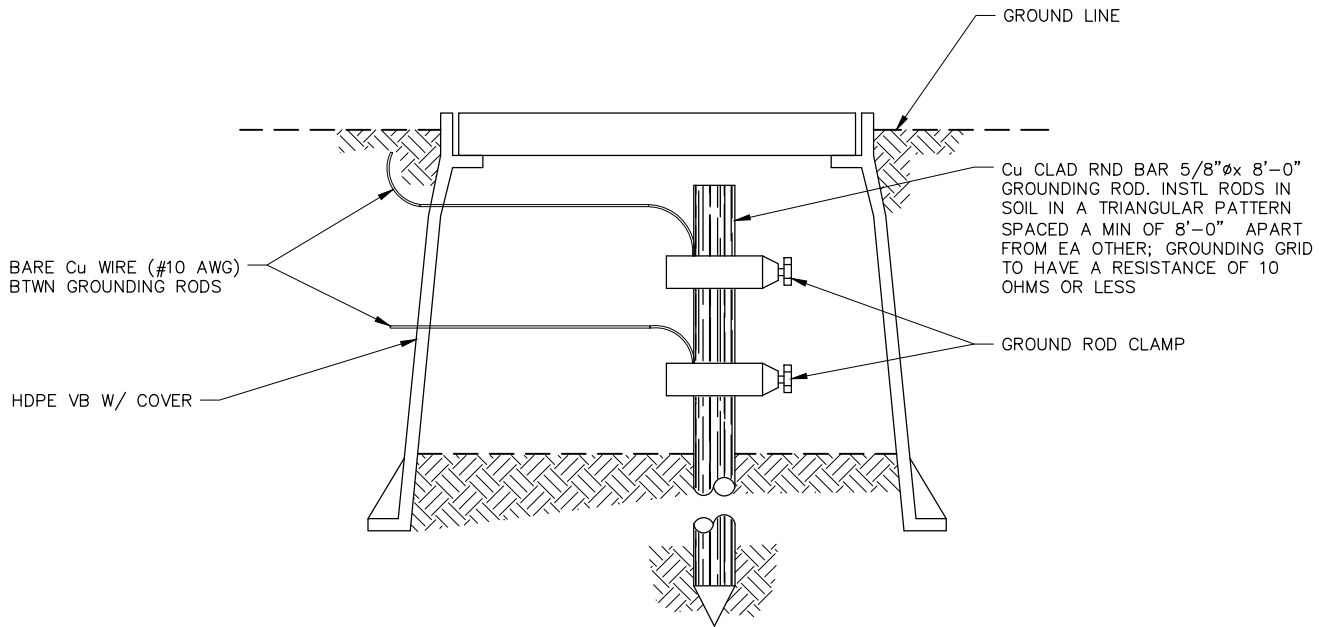
**32070
THRUST BLOCKS FOR
IRRIGATION PIPING**



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GROUND ROD LAYOUT



GROUND ROD ASSEMBLY

NOTE:

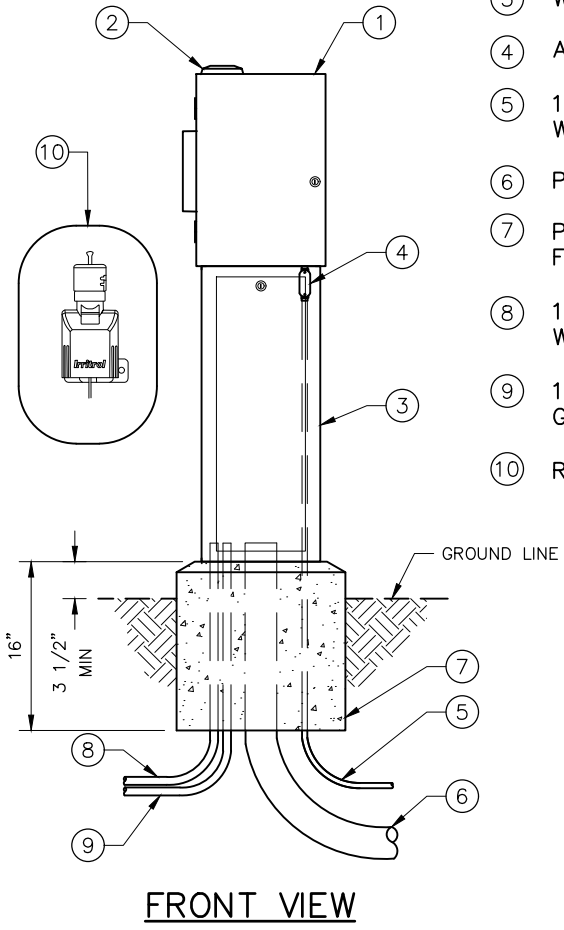
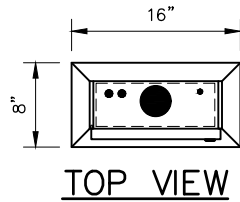
USE ONLY WHERE FACILITY GROUNDING GRID IS NOT AVAILABLE FOR CONNECTION.

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APPD BY: [Signature]
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32080
CENTRAL CONTROL UNIT
OR FIELD SATELLITE
GROUNDING ROD



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KEYED NOTES:

- ① WEATHERTRAK ET PRO3 SERIES CONTROLLER
- ② LOW PROFILE ANTENNA
- ③ WEATHERTRAK ENCLOSURE PEDESTAL
- ④ APPROVED ELECTRICAL JUNCTION BOX OR CONDULET
- ⑤ 1" PVC OR RIGID CONDUIT & CONDUIT SWEEP FOR 120VAC WIRING
- ⑥ PVC CONDUIT & CONDUIT SWEEP FOR VALVE WIRING
- ⑦ POURED-IN-PLACE CONCRETE BASE WITH SLOPED EDGES FOR DRAINAGE AWAY FROM PEDESTAL
- ⑧ 1" PVC CONDUIT & CONDUIT SWEEP FOR FLOW SENSOR WIRING AND MASTER VALVE WIRING
- ⑨ 1" PVC CONDUIT & CONDUIT SWEEP FOR #6 BARE COPPER GROUND WIRE
- ⑩ RAIN SENSOR PER SPECS (WIRELESS SHOWN)

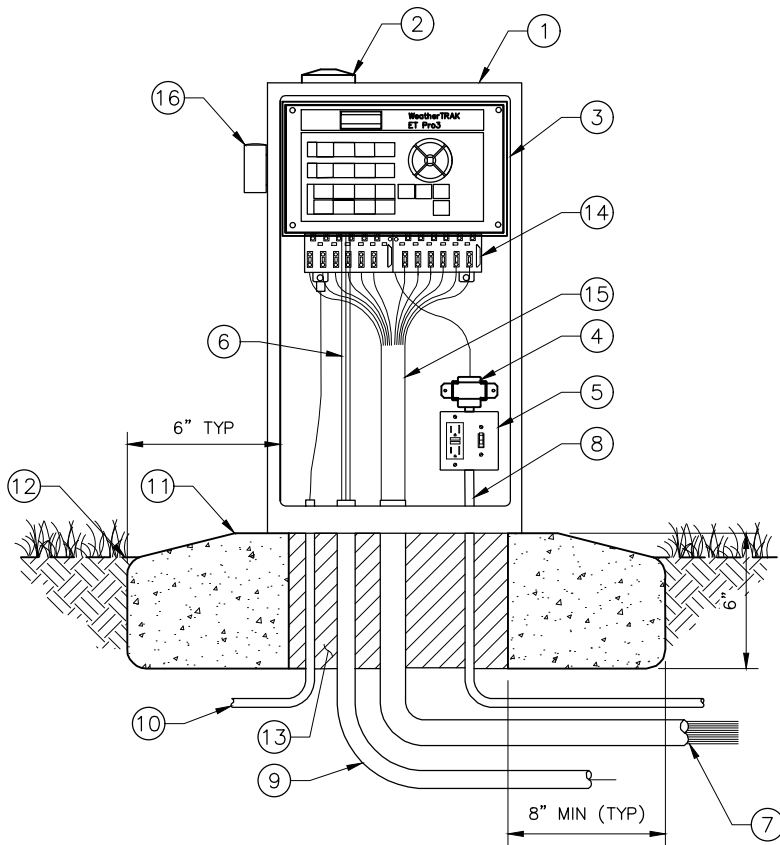
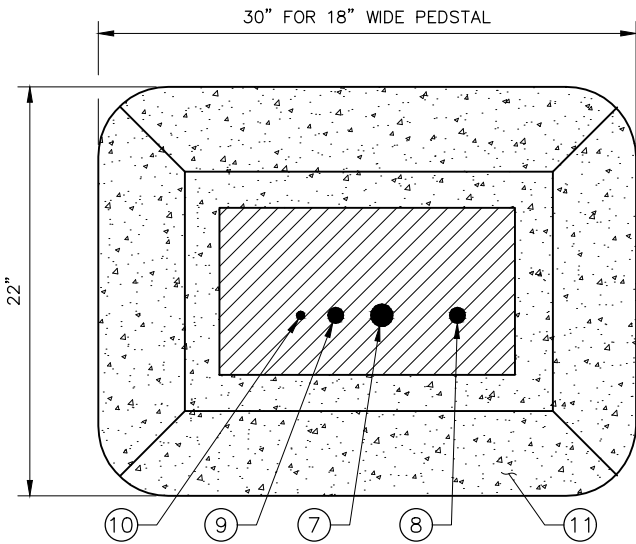
NOTES:

1. MINIMUM CONCRETE BASE REQUIREMENTS:
 VERIFY NUMBER & SIZE OF CONDUITS REQUIRED FOR EACH ENCLOSURE. USE MOUNTING TEMPLATE TO LOCATE "J" BOLT FASTENERS.
2. SEE IRRIGATION DRAWINGS FOR ENCLOSURE DIMENSIONS & FINISH.

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**32081
WEATHERTRAK ET PRO3
PEDESTAL MOUNT**

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KEYED NOTES:

- ① STAINLESS STEEL AUTOMATIC CONTROLLER ENCLOSURE ASSEMBLY. SEE IRRIGATION LEGEND FOR MAKE AND MODEL.
- ② LOW PROFILE ANTENNA
- ③ WEATHERTRAK ET PRO3 SERIES CONTROLLER. SEE DRAWINGS AND SPECS FOR ADDITIONAL INFORMATION.
- ④ CONTROLLER TRANSFORMER.
- ⑤ GFI ON/OFF POWER SWITCH RECEPTACLE (OPTIONAL).
- ⑥ FLOW SENSOR CABLE AND MASTER VALVE WIRES PER SPECIFICATIONS.
- ⑦ 3" PVC SWEEP ELL AND CONDUIT FOR CONTROL WIRES.
- ⑧ 1" PVC SWEEP ELL AND CONDUIT FOR 120VAC FROM METERED POWER SUPPLY.
- ⑨ 2" PVC SWEEP ELL AND CONDUIT FOR FLOW SENSOR CABLE AND MASTER VALVE WIRES.
- ⑩ 1" PVC SWEEP ELL AND CONDUIT FOR GROUNDING WIRE. WIRE SHALL BE AS STRAIGHT AS POSSIBLE. GROUND CONTROLLER PER ASIC GUIDELINES.
- ⑪ POURED CONCRETE BASE. SLOPE TO DRAIN.
- ⑫ FINISH GRADE. 2" BELOW TOP OF CONCRETE BASE.
- ⑬ FILL VOIDS WITH CONCRETE SLURRY MIX.
- ⑭ UNIVERSAL RADIO REMOTE INTERFACE (TYPICAL).
- ⑮ NEATLY BUNDLE WIRES AND SECURE WITH WIRE TIES (TYPICAL).
- ⑯ RAIN SENSOR WITHIN VIT RAIN SENSOR ENCLOSURE (PT# RGVRS) PER SPEC.

NOTE:

MINIMUM CONCRETE BASE REQUIREMENTS:

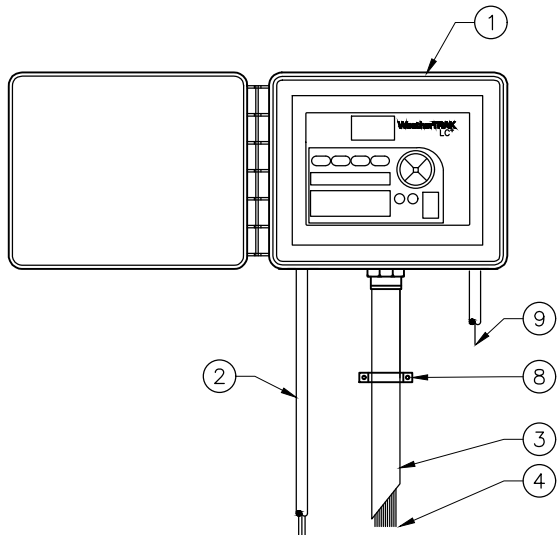
VERIFY NUMBER AND SIZE OF CONDUITS REQUIRED FOR EACH ENCLOSURE INSTALLATION. USE ENCLOSURE MANUFACTURER'S TEMPLATE FOR PROPER LAG BOLT PLACEMENT. PROVIDE A MINIMUM OF 2" OF CONCRETE FROM LAG BOLT TO OPENING IN CONCRETE BASE FOR CONDUITS.

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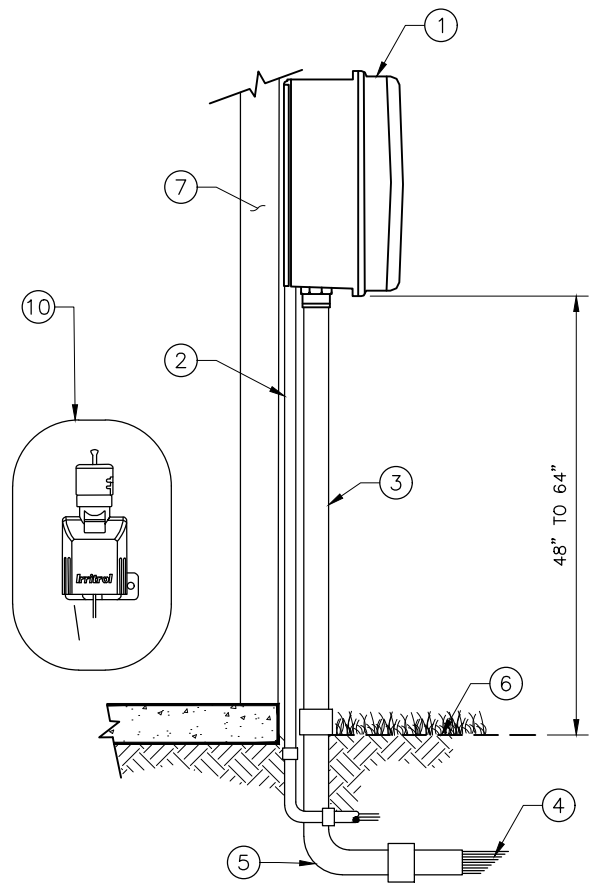
32082
WEATHERTRAK ET PRO3 18"
FRONT ENTRY ENCLOSURE



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FRONT VIEW



SIDE VIEW

KEYED NOTES:

- ① WEATHERTRAK LC+ CENTRAL AUTOMATIC IRRIGATION CONTROLLER SECURED TO WALL WITH APPROPRIATE FASTENERS.
- ② 120 VOLT ELECTRICAL POWER WIRES WITH GROUND WITHIN CONDUIT FOR AUTOMATIC CONTROLLER. SIZE AND INSTALL PER CODE.
- ③ 1", 1-1/2" AND 2" PVC CONDUIT—SIZE AS REQUIRED.
- ④ CONTROL WIRING TO ELECTRIC CONTROL VALVES.
- ⑤ PVC ELECTRICAL SWEEP ELL—SAME SIZE AS CONTROL WIRE CONDUIT.
- ⑥ FINISH GRADE.
- ⑦ WALL
- ⑧ SECURE CONDUIT TO WALL WITH 'C' OR 'U' CLAMP. SIZE AS REQUIRED.
- ⑨ 3/4" CONDUIT WITH #6 BARE COPPER WIRE TO GROUND ROD OR GROUND PLATE.
- ⑩ RAIN SENSOR PER SPECS. (WIRELESS SHOWN)

NOTE:

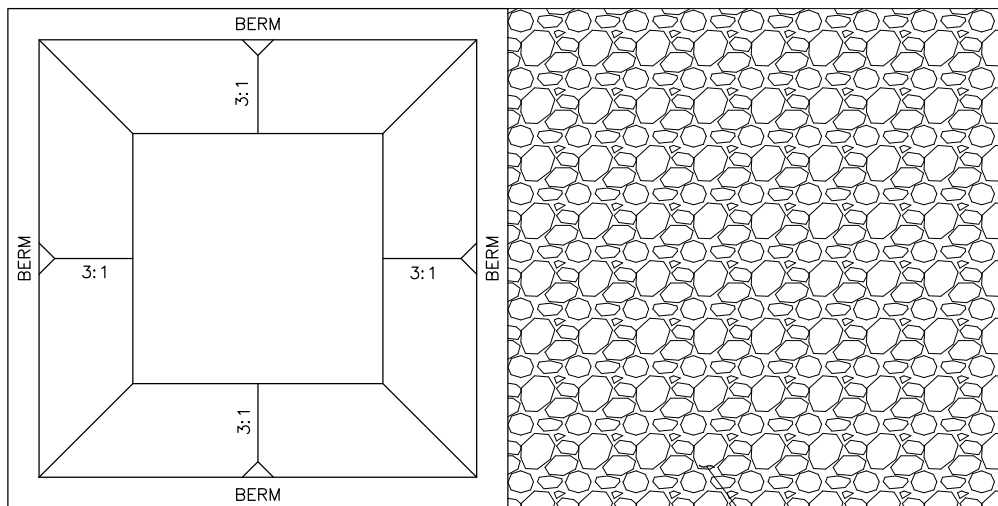
INSTALL ALL WIRING PER LOCAL CODE.

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APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

32090
WEATHERTRAK LC+ WALL
MOUNT OUTDOOR

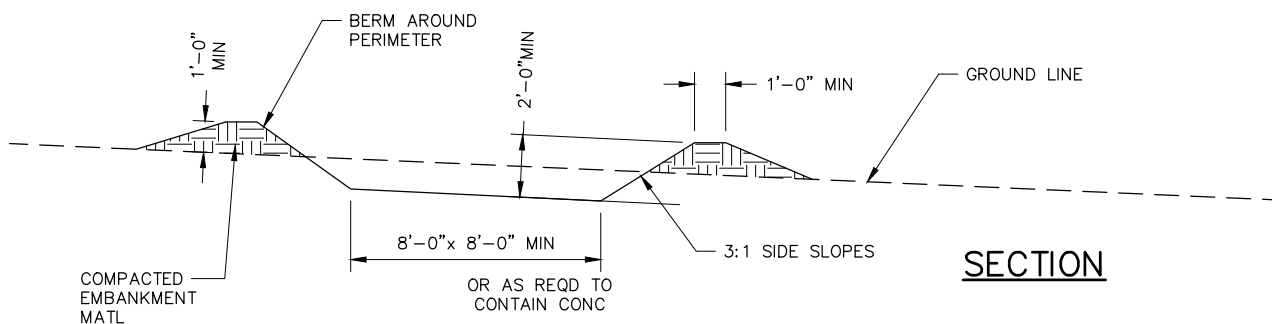
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PLAN

3"-6" ROCK PLACED
3" THK MIN
SIGN "CONCRETE WASHOUT"



SECTION

CONCRETE WASHOUT AREA INSTALLATION NOTES:

1. SEE PLAN VIEW FOR LOCATIONS OF CONCRETE WASHOUT AREA.
2. THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT ON SITE.
3. VEHICLE TRACKING CONTROL (VTC) IS REQUIRED AT THE ACCESS POINT.
4. PLACE SIGNS AT THE WASHOUT AREA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT AREA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
5. UTILIZE EXCAVATED MATERIAL IN PERIMETER BERM CONSTRUCTION.
6. CONCRETE WASHOUT SHALL BE LINED IN AREAS WITH HIGH GROUNDWATER. LINERS SHALL BE 30 MIL OR GREATER.

CONCRETE WASHOUT AREA MAINTENANCE NOTES:

1. THE CONCRETE WASHOUT AREA SHALL BE REPAIRED AND ENLARGED OR CLEANED OUT AS NECESSARY TO MAINTAIN CAPACITY FOR WASTED CONCRETE.
2. AT THE END OF CONSTRUCTION, REMOVE ALL CONCRETE FROM THE SITE AND DISPOSE OF AT AN APPROVED WASTE SITE.
3. WHEN THE CONCRETE WASHOUT AREA IS REMOVED, THE DISTURBED AREA SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE ENGINEER.
4. INSPECT WEEKLY, DURING AND AFTER ANY STORM EVENT.

DRAWN BY: BAIREs

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

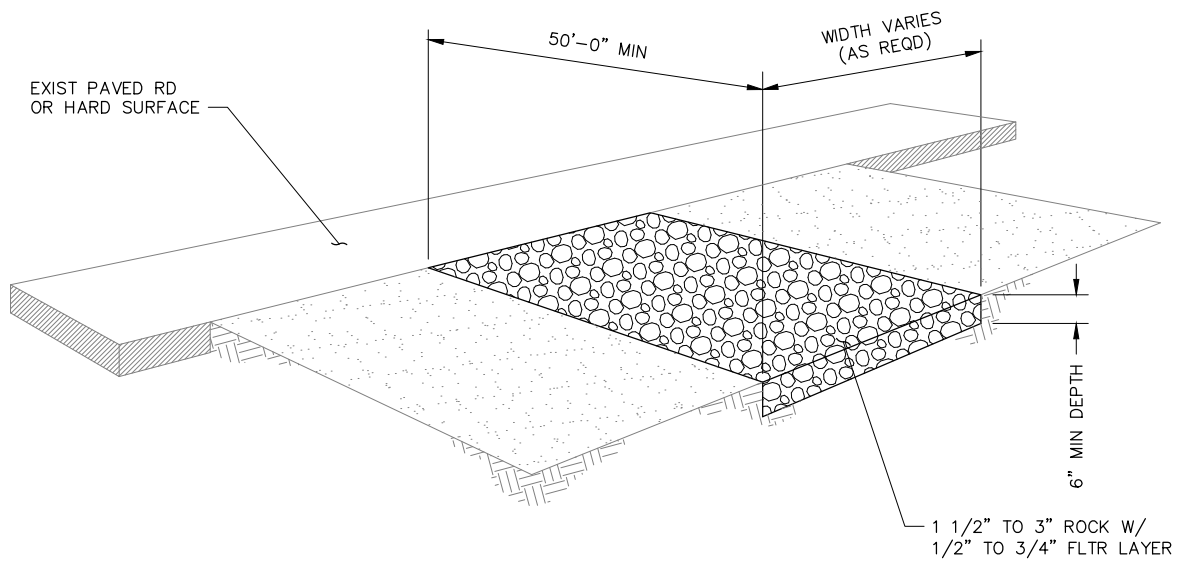
ORIGINATION DATE: JULY 2021

REVISION DATE:

**32100
CONCRETE WASHOUT**



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NOTE:

MAINTAIN EROSION CONTROL MEASURES UNTIL CONSTRUCTION IS COMPLETED, OR AS DIRECTED BY THE LOCAL JURISDICTION.

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CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

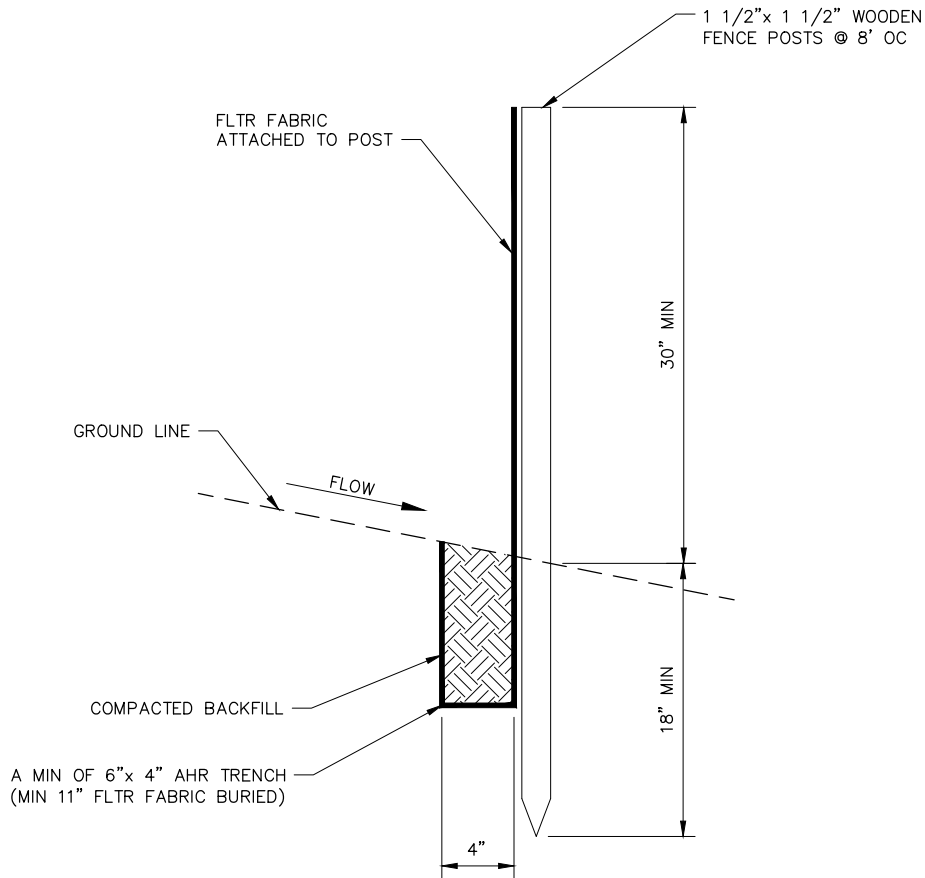
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

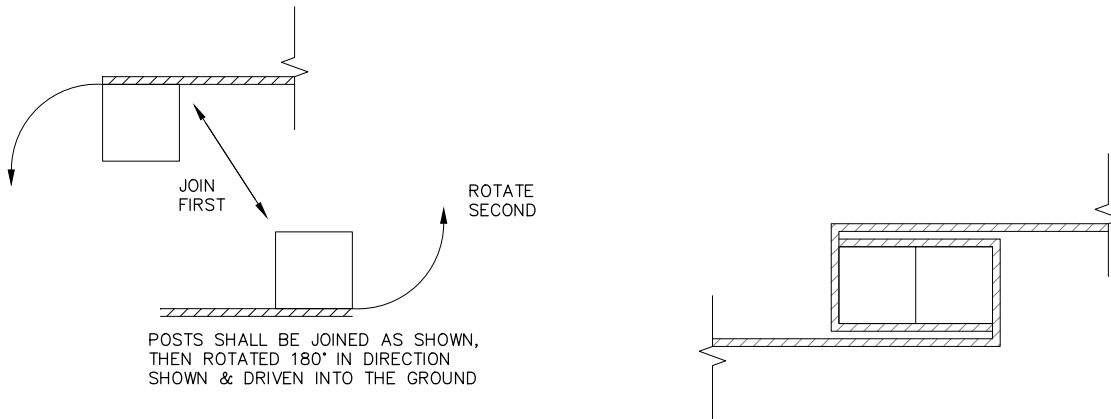
**32101
VEHICLE TRACKING
CONTROL**



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ELEVATION



JOINTING AT FABRIC LAPS

NOTES:

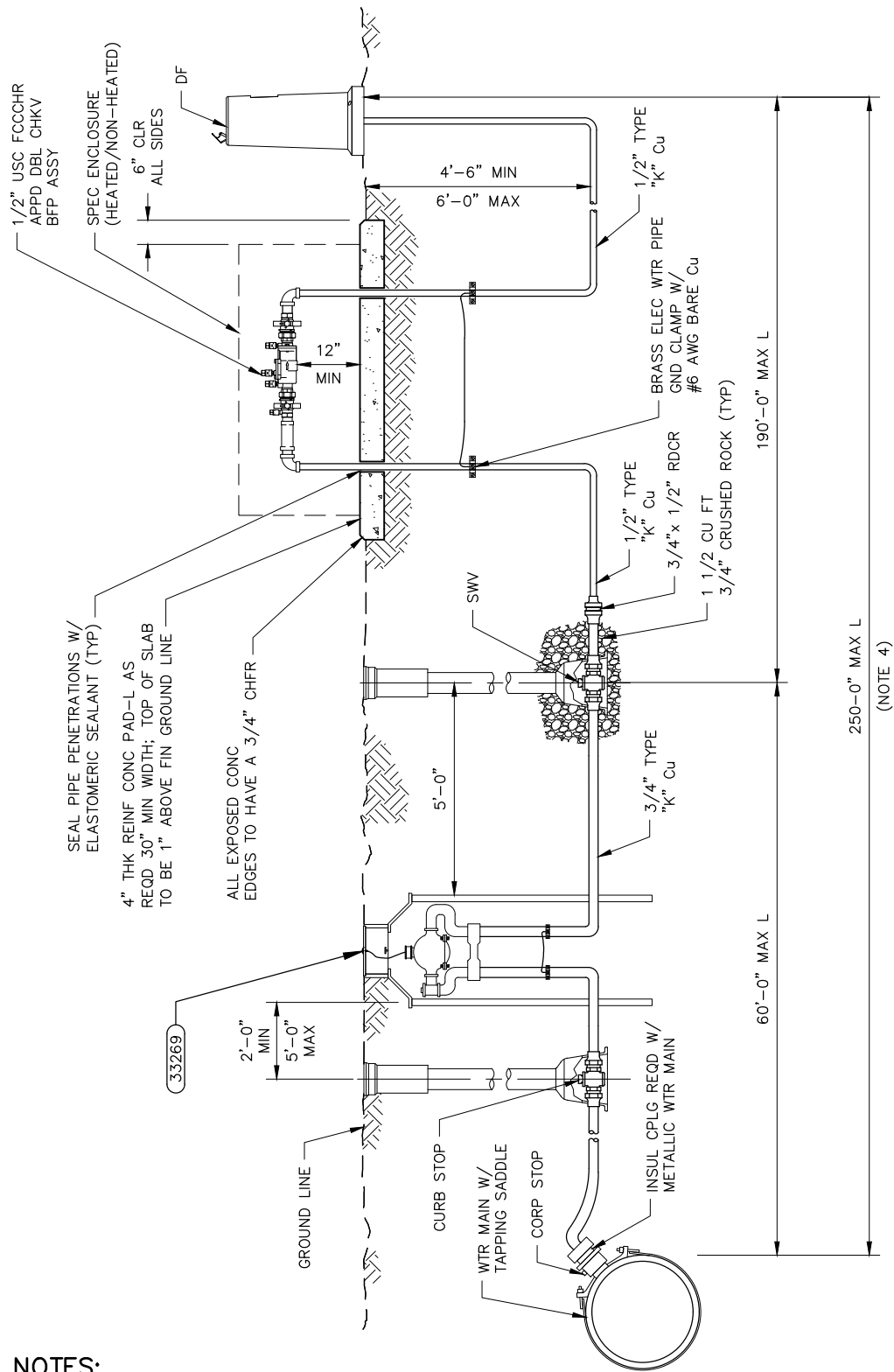
1. INDICATED ON PLAN AS _____SF_____ .
2. THICKNESS OF MATERIAL HAS BEEN EXAGGERATED FOR CLARITY.
3. INSTALL AND MAINTAIN IN ACCORDANCE WITH SPECIFICATION SECTION 31 05 19.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
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**32102
SILT FENCE**



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NOTES:

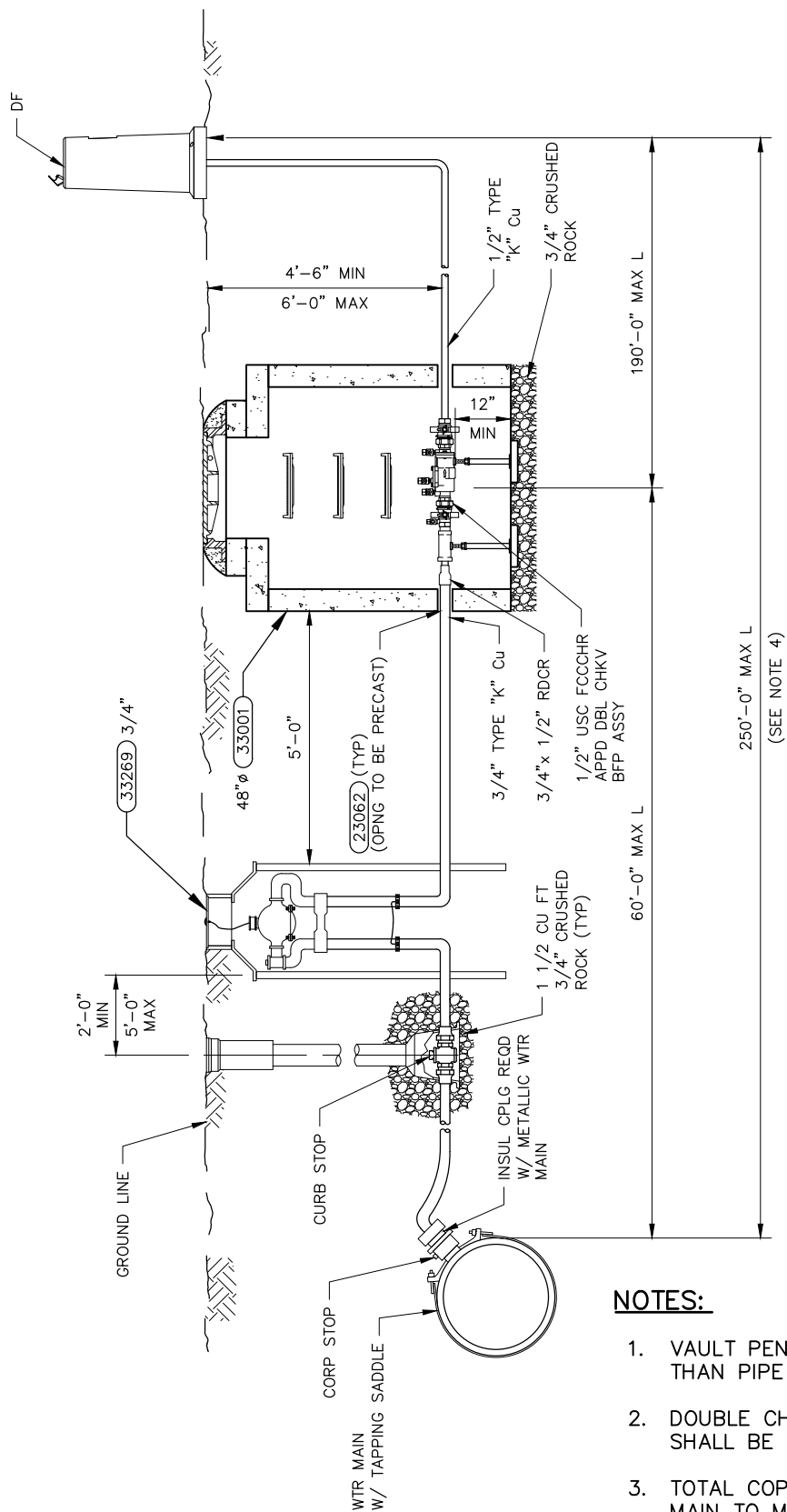
1. CONCRETE PAD PENETRATIONS SHALL BE 1 INCH LARGER THAN PIPE OUTSIDE DIAMETER.
2. DOUBLE CHECK BACKFLOW PREVENTION ASSEMBLY SHALL BE LOCATED IN LANDSCAPED AREAS.
3. TOTAL COPPER TUBING LENGTH MEASURED FROM MAIN TO METER TO DOUBLE CHECK BACKFLOW PREVENTION ASSEMBLY TO DRINKING FOUNTAIN SHALL HAVE A MAXIMUM LENGTH OF 250 FEET.
4. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR INSTALLATION INSTRUCTIONS.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

32110
DRINKING FOUNTAIN DOUBLE
CHECK VALVE ABOVE
GROUND INSTALLATION

D DENVER WATER

1600 West 12th Ave
 Denver, Colorado 80204-3412
 T: 303.628.6000
 F: 303.628.6199
 denverwater.org



NOTES:

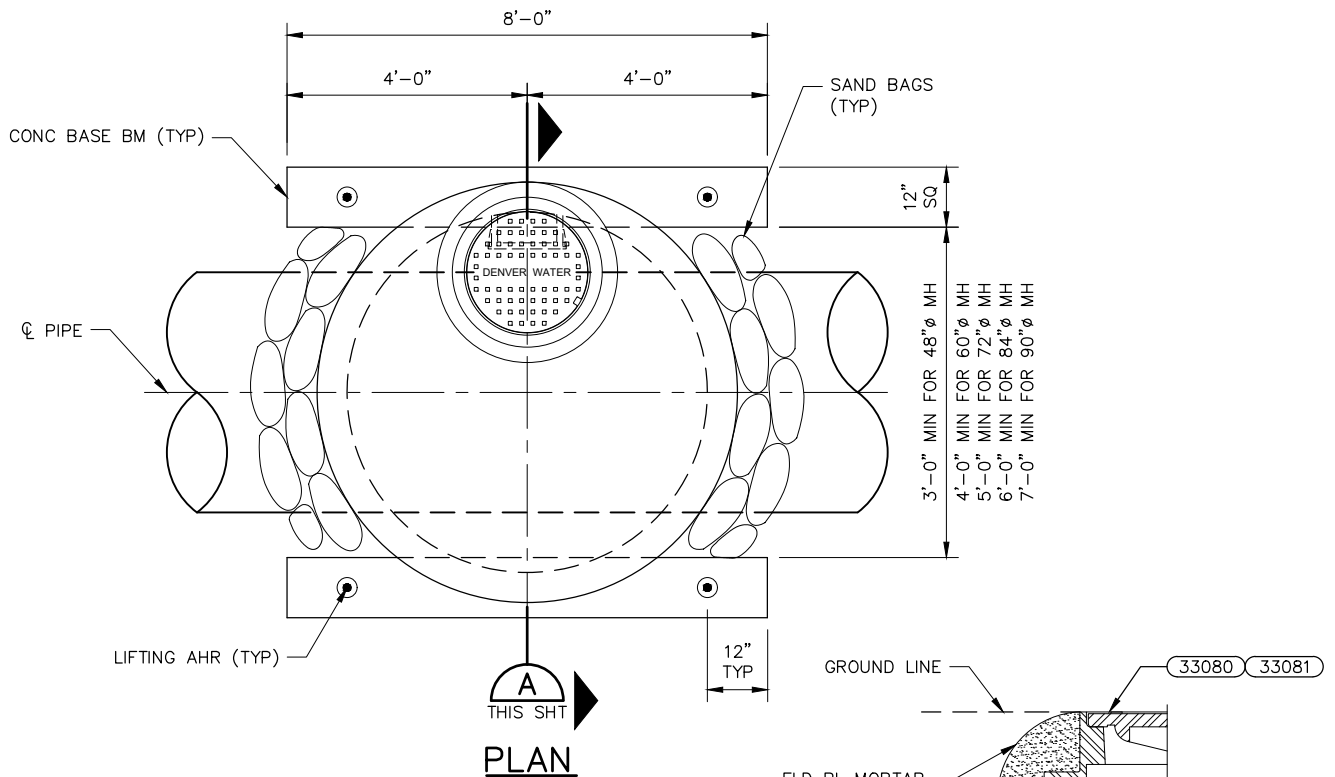
1. VAULT PENETRATIONS SHALL BE 1 INCH LARGER THAN PIPE OUTSIDE DIAMETER.
2. DOUBLE CHECK BACKFLOW PREVENTION ASSEMBLY SHALL BE LOCATED IN LANDSCAPED AREAS.
3. TOTAL COPPER TUBING LENGTH MEASURED FROM MAIN TO METER TO DOUBLE CHECK BACKFLOW PREVENTION ASSEMBLY TO DRINKING FOUNTAIN SHALL HAVE A MAXIMUM LENGTH OF 250 FEET.
4. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR INSTALLATION INSTRUCTIONS.

DRAWN BY: BAIREs
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

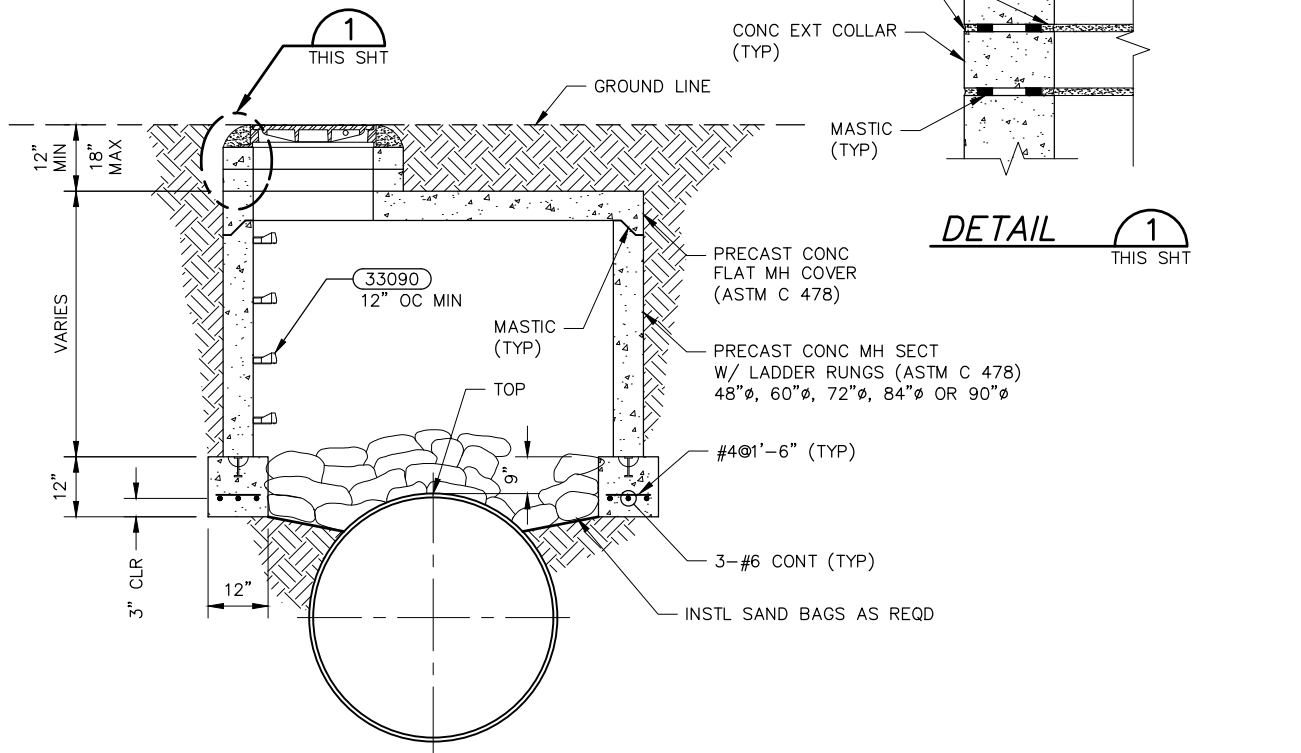
32111
DRINKING FOUNTAIN DOUBLE
CHECK VALVE BELOW
GROUND INSTALLATION

D DENVER WATER

1600 West 12th Ave
 Denver, Colorado 80204-3412
 T: 303.628.6000
 F: 303.628.6199
 denverwater.org



PLAN



DETAIL 1

SECTION A

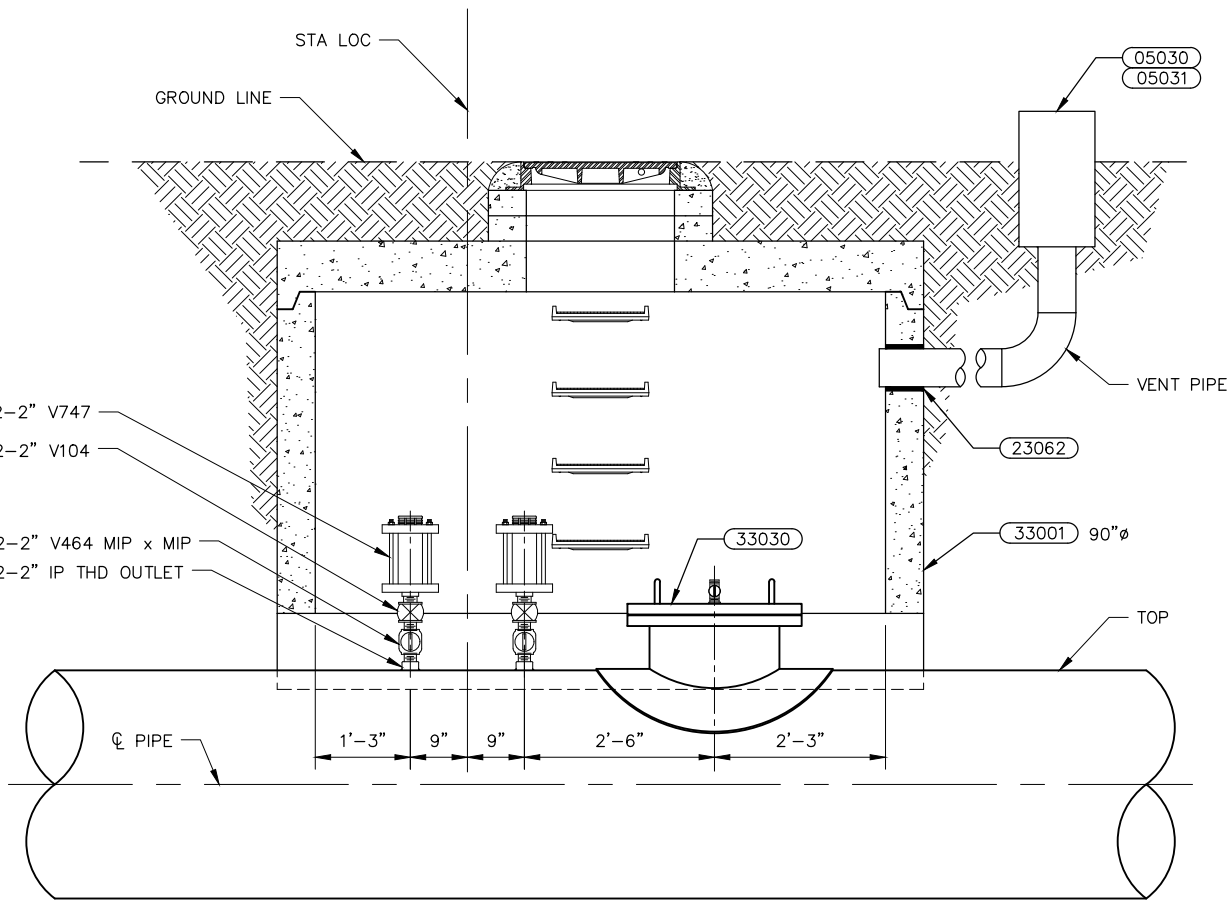
NOTES:

1. FOR ACCESS, PITOT, AND AIR VALVE MANHOLES.
2. CONCRETE EXTENSION COLLARS, MANHOLE RINGS, AND 6 INCH VALVE BOXES SHALL BE FIELD MORTARED. MORTAR: 1 PART PORTLAND CEMENT TO 3 PARTS SAND CONFORMING TO ASTM C 35.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33001
TYPICAL CONCRETE MANHOLE
INSTALLATION**

DENVER WATER
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 F: 303.628.6199
 denverwater.org



NOTE:

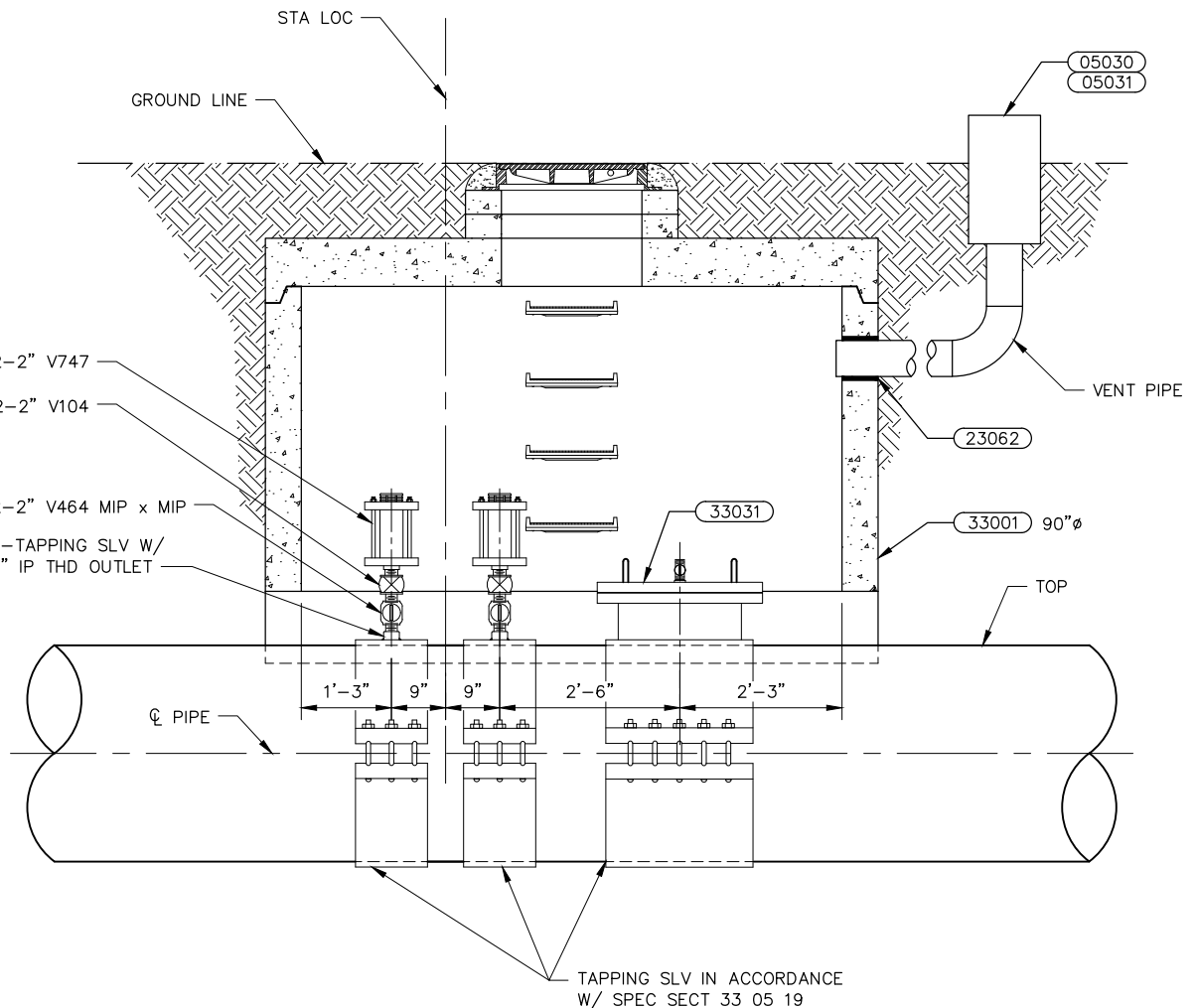
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE INACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33004
2" AIR VALVE ASSEMBLY
WITH 20" ACCESS MANHOLE
(STEEL PIPE)

D DENVER WATER

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 Denver, Colorado 80204-3412
 T: 303.628.6000
 F: 303.628.6199
 denverwater.org



NOTES:

1. WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.
2. ALSO FOR USE ON 24 INCH POLYVINYL CHLORIDE PIPE.
3. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

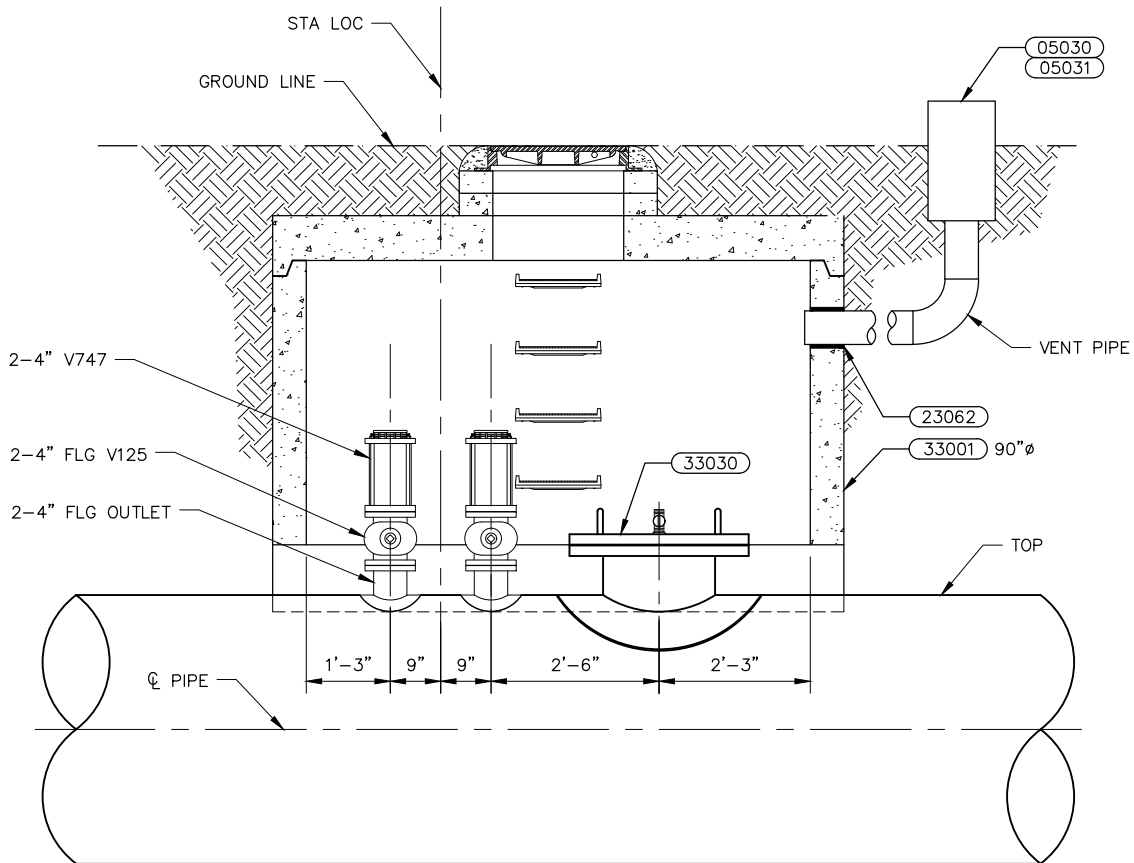
ORIGINATION DATE: JULY 2021

REVISION DATE:

33005
2" AIR VALVE ASSEMBLY
WITH 20" ACCESS MANHOLE
(DUCTILE IRON PIPE)

D DENVER WATER

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T: 303.628.6000
F: 303.628.6199
denverwater.org



NOTE:

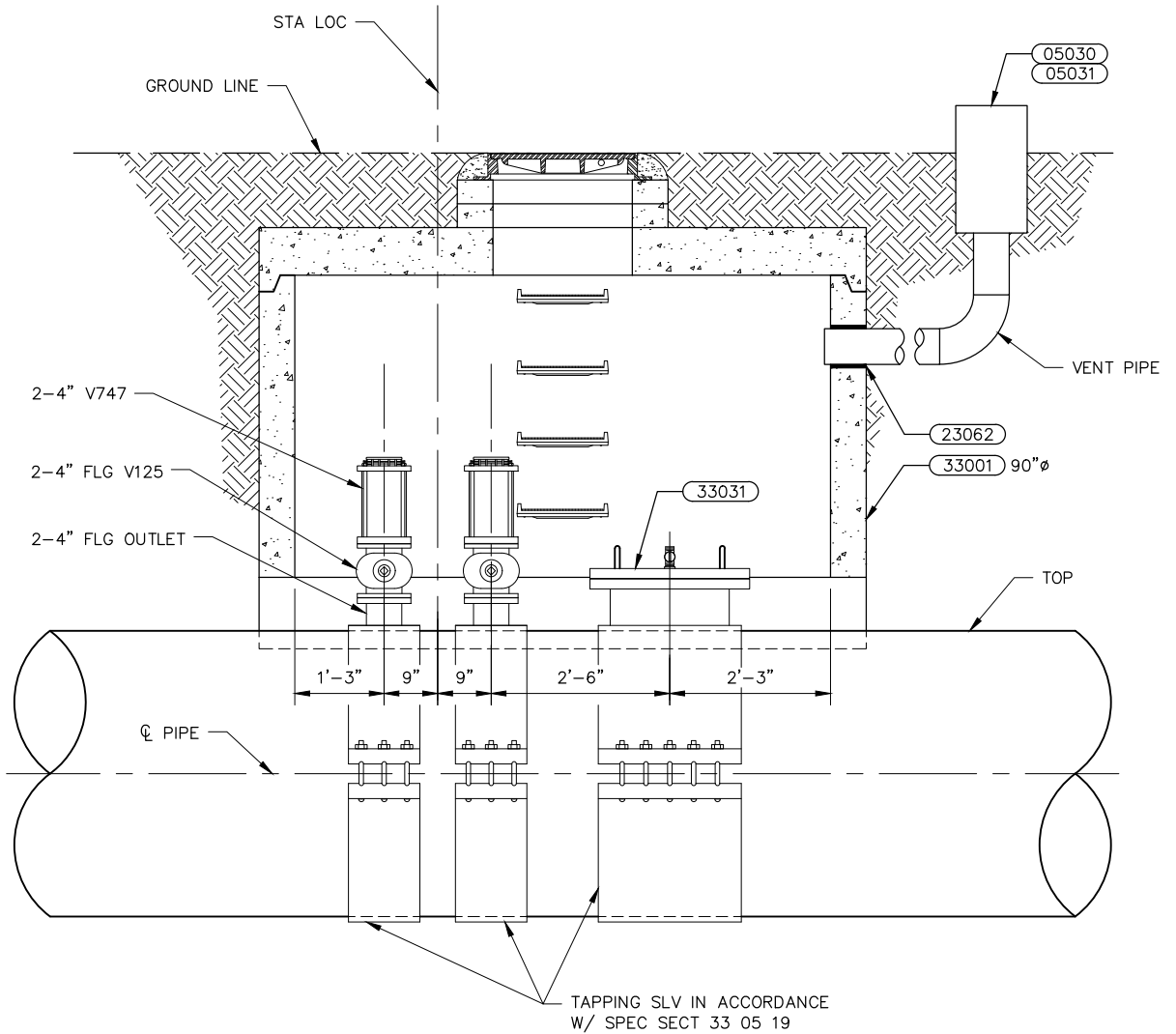
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33006
4" AIR VALVE ASSEMBLY
WITH 20" ACCESS MANHOLE
(STEEL PIPE)



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NOTES:

1. WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.
2. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

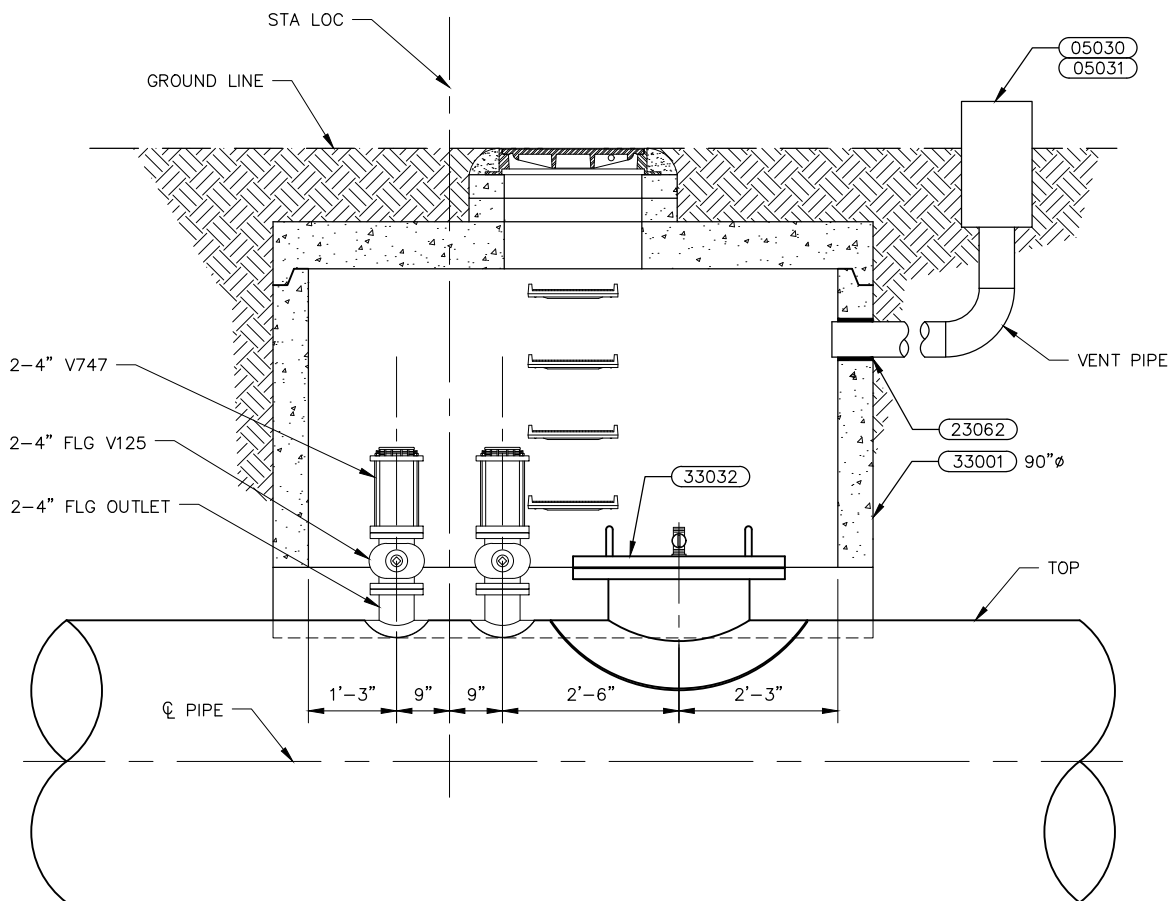
ORIGINATION DATE: JULY 2021

REVISION DATE:

33007
4" AIR VALVE ASSEMBLY
WITH 20" ACCESS MANHOLE
(DUCTILE IRON PIPE)

D DENVER WATER

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F: 303.628.6199
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NOTE:

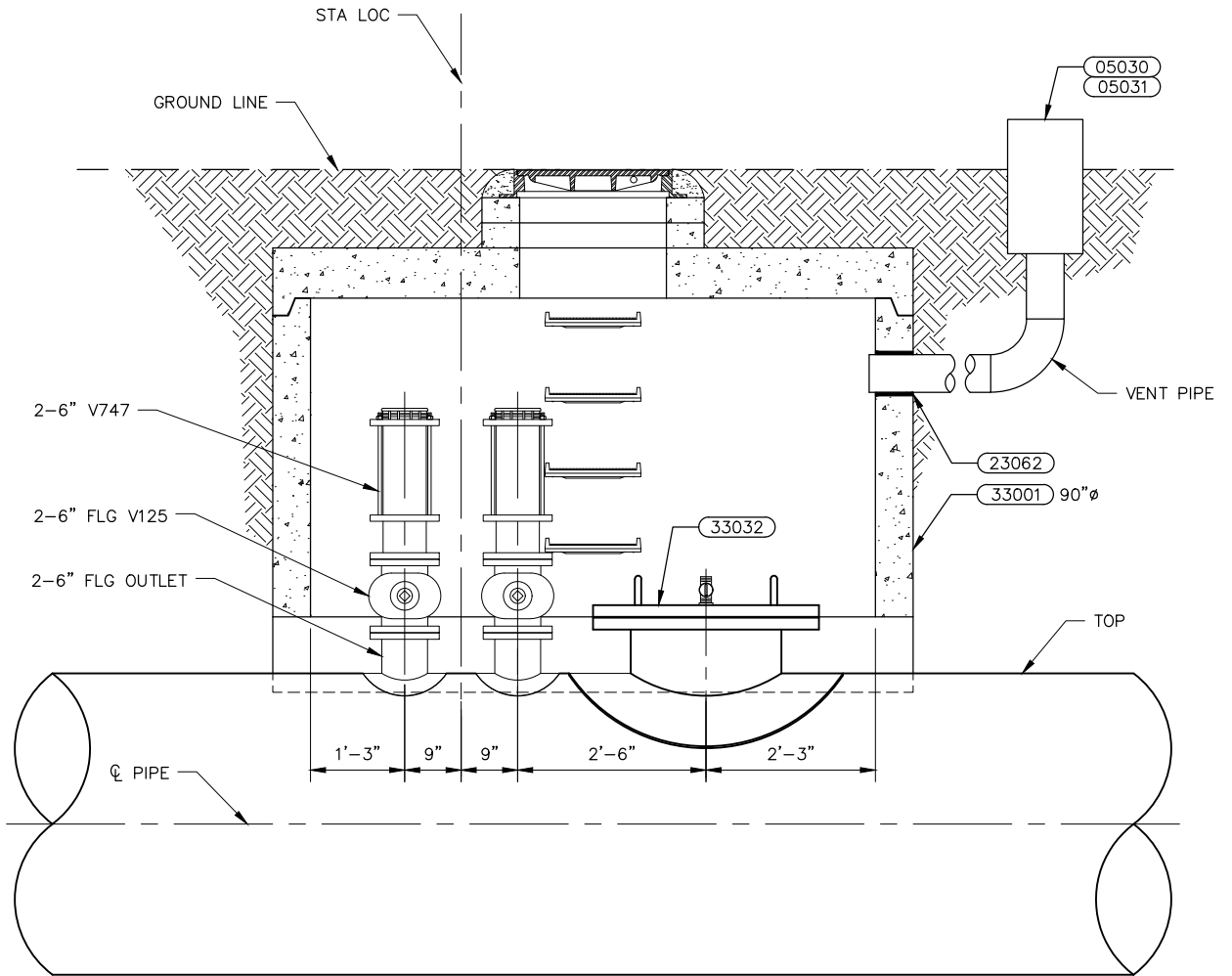
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33008
4" AIR VALVE ASSEMBLY
WITH 24" ACCESS MANHOLE
(STEEL PIPE)



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 F: 303.628.6199
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NOTE:

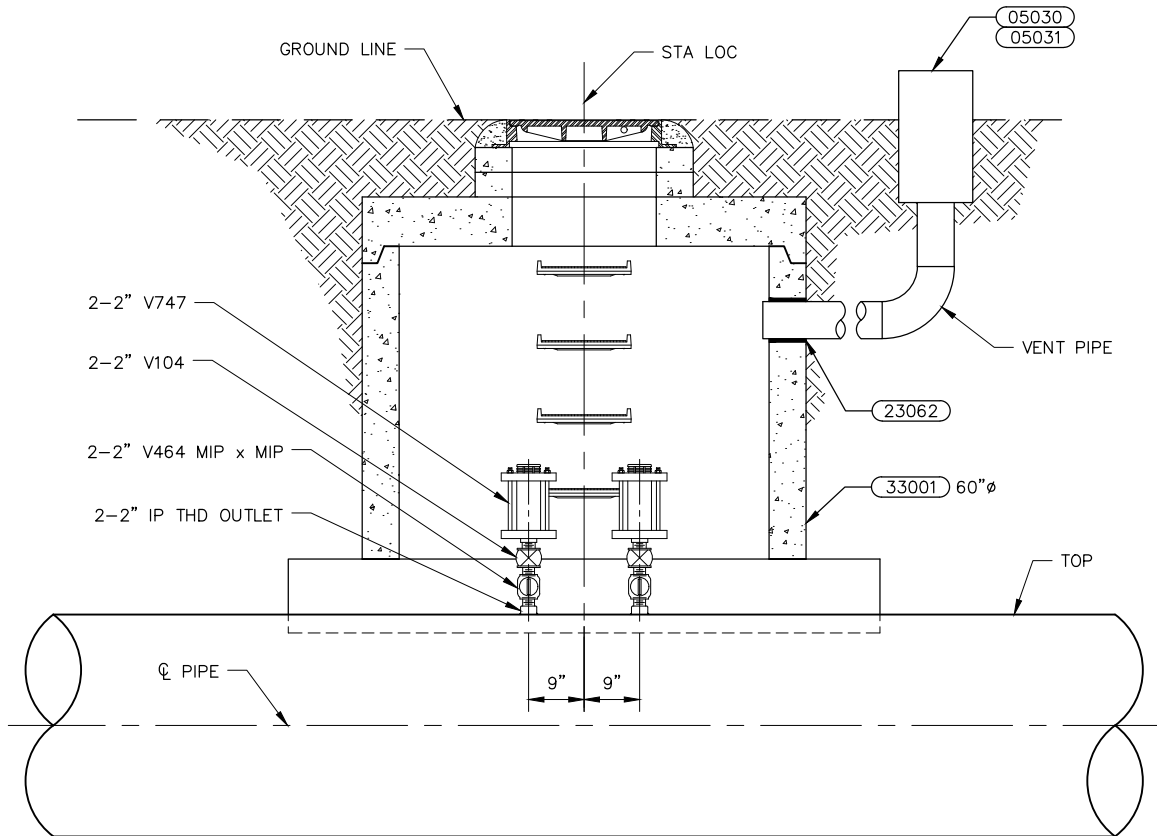
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33009
6" AIR VALVE ASSEMBLY
WITH 24" ACCESS MANHOLE
(STEEL PIPE)



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 F: 303.628.6199
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NOTE:

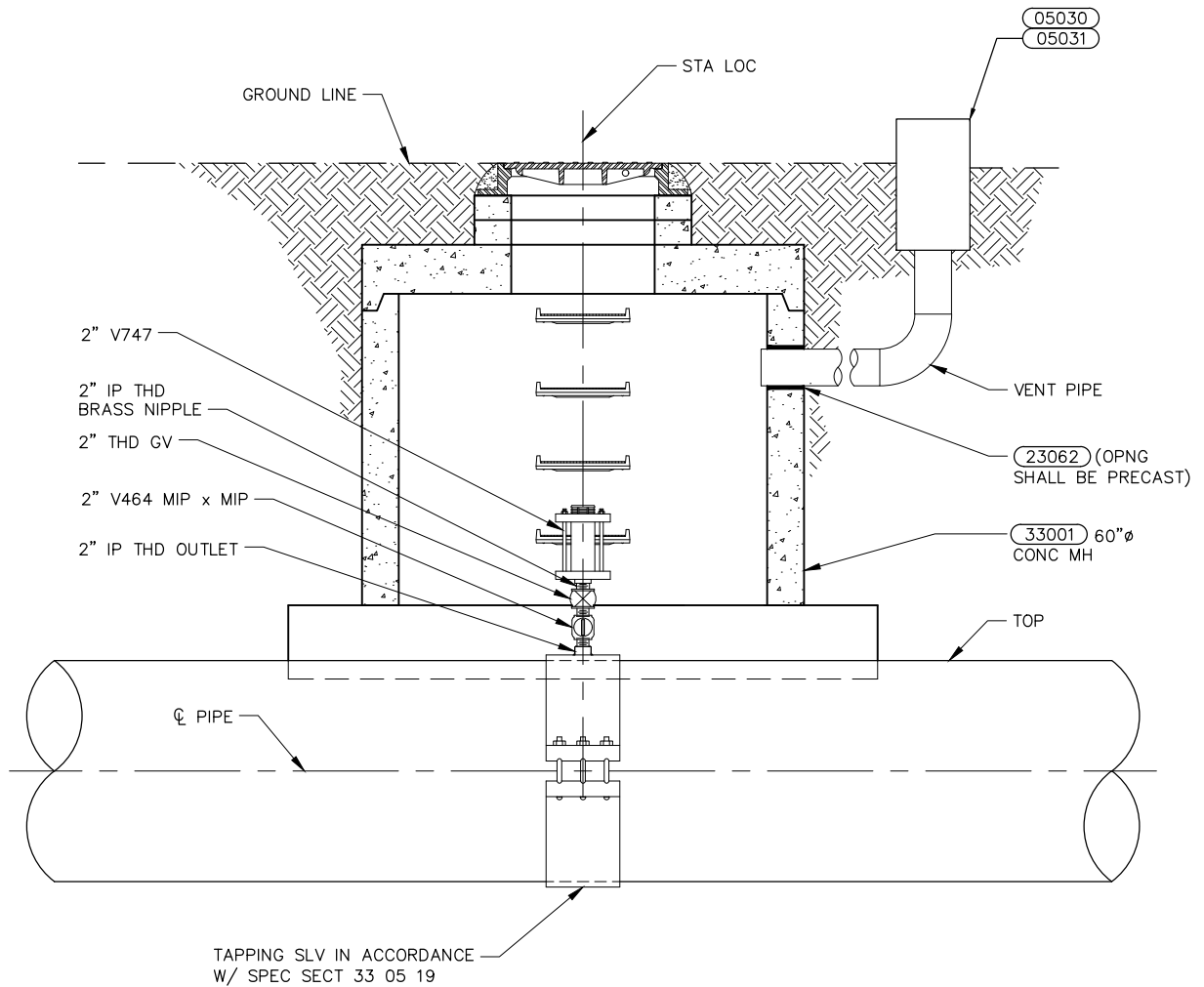
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

33010
2" AIR VALVE ASSEMBLY
(STEEL PIPE)



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 F: 303.628.6199
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NOTES:

1. WELD-ON OUTLETS ARE PERMISSIBLE IF A QUALIFIED WELDER AND PROCEDURES ARE USED BY THE PIPE MANUFACTURER IN ACCORDANCE WITH ANSI/AWS D11.2.
2. COAT PIPE, VALVE, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

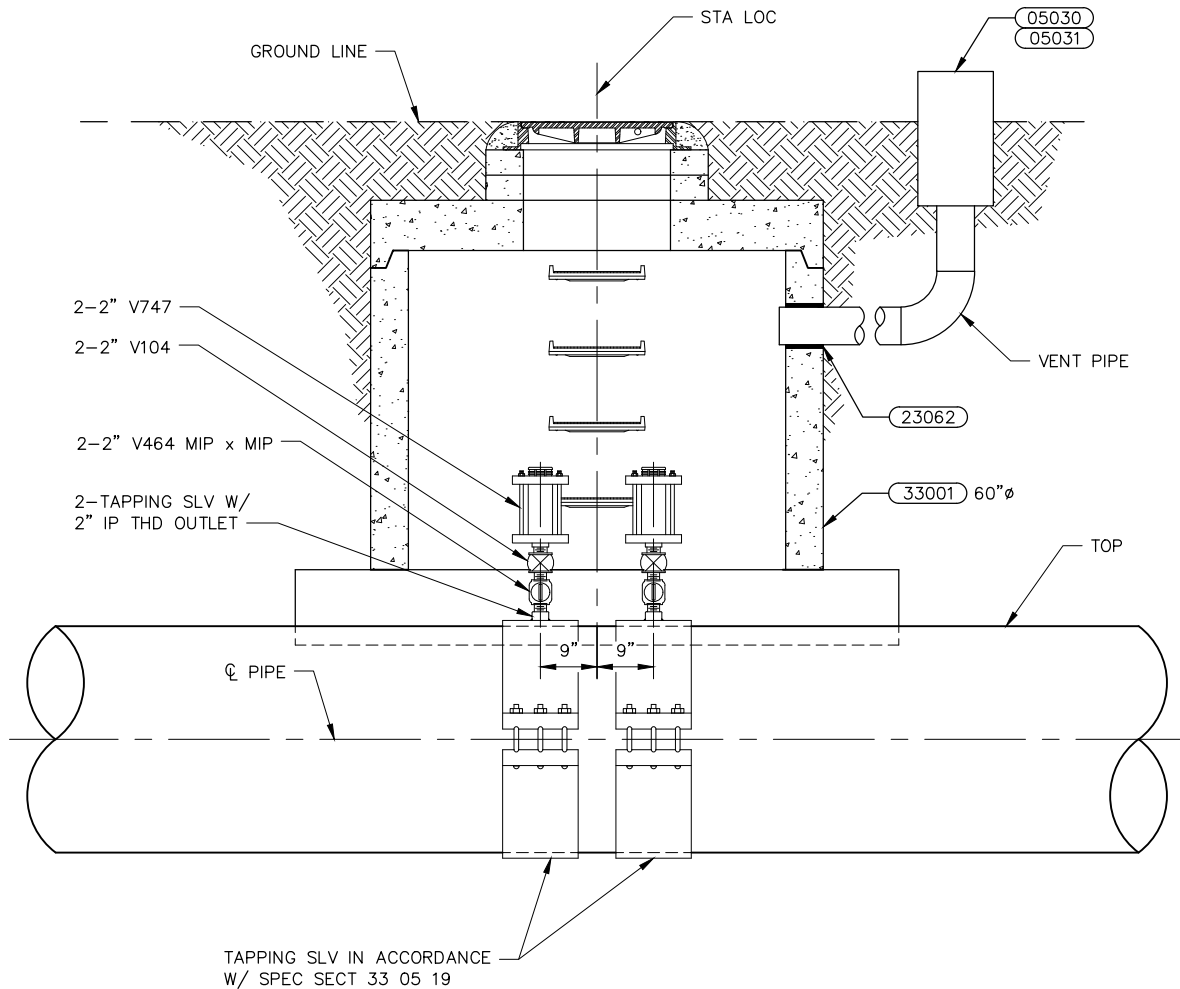
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

33011
SINGLE 2" AIR VALVE
ASSEMBLY (16" & 20"
DUCTILE IRON MAINS)



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 F: 303.628.6199
 denverwater.org



NOTES:

1. WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.
2. ALSO FOR USE ON 24 INCH POLYVINYL CHLORIDE PIPE.
3. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

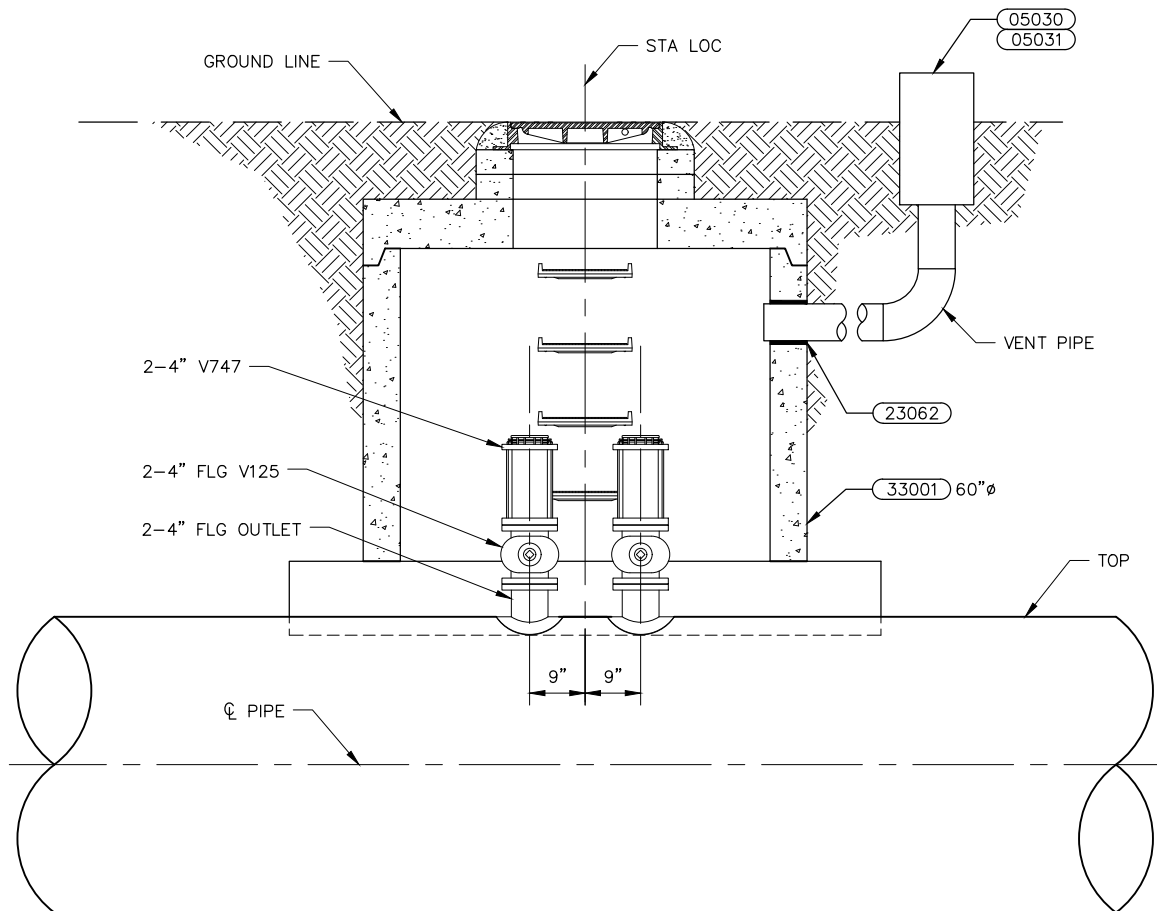
ORIGINATION DATE: JULY 2021

REVISION DATE:

33012
2" AIR VALVE ASSEMBLY
(DUCTILE IRON PIPE)



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NOTE:

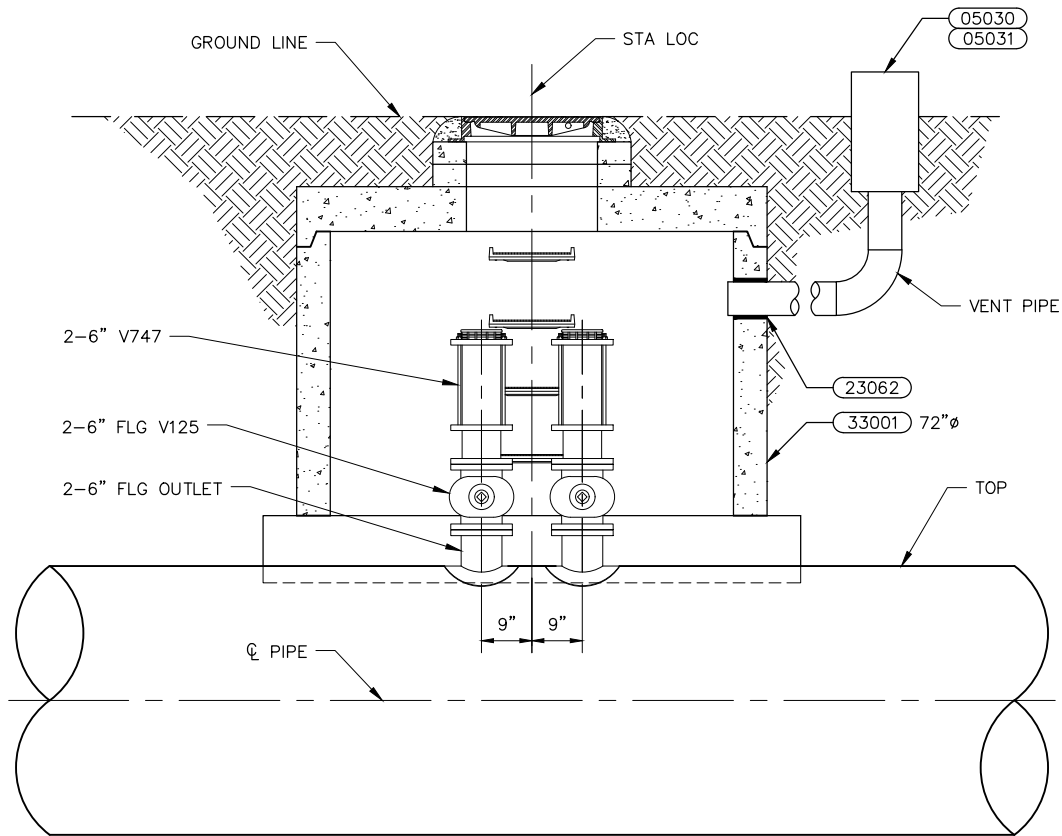
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33013
4" AIR VALVE ASSEMBLY
(STEEL PIPE)

D DENVER WATER

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 F: 303.628.6199
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NOTE:

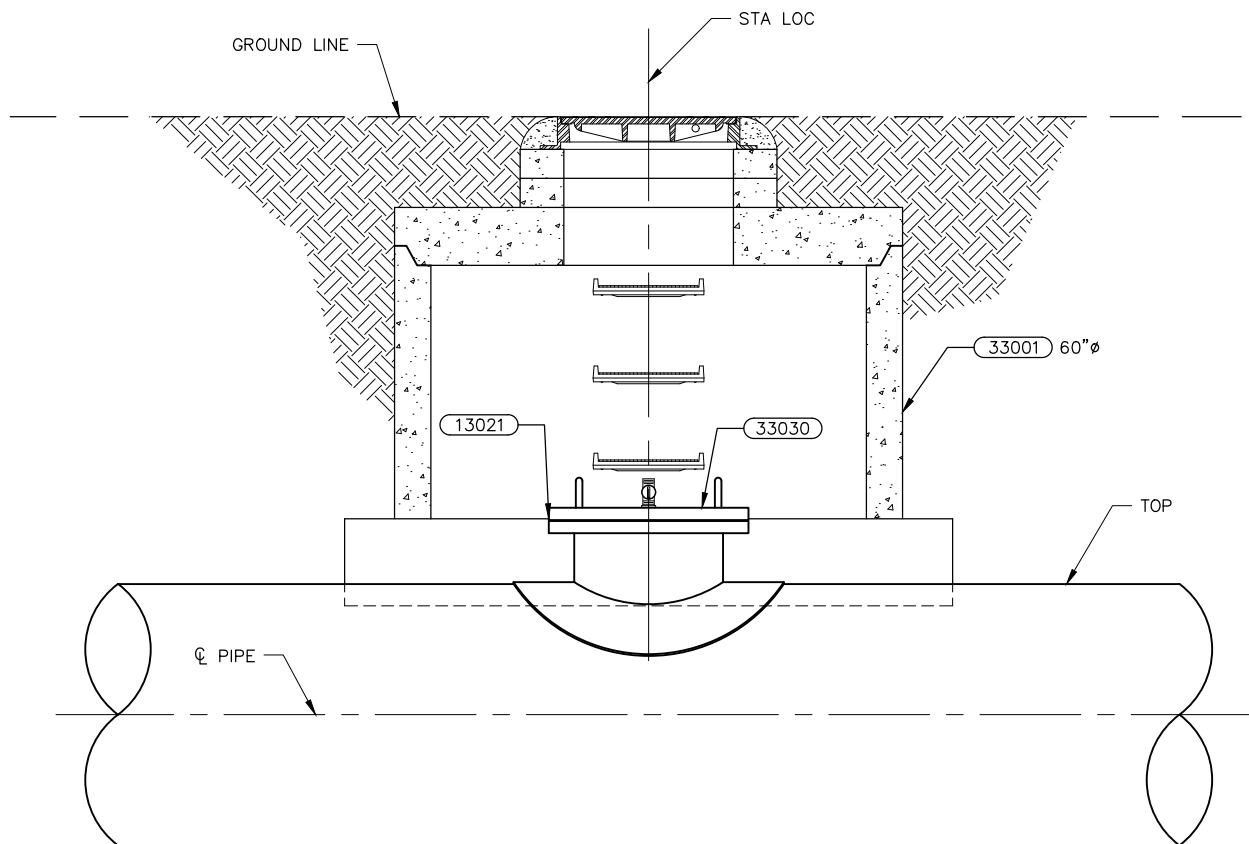
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33015
6" AIR VALVE ASSEMBLY
(STEEL PIPE)



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denverwater.org



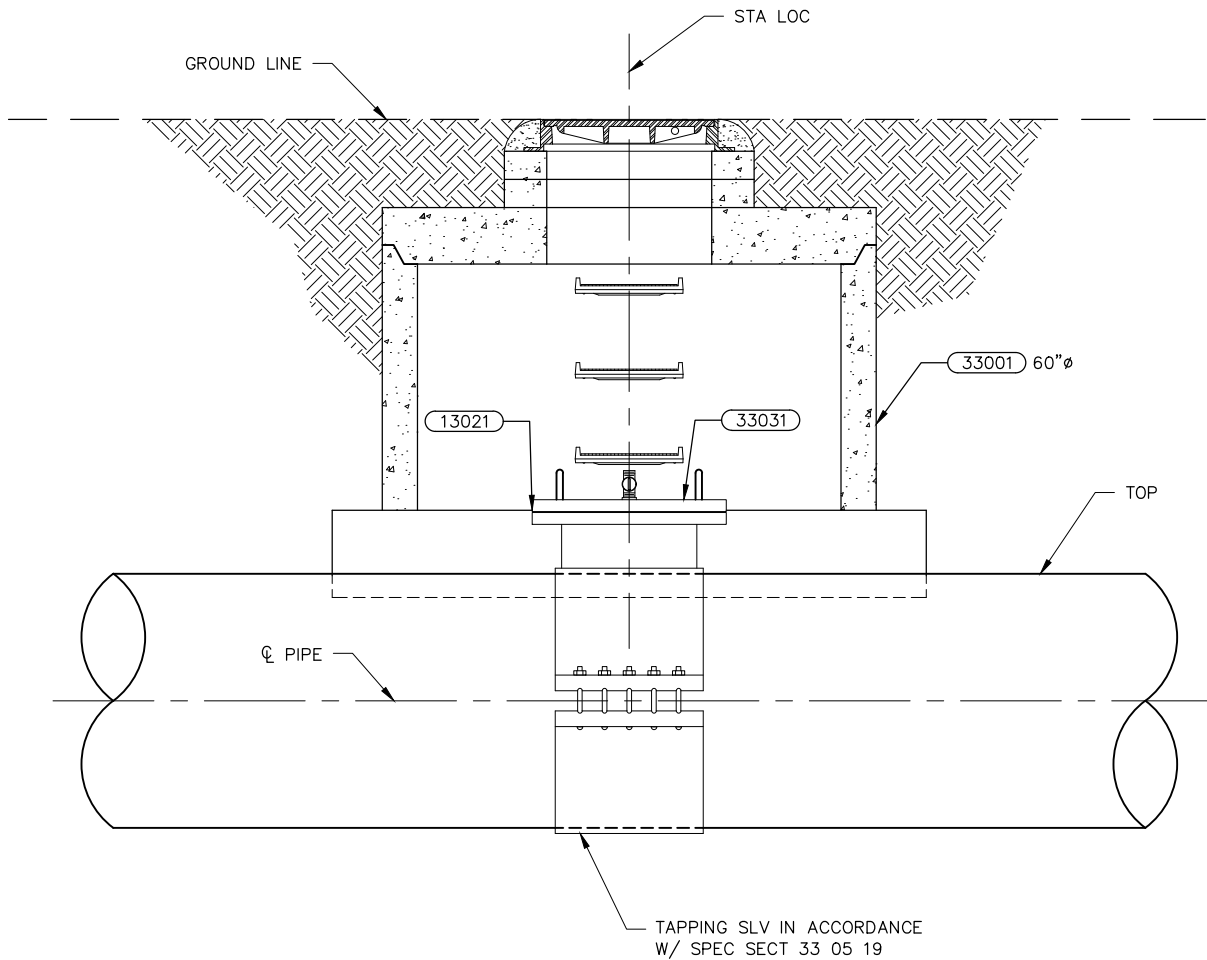
NOTES:

1. FOR PIPE DIAMETER GREATER THAN OR EQUAL TO 24 INCHES AND LESS THAN OR EQUAL TO 42 INCHES.
2. PIPE LINING AND COATING NOT SHOWN FOR CLARITY.
3. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33020
20" ACCESS MANHOLE
ASSEMBLY (STEEL PIPE)


DENVER WATER
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 F: 303.628.6199
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NOTES:

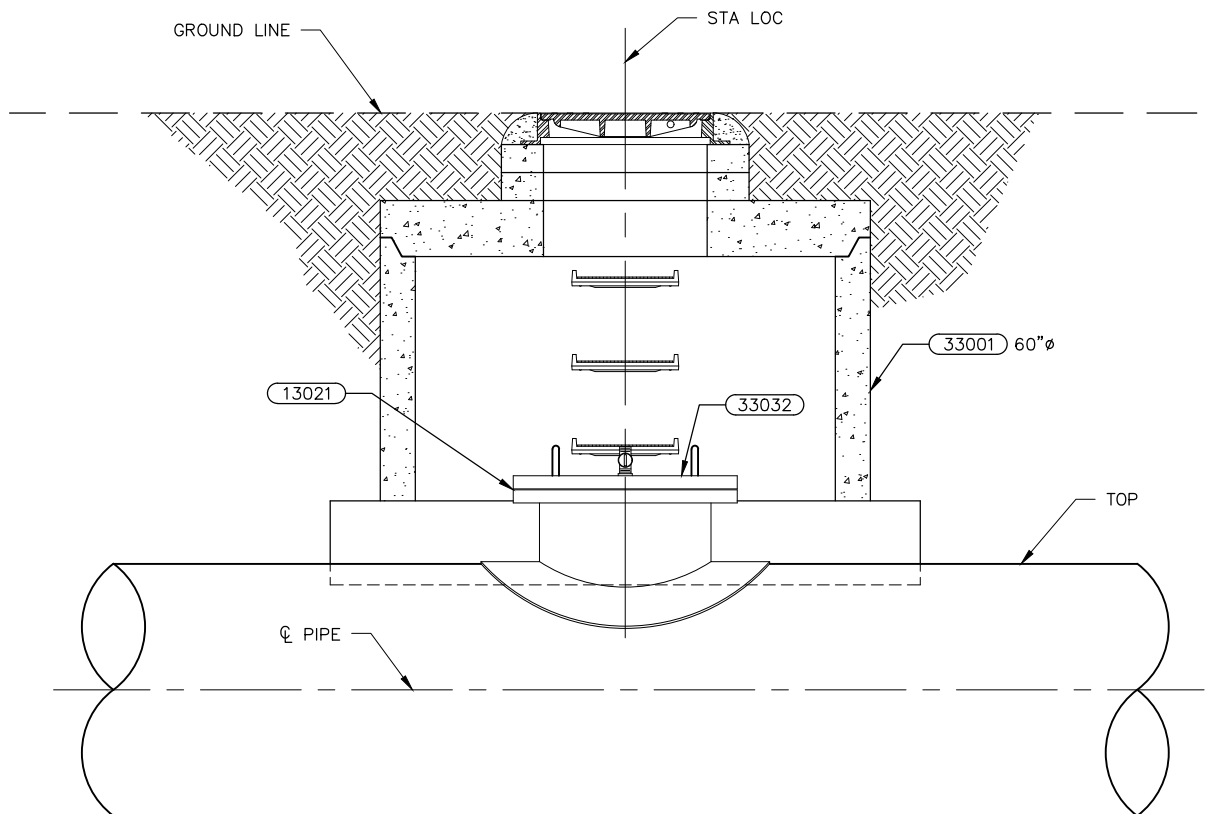
1. FOR PIPE DIAMETER GREATER THAN OR EQUAL TO 24 INCHES AND LESS THAN OR EQUAL TO 42 INCHES.
2. WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.
3. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

33021
20" ACCESS
MANHOLE ASSEMBLY
(DUCTILE IRON PIPE)



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NOTES:

1. FOR PIPE DIAMETERS GREATER THAN 42 INCHES.
2. PIPE LINING AND COATING NOT SHOWN FOR CLARITY.
3. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

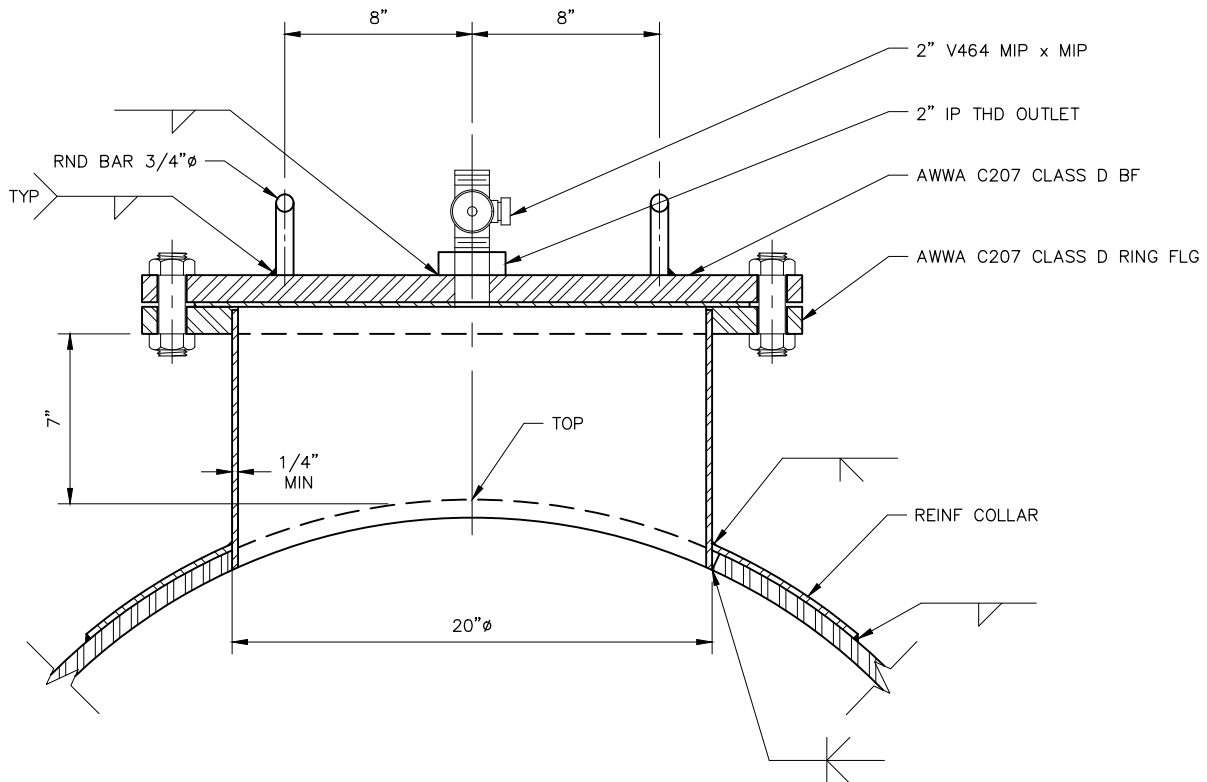
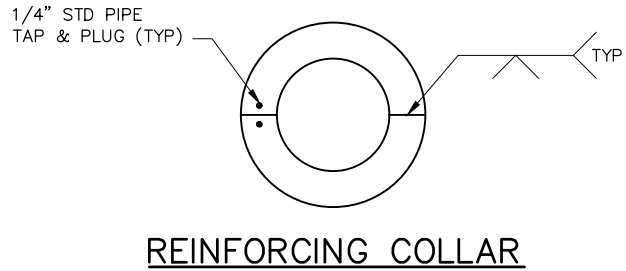
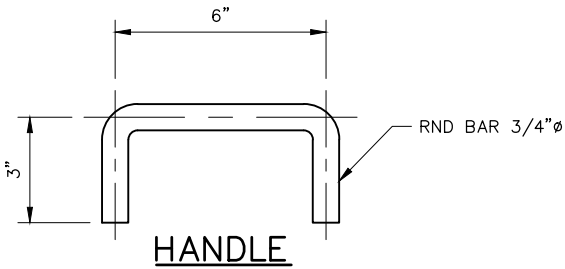
ORIGINATION DATE: JULY 2021

REVISION DATE:

33022
24" ACCESS
MANHOLE ASSEMBLY
(STEEL PIPE)



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 denverwater.org



NOTE:

PIPE LINING AND COATING NOT SHOWN FOR CLARITY.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

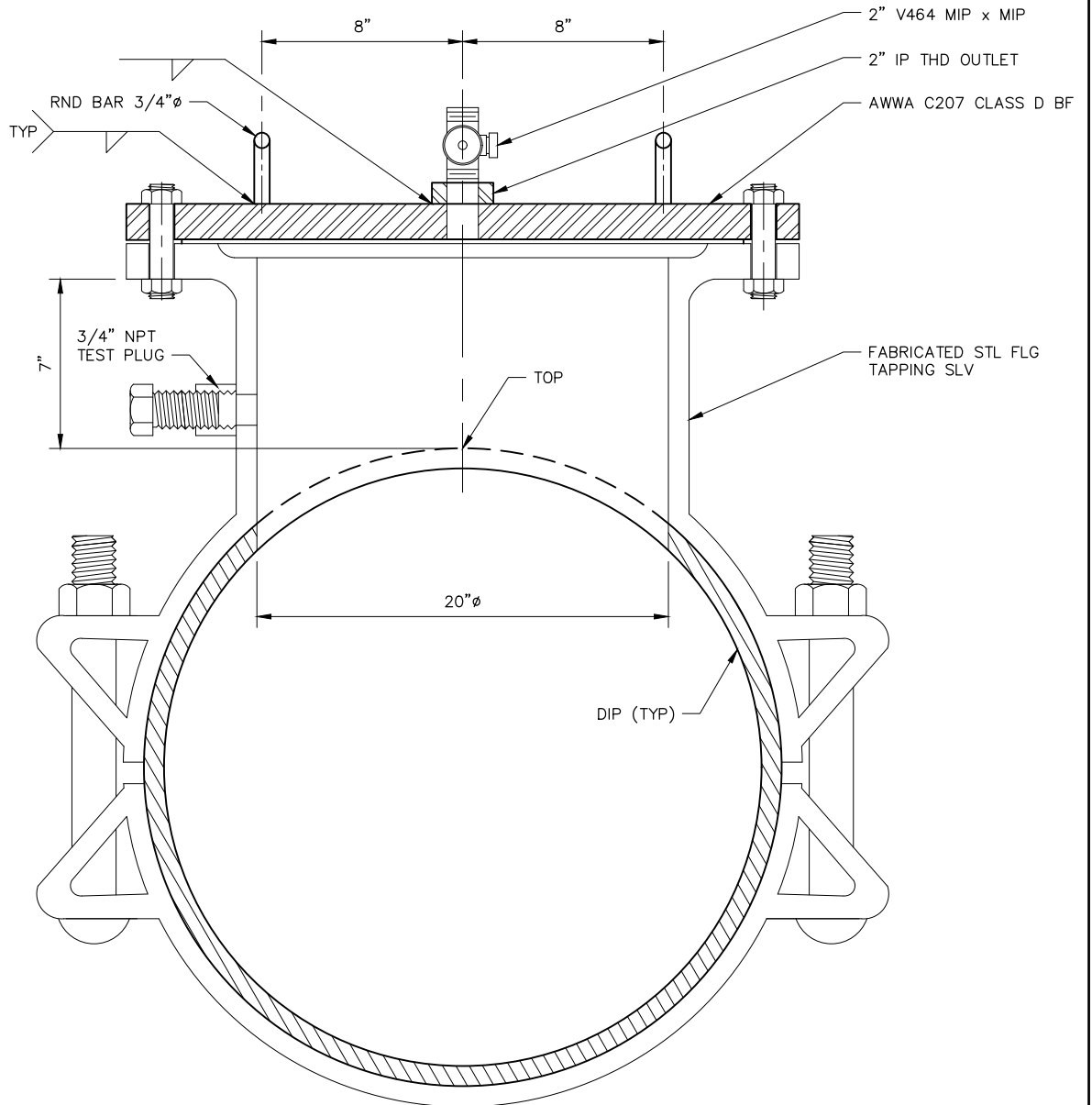
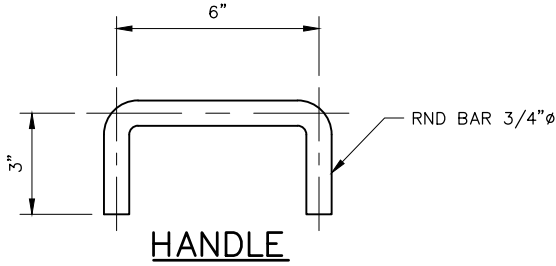
ORIGINATION DATE: JULY 2021

REVISION DATE:

**33030
20" ACCESS MANHOLE
(STEEL PIPE)**



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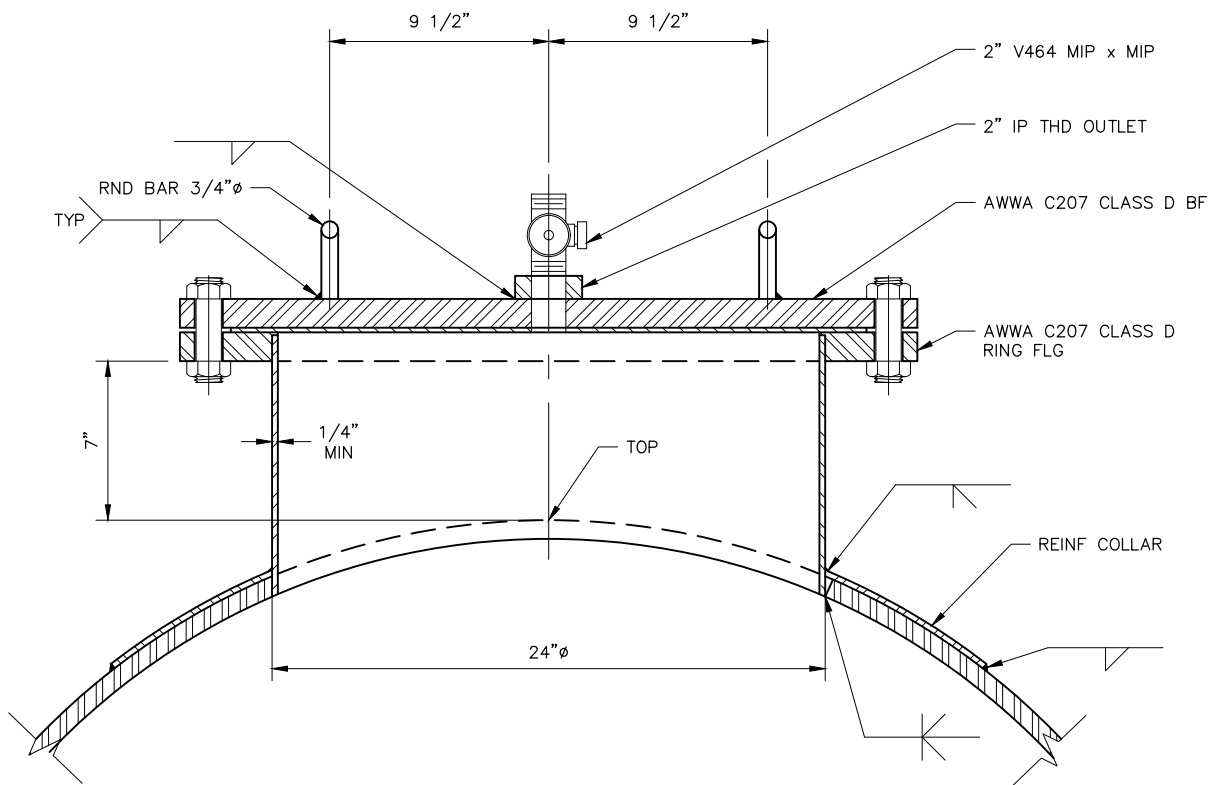
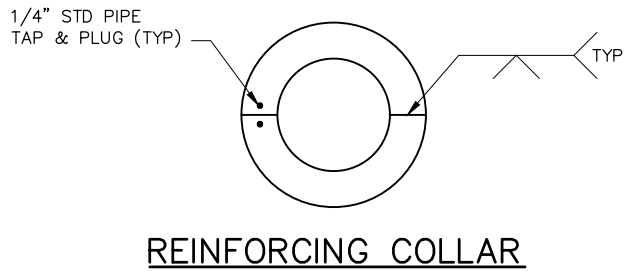
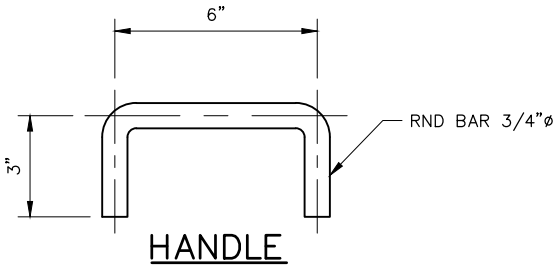


DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33031
20" ACCESS MANHOLE
(DUCTILE IRON PIPE)

D DENVER WATER

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 F: 303.628.6199
 denverwater.org



NOTE:

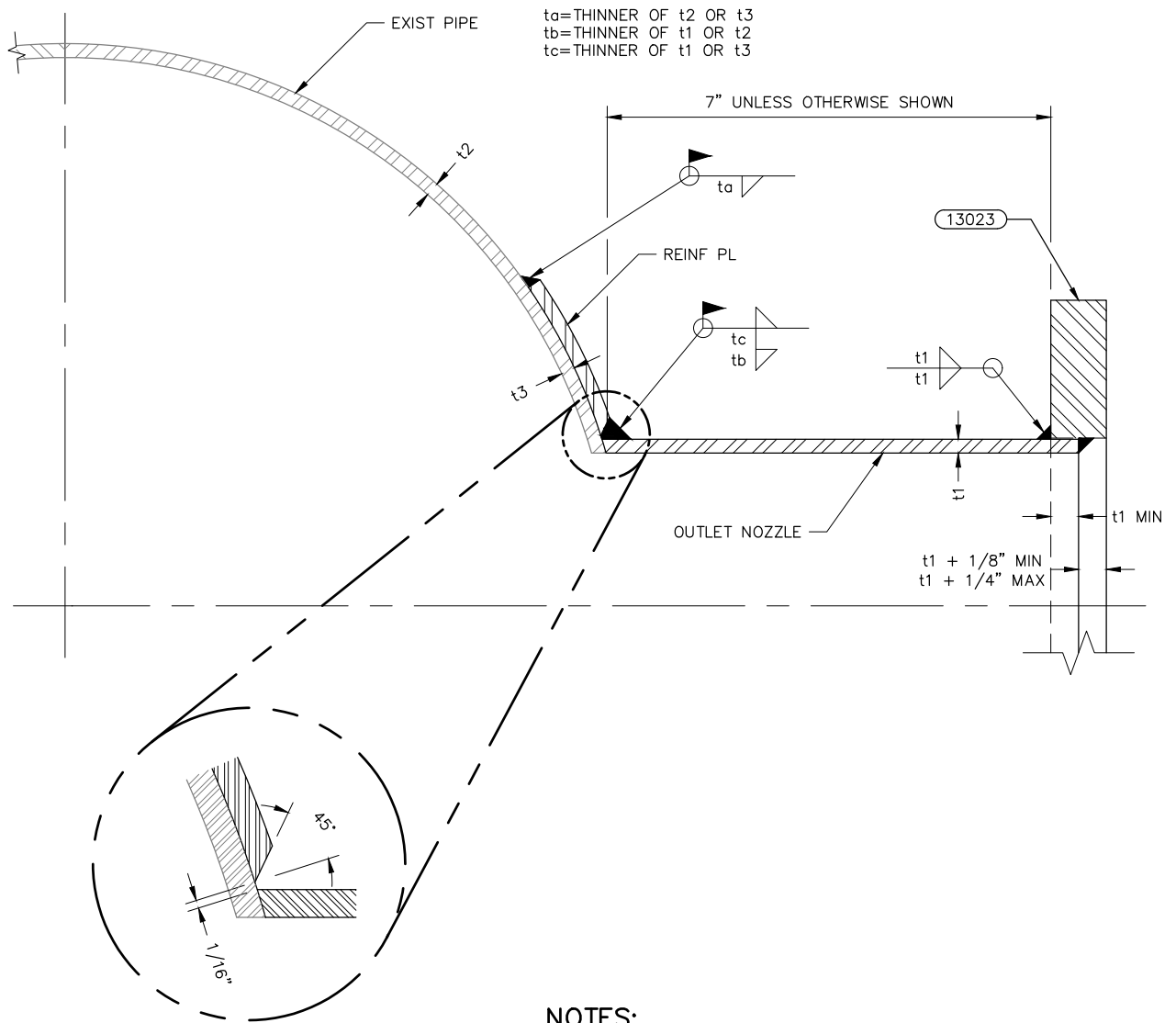
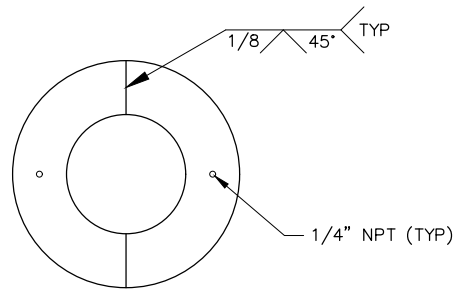
PIPE LINING AND COATING NOT SHOWN FOR CLARITY.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33032
24" ACCESS ASSEMBLY
(STEEL PIPE)



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NOTES:

1. LINING AND COATING NOT SHOWN FOR CLARITY.
2. REPAIR LINING AND COATING.
3. REINFORCING PLATE WIDTH AND THICKNESS AND OUTLET NOZZLE THICKNESS SHALL BE DESIGNED IN ACCORDANCE WITH AWWA M11.

DRAWN BY: BAIRES

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

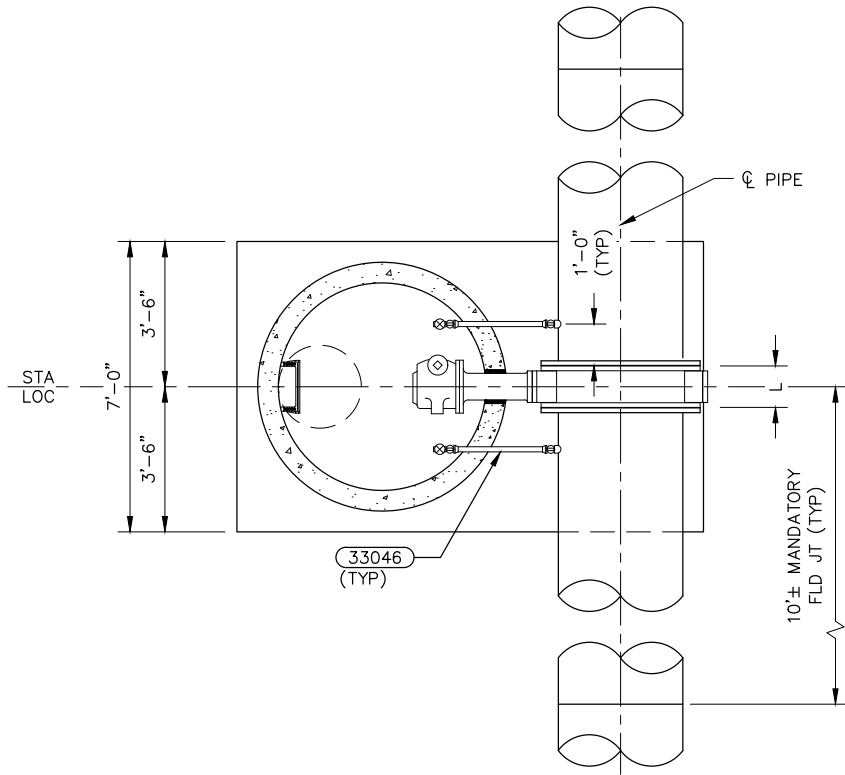
ORIGINATION DATE: JULY 2021

REVISION DATE:

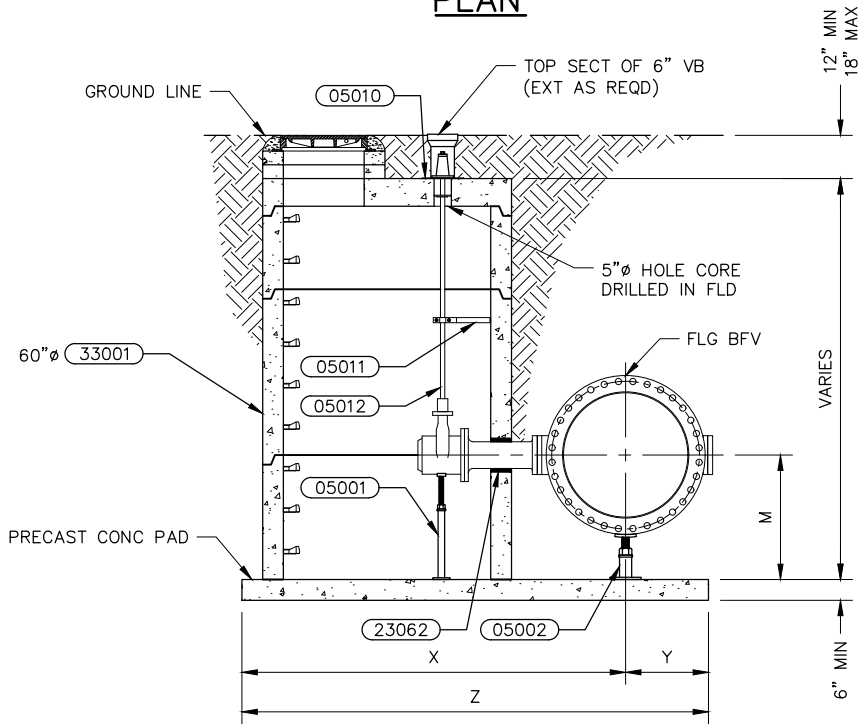
**33033
 FIELD ATTACHED
 FLANGED OUTLET**



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 denverwater.org



PLAN



ELEVATION

NOTE:

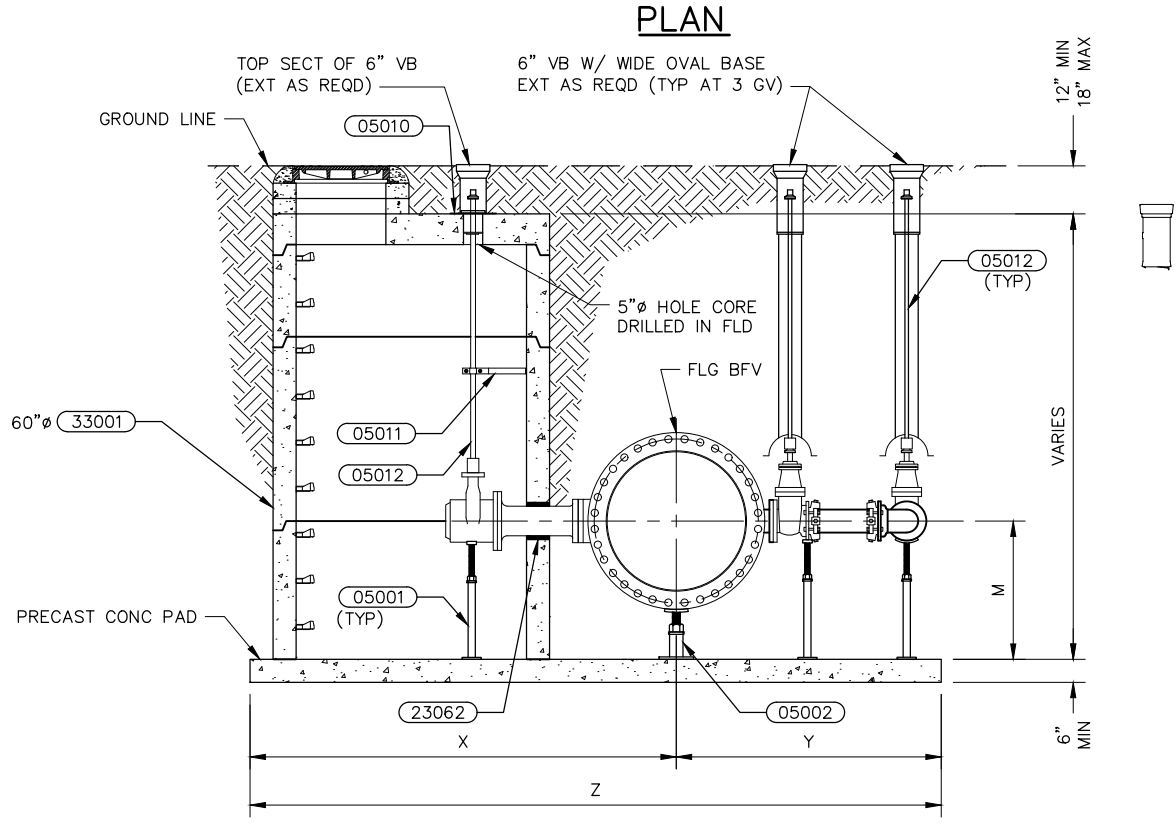
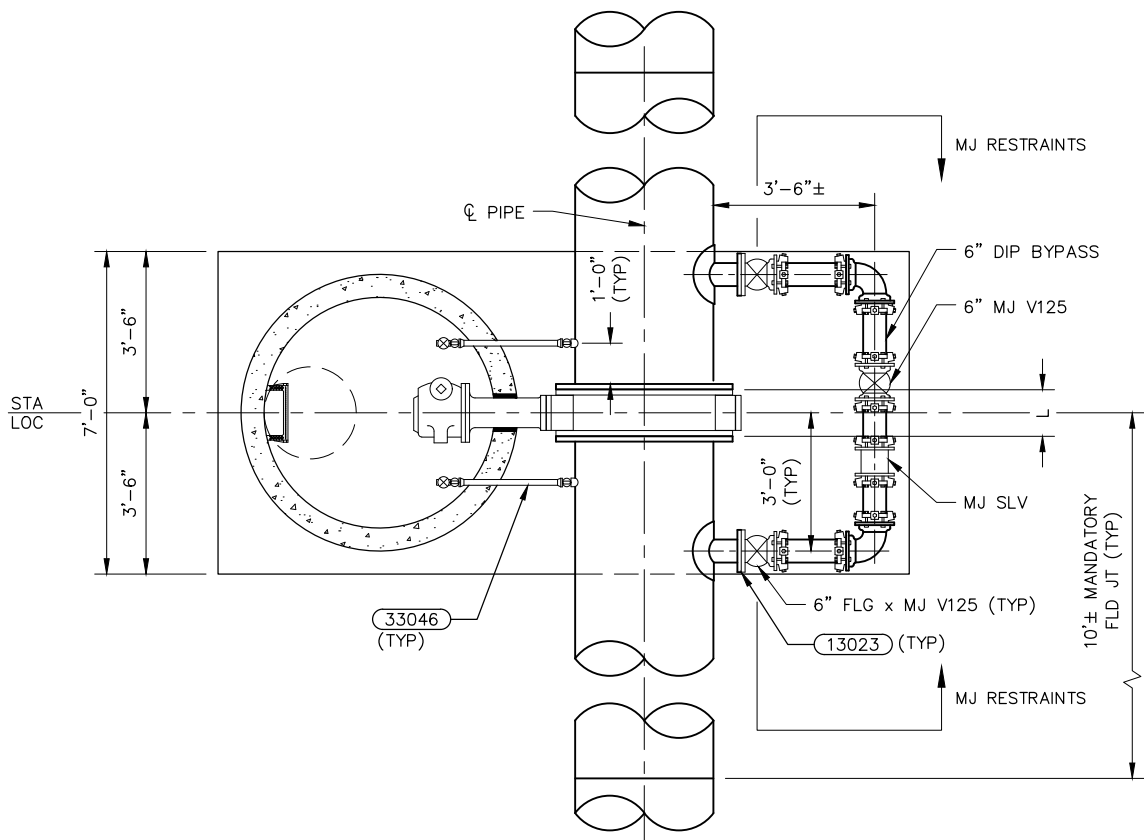
SEE (33045) FOR DIMENSION TABLE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33040
BUTTERFLY VALVE ASSEMBLY
(STEEL PIPE)**



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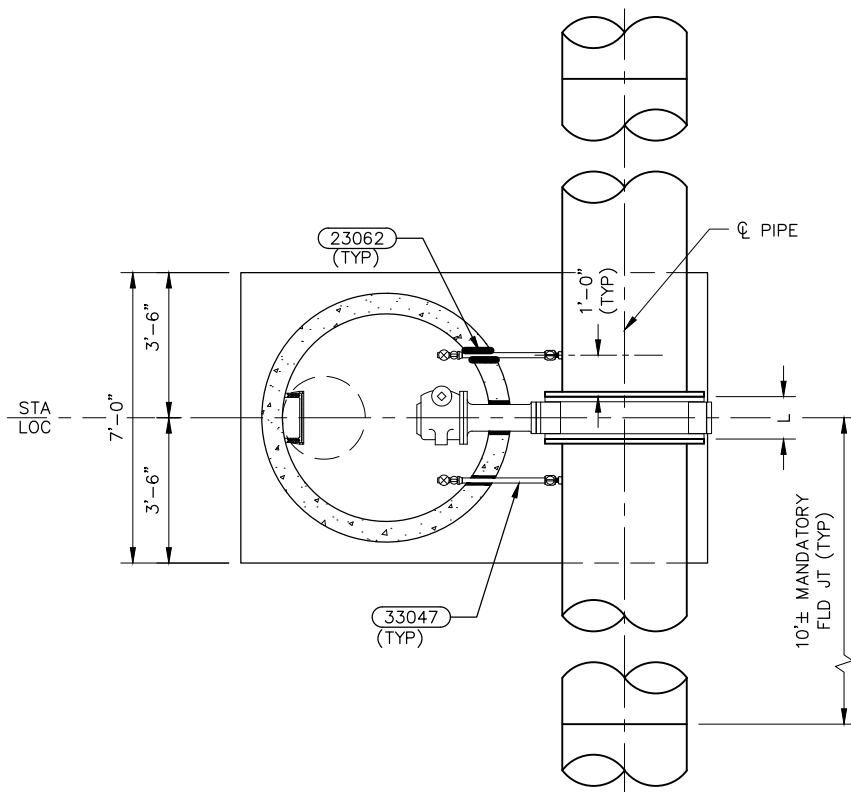
NOTE:
SEE 33045 FOR DIMENSION TABLE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

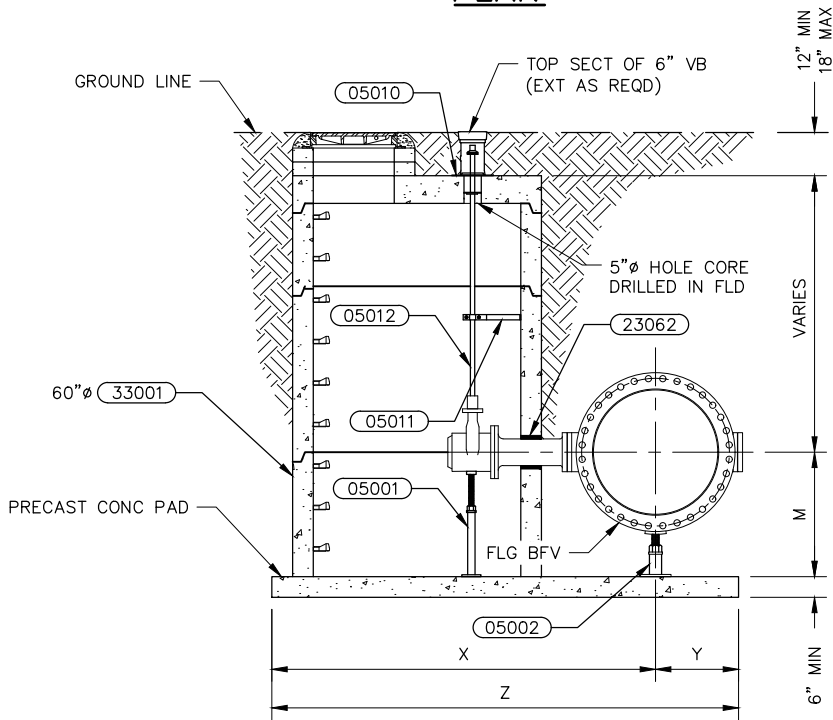
33041
BUTTERFLY VALVE ASSEMBLY
WITH BYPASS (STEEL PIPE)

D DENVER WATER

1600 West 12th Ave
Denver, Colorado 80204-3412
T: 303.628.6000
F: 303.628.6199
denverwater.org



PLAN



ELEVATION

NOTE:

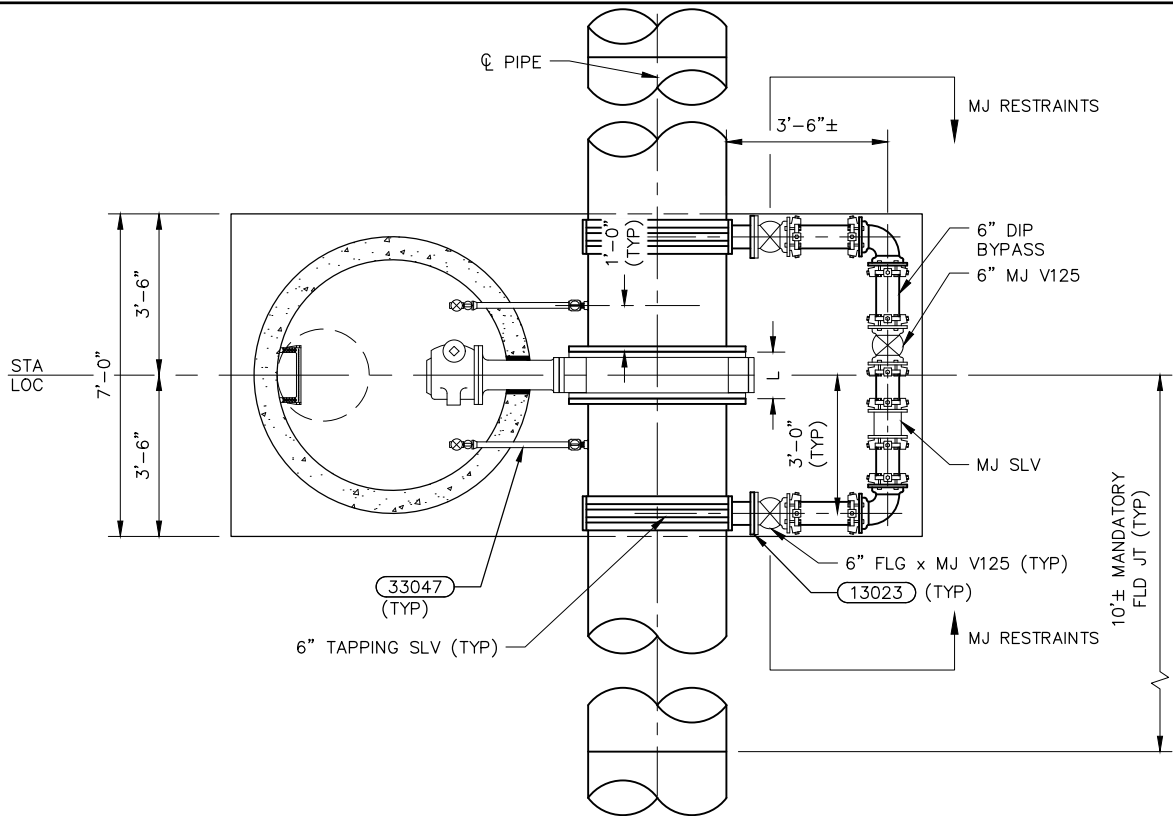
SEE (33045) FOR DIMENSION TABLE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

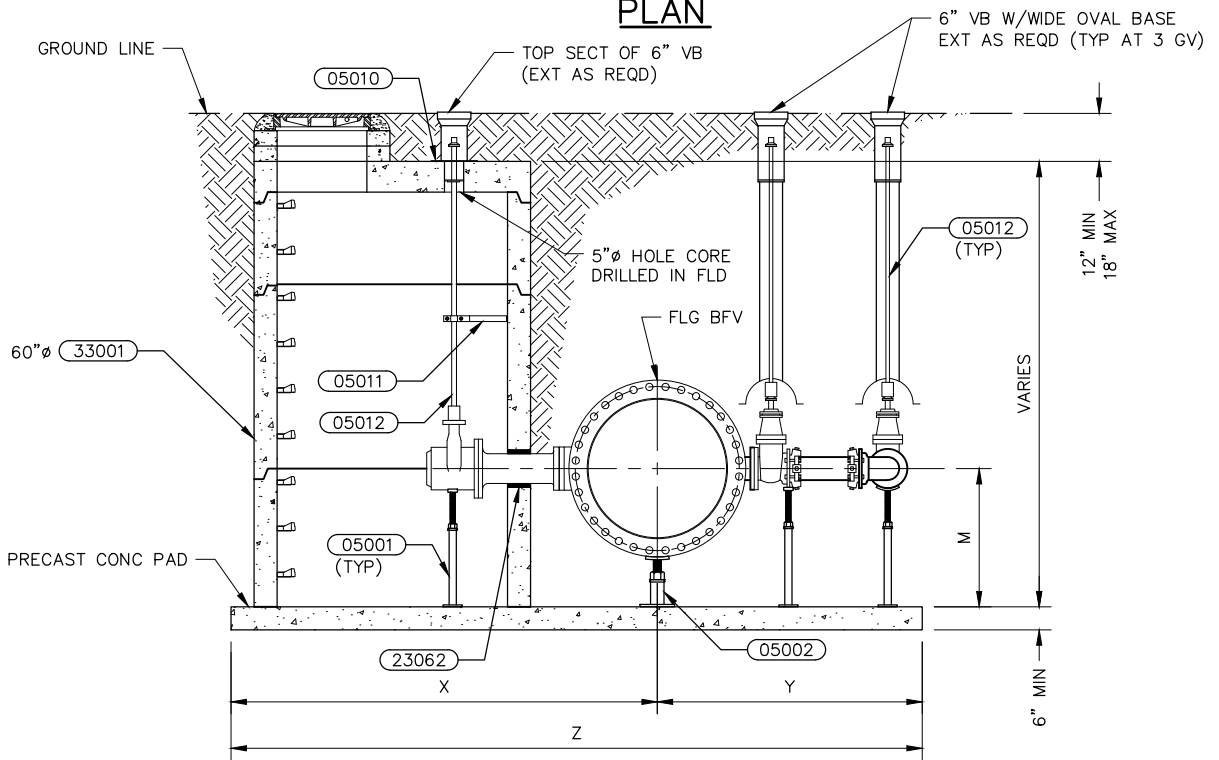
**33042
BUTTERFLY VALVE ASSEMBLY
(DUCTILE IRON PIPE)**



1600 West 12th Ave
Denver, Colorado 80204-3412
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F: 303.628.6199
denverwater.org



PLAN



ELEVATION

NOTES:

1. WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.
2. SEE (33045) FOR DIMENSION TABLE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33043
BUTTERFLY VALVE
ASSEMBLY WITH BYPASS
(DUCTILE IRON PIPE)**



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33040 33042 DIMENSION TABLE

VALVE SIZE	L	M	X	Y	Z
16"	8"	2'-0"	8'-3"	2'-0"	10'-3"
20"	8"	2'-0"	8'-3"	2'-0"	10'-3"
24"	8"	2'-6"	8'-9"	2'-0"	10'-9"
30"	12"	3'-0"	9'-3"	2'-0"	11'-3"
36"	12"	3'-0"	9'-3"	2'-0"	11'-3"
42"	12"	3'-6"	9'-9"	2'-0"	11'-9"

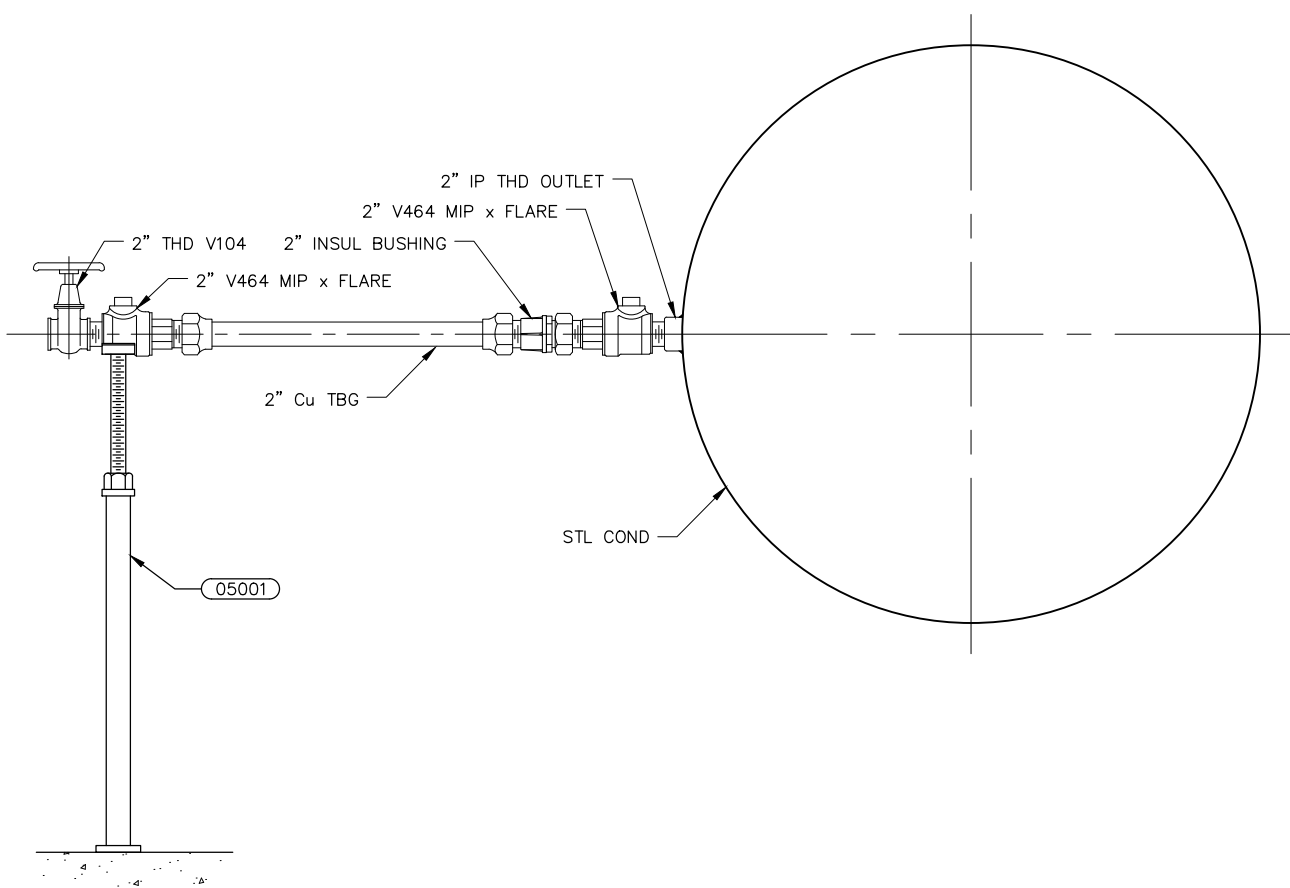
33041 33043 DIMENSION TABLE

VALVE SIZE	L	M	X	Y	Z
24"	8"	2'-6"	8'-9"	5'-6"	14'-3"
30"	12"	3'-0"	9'-3"	5'-9"	15'-0"
36"	12"	3'-0"	9'-3"	6'-0"	15'-3"
42"	12"	3'-6"	9'-9"	6'-3"	16'-0"
48"	15"	3'-6"	10'-0"	6'-9"	16'-9"
54"	15"	4'-0"	10'-6"	6'-9"	17'-3"
60"	15"	4'-6"	10'-9"	7'-3"	18'-0"
66"	18"	4'-6"	11'-3"	7'-6"	18'-9"
72"	18"	5'-0"	11'-6"	7'-9"	19'-3"
84"	18"	5'-6"	12'-6"	8'-3"	20'-9"
90"	21"	5'-6"	12'-9"	8'-6"	21'-3"
96"	24"	6'-0"	12'-9"	8'-9"	21'-6"
108"	28"	6'-6"	13'-6"	9'-6"	23'-0"

DRAWN BY: SCHULTE
 CHKD BY: K ROSS/KLR
 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

33045
BUTTERFLY VALVE ASSEMBLY
DIMENSION TABLES





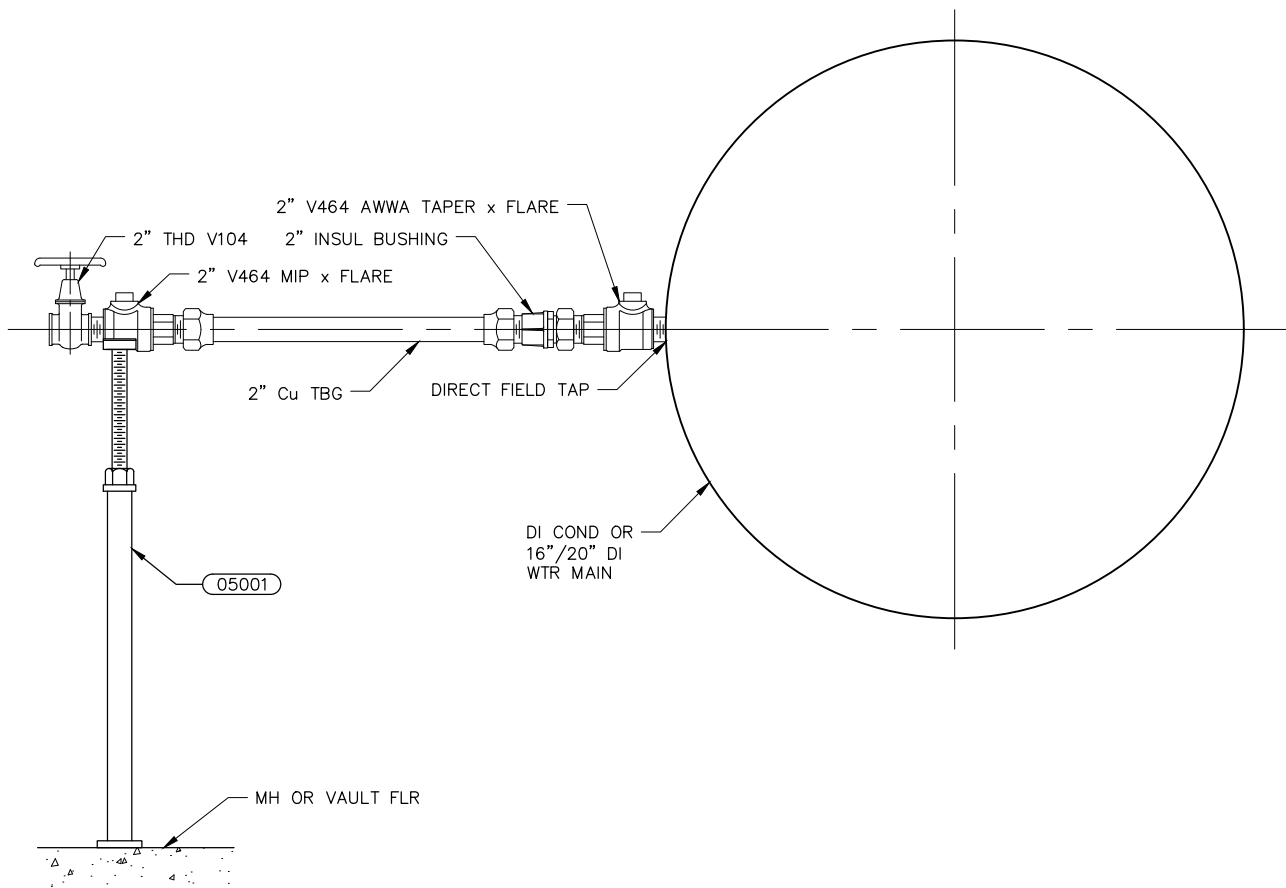
NOTE:

MANHOLE AND PENETRATION NOT SHOWN FOR CLARITY.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33046
CHLORINATION TAP
(STEEL PIPE)**

D DENVER WATER
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 F: 303.628.6199
 denverwater.org



NOTES:

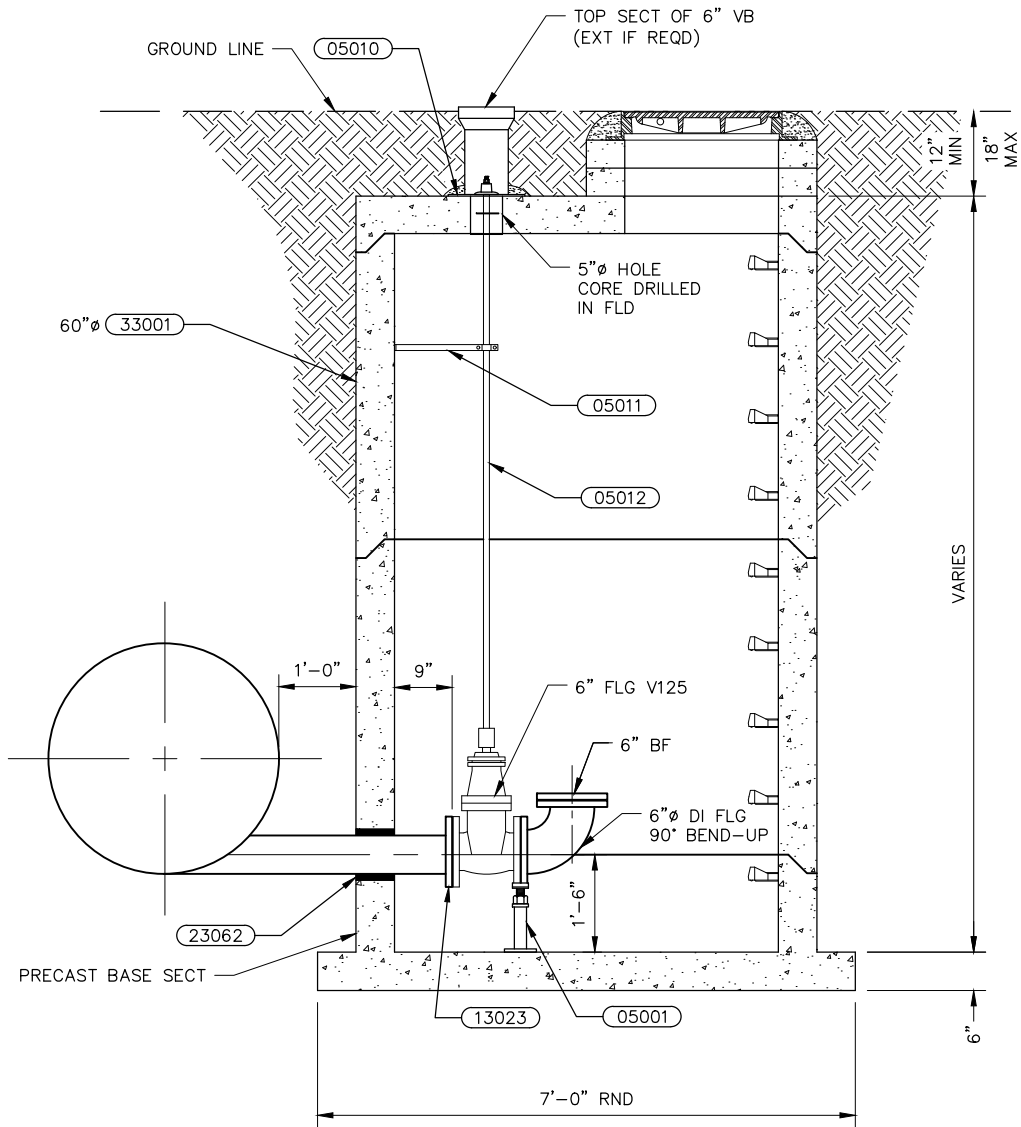
1. MANHOLE AND PENETRATION NOT SHOWN FOR CLARITY.
2. TAPPING SLEEVE WITH THREADED OUTLET IS AN ALLOWABLE ALTERNATIVE TO A DIRECT TAP.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33047
CHLORINATION TAP
(DUCTILE IRON PIPE)**



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NOTE:

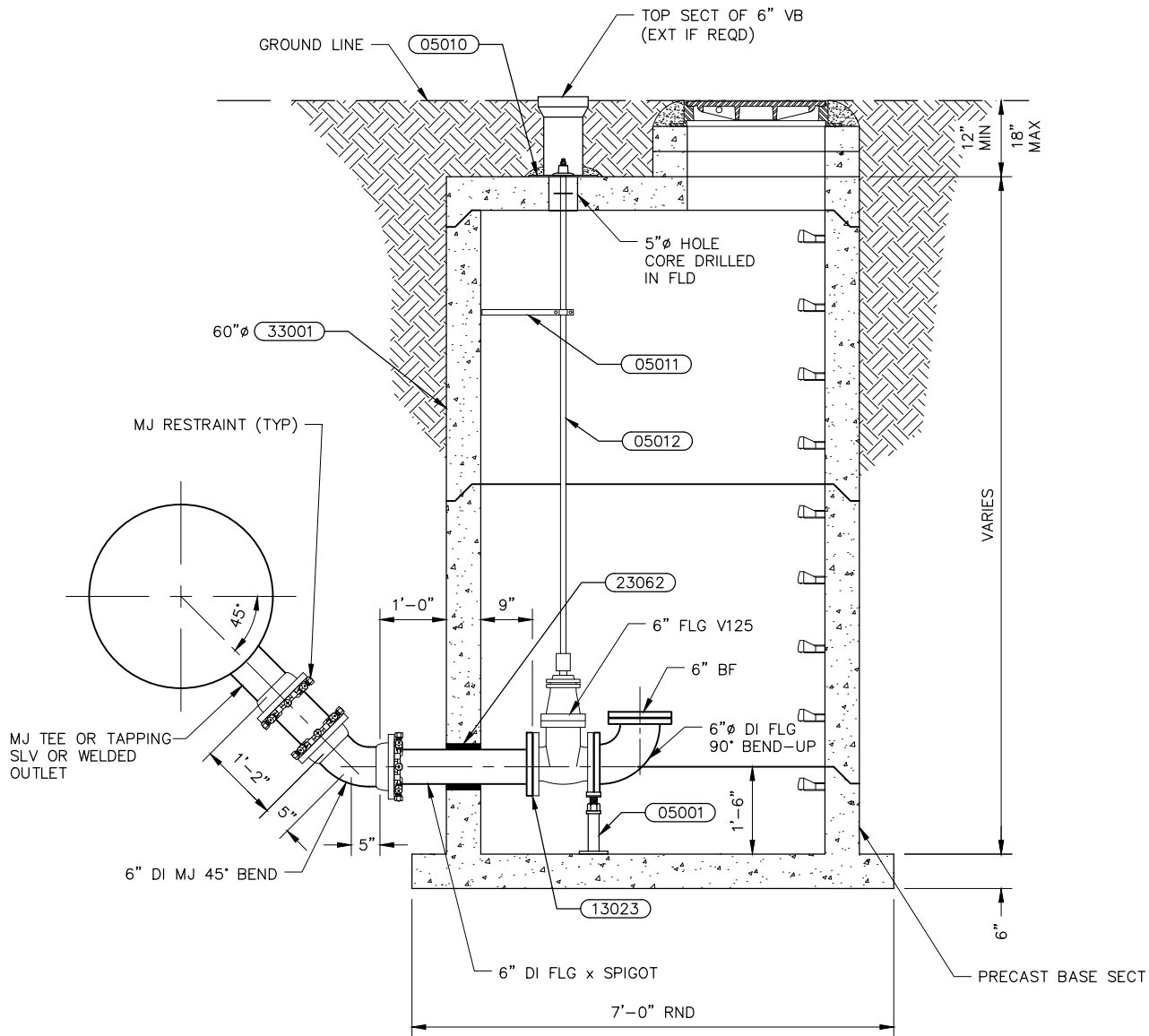
COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33048
6" BLOWOFF VALVE
ASSEMBLY (STEEL PIPE)

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NOTES:

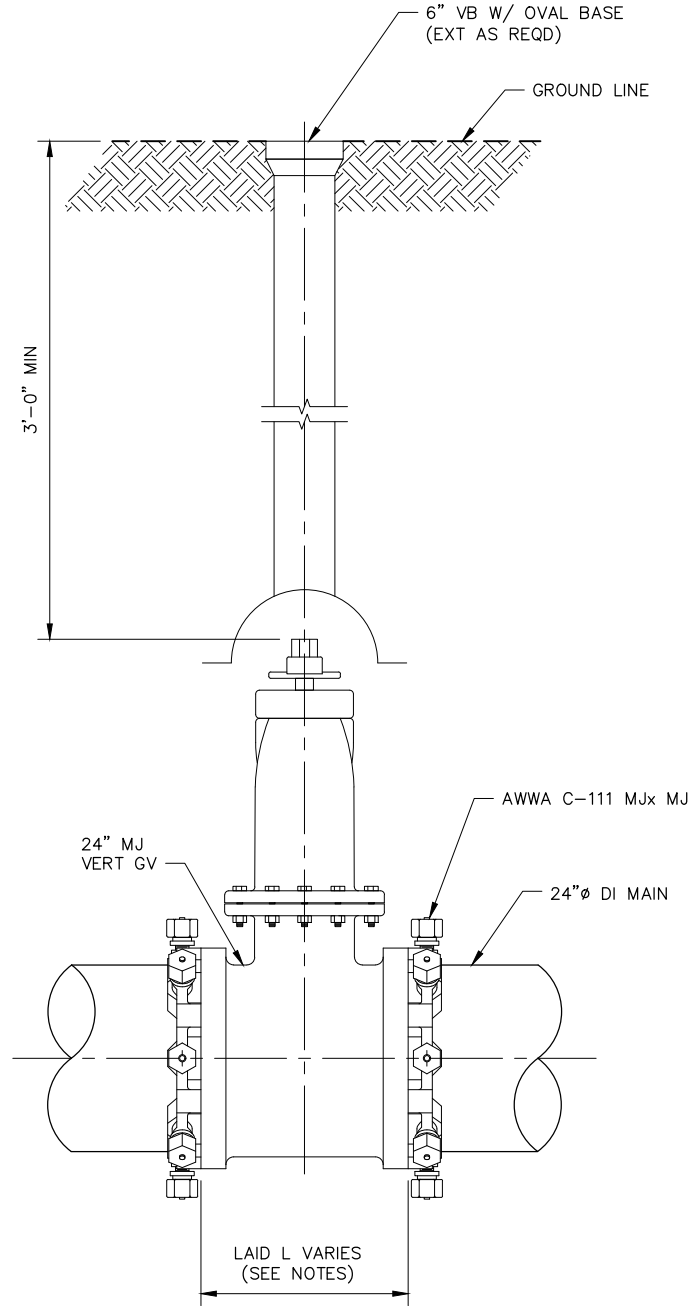
1. WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.
2. COAT PIPE, VALVES, AND FITTINGS WITHIN MANHOLE IN ACCORDANCE WITH SPECIFICATION SECTION 09 97 13.04.
3. THIS INSTALLATION MAY BE REPLACED BY A FIRE HYDRANT WHERE APPROVED BY DENVER WATER FOR 16-INCH AND 20-INCH MAINS.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33049
6" BLOWOFF VALVE
ASSEMBLY
(DUCTILE IRON PIPE)



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NOTE:

24-INCH GATE VALVE LAID LENGTH IS 23.50 INCHES.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

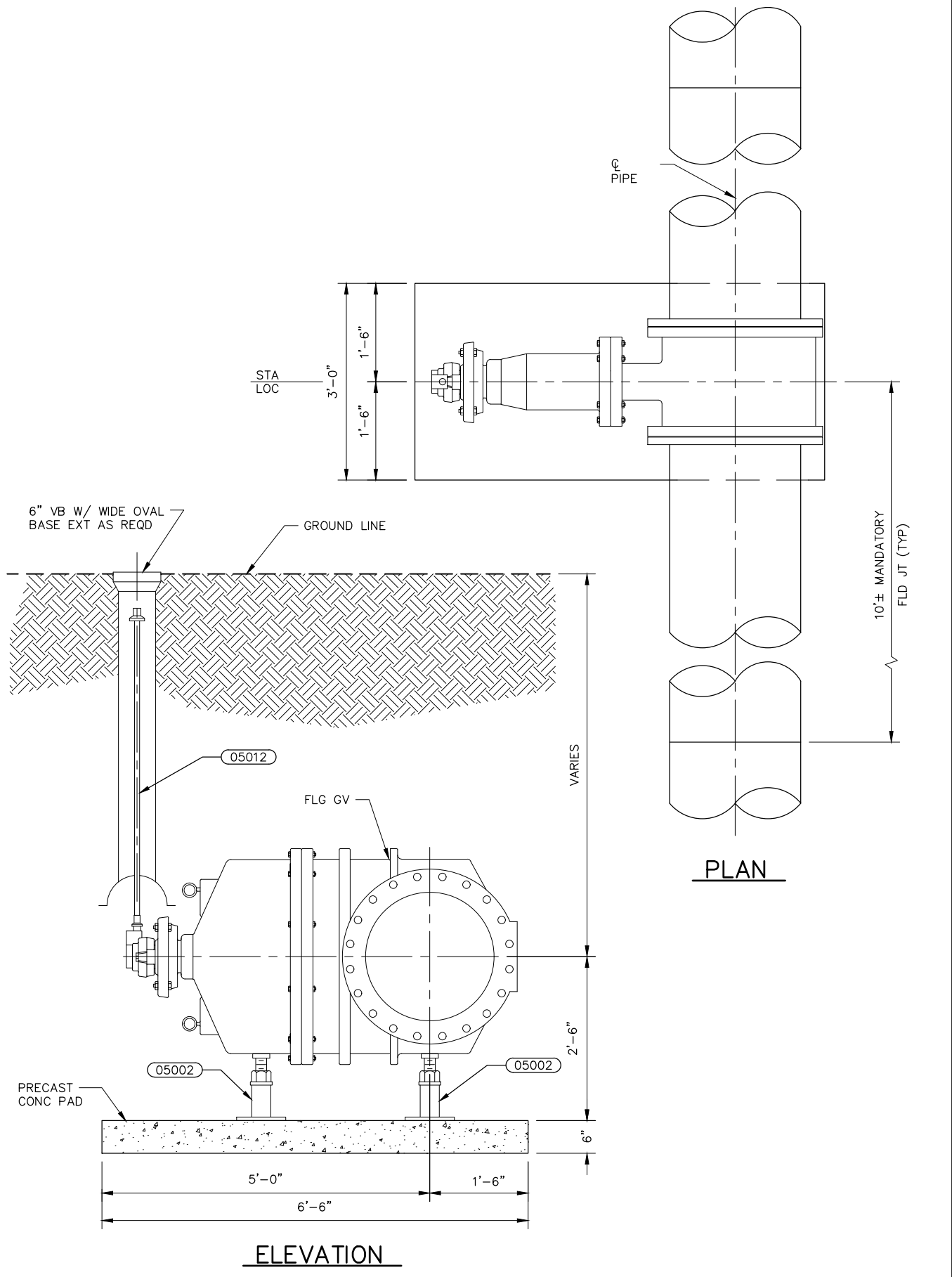
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

33051
24" VERTICAL GATE
VALVE INSTALLATION



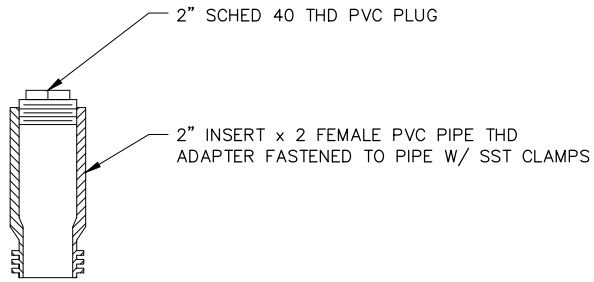
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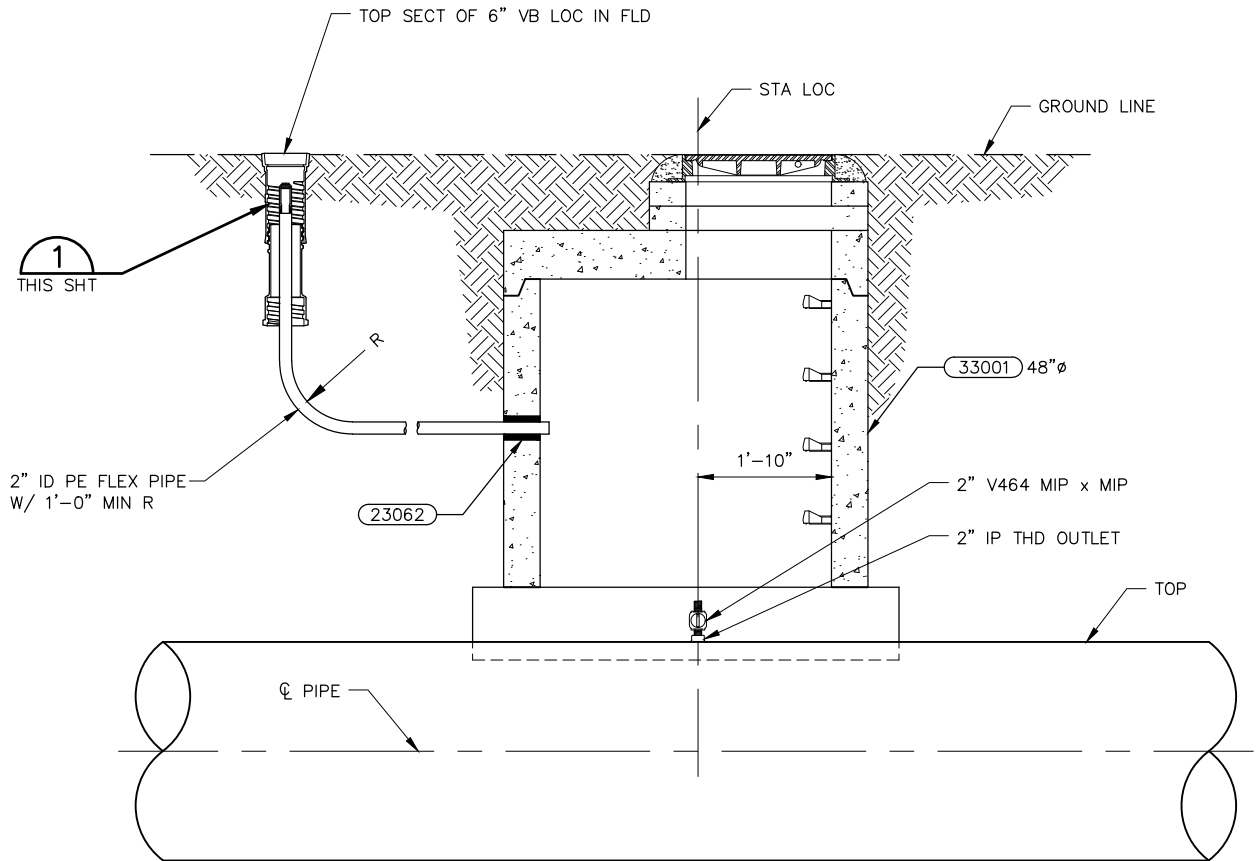
DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33052
HORIZONTAL
GATE VALVE ASSEMBLY


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DETAIL 1
THIS SHT



DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

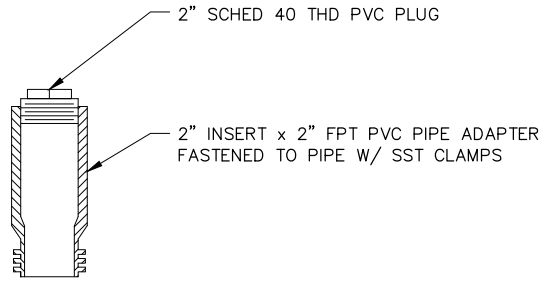
ORIGINATION DATE: JULY 2021

REVISION DATE:

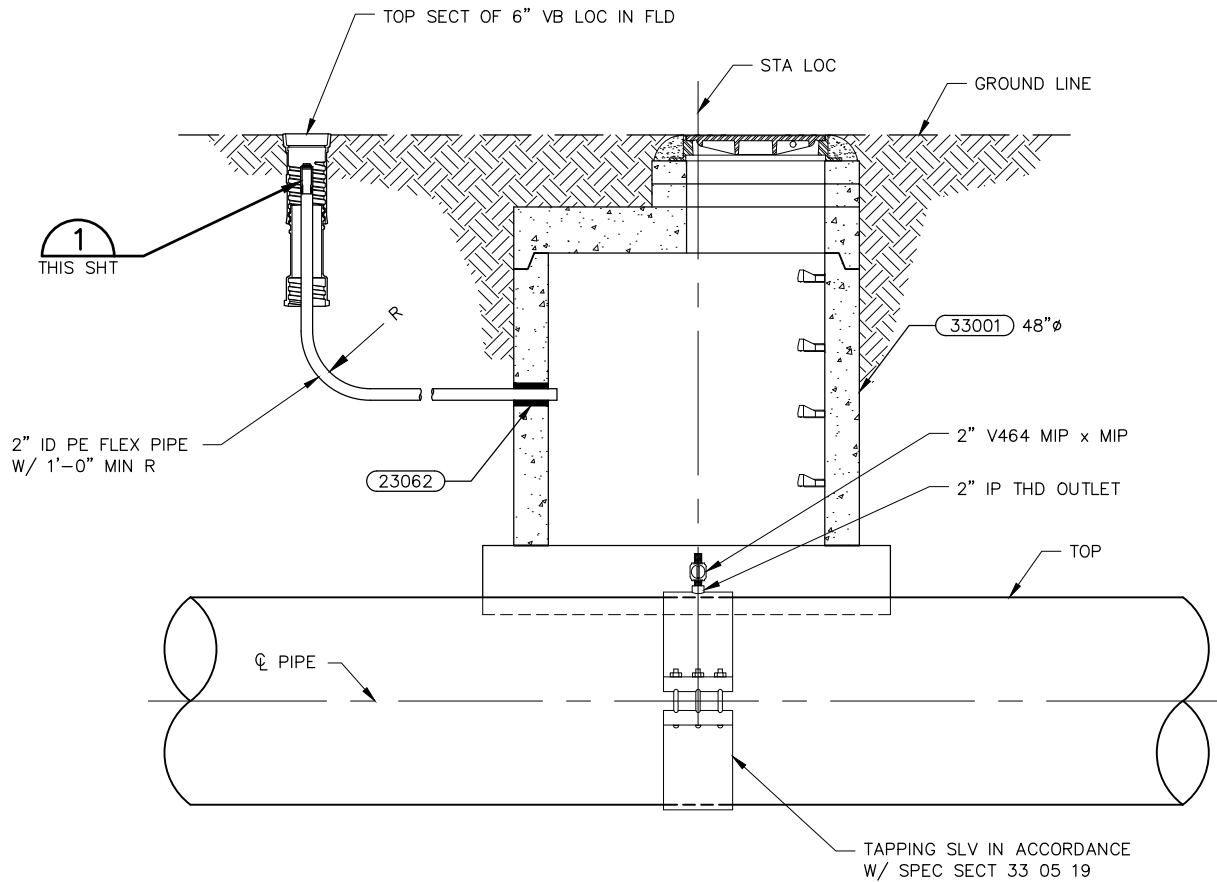
33053
2" PITOT MANHOLE
(STEEL PIPE)

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DETAIL 1
THIS SHT



NOTE:

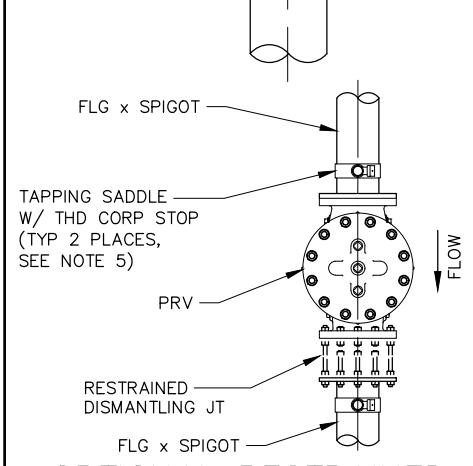
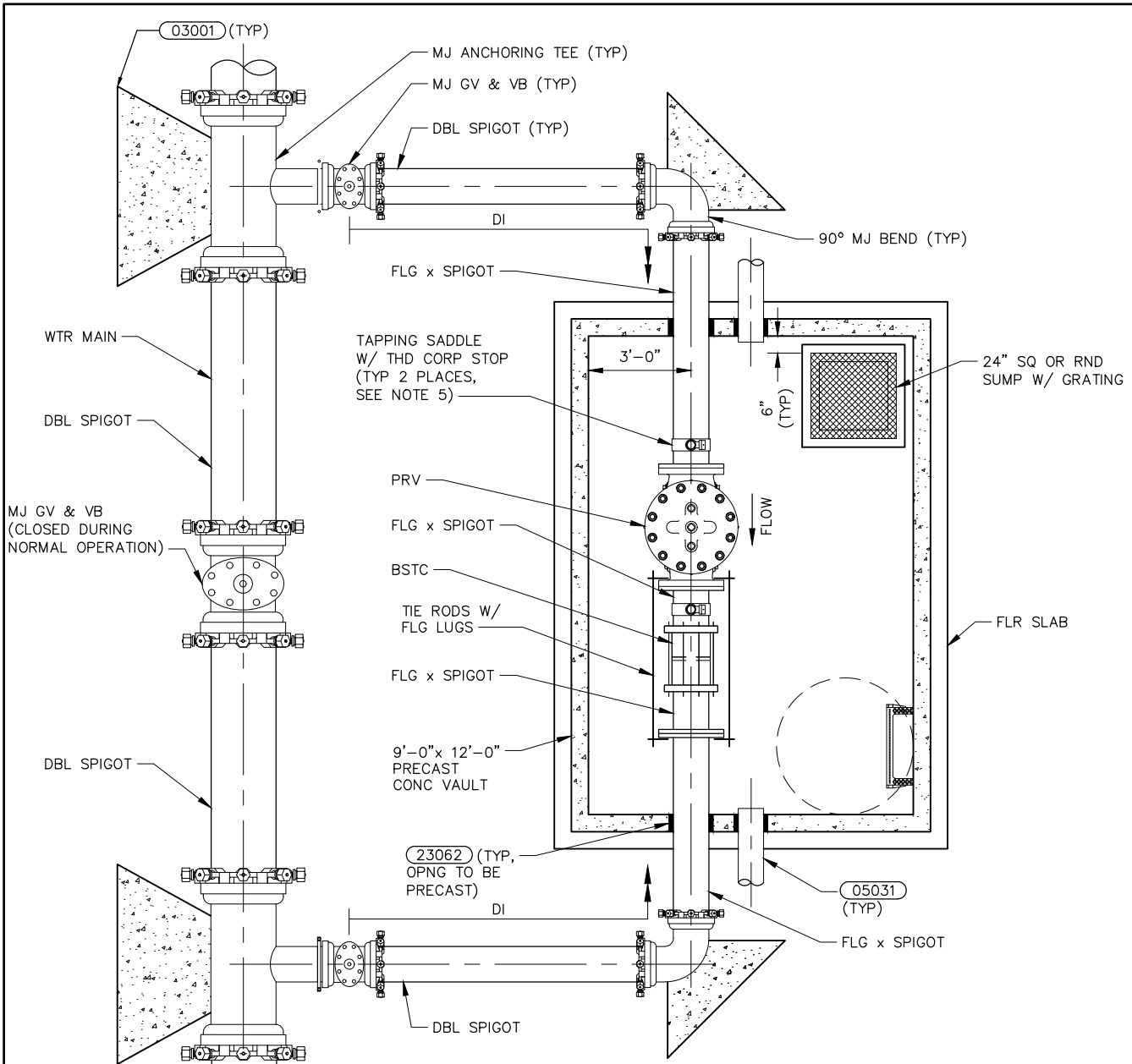
2-INCH INSIDE DIAMETER FLEX MAY NOT BE REQUIRED FOR SOME LOCATIONS. VERIFY FLEX REQUIREMENT PRIOR TO INSTALLATION.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33054
2" PITOT MANHOLE
(DUCTILE IRON PIPE)

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OPTIONAL RESTRAINED DISMANTLING JOINT

NOTES:

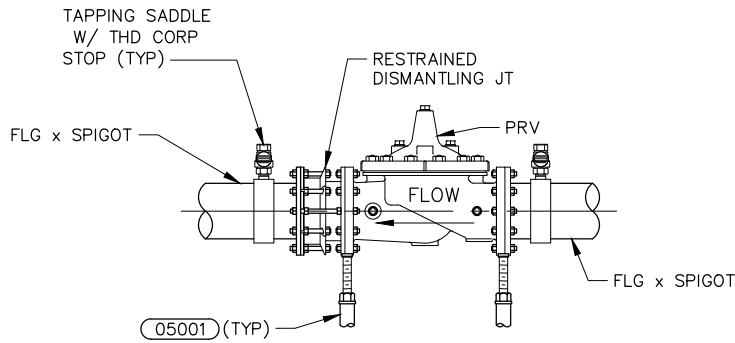
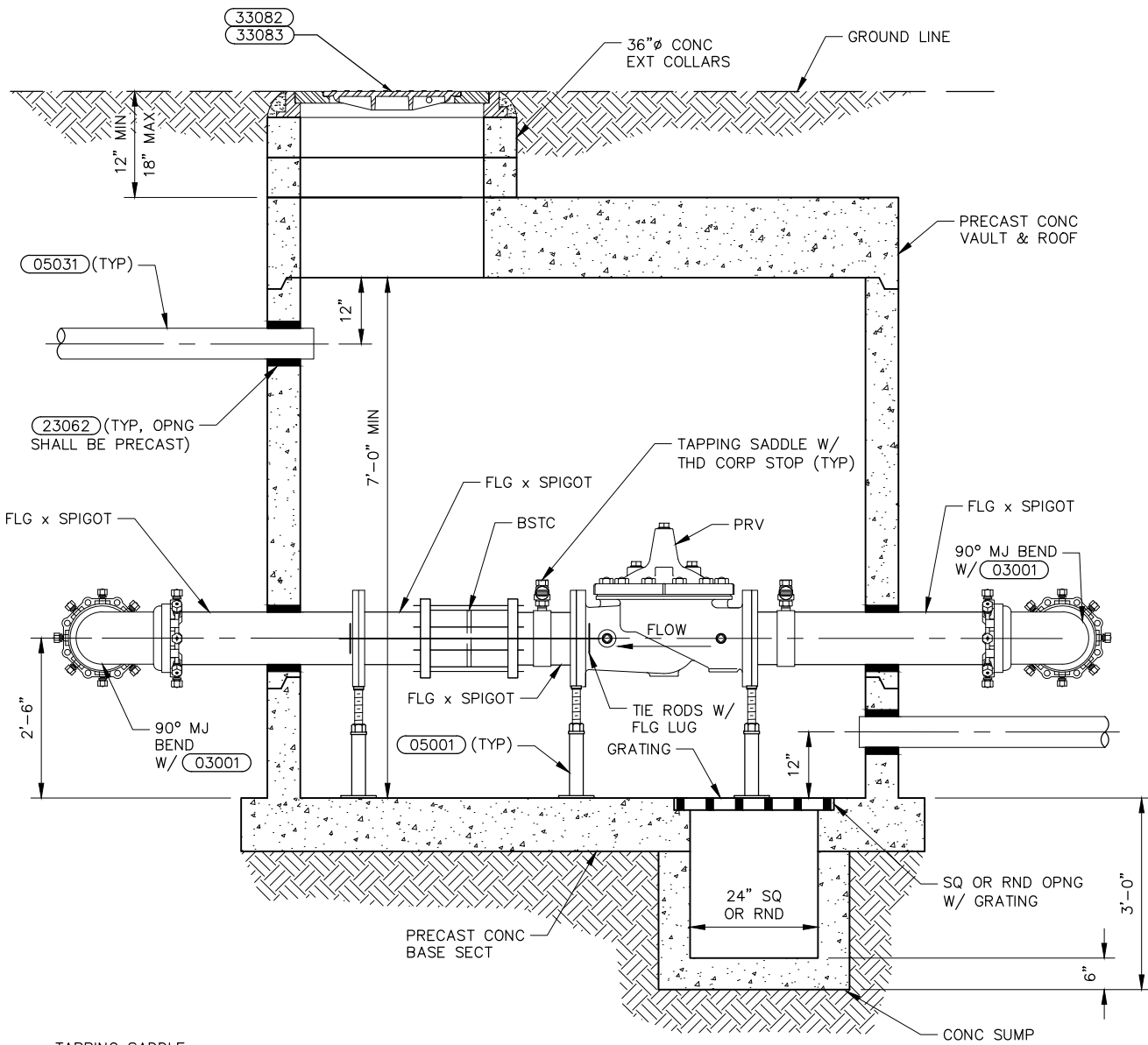
1. ACCESS STAIRS WITH A DOOR OUTSIDE OF THE PAVEMENT MAY BE REQUIRED ON STREETS WITH HEAVY TRAFFIC.
2. SEE (33056) FOR TYPICAL SECTION.
3. DO NOT PLACE SUMP DIRECTLY UNDER A VAULT ACCESS OPENING.
4. WHEN INSTALLING AN 8 INCH OR SMALLER PRESSURE REGULATING VALVE ON A 20 INCH OR SMALLER MAIN, PIPING SHALL BE THE SAME SIZE AS THE PRESSURE REGULATING VALVE AND ONE PIPE SIZE SMALLER THAN THE MAIN. (LARGER SIZE CONDUIT AND PRESSURE REGULATING VALVES REQUIRE APPROVAL OF LINE SIZE).
5. FOR PIPE SIZES LESS THAN 12 INCHES, CORP STOPS SHALL BE 1 INCH. FOR PIPE SIZES 16 INCH AND 20 INCH, CORP STOPS SHALL BE 2 INCH.
6. IF SUPERVISORY CONTROL AND DATA ACQUISITION IS REQUIRED VAULT SIZE SHALL BE 9 FEET BY 18 FEET.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33055
PRESSURE REGULATING
VALVE VAULT INSTALLATION
TYPICAL PLAN**

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**OPTIONAL RESTRAINED
DISMANTLING JOINT**

NOTE:

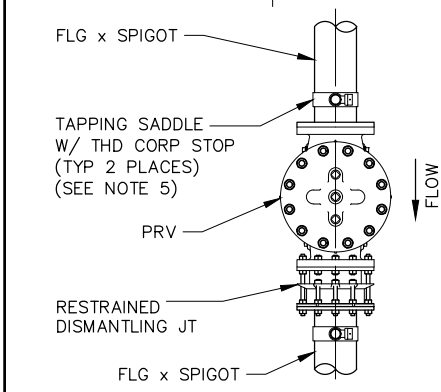
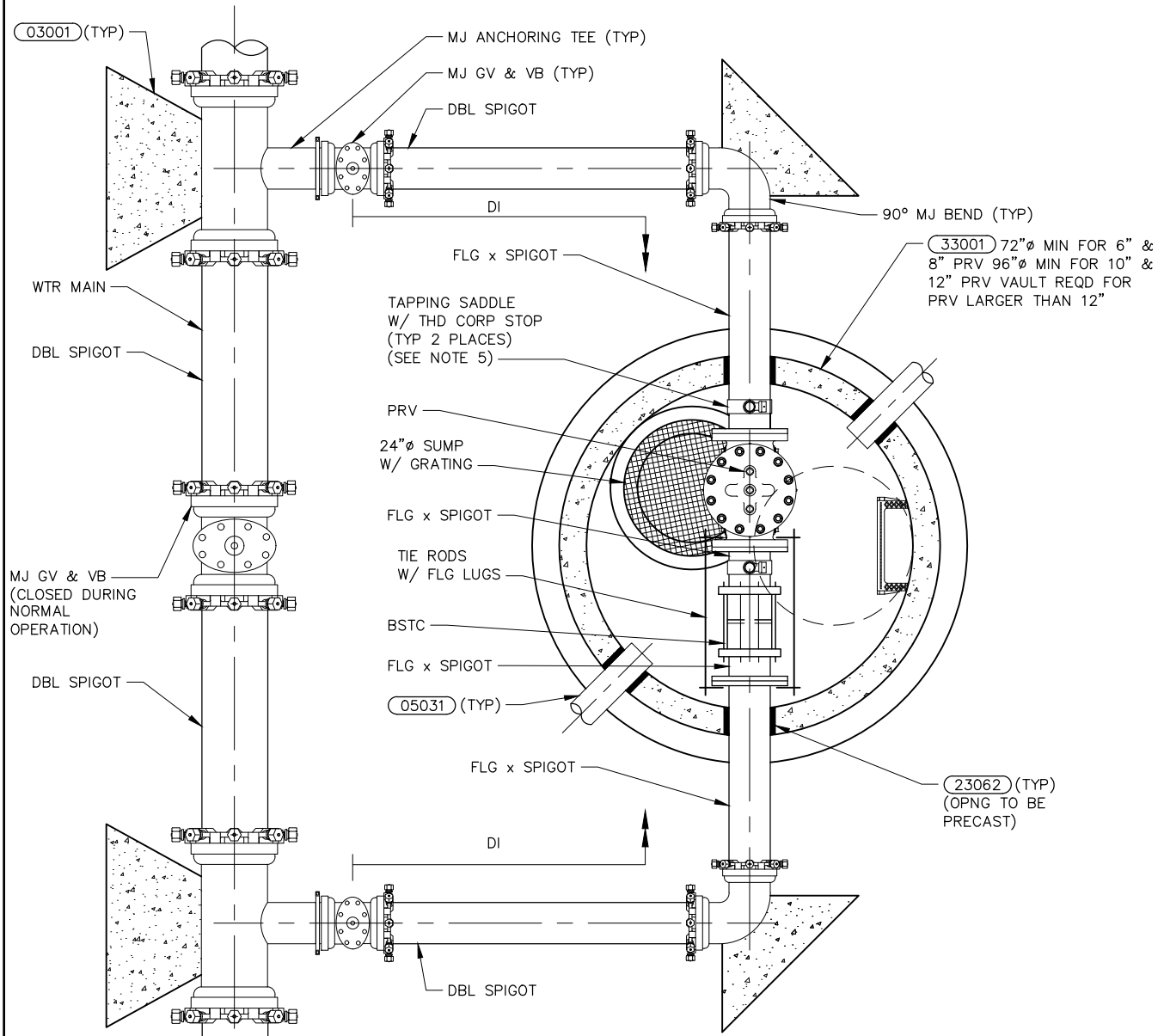
SEE (33055) FOR TYPICAL PLAN AND ADDITIONAL NOTES.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33056
PRESSURE REGULATING
VALVE VAULT INSTALLATION
TYPICAL SECTION**



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**OPTIONAL RESTRAINED
DISMANTLING JOINT**

NOTES:

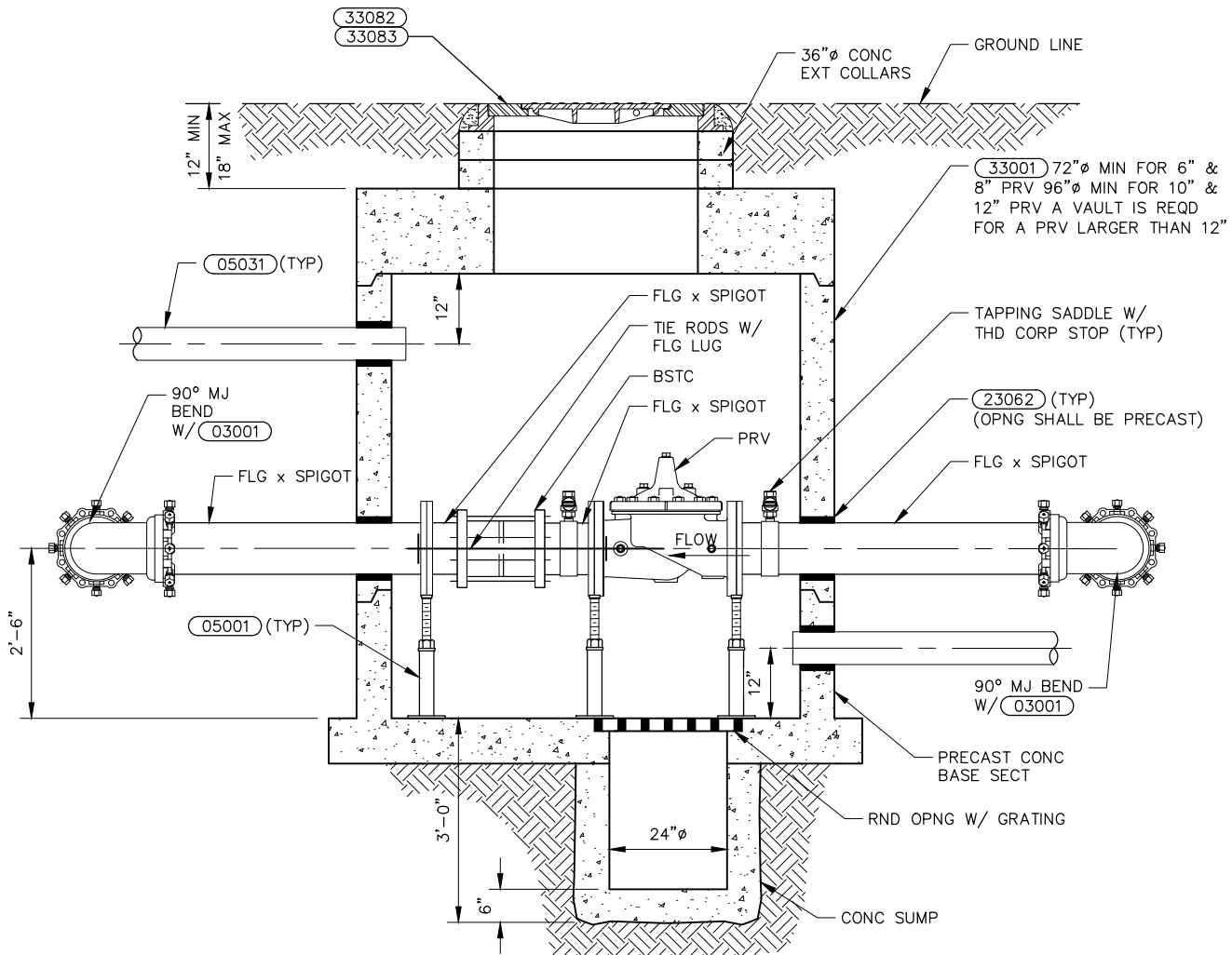
1. A RECTANGULAR VAULT IS REQUIRED WHEN TELEMETRY OR ELECTRICAL EQUIPMENT IS TO BE INSTALLED INSIDE THE VAULT, SEE (33055).
2. SEE (33058) FOR TYPICAL SECTION.
3. DO NOT PLACE SUMP DIRECTLY UNDER THE MANHOLE ACCESS OPENING.
4. WHEN INSTALLING AN 8 INCH OR SMALLER PRESSURE REGULATING VALVE ON A 20 INCH OR SMALLER MAIN, PIPING SHALL BE THE SAME SIZE AS THE PRESSURE REGULATING VALVE AND ONE PIPE SIZE SMALLER THAN THE MAIN. (LARGER SIZE CONDUIT AND PRESSURE REGULATING VALVES REQUIRE APPROVAL OF LINE SIZE).
5. FOR PIPE SIZES LESS THAN 12 INCHES, CORP STOPS SHALL BE 1 INCH. FOR PIPE SIZES 16 INCH AND 20 INCH, CORP STOPS SHALL BE 2 INCH.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33057
PRESSURE REGULATING
VALVE MANHOLE
INSTALLATION TYPICAL PLAN**

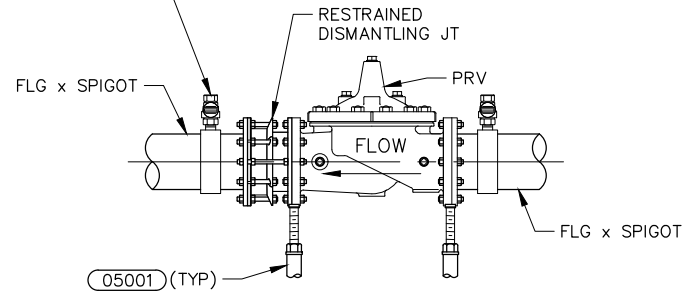
DENVER WATER

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33001 72"Ø MIN FOR 6" & 8" PRV 96"Ø MIN FOR 10" & 12" PRV A VAULT IS REQD FOR A PRV LARGER THAN 12"

TAPPING SADDLE W/ THD CORP STOP (TYP)



OPTIONAL RESTRAINED DISMANTLING JOINT

NOTE:

SEE 33057 FOR TYPICAL PLAN AND ADDITIONAL NOTES.

DRAWN BY: BAIREs
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33058
PRESSURE REGULATING VALVE
MANHOLE INSTALLATION
TYPICAL SECTION**

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TAPPING SADDLE W/ THD CORP STOP (TYP 2 PLACES) (SEE NOTE 3)

SUMP W/ GRATING

CHKV W/ 3/4"φ SST BYPASS & ISOLATION VLV (TYP)

FLG x SPIGOT
TIE RODS W/ FLG LUGS

FLG x SPIGOT

33001 72"φ

05031 (TYP)

BSTC

FLG x SPIGOT

23062 (TYP)
(OPNG TO BE PRECAST)

FLG x SPIGOT

CHKV W/ 3/4"φ SST BYPASS & ISOLATION VLV (TYP)

FLG x SPIGOT

RESTRAINED DISMANTLING JT

FLG x SPIGOT

TAPPING SADDLE W/ THD CORP STOP (TYP 2 PLACES) (SEE NOTE 3)

OPTIONAL RESTRAINED DISMANTLING JOINT

NOTES:

1. SEE 33060 FOR TYPICAL SECTION.
2. DO NOT PLACE SUMP DIRECTLY UNDER A MANHOLE ACCESS OPENING.
3. FOR PIPE SIZES LESS THAN 12 INCHES, CORP STOPS SHALL BE 1 INCH, FOR PIPE SIZES 16 INCH AND 20 INCH, CORP STOPS SHALL BE 2 INCH.

DRAWN BY: BAIRES

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

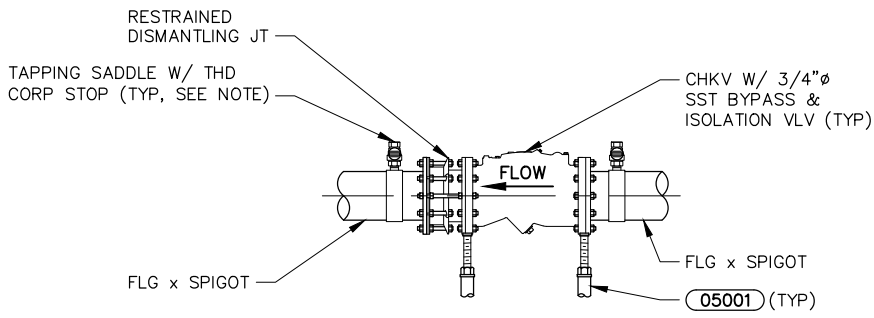
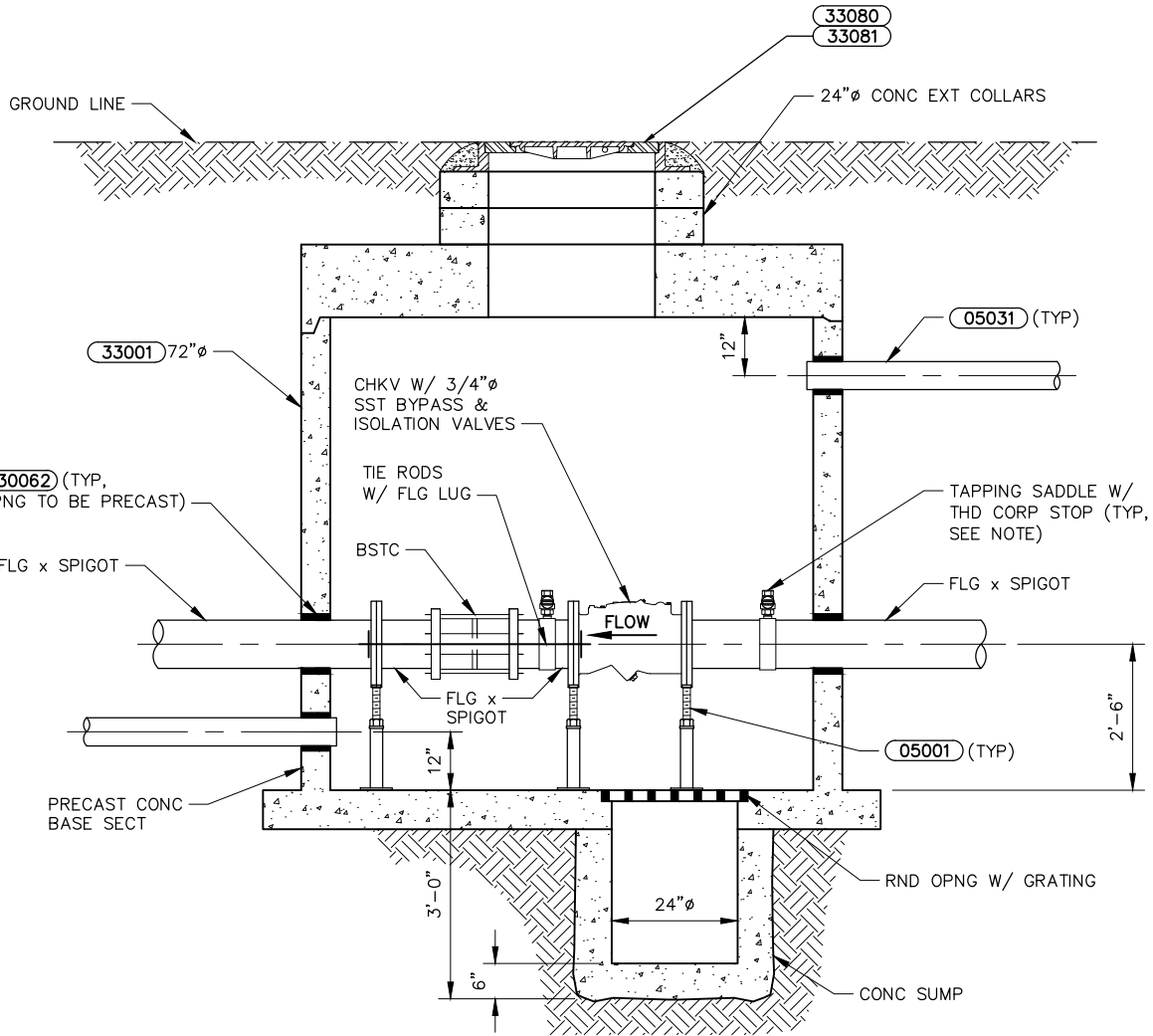
ORIGINATION DATE: JULY 2021

REVISION DATE:

**33059
CHECK VALVE MANHOLE
INSTALLATION TYPICAL PLAN**



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**OPTIONAL RESTRAINED
DISMANTLING JOINT**

NOTE:

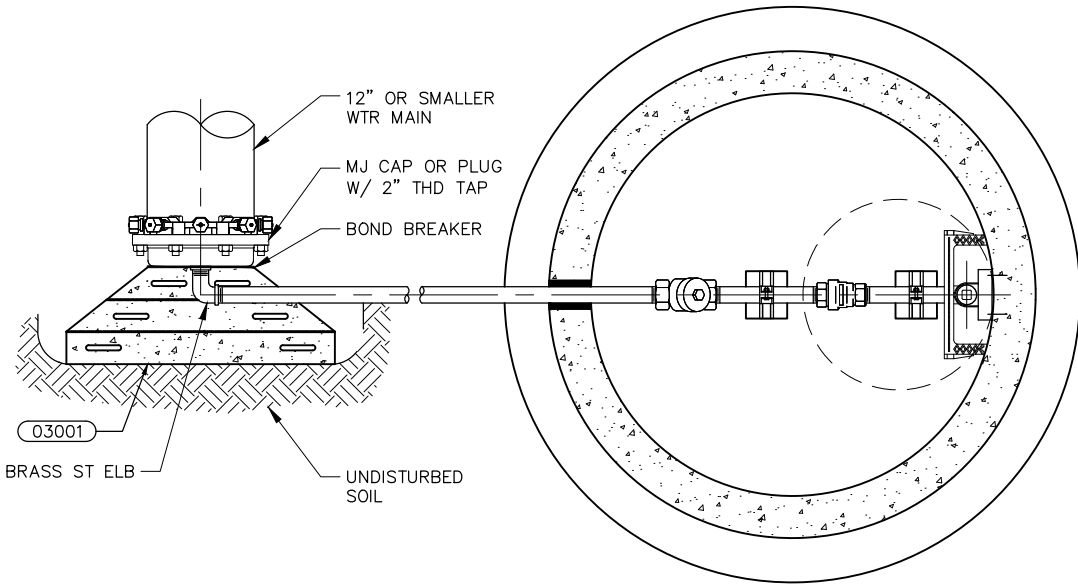
SEE (33059) FOR TYPICAL PLAN AND ADDITIONAL NOTES.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

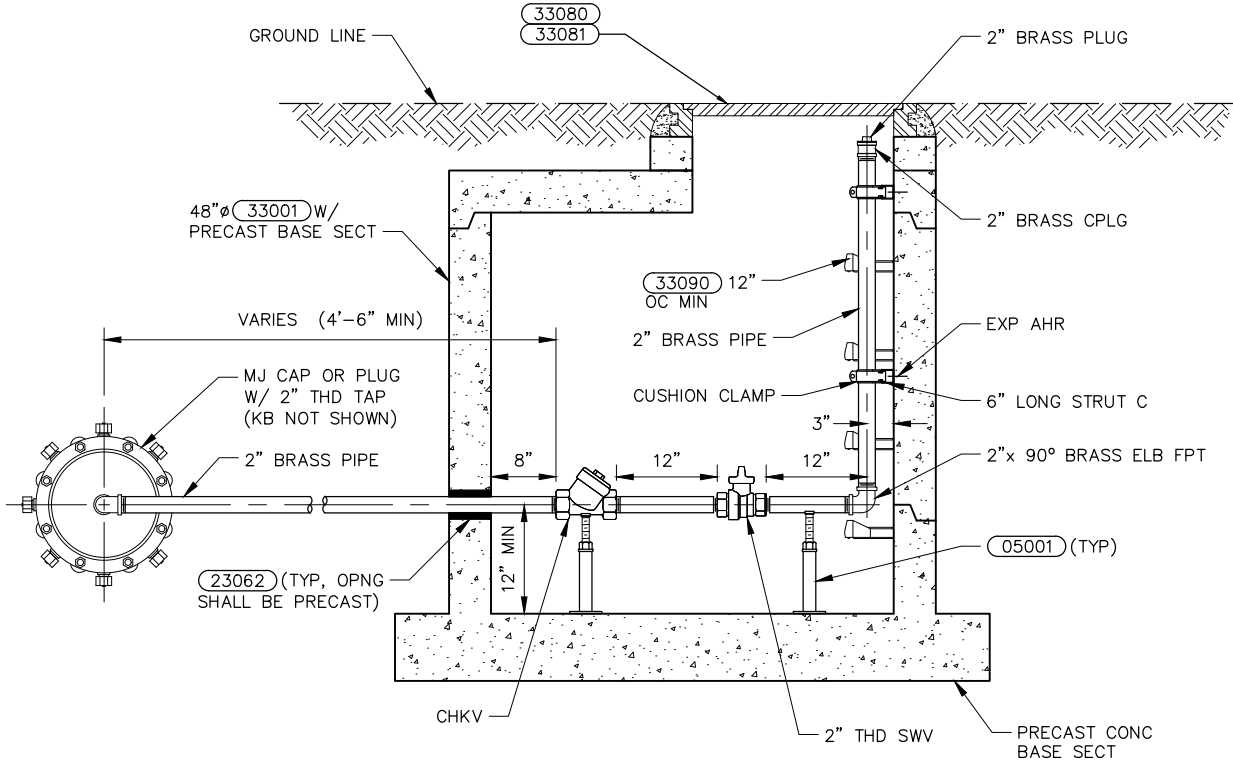
**33060
CHECK VALVE
MANHOLE INSTALLATION
TYPICAL SECTION**

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PLAN



ELEVATION

NOTE:

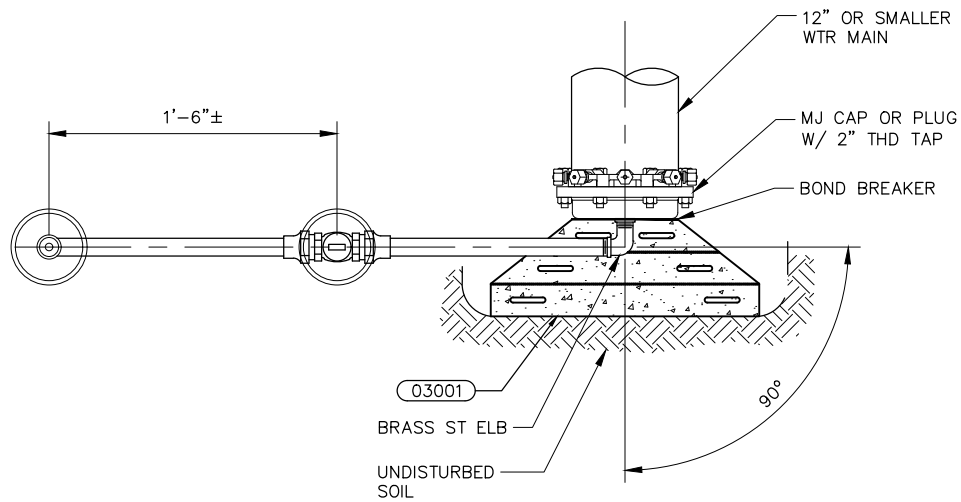
CAP OR PLUG SHALL BE MECHANICALLY RESTRAINED.
(SHOWN AS A CAP WITH A RESTRAINT GLAND).

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

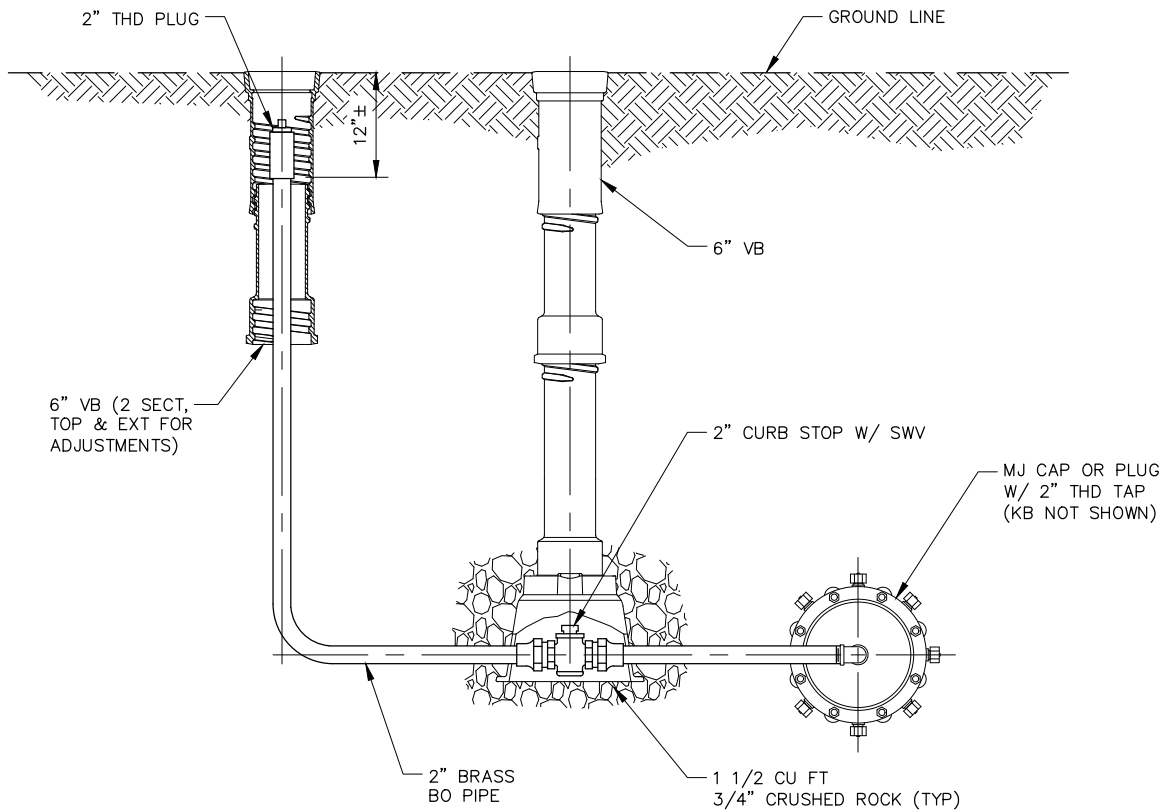
33061
STANDARD DESIGN FOR 2"
BLOWOFF IN MANHOLE

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PLAN



ELEVATION

NOTES:

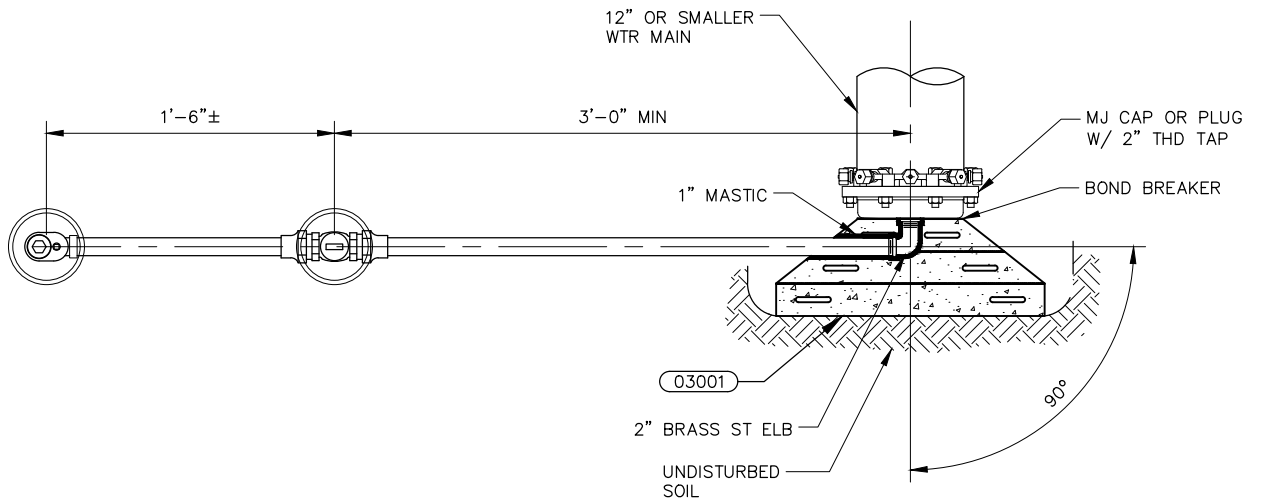
1. CAP OR PLUG SHALL BE MECHANICALLY RESTRAINED (SHOWN AS A SPIGOT WITH A CAP).
2. FOR USE WITH FUTURE STUB-OUT INSTALLATIONS ONLY.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

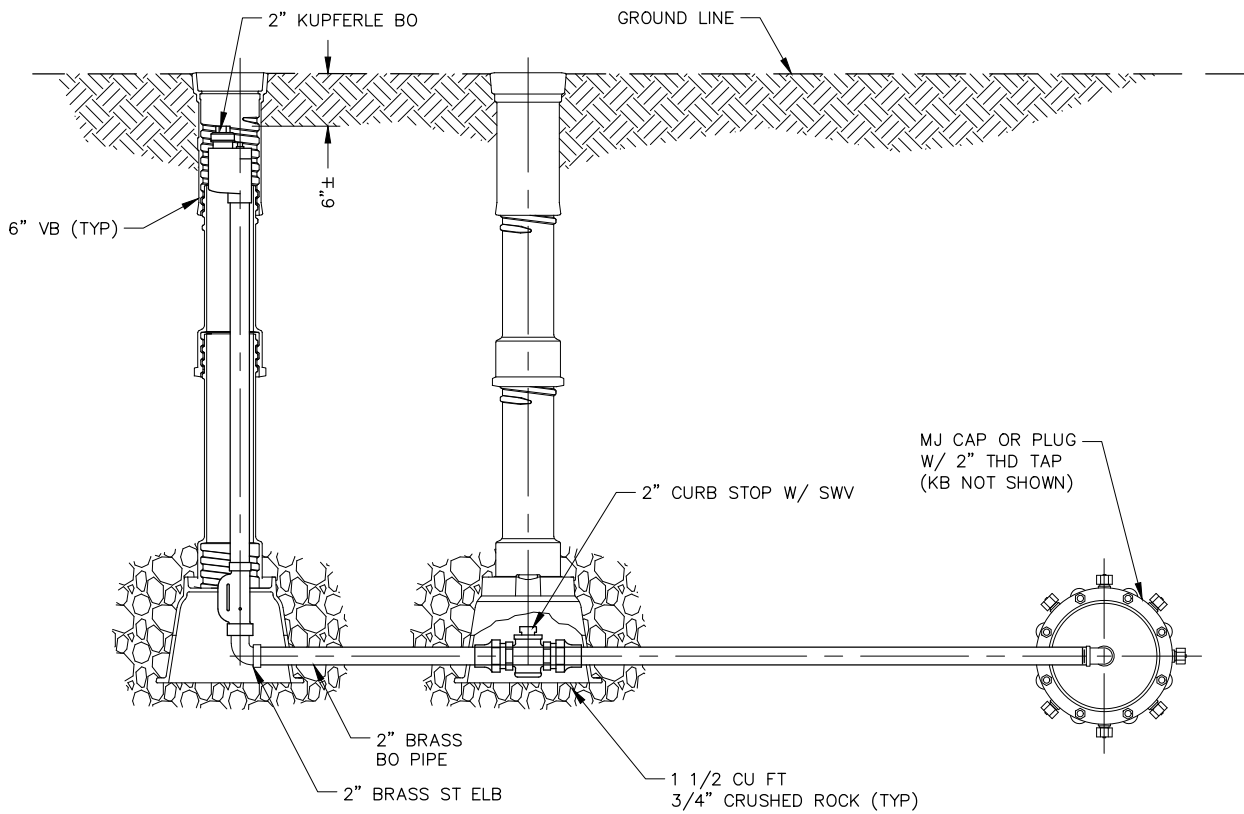
33062
TEMPORARY BLOWOFF
INSTALLATION FOR
12" & SMALLER MAINS

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PLAN



ELEVATION

NOTES:

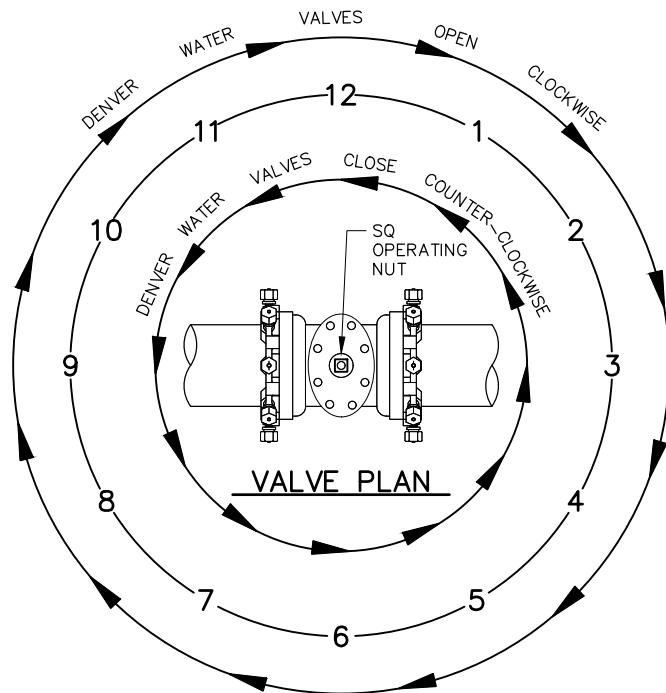
1. HYDRANT SHALL BE A KUPFERLE FOUNDRY CO TRUFLO MODEL TF 500.
2. THE NORMAL POSITION OF THE TOP OF THE OPERATING NUT IS APPROXIMATELY 6 INCHES BELOW THE TOP OF THE VALVE BOX.
3. INSURE THAT THE HYDRANT IS FREE TO MOVE VERTICALLY WITHIN THE VALVE BOX IN ORDER TO PREVENT TRANSMISSION OF TRAFFIC LOADS TO THE HYDRANT.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

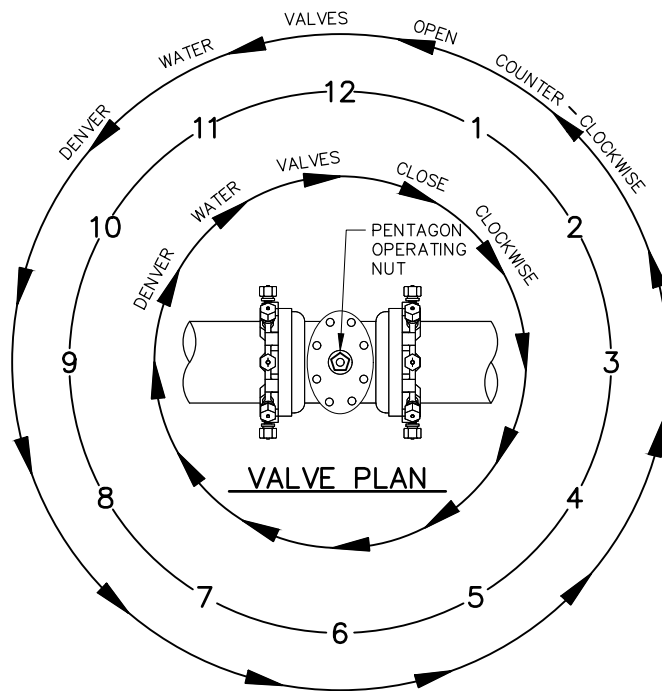
33063
2" BLOWOFF HYDRANT

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TREATED/POTABLE
VALVE OPENING & CLOSING DIRECTION



RECYCLED
VALVE OPENING & CLOSING DIRECTION

NOTES:

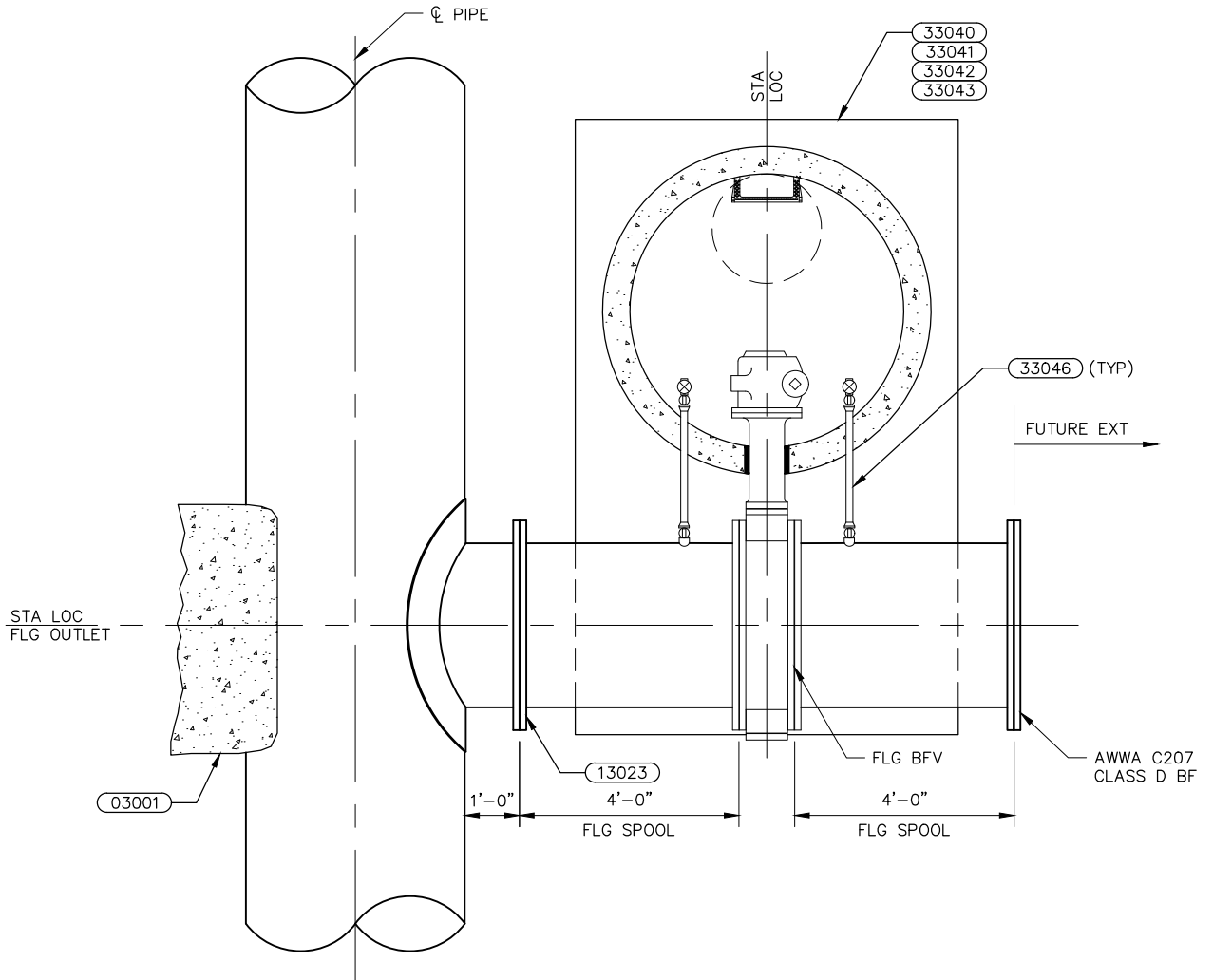
1. VALVES WITH A RED SQUARE OPERATING NUT NORMALLY INDICATE A STANDARD DENVER WATER VALVE (OPEN RIGHT).
2. VALVES WITH A PURPLE PENTAGON OPERATING NUT NORMALLY INDICATE A RECYCLED DENVER WATER VALVE (OPEN LEFT).

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33064
VALVE OPERATION



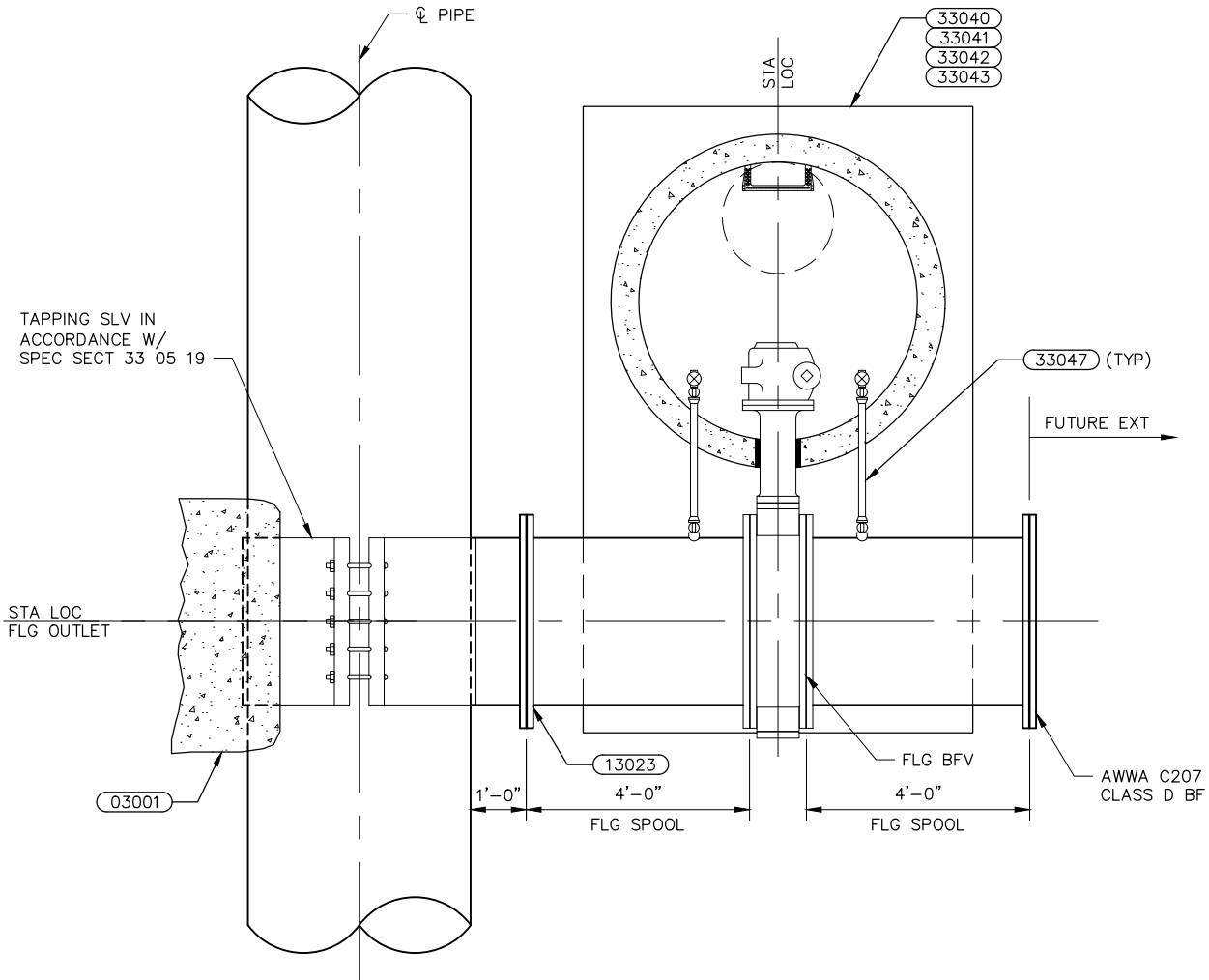
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DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33070
16"Ø AND LARGER OUTLET
(STEEL PIPE)


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TAPPING SLV IN ACCORDANCE W/ SPEC SECT 33 05 19

STA LOC FLG OUTLET

03001

1'-0"

13023

FLG SPOOL

4'-0"

FLG BFV

FLG SPOOL

4'-0"

AWWA C207 CLASS D BF

FUTURE EXT

33047 (TYP)

33040
33041
33042
33043

STA LOC

16" PIPE

NOTE:

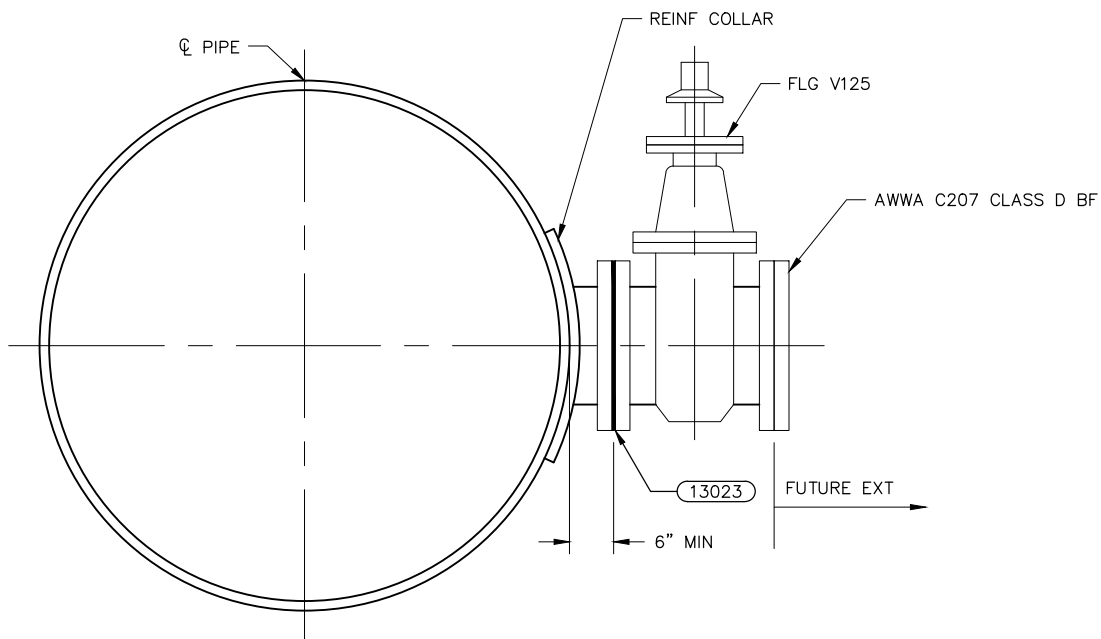
WELD-ON OUTLETS ARE PERMISSIBLE IF QUALIFIED WELDERS AND PROCEDURES ARE USED IN ACCORDANCE WITH ANSI/AWS D11.2.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33071
16"Ø AND LARGER OUTLET
(DUCTILE IRON PIPE)

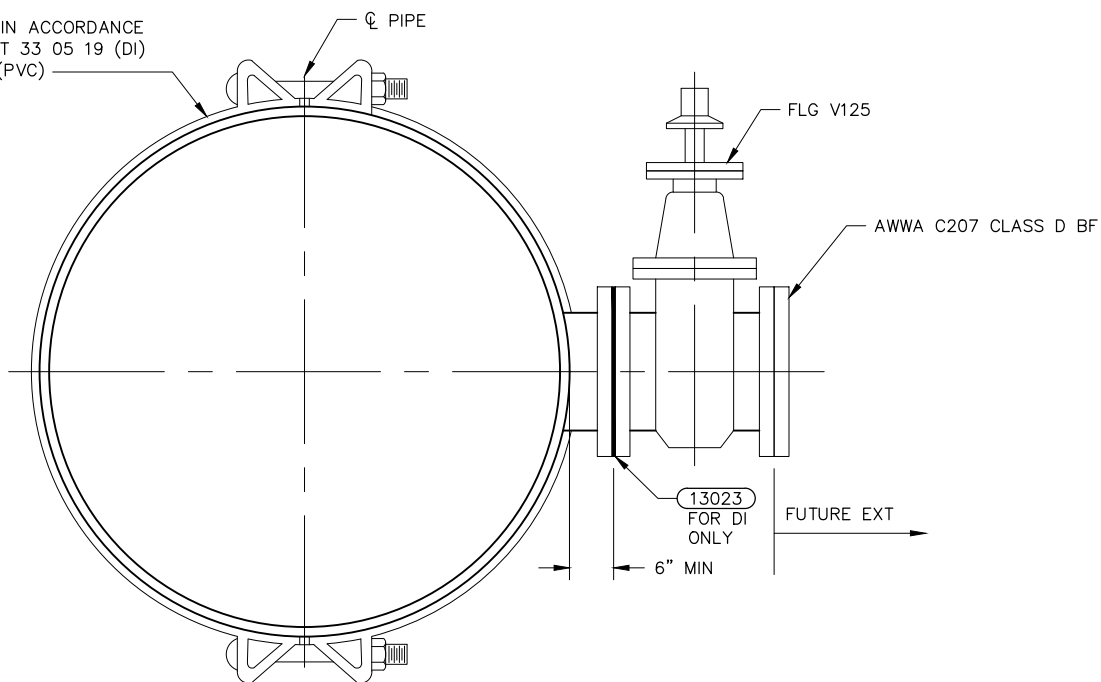


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STEEL OUTLET

TAPPING SLV IN ACCORDANCE
W/ SPEC SECT 33 05 19 (DI)
33 05 31.13 (PVC)



DUCTILE IRON & PVC OUTLETS

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

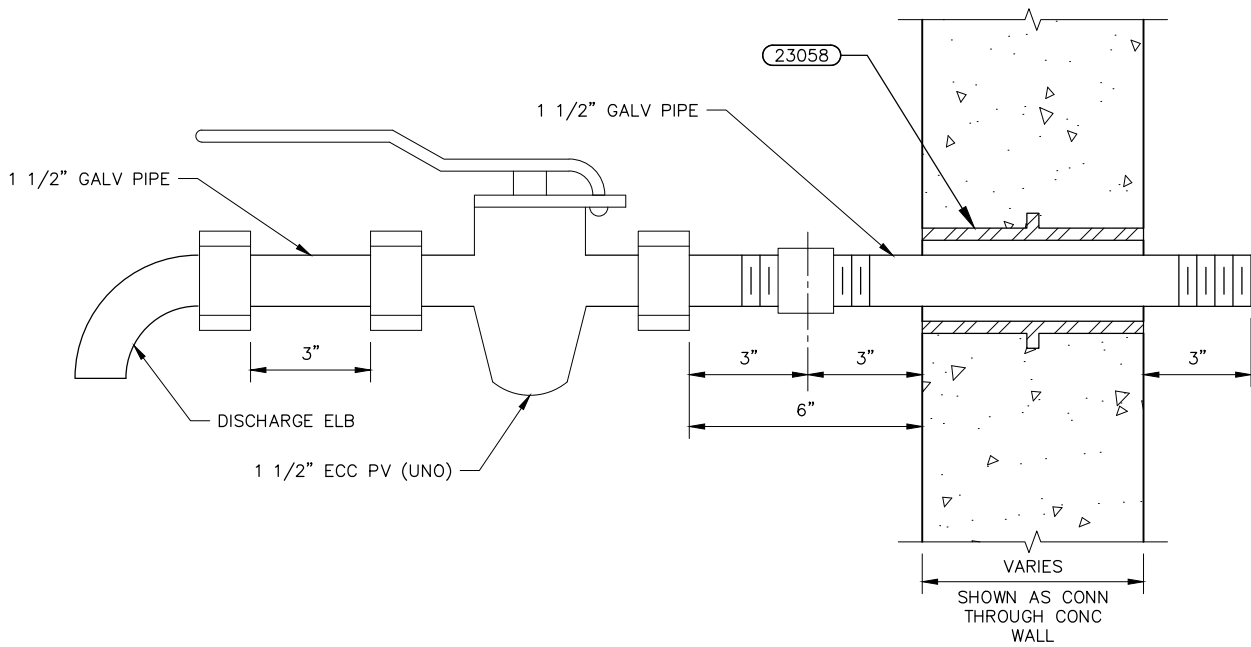
ORIGINATION DATE: JULY 2021

REVISION DATE:

33072
20"Ø AND SMALLER OUTLET



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NOTES:

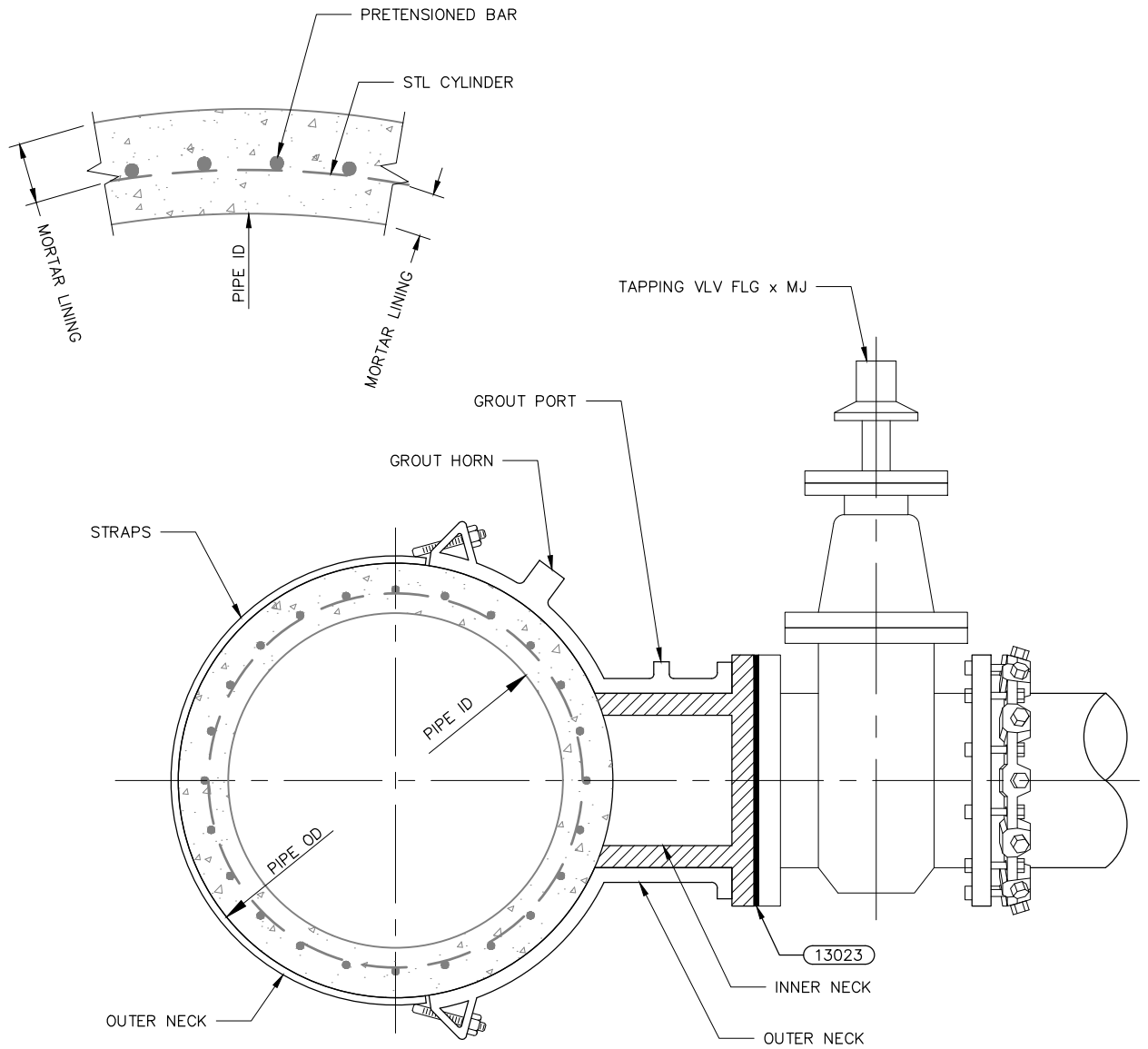
1. FOR CONNECTION TO STEEL PIPE, WELD THREADOLET TO PIPE; FOR DUCTILE IRON PIPE, USE DOUBLE STRAP SADDLE.
2. FOR CONNECTION TO SAMPLE LINE, OMIT DISCHARGE ELBOW AND PROVIDE CONNECTING ADAPTER TO SAMPLE LINE.

DRAWN BY: BERKNESS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33073
SAMPLING VALVE**



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NOTES:

1. TAPPING SLEEVE SHALL BE APPROVED FOR AWWA C303, CONCRETE BAR-WRAPPED CYLINDER PIPE.
2. SUPPORT TAPPING VALVE, DO NOT ALLOW VALVE TO HANG ON TAPPING SLEEVE.
3. PRESSURE TEST THE GLAND SEAL, FLANGE GASKETS, AND TAPPING VALVE TO 150 POUNDS PER SQUARE INCH TO ASSURE THAT ALL JOINTS ARE TIGHT AND GASKETS ARE SEATED.
4. TAP PIPE AFTER ALL GROUT HAS SET.
5. AFTER TAP IS COMPLETE, PROTECT SLEEVE AND STRAPS BY ENCASING WITH 1-INCH COATING OF CEMENT MORTAR (2 PARTS SAND AND 1 PART CEMENT).

DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

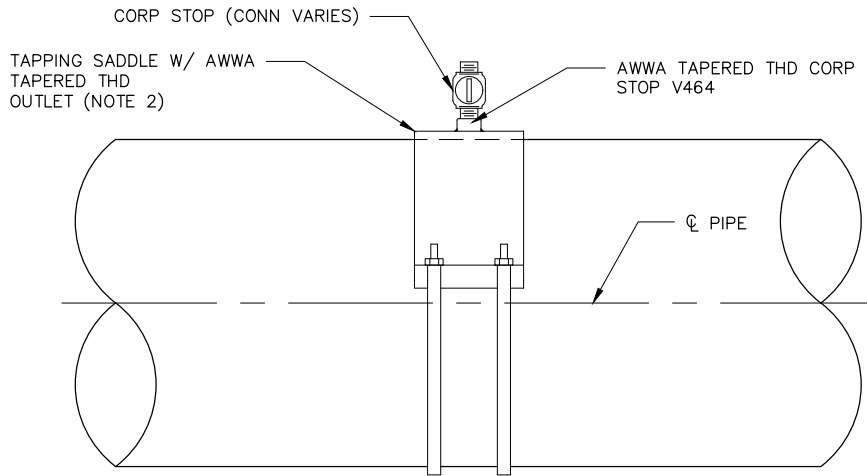
ORIGINATION DATE: JULY 2021

REVISION DATE:

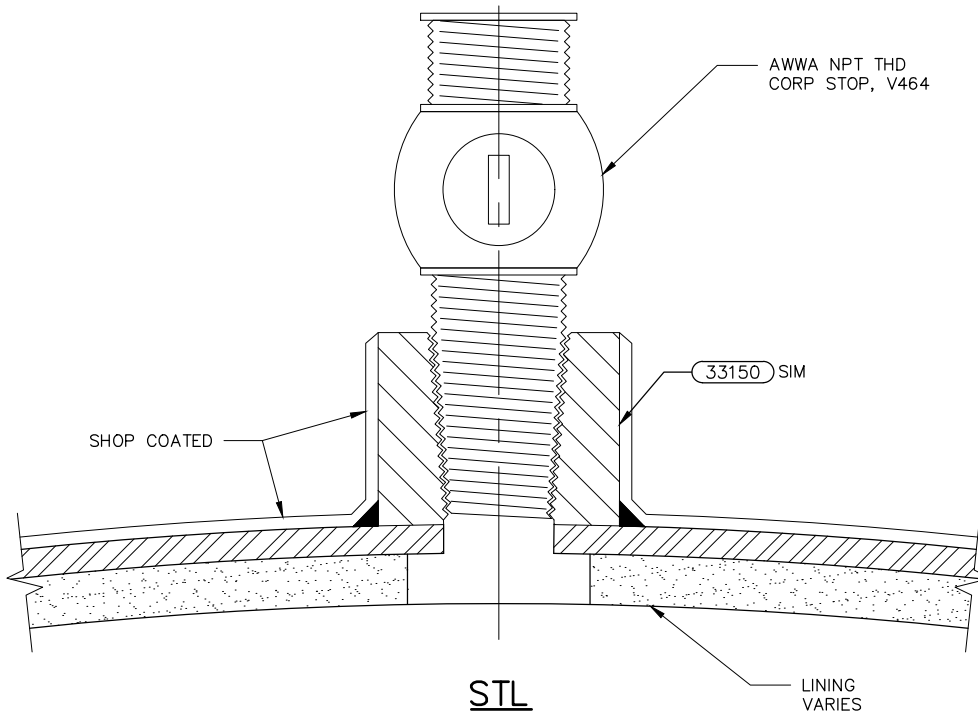
**33075
REINFORCED CONCRETE
PIPE TAPPED OUTLET**



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denverwater.org



DI



STL

NOTES:

1. USE AWWA NATIONAL PIPE THREADS ON STEEL PIPE OUTLETS.
2. USE DOUBLE BRONZE STRAPPED TAPPING SADDLE FOR DUCTILE IRON PIPE, IN ACCORDANCE WITH SPECIFICATION SECTION 33.14.17. DIRECT TAP IS ALSO ALLOWED WITH ENGINEER APPROVAL ON DUCTILE IRON FOR TAPS 1 INCH DIAMETER OR SMALLER.
3. PIT CONNECTIONS AND OTHER PERMANENT CONNECTIONS REQUIRE BRASS OR BRONZE DIELECTRIC UNIONS INSTALLED AFTER THE CORP STOP.

DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

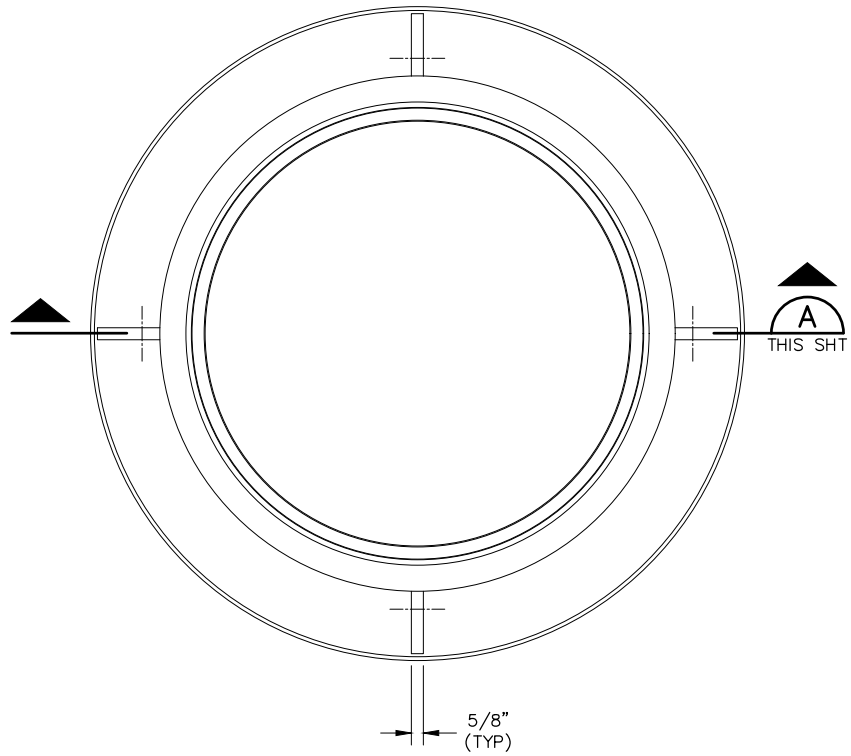
ORIGINATION DATE: JULY 2021

REVISION DATE:

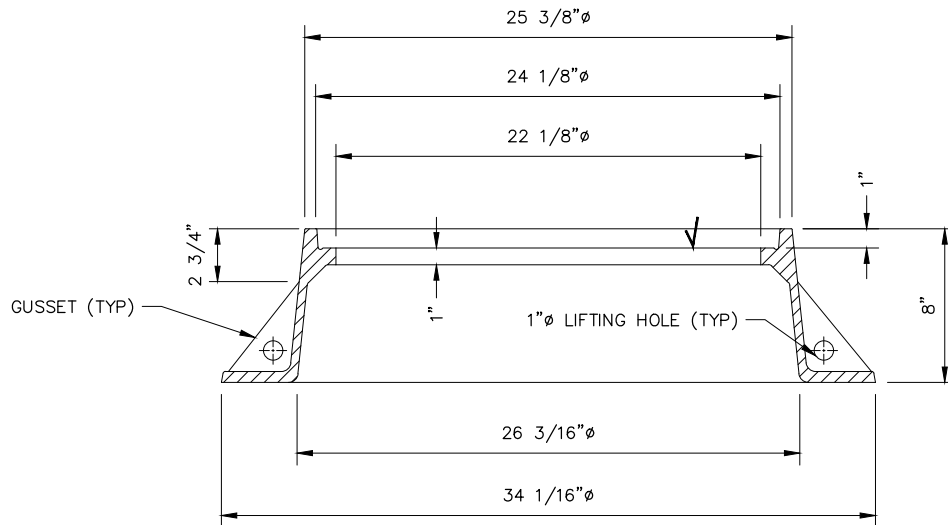
**33076
THREADED OUTLET
WITH CORP STOP**



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PLAN



SECTION A
THIS SH'T

NOTE:

√ = MACHINED SURFACE

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

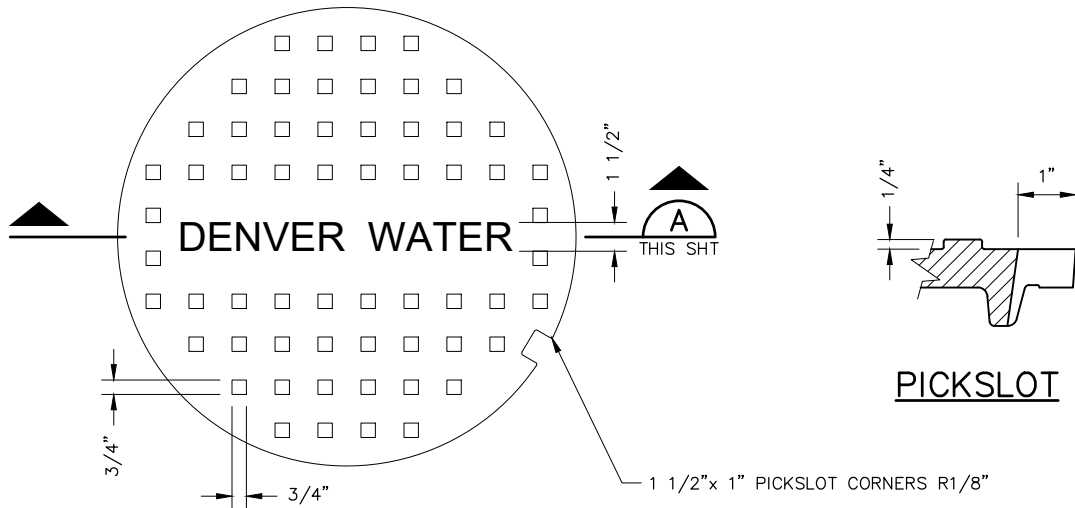
ORIGINATION DATE: JULY 2021

REVISION DATE:

33080
24"∅ MANHOLE RING

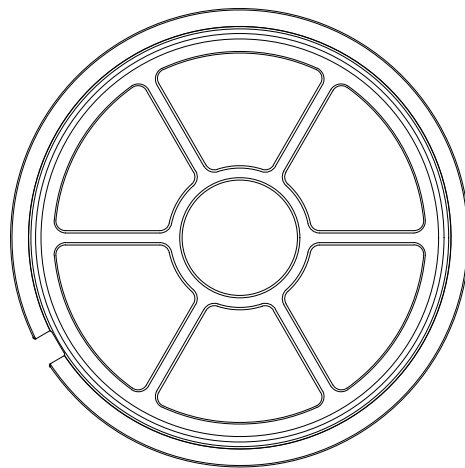
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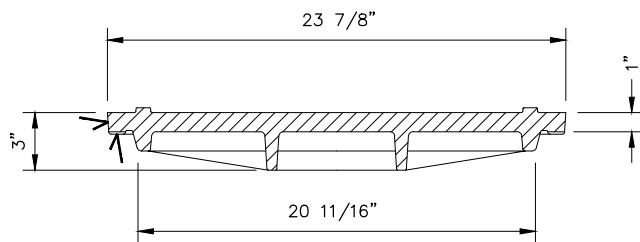


PICKSLOT

TOP PLAN



BOTTOM PLAN



SECTION A
THIS SHT

NOTE:

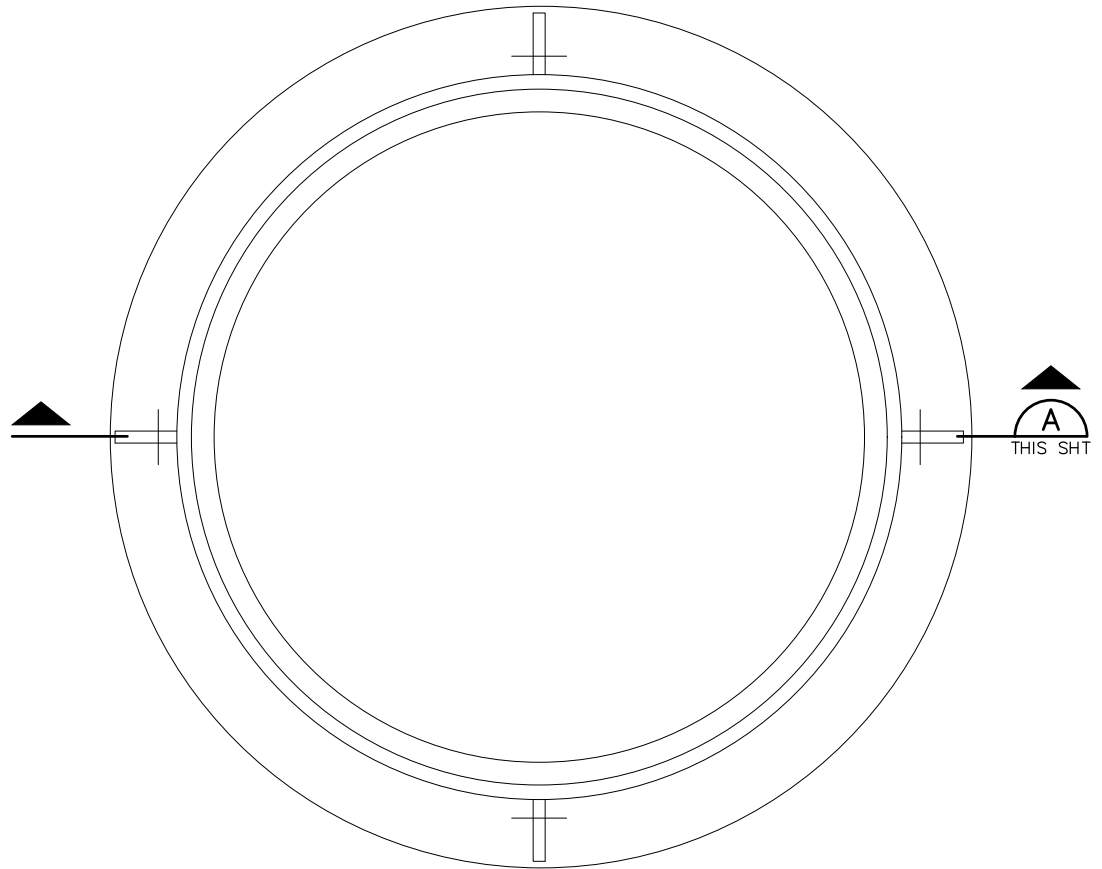
√ = MACHINED SURFACE

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

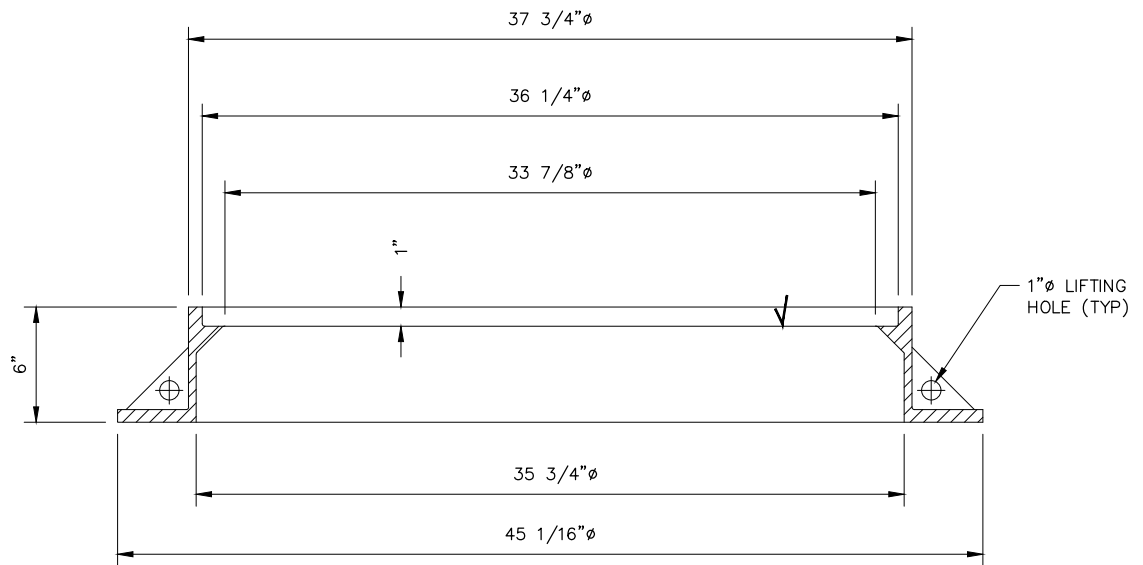
33081
24"∅ MANHOLE COVER



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PLAN



SECTION A
THIS SHT

NOTE:

√ = MACHINED SURFACE

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

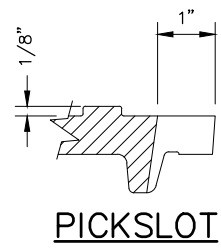
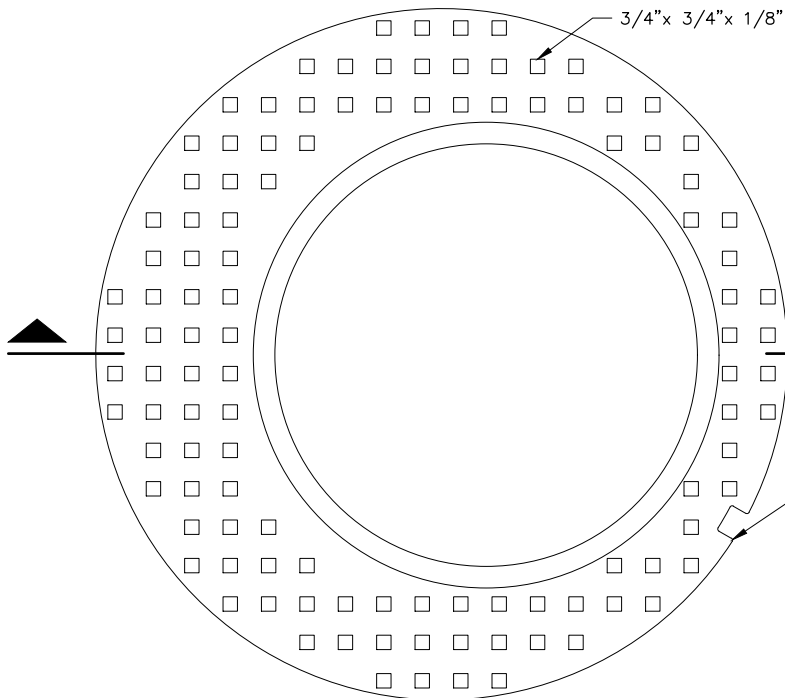
ORIGINATION DATE: JULY 2021

REVISION DATE:

33082
36"Ø MANHOLE RING

D DENVER WATER

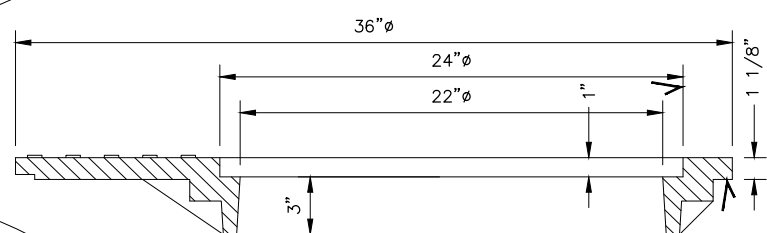
1600 West 12th Ave
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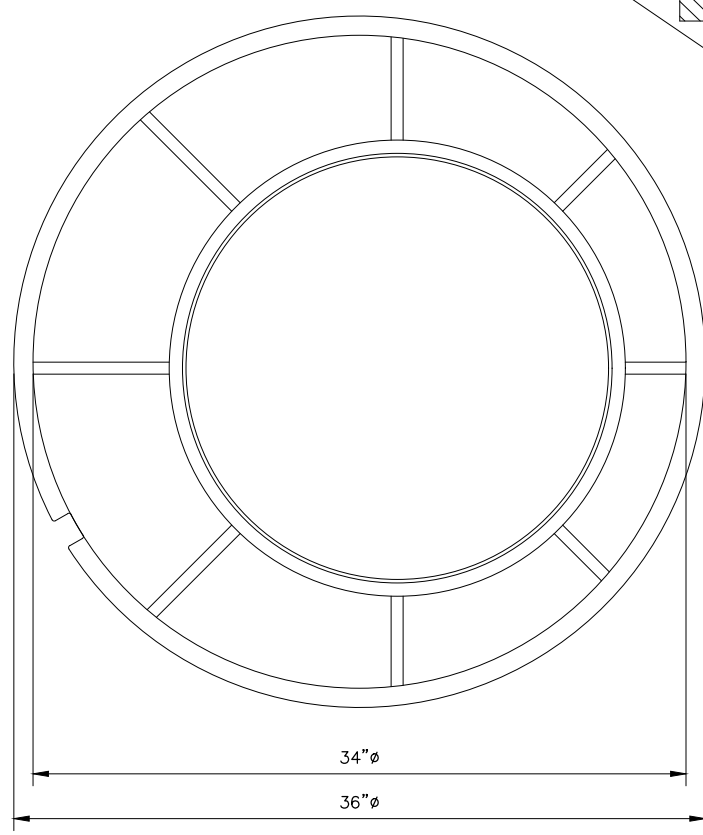
A
THIS SHT

1 1/2" x 1" PICKSLOT CORNERS 1/8"R

TOP PLAN



SECTION **A**
THIS SHT



BOTTOM PLAN

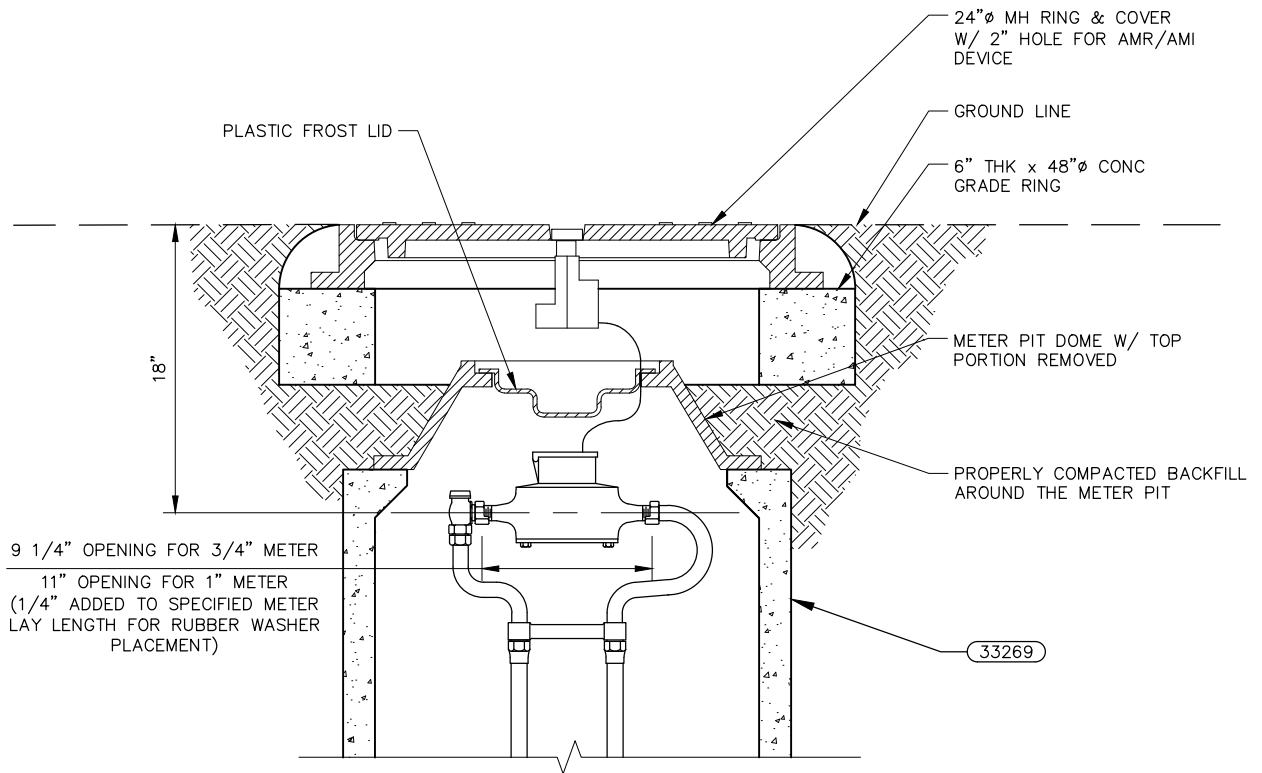
NOTE:
√ = MACHINED SURFACE

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33083
36" x 24"Ø MANHOLE COVER

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NOTES:

1. BENDING COPPER RISERS FOR GRADE ADJUSTMENT OF THE METER YOKE IS NOT PERMITTED.
2. SERVICE LINES SHALL NOT CROSS IN THE METER PIT.
3. COPPER RISERS SHALL BE NEW. DAMAGED OR BENT COPPER RISERS ARE NOT PERMITTED.
4. CONCRETE METER PIT REQUIRED.
5. USE OF THIS DETAIL REQUIRES WRITTEN APPROVAL BY DENVER WATER AND IS ONLY FOR INSTALLATIONS SUBJECT TO TRAFFIC LOADING.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

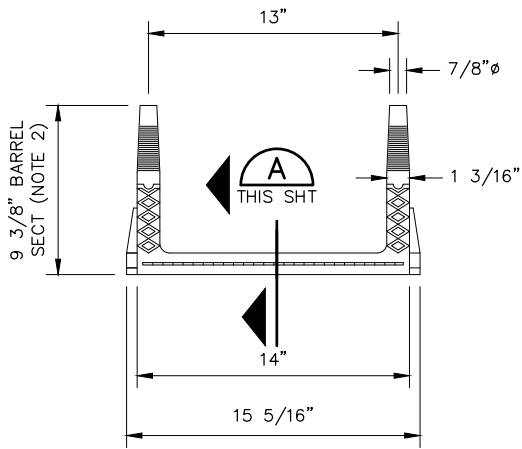
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

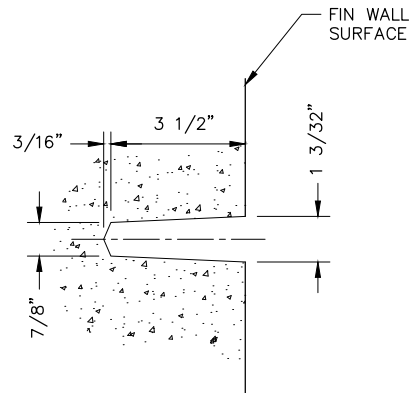
**33084
MANHOLE RING AND
COVER OVER METER PIT**



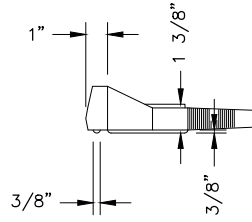
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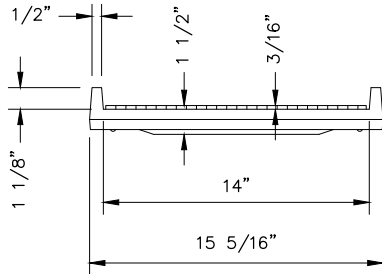
PLAN



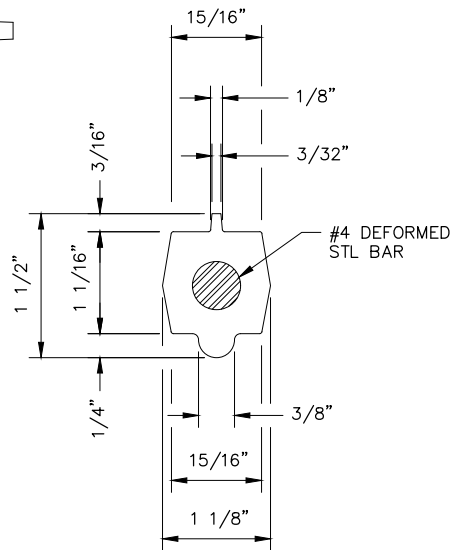
PIN BLOCK OUT



END



ELEVATION



SECTION

A
THIS SHT

NOTES:

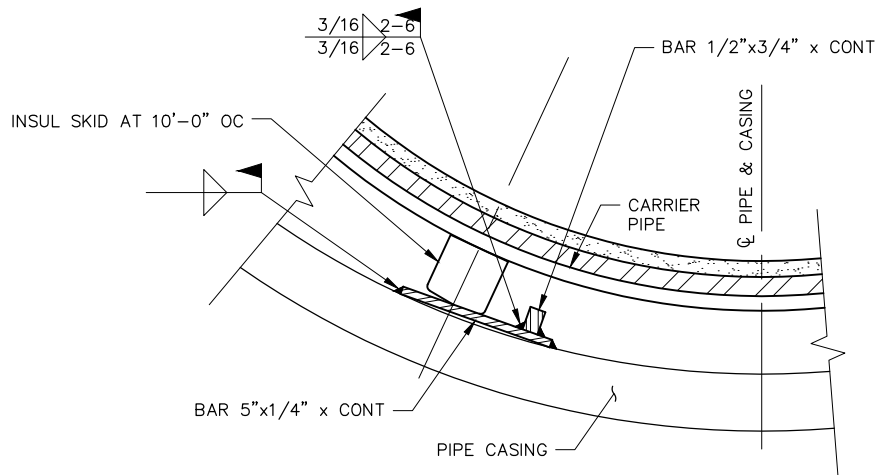
1. ASTM SPECIFICATIONS:
 - A. ASTM C 478
 - B. ASTM A 615 GRADE 60 STL REBAR
 - C. ASTM D 4101 CLASSIFICATION PP0311 POLYPROPYLENE
2. STEPS SHALL HAVE A PENETRATION DEPTH INTO THE WALL OF 3 3/8 INCH.
3. STEP SHALL BE INSTALLED BY THE "PRESS-FIT" METHOD UTILIZING A SPECIALLY TAPERED PIN TO FORM THE INSERT HOLE AS SHOWN, FOLLOWING MANUFACTURER RECOMMENDED PROCEDURE AND SHALL NOT BE GROUTED IN PLACE.
4. INSTALLED STEPS SHALL BE CAPABLE OF WITHSTANDING A PULL OUT FORCE OF 2500 POUNDS PER LEG FOR A MINIMUM PERIOD OF TWO MINUTES.
5. STEP SHALL BE SMOOTH AND CONTINUOUSLY TAPERED. DIMENSIONS OF THE PIN AND THE INSERTED PORTION OF THE MANHOLE STEPS ARE TYPICAL ONLY. INSTALLATIONS REQUIRE A MATCHED COMBINATION OF A TAPERED INSERT PIN AND MANHOLE STEPS, AS RECOMMENDED OR REQUIRED BY SPECIFIC MANUFACTURER OF THE STEP TO BE USED.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

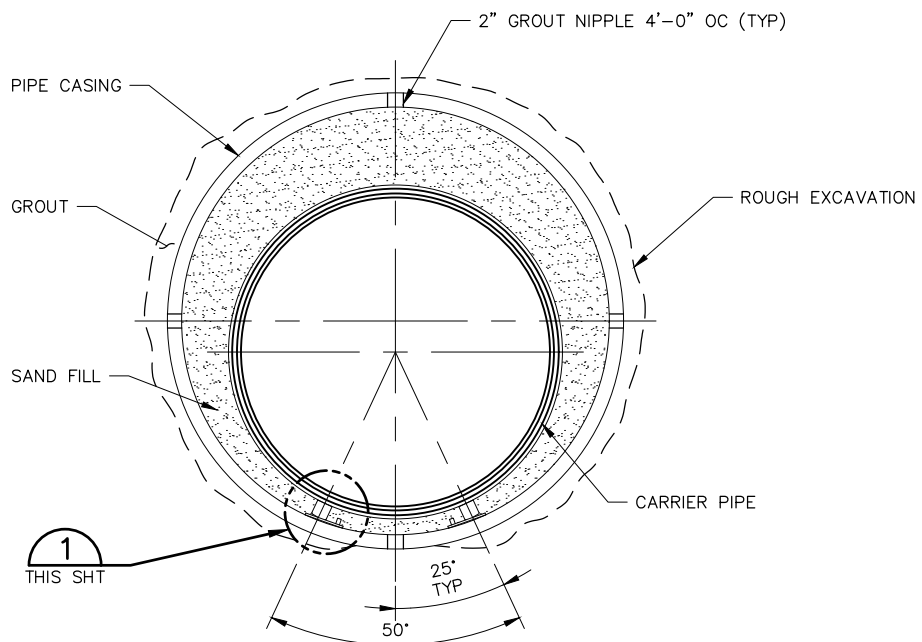
33090
POLYPROPYLENE REINFORCED
PLASTIC MANHOLE STEP

D DENVER WATER

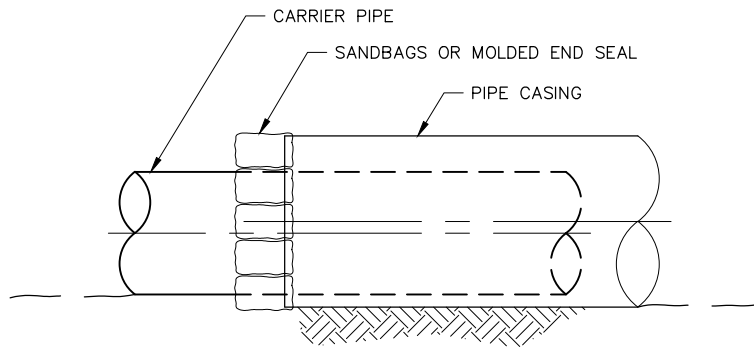
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DETAIL 1
THIS SHT



CROSS SECTION

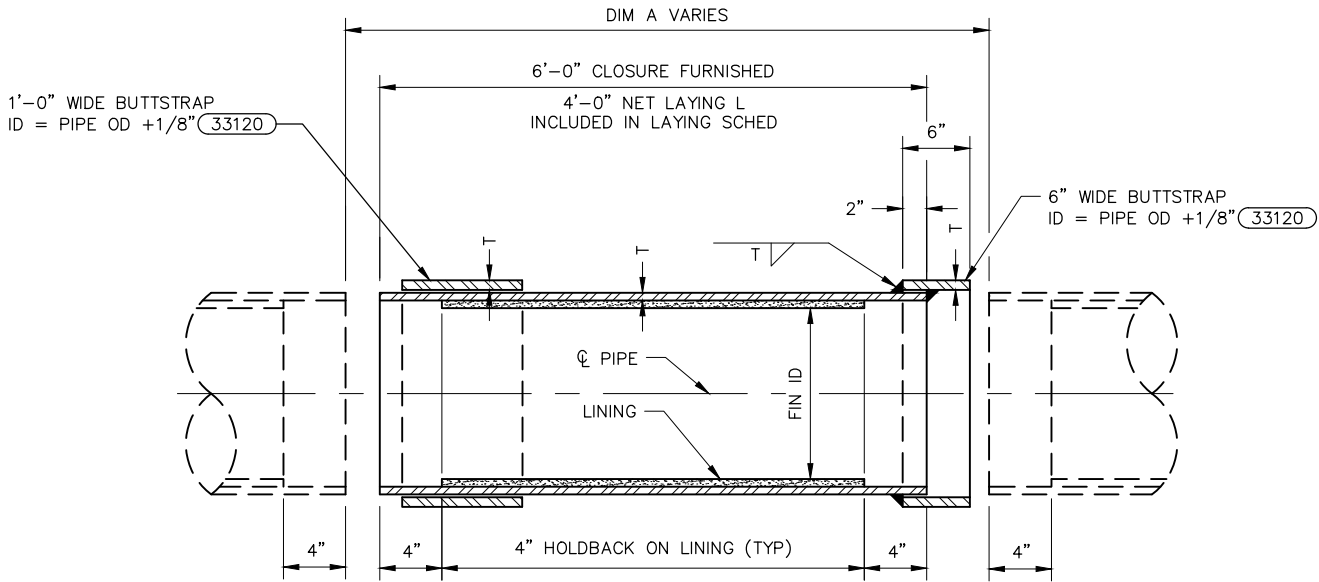


ELEVATION

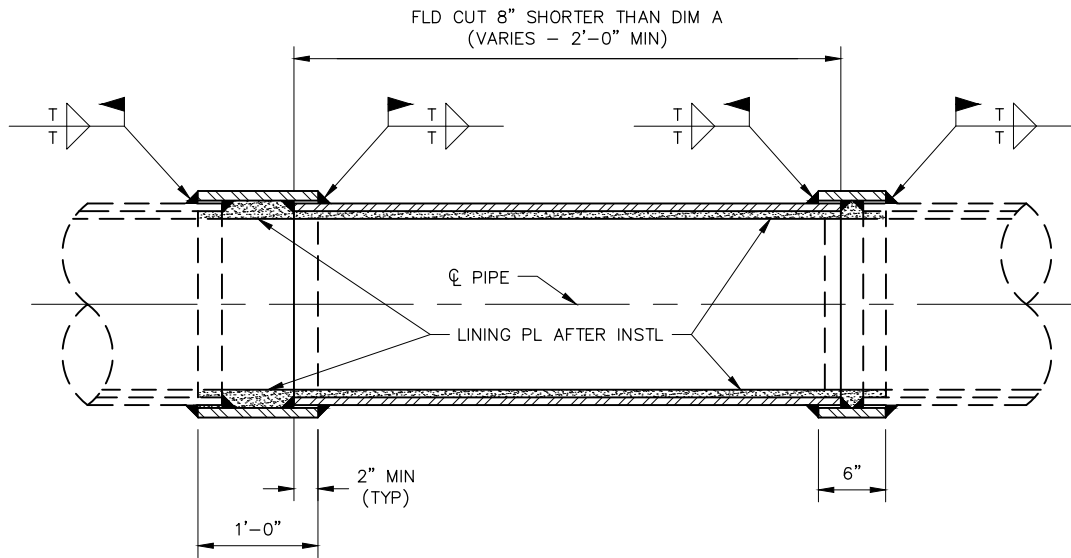
DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33101
INSULATED SKID AND PIPE
CASING (24"Ø AND LARGER)

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OPEN POSITION



CLOSED POSITION

NOTE:

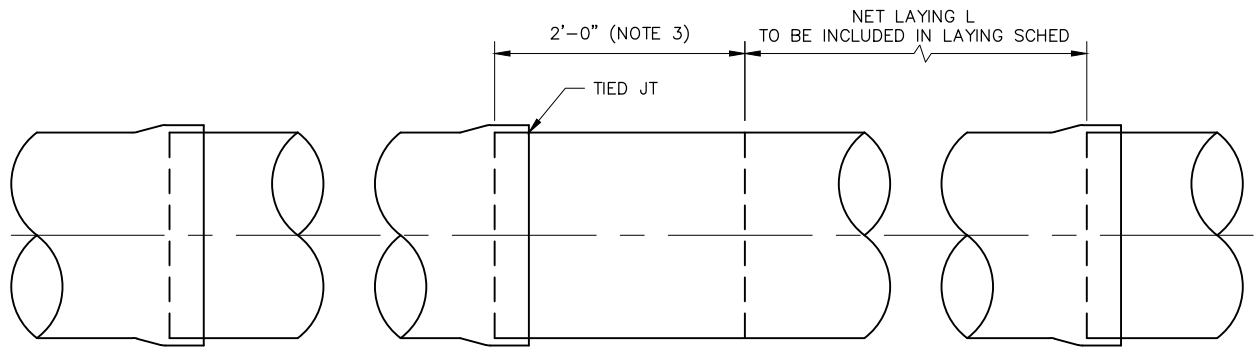
AFTER INSTALLATION, CLOSURE ASSEMBLY SHALL BE FIELD COATED AND LINED WITH SAME BASIC COATING AND LININGS AS MAIN PIPELINE.

DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

3311
24"Ø AND LARGER CLOSURE
(STEEL PIPE)

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CORRECTION PIECE

NOTES:

1. AFTER INSTALLATION, CORRECTION PIECE SHALL BE FIELD COATED AND LINED WITH SAME COATING AND LINING AS MAIN PIPELINE.
2. CORRECTION PIECES SHALL BE PLACED AT APPROXIMATE INTERVALS OF 2000 FEET AND JUST PRIOR TO 45-DEGREE AND 90-DEGREE BENDS, AND AT END OF CONTRACT. CORRECTION PIECES ARE LOCATED IN TIED JOINT REACHES.
3. THIS SECTION OF PIPE IS FOR FIELD TRIM. BARE OUTSIDE, LINED INSIDE. LENGTH SHALL NOT TO BE INCLUDED IN LAYING SCHEDULE.

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

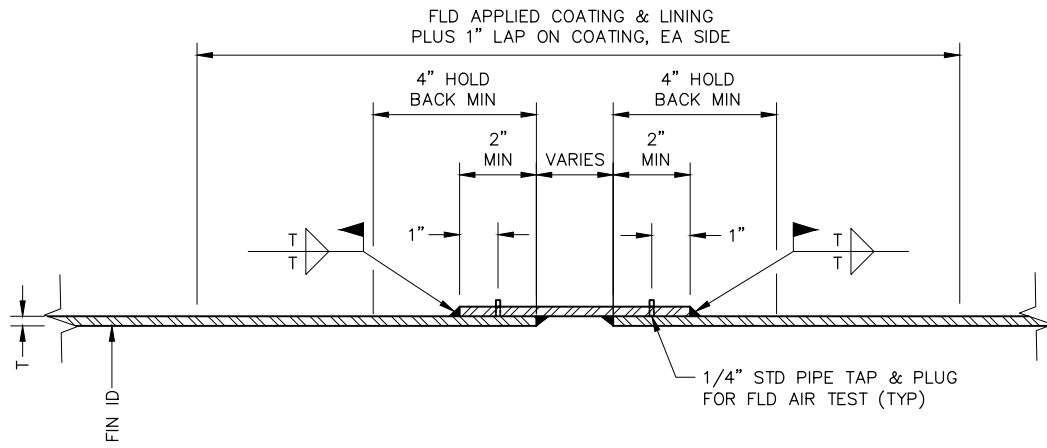
ORIGINATION DATE: JULY 2021

REVISION DATE:

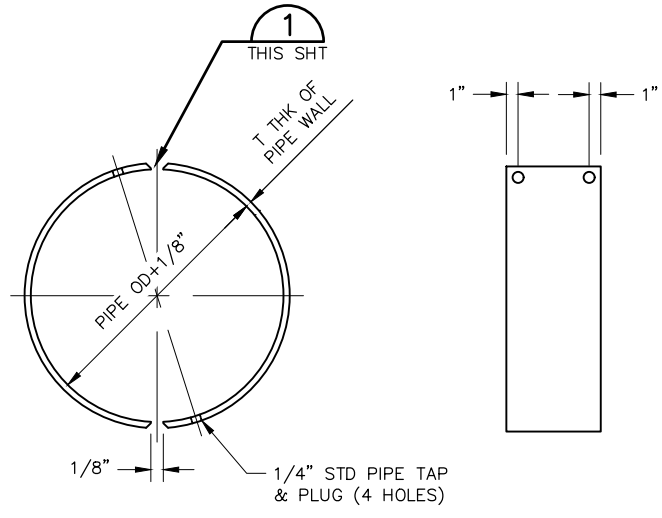
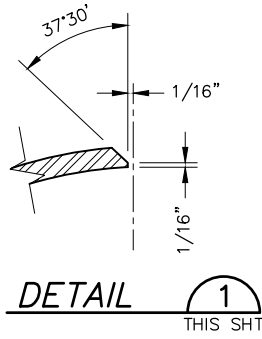
33112
CORRECTION PIECE
(STEEL PIPE)

D DENVER WATER

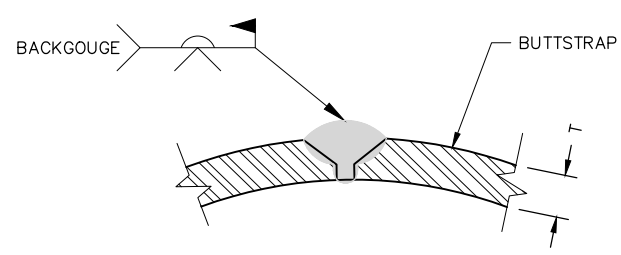
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TIED JOINT BUTTSTRAP



LOOSE BUTTSTRAP



LONGITUDINAL WELD

NOTE:

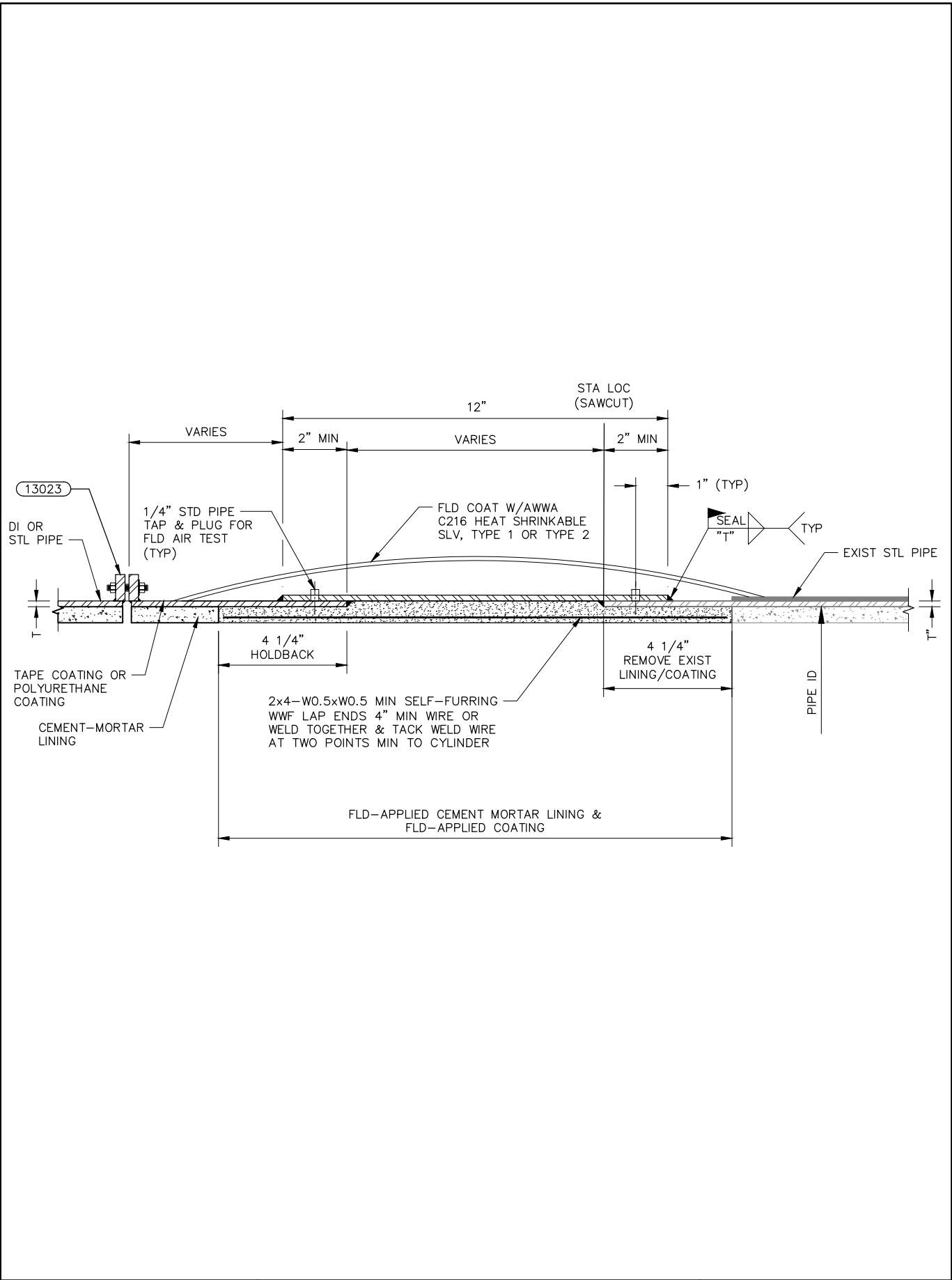
SEE **33122** TO **33129** FOR COATING AND LINING.

DRAWN BY: <i>DITTERLINE</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**33120
BUTTSTRAP**

D DENVER WATER

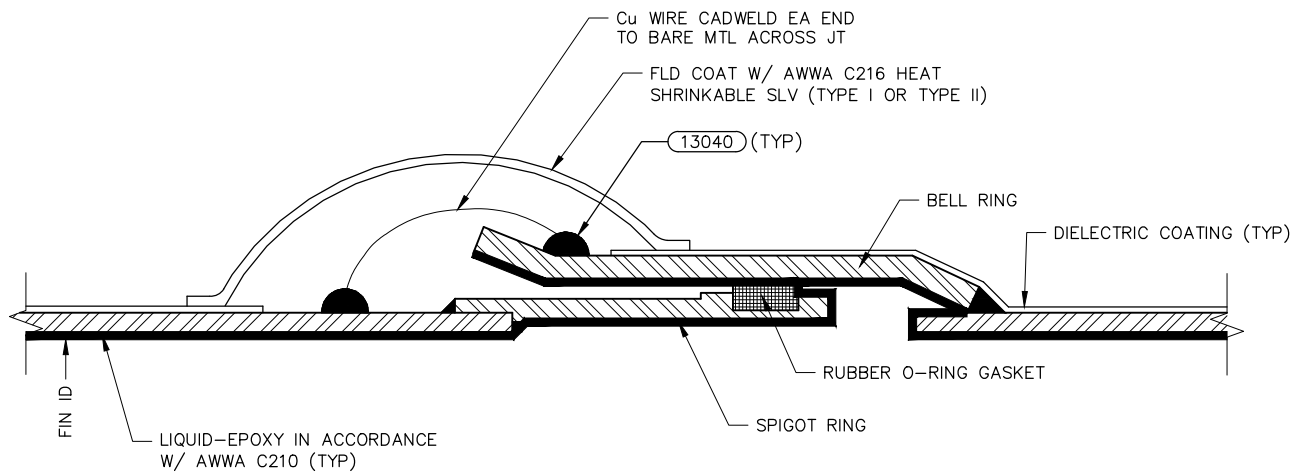
1600 West 12th Ave
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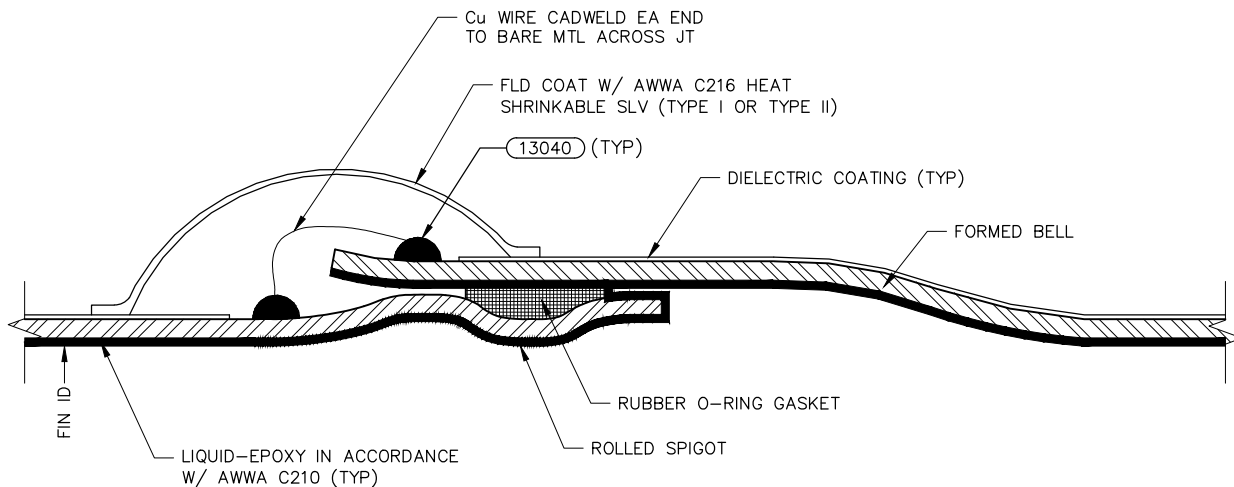
DRAWN BY: BAIRE S
CHKD BY: K ROSS / KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33121
BUTTSTRAP JOINT
AT FLANGED CONNECTION


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O-RING CARNEGIE JOINT



ROLLED SPIGOT JOINT

NOTE:

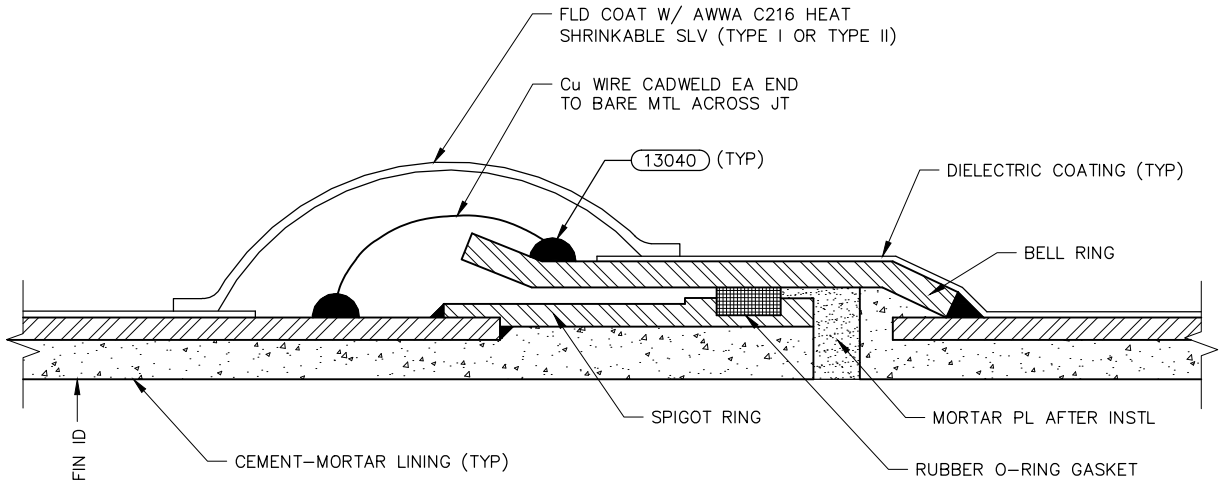
THE DIELECTRIC COATING SHALL BE LIQUID-EPOXY, POLYURETHANE, OR TAPE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

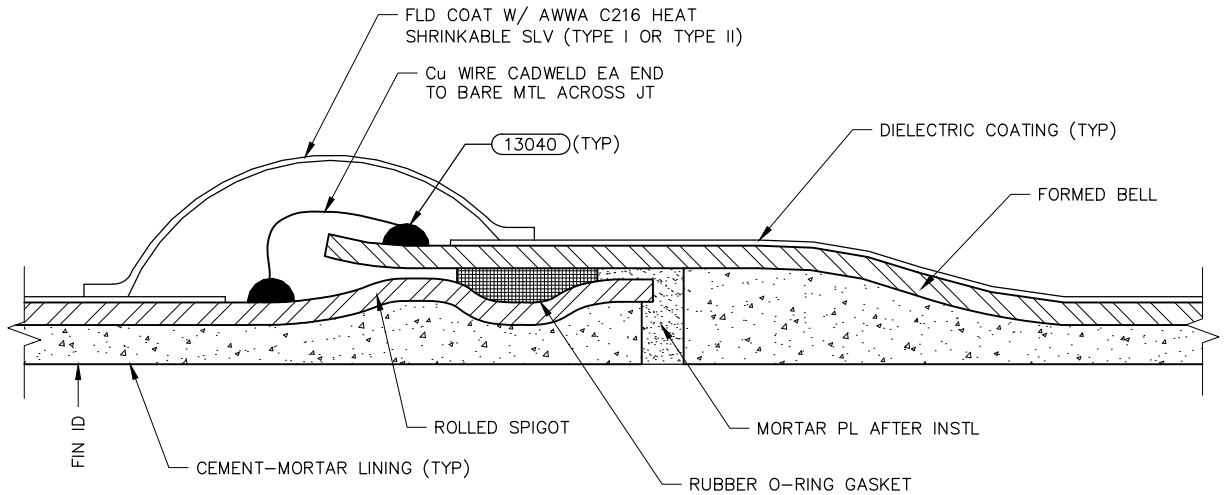
33122
STEEL PIPE O-RING JOINTS
(LIQUID-EPOXY LINING)

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O-RING CARNEGIE JOINT



ROLLED SPIGOT JOINT

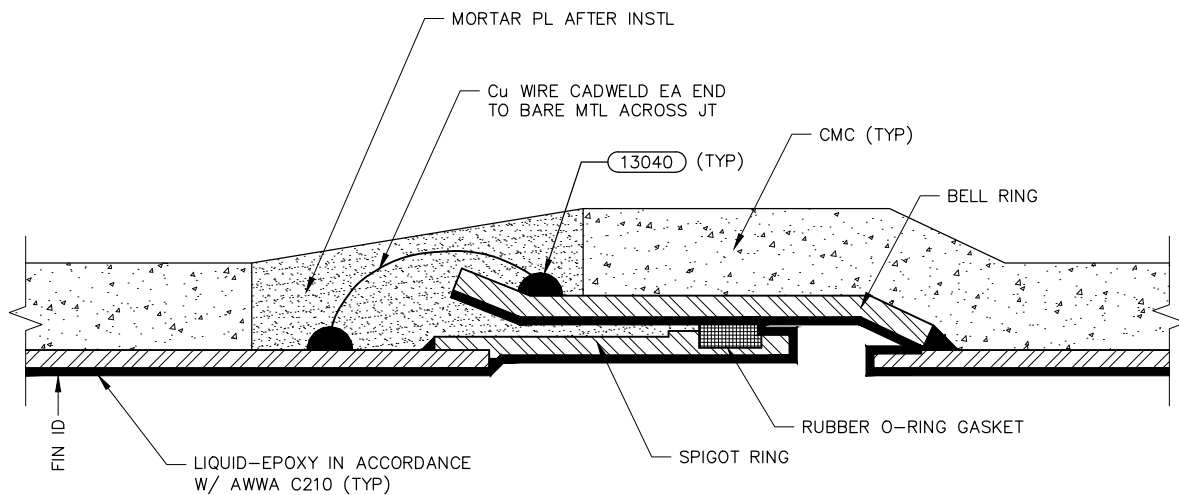
NOTE:

THE DIELECTRIC COATING SHALL BE LIQUID-EPOXY, POLYURETHANE, OR TAPE.

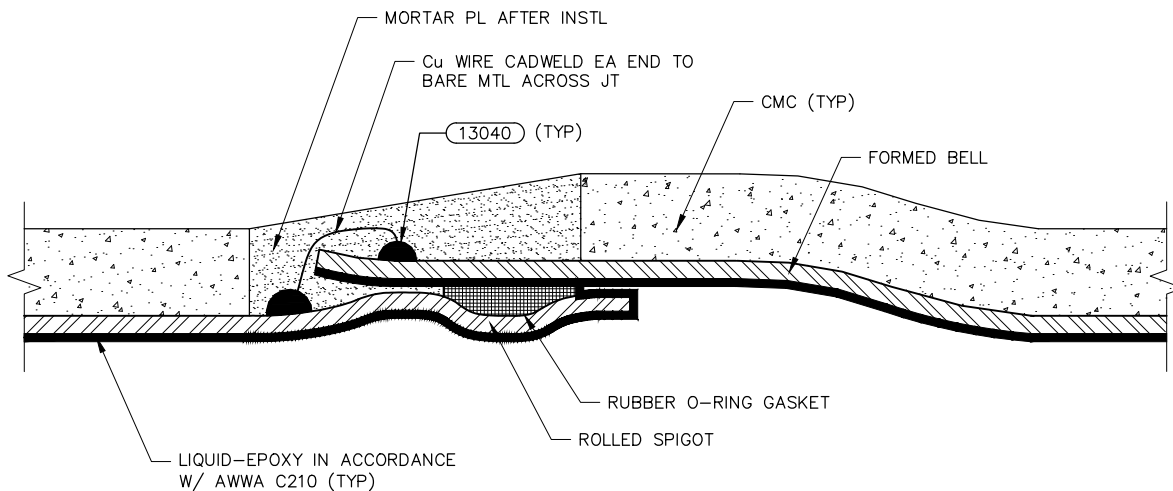
DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33123
STEEL PIPE O-RING JOINTS
(CEMENT-MORTAR LINING)

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O-RING CARNEGIE JOINT



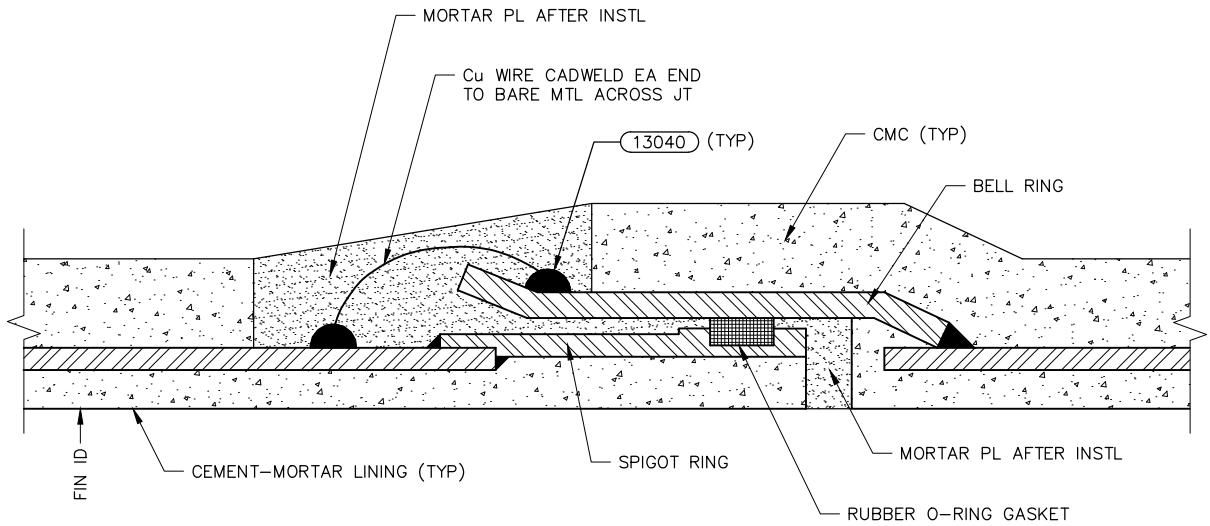
ROLLED SPIGOT JOINT

DRAWN BY: WENKHEIMER
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

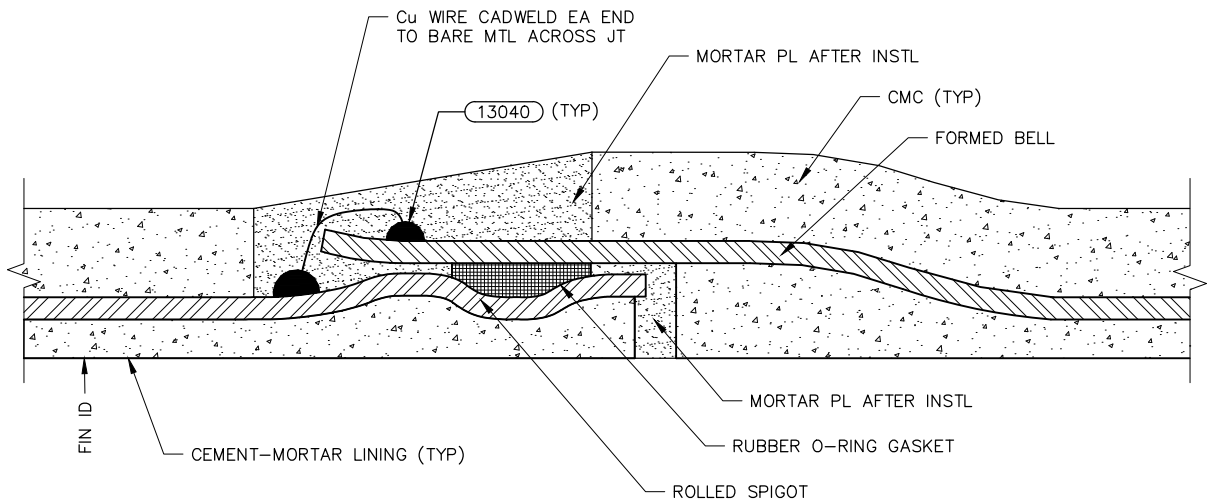
33124
CEMENT-MORTAR COATED
STEEL PIPE O-RING JOINTS
(LIQUID-EPOXY LINING)

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O-RING CARNEGIE JOINT



ROLLED SPIGOT JOINT

DRAWN BY: WENKHEIMER

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

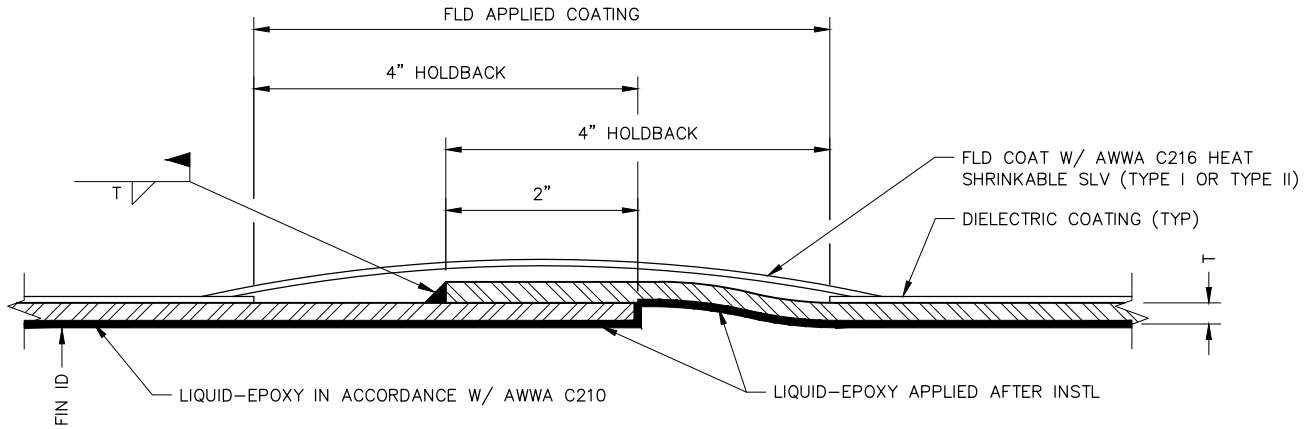
ORIGINATION DATE: JULY 2021

REVISION DATE:

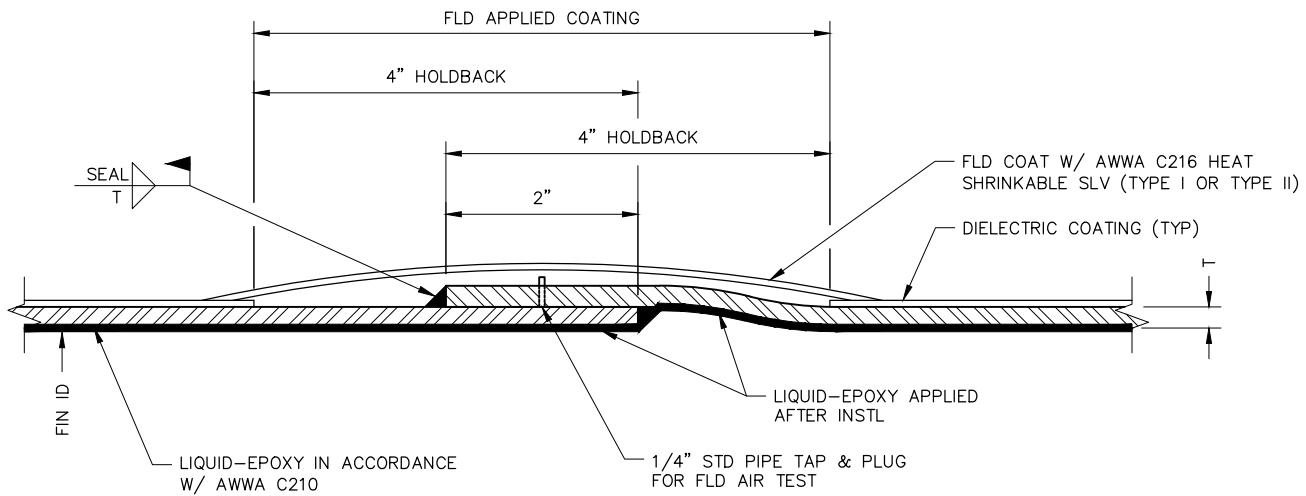
33125
CEMENT-MORTAR COATED STEEL
PIPE O-RING JOINTS
(CEMENT-MORTAR LINING)

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TYPE A
SINGLE WELDED LAP JOINT



TYPE B
SINGLE WITH SEAL WELDED LAP JOINT

NOTES:

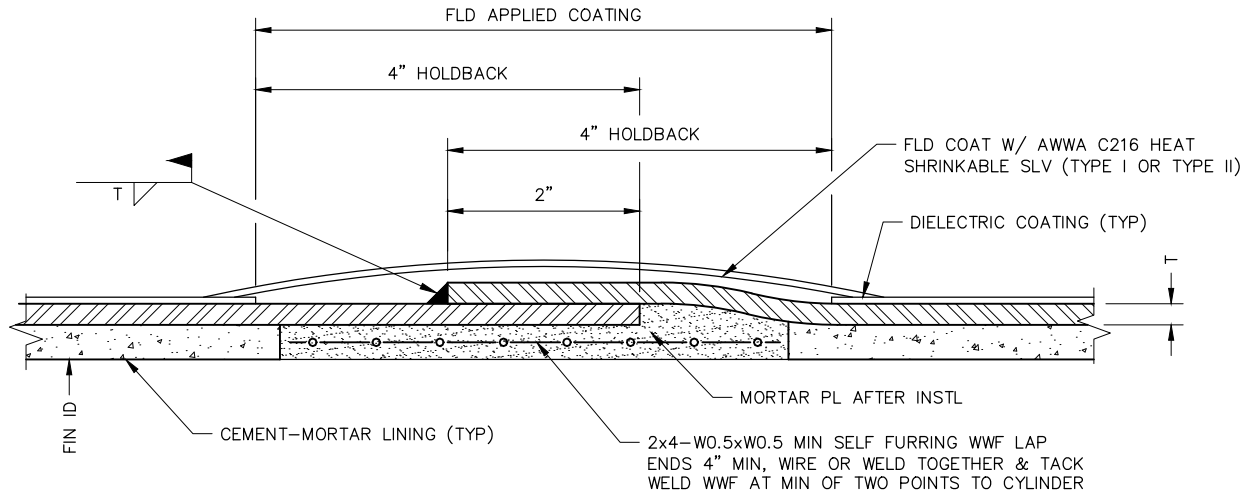
1. THE DIELECTRIC COATING SHALL BE LIQUID-EPOXY, POLYURETHANE, OR TAPE.
2. THE FULL FILLET WELD MAY BE ON EITHER THE INTERIOR OR EXTERIOR OF THE PIPE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/ KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

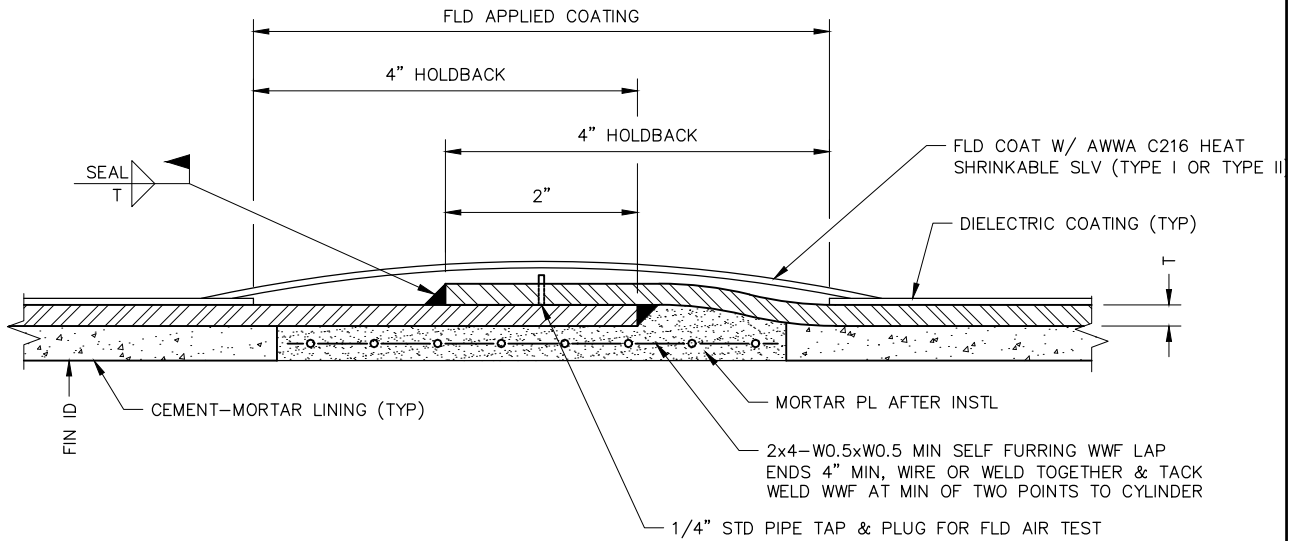
33126
STEEL PIPE TIED JOINT-LAP
JOINTS (LIQUID-EPOXY
LINING)



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**TYPE A
SINGLE WELDED LAP JOINT**



**TYPE B
SINGLE WITH SEAL WELDED LAP JOINT**

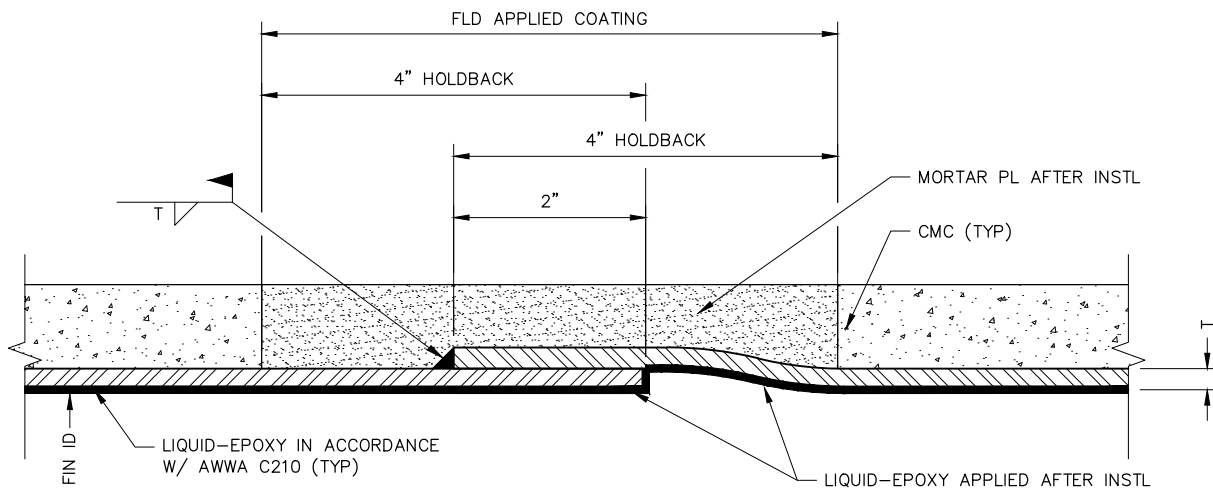
NOTES:

1. THE DIELECTRIC COATING SHALL BE LIQUID-EPOXY, POLYURETHANE, OR TAPE.
2. THE FULL FILLET WELD MAY BE ON EITHER THE INTERIOR OR EXTERIOR OF THE PIPE.

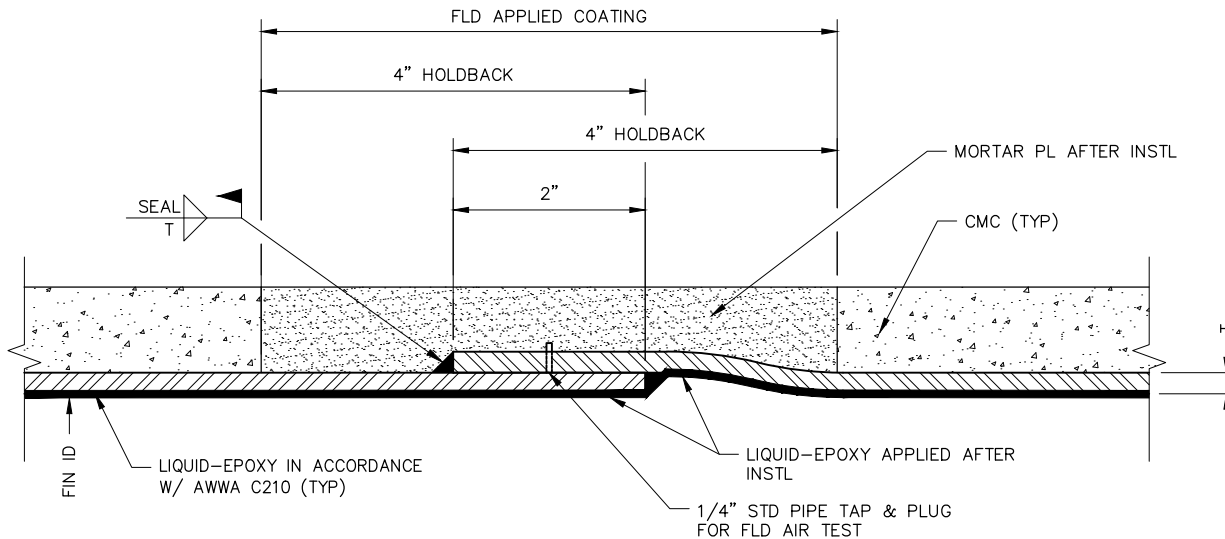
DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33127
STEEL PIPE TIED
JOINT-LAP JOINTS
(CEMENT-MORTAR LINING)


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TYPE A
SINGLE WELDED LAP JOINT



TYPE B
SINGLE WITH SEAL WELDED LAP JOINT

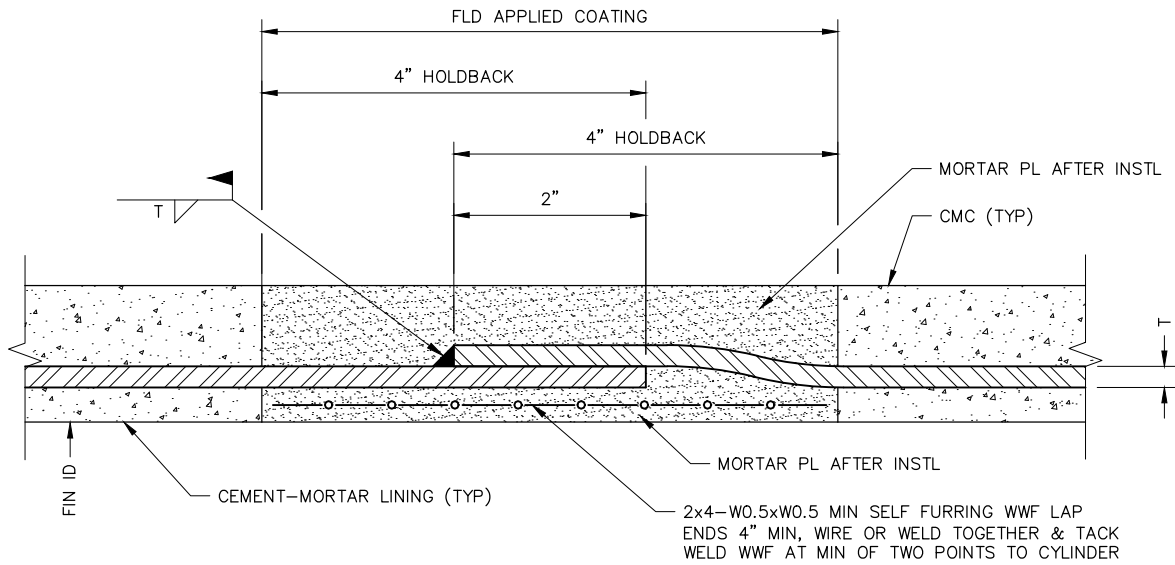
NOTES:

1. THE DIELECTRIC COATING SHALL BE LIQUID-EPOXY, POLYURETHANE, OR TAPE.
2. THE FULL FILLET WELD MAY BE ON EITHER THE INTERIOR OR EXTERIOR OF THE PIPE.

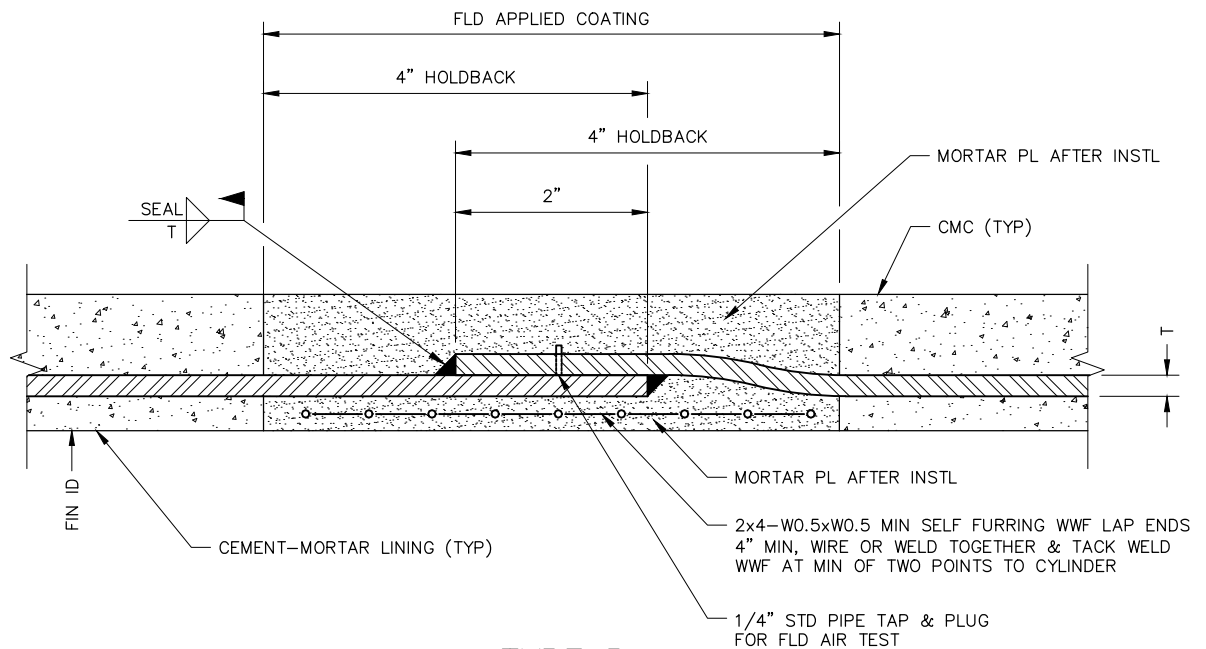
DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33128
CEMENT-MORTAR COATED STEEL PIPE
TIED JOINT-LAP JOINTS
(LIQUID-EPOXY LINING)

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TYPE A
SINGLE WELDED LAP JOINT



TYPE B
SINGLE WITH SEAL WELDED LAP JOINT

NOTES:

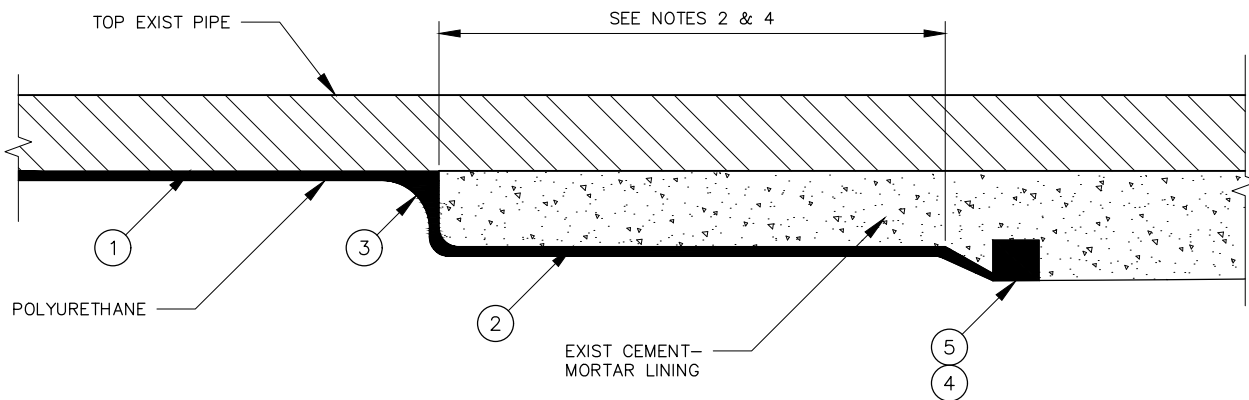
1. THE DIELECTRIC COATING SHALL BE LIQUID-EPOXY, POLYURETHANE, OR TAPE.
2. THE FULL FILLET WELD MAY BE ON EITHER THE INTERIOR OR EXTERIOR OF THE PIPE.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33129
CEMENT-MORTAR COATED STEEL
PIPE TIED JOINT-LAP JOINTS
(CEMENT MORTAR LINING)

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KEYED NOTES:

- ① ABRASIVE BLAST SSPC-SP-10 MINIMUM TO ANCHOR PROFILE SPECIFIED BY COATING MANUFACTURER.
- ② BRUSH BLAST SSPC-SP-7 MORTAR 6 INCHES MINIMUM TO PROVIDE ANCHOR TO MORTAR.
- ③ APPLY LINING TO PROVIDE SMOOTH TRANSITION BETWEEN BARE STEEL AND MORTAR.
- ④ FEATHER POLYURETHANE TO EDGES OF BRUSH BLASTED LENGTH.
- ⑤ CUT 1/8 INCH KEYWAY IN MORTAR AROUND CIRCUMFERENCE. TAPE AT EDGE OF MORTAR CUT.

DRAWN BY: *BERKNESS*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

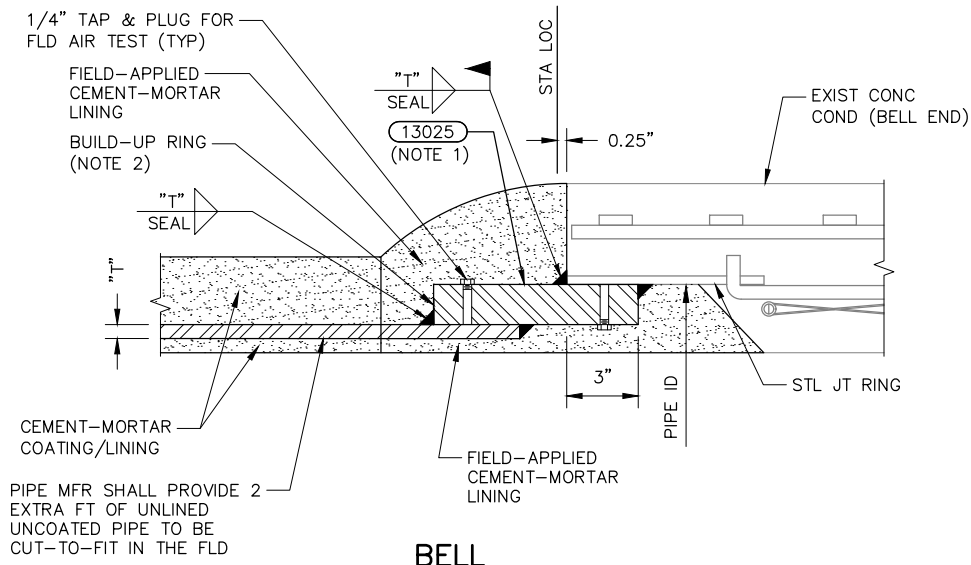
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

33130
POLYURETHANE TO
CEMENT-MORTAR TRANSITION

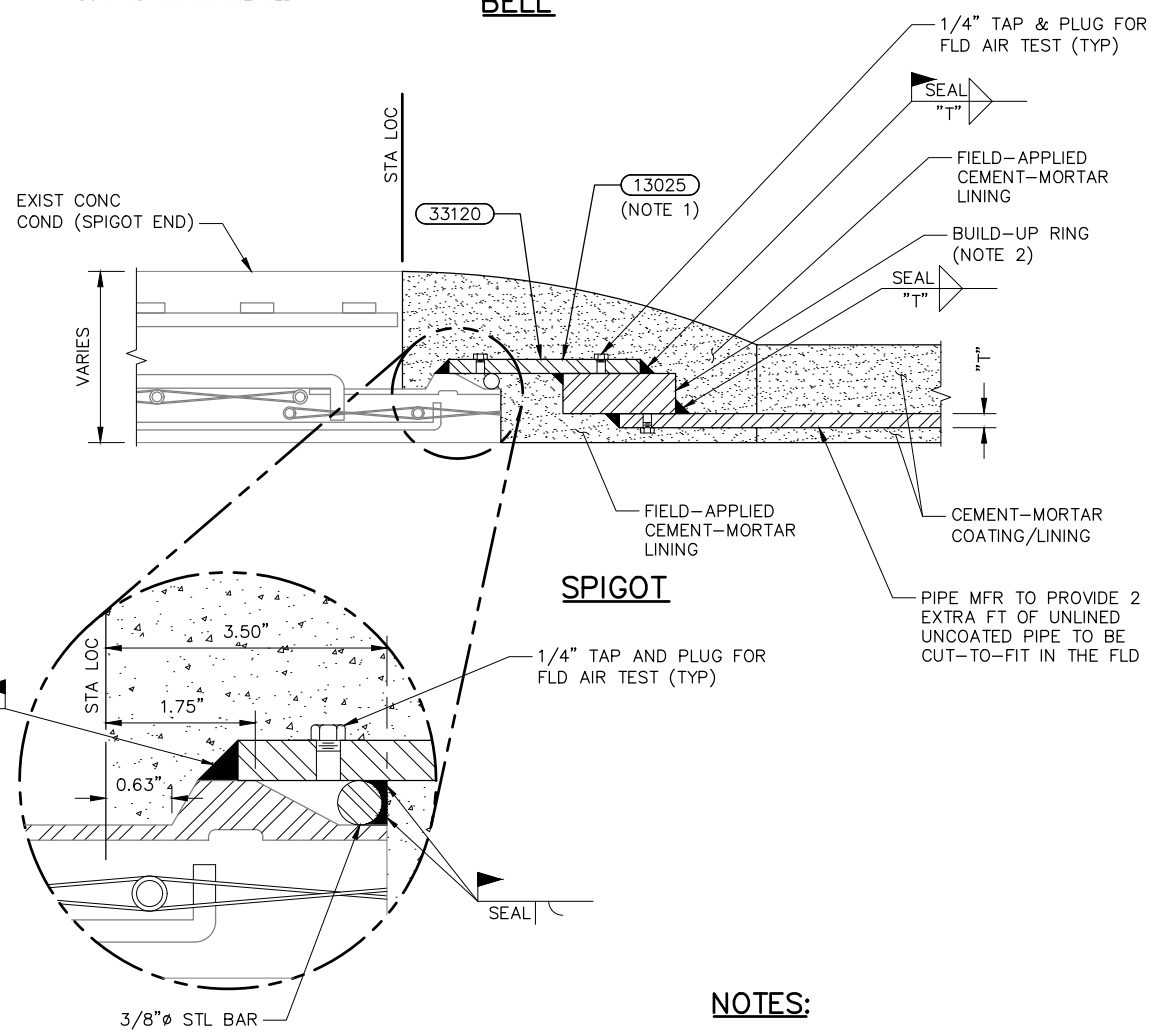


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PIPE MFR SHALL PROVIDE 2 EXTRA FT OF UNLINED UNCOATED PIPE TO BE CUT-TO-FIT IN THE FLD

BELL



PIPE MFR TO PROVIDE 2 EXTRA FT OF UNLINED UNCOATED PIPE TO BE CUT-TO-FIT IN THE FLD

SPIGOT

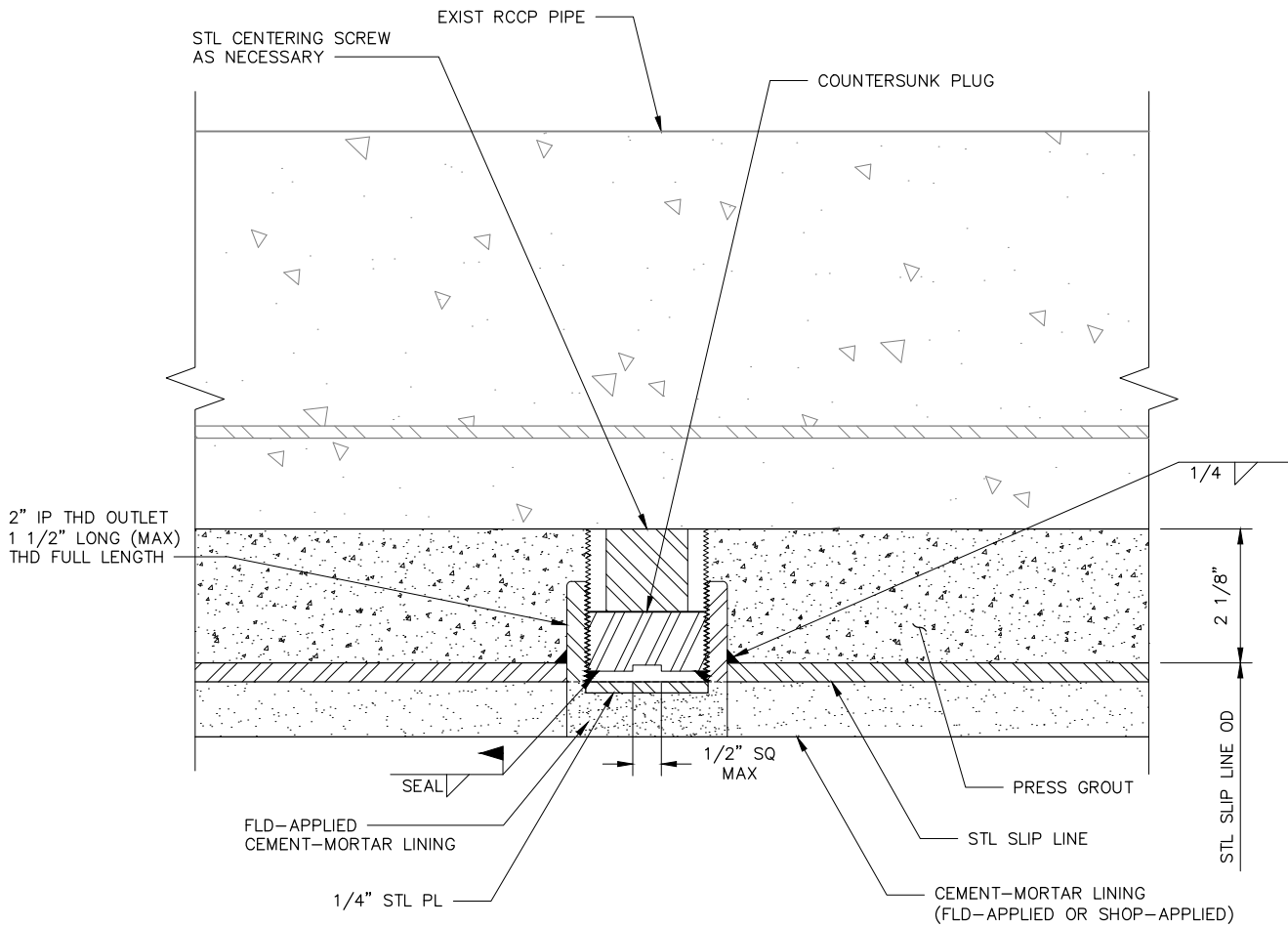
NOTES:

1. INSTALL 48# ZINC ANODE.
2. FIELD VERIFY EXISTING DIMENSIONS.

DRAWN BY: SCHULTE
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33131
CONCRETE TO STEEL
ADAPTER**

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NOTES:

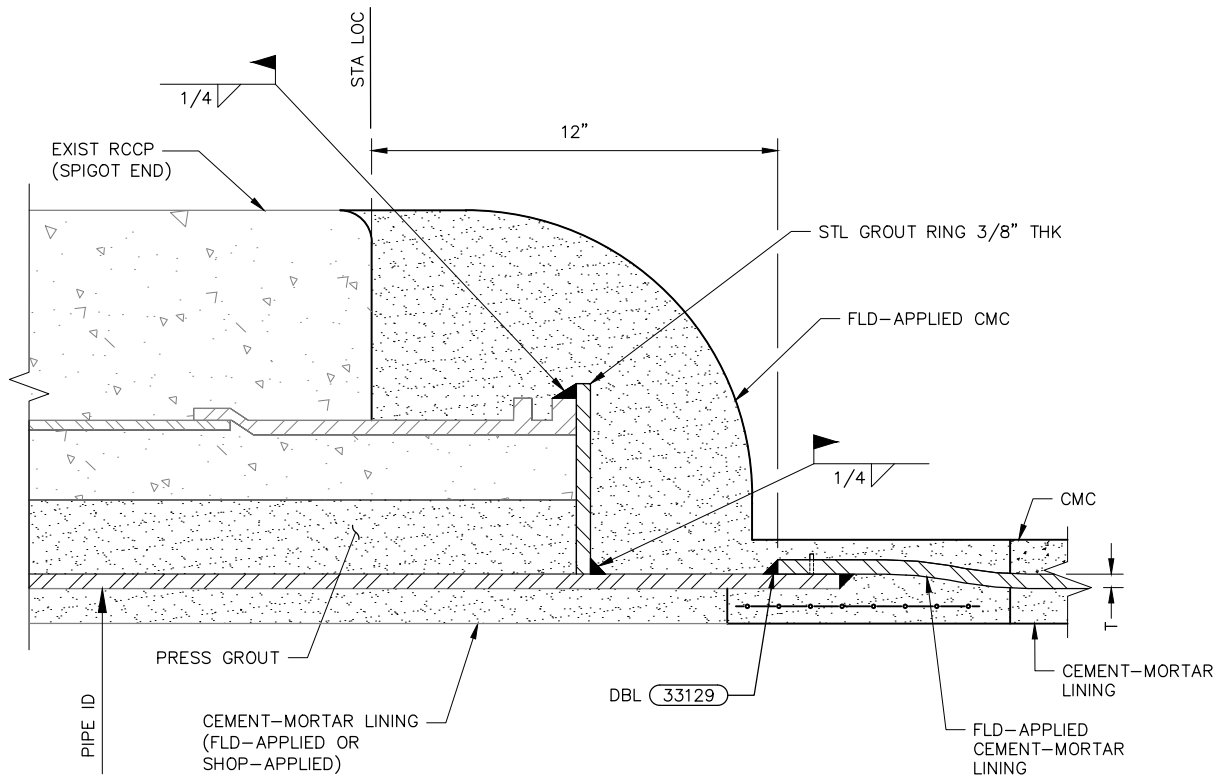
EXISTING REINFORCED CONCRETE CYLINDER PIPE
REINFORCEMENT NOT SHOWN FOR CLARITY.

DRAWN BY: VA/CIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

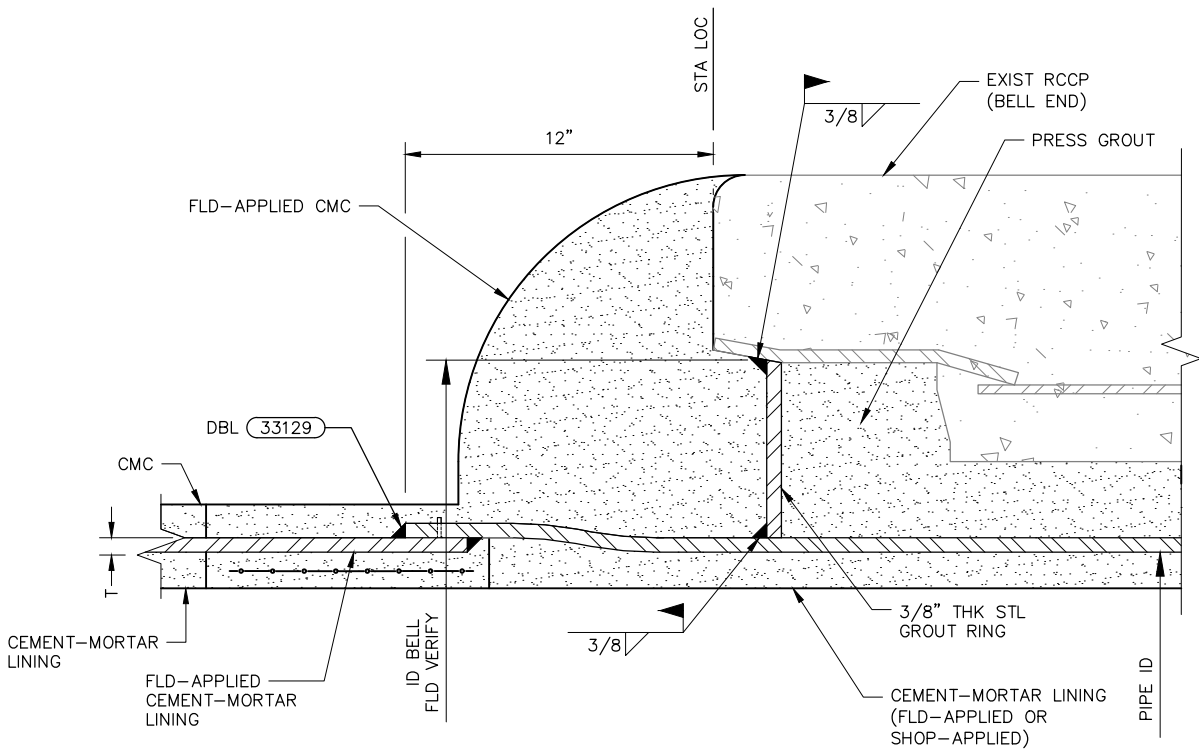
**33132
GROUT COUPLING**



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SPIGOT END



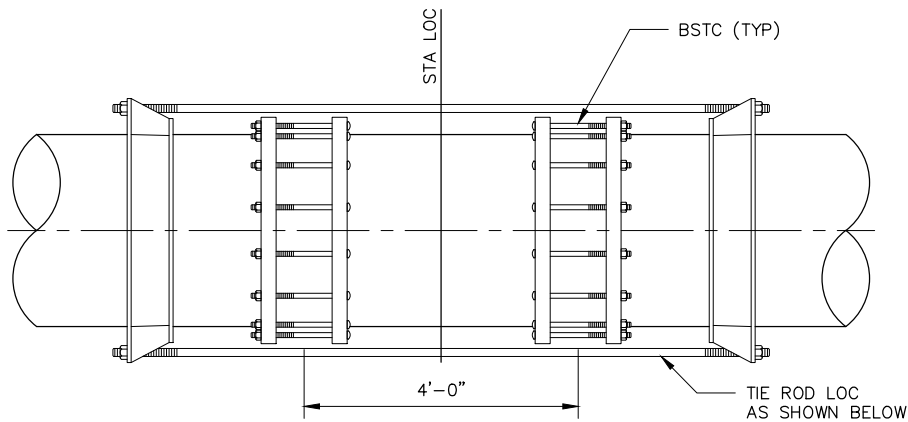
BELL END

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

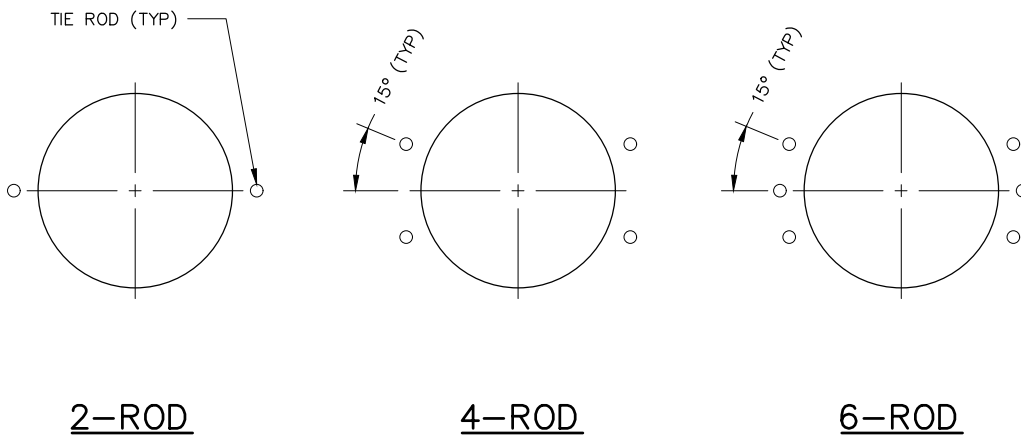
**33133
GROUT RINGS**



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PLAN



NOTE:

JOINT HARNESS AND TIE RODS SHALL BE DESIGNED IN ACCORDANCE WITH AWWA M11.

DRAWN BY: VAICIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

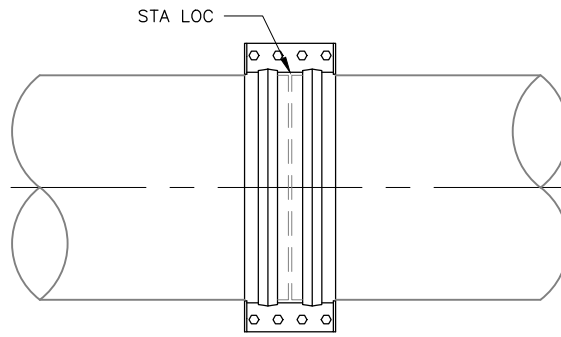
ORIGINATION DATE: JULY 2021

REVISION DATE:

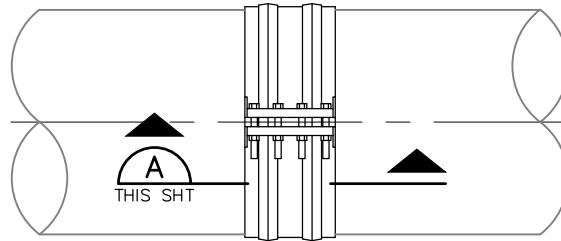
33134
HARNESSED DOUBLE BOLTED
SLEEVE TYPE COUPLING



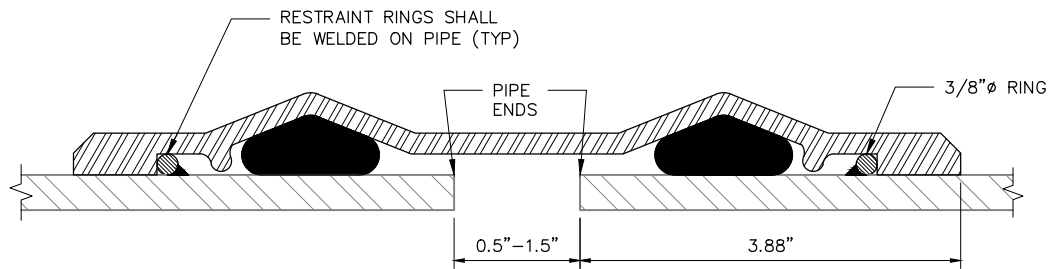
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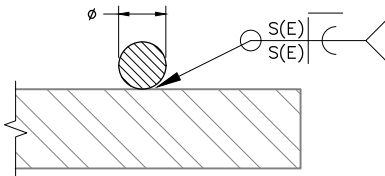
PLAN



ELEVATION



SECTION



$E=0.625*S$
 $S=0.5\phi$

RESTRAINED RING WELD

NOTE:

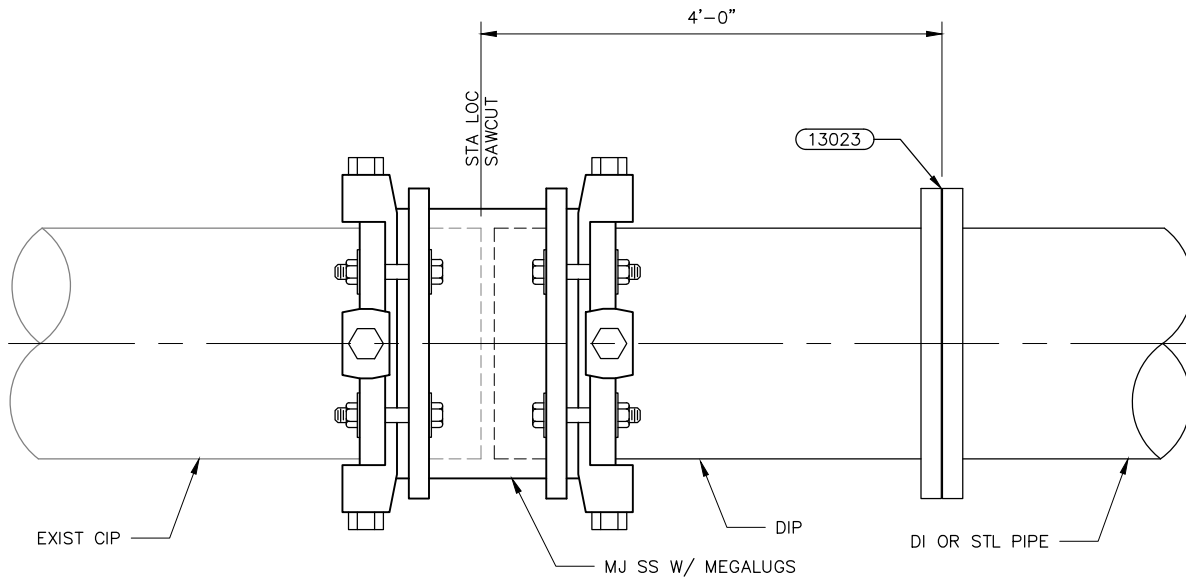
A DESIGN USING PAIRS OF FLEXIBLE, RESTRAINED BOLTED SPLIT SLEEVE COUPLINGS MAY BE SUBSTITUTED FOR HARNESSSED BOLTED SLEEVE TYPE COUPLINGS WITH APPROVAL OF THE ENGINEER.

DRAWN BY: VAICIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33135
SLEEVE COUPLING



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CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

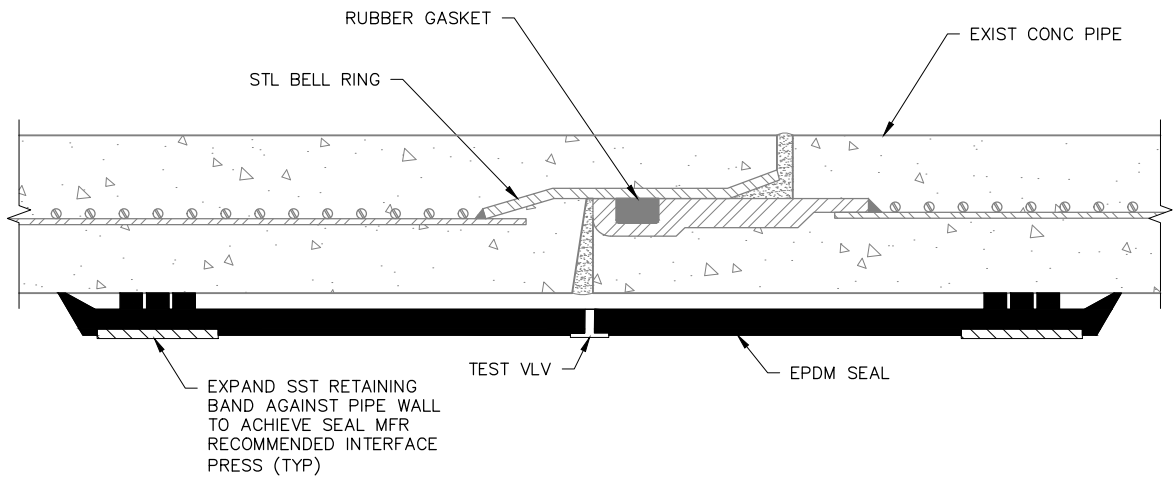
ORIGINATION DATE: JULY 2021

REVISION DATE:

33136
MECHANICAL JOINT TIE-IN



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NOTE:

STEEL REINFORCEMENT SHOWN WITHIN CONCRETE PIPE IS NOT REPRESENTATIVE OF THE ACTUAL STEEL REINFORCEMENT IN ANY PARTICULAR PIPE.

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

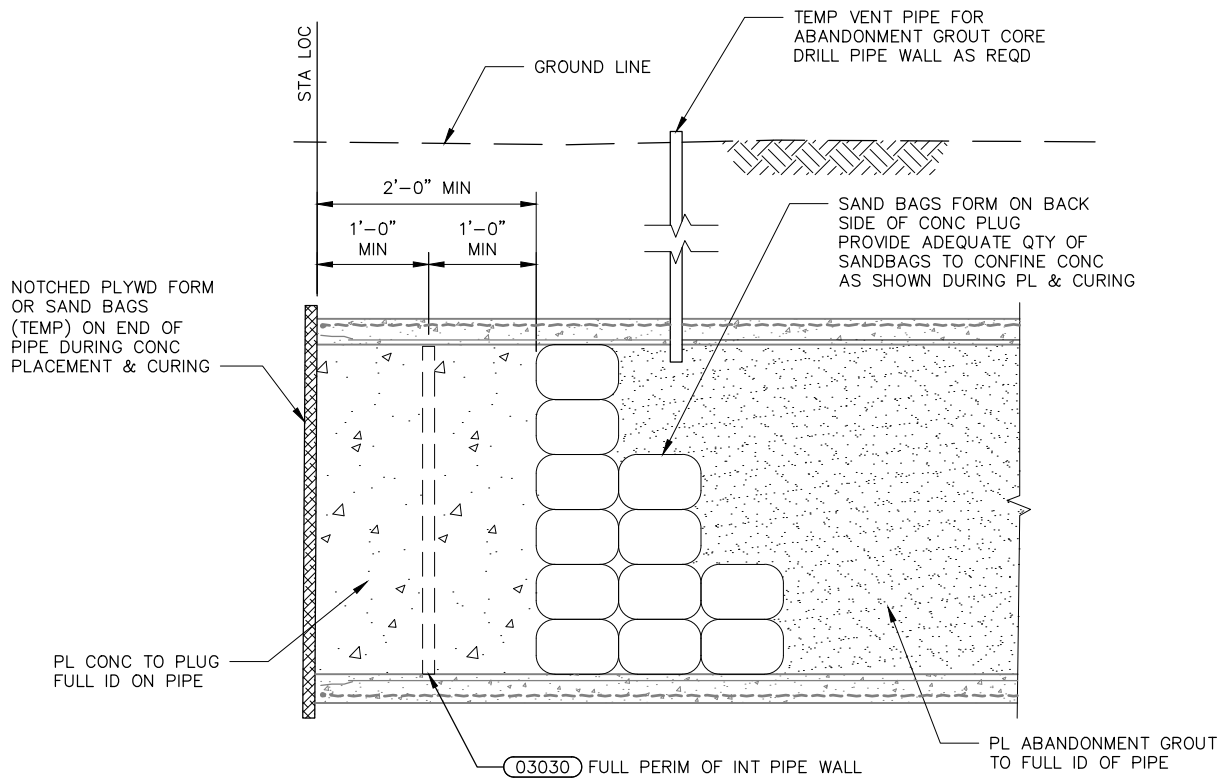
ORIGINATION DATE: JULY 2021

REVISION DATE:

**33137
INTERNAL JOINT SEAL**



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NOTE:

APPLIES TO ALL MAINS 16 INCH AND LARGER.

DRAWN BY: VA/CIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

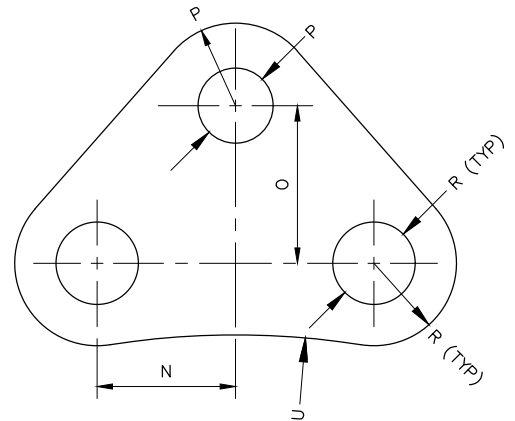
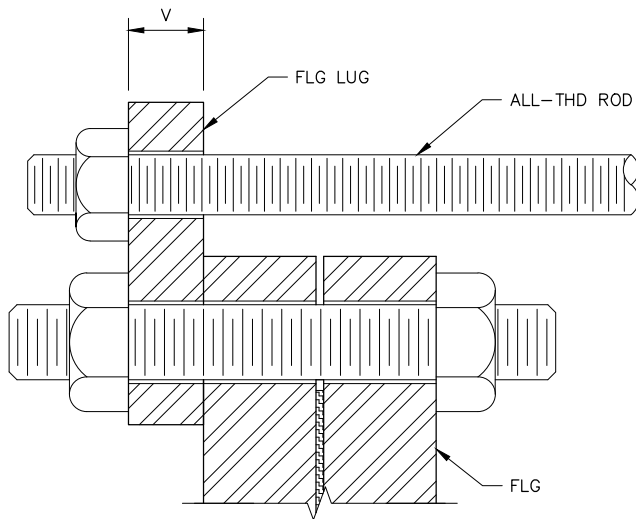
ORIGINATION DATE: JULY 2021

REVISION DATE:

**33138
PIPE ABANDONMENT PLUG**



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DIMENSION TABLE

PIPE ϕ	N	O	P	ROD ϕ	NO of RODS	R	U	V	PIPE ϕ
3"	2 1/8"	2 9/16"	7/8"	3/4"	2	3/4"	2 1/4"	3/4"	3"
4"	1 7/16"	2"	7/8"	3/4"	2	3/4"	3"	3/4"	4"
6"	1 13/16"	2 1/16"	7/8"	3/4"	2	7/8"	3 7/8"	3/4"	6"
8"	2 1/4"	2 1/4"	7/8"	3/4"	2	7/8"	5"	3/4"	8"
10"	1 7/8"	2 1/16"	7/8"	3/4"	2	1"	6 1/8"	3/4"	10"
12"	2 3/16"	2 5/16"	7/8"	3/4"	2	1"	7 1/2"	1"	12"
16"	2 1/16"	2 7/16"	1 1/8"	1"	2	1 1/8"	9 1/2"	1 1/4"	16"
20"	1 15/16"	2 5/8"	1 3/8"	1 1/4"	2	1 1/4"	11 1/4"	1 3/8"	20"
24"	2 5/16"	2 5/8"	1 1/8"	1"	4	1 3/8"	13 3/8"	1 1/4"	24"
30"	2"	2 3/4"	1 3/8"	1 1/4"	4	1 3/8"	16 5/8"	1 1/2"	30"
36"	2 1/8"	3 1/8"	1 5/8"	1 1/2"	4	1 5/8"	19 3/4"	1 3/4"	36"
42"	2 3/16"	3 1/4"	1 7/8"	1 3/4"	4	1 5/8"	23 1/8"	2"	42"
48"	2"	3 3/8"	2 1/8"	2"	4	1 5/8"	26 3/8"	2 1/2"	48"
54"	2 1/4"	3 3/8"	2 1/8"	2"	4	1 7/8"	29 1/2"	2 1/2"	54"
60"	2 1/16"	3 1/2"	2 3/8"	2 1/4"	4	1 7/8"	32 3/4"	2 3/4"	60"
66"	2 5/16"	3 3/4"	2 5/8"	2 1/2"	4	1 7/8"	36 1/8"	3 1/4"	66"
72"	2 3/16"	3 3/4"	2 3/8"	2 1/4"	6	1 7/8"	39 3/8"	3"	72"

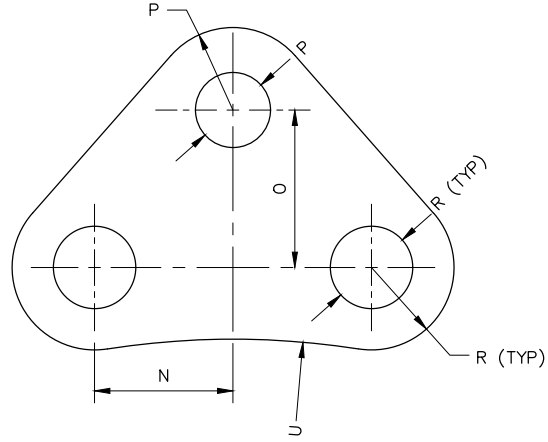
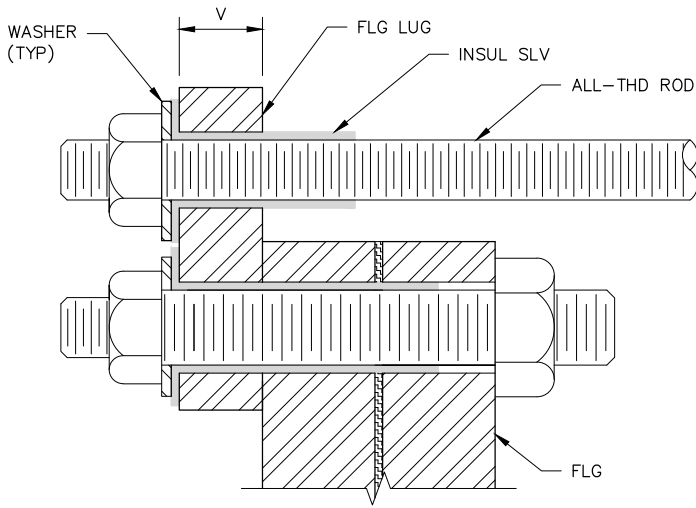
NOTES:

1. EQUALLY SPACE RODS AND FLANGE LUGS AROUND FLANGE.
2. RODS ARE ASTM A 193 GRADE B7 WITH ASTM A 194 GRADE 2H NUTS.
3. LUGS ARE ASTM A 36 PLATE.
4. DESIGN PRESSURE:
 - A. 3 INCH THROUGH 16 INCH – 260 POUNDS PER SQUARE INCH
 - B. 20 INCH THROUGH 72 INCH – 220 POUNDS PER SQUARE INCH

DRAWN BY: SCHULTE
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

33140
NON-INSULATED
FLANGE LUGS

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DIMENSION TABLE

PIPE ϕ	N	O	P	ROD ϕ	NO of RODS	R	U	V	PIPE ϕ
3"	2 1/8"	2 9/16"	7/8"	3/4"	2	3/4"	2 1/4"	3/4"	3"
4"	1 7/16"	2"	7/8"	3/4"	2	3/4"	3"	3/4"	4"
6"	1 13/16"	2 1/16"	7/8"	3/4"	2	7/8"	3 7/8"	3/4"	6"
8"	2 1/4"	2 1/4"	7/8"	3/4"	2	7/8"	5"	3/4"	8"
10"	1 7/8"	2 1/16"	7/8"	3/4"	2	1"	6 1/8"	3/4"	10"
12"	2 3/16"	2 5/16"	7/8"	3/4"	2	1"	7 1/2"	1"	12"
16"	2 1/16"	2 7/16"	1 1/8"	1"	2	1 1/8"	9 1/2"	1 1/4"	16"
20"	1 15/16"	2 5/8"	1 3/8"	1 1/4"	2	1 1/4"	11 1/4"	1 3/8"	20"
24"	2 5/16"	2 5/8"	1 1/4"	1"	4	1 1/2"	13 3/8"	1 1/4"	24"
30"	2"	2 3/4"	1 1/2"	1 1/4"	4	1 1/2"	16 5/8"	1 1/2"	30"
36"	2 1/8"	3 1/8"	1 3/4"	1 1/2"	4	1 5/8"	19 3/4"	1 3/4"	36"
42"	2 3/16"	3 1/4"	2"	1 3/4"	4	1 5/8"	23 1/8"	2"	42"
48"	2"	3 3/8"	2 1/4"	2"	4	1 5/8"	26 3/8"	2 1/2"	48"
54"	2 1/4"	3 3/8"	2 1/4"	2"	4	1 7/8"	29 1/2"	2 1/2"	54"
60"	2 1/16"	3 1/2"	2 1/2"	2 1/4"	4	1 7/8"	32 3/4"	2 3/4"	60"
66"	2 5/16"	3 3/4"	2 3/4"	2 1/2"	4	1 7/8"	36 1/8"	3 1/4"	66"
72"	2 3/16"	3 3/4"	2 1/2"	2 1/4"	6	1 7/8"	39 3/8"	3"	72"

NOTES:

1. EQUALLY SPACE RODS AND FLANGE LUGS AROUND FLANGE.
2. RODS ARE ASTM A 193 GRADE B7 WITH ASTM A 194 GRADE 2H NUTS.
3. LUGS ARE ASTM A 36 PLATE.
4. DESIGN PRESSURE:
 - A. 3 INCH THROUGH 16 INCH – 260 POUNDS PER SQUARE INCH
 - B. 20 INCH THROUGH 72 INCH – 220 POUNDS PER SQUARE INCH

DRAWN BY: SCHULTE

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

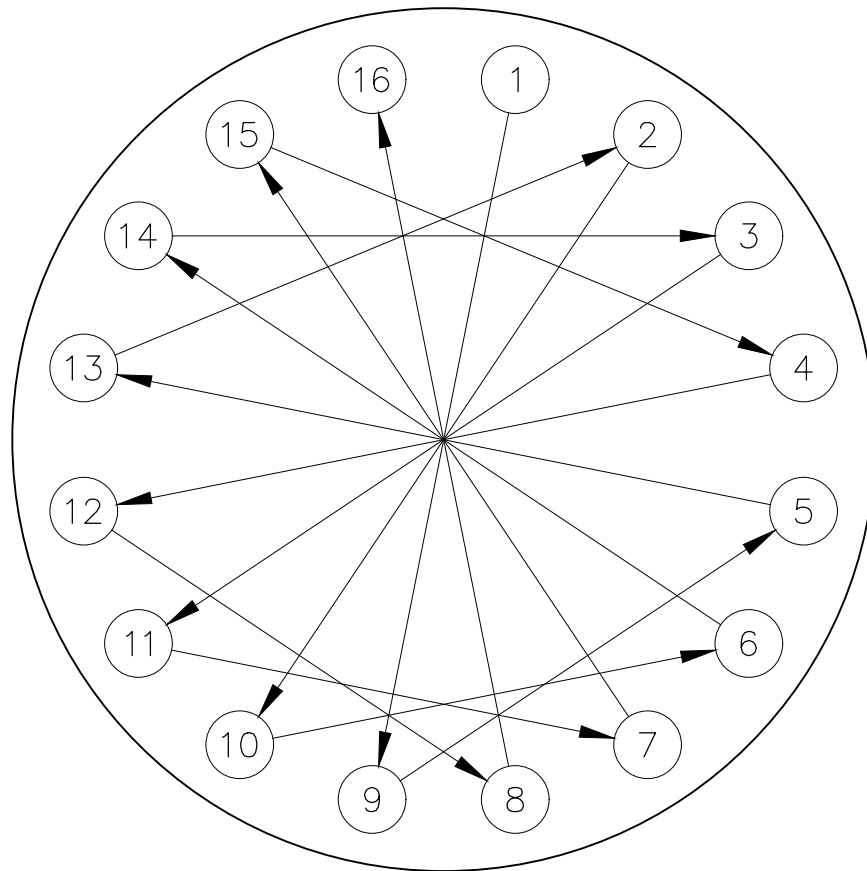
ORIGINATION DATE: JULY 2021

REVISION DATE:

**33141
INSULATED FLANGE LUGS**



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16 STUD EXAMPLE

NOTES:

1. STUDS AND NUTS SHALL BE CLEAN AND DRY (UNLUBRICATED).
 - A. HAND TIGHTEN ALL NUTS.
 - B. CONSECUTIVELY NUMBER THE STUDS AROUND THE FLANGE.
2. TIGHTEN STUD NUTS TO ONE-THIRD OF TARGET TORQUE IN SEQUENCE GIVEN.
3. TIGHTEN STUD NUTS TO TWO-THIRDS OF TARGET TORQUE IN SEQUENCE GIVEN.
4. TIGHTEN STUD NUTS TO FULL TARGET TORQUE IN SEQUENCE GIVEN.
5. AFTER 24 HOURS, RE-TIGHTEN STUD NUTS TO FULL TARGET TORQUE IN SEQUENCE GIVEN.
6. TORQUE WRENCHES AND WRENCHES USED FOR STUD NUT TIGHTENING SHALL BE IN GOOD CONDITION AND CERTIFIED BY AN INDEPENDENT TESTING AGENCY WITHIN 6 MONTHS OF USE.
7. SEQUENCE GIVEN FOR AWWA C207 CLASS B, D, AND E AND ANSI CLASS 150 FLANGES.

DRAWN BY: <i>WENKHEIMER</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33142
STUD NUT
TIGHTENING SEQUENCE


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NO OF STUDS	NOMINAL PIPE SIZE	STUD NUT TIGHTENING SEQUENCE
8	4", 6", 8"	1, 5, 3, 7, 2, 6, 4, 8
12	10", 12"	1, 7, 4, 10, 2, 8, 5, 11, 3, 9, 6, 12
16	16"	1, 9, 5, 13, 2, 10, 6, 14, 3, 11, 7, 15, 4, 12, 8, 16
18	20"	1, 11, 6, 16, 2, 12, 7, 17, 3, 13, 8, 18, 4, 14, 9, 19, 5, 15, 10, 20
24	26"	1, 13, 7, 19, 2, 14, 8, 20, 3, 15, 9, 21, 4, 16, 10, 22, 5, 17, 11, 23, 6, 18, 12, 24
28	28", 30", 32"	1, 15, 8, 22, 2, 16, 9, 23, 3, 17, 10, 24, 4, 18, 11, 25, 5, 19, 12, 26, 6, 20, 13, 27, 7, 21, 14, 28,
32	34", 36", 38"	1, 17, 9, 25, 2, 18, 10, 26, 3, 19, 11, 27, 4, 20, 12, 28, 5, 21, 13, 29, 6, 22, 14, 30, 7, 23, 15, 31, 8, 24, 16, 32
36	40", 42"	1, 19, 10, 28, 2, 20, 11, 29, 3, 21, 12, 30, 4, 22, 13, 31, 5, 23, 14, 32, 6, 24, 15, 33, 7, 25, 16, 34, 8, 26, 17, 35, 9, 27, 18, 36
40	44", 46"	1, 21, 11, 31, 2, 22, 12, 32, 3, 23, 13, 33, 4, 24, 14, 34, 5, 25, 15, 35, 6, 26, 16, 36, 7, 27, 17, 37, 8, 28, 18, 38, 9, 29, 19, 39, 10, 30, 20, 40
44	48", 50", 52", 54"	1, 23, 12, 34, 2, 24, 13, 35, 3, 25, 14, 36, 4, 26, 15, 37, 5, 27, 16, 38, 6, 28, 17, 39, 7, 29, 18, 40, 8, 30, 19, 41, 9, 31, 20, 42, 10, 32, 21, 43, 11, 33, 22, 44
52	60", 66"	1, 27, 14, 40, 2, 28, 15, 41, 3, 29, 16, 42, 4, 30, 17, 43, 5, 31, 18, 44, 6, 32, 19, 45, 7, 33, 20, 46, 8, 34, 21, 47, 9, 35, 22, 48, 10, 36, 23, 49, 11, 37, 24, 50, 12, 38, 25, 51, 13, 39, 26, 52
60	72"	1, 31, 16, 46, 2, 32, 17, 47, 3, 33, 18, 48, 4, 34, 19, 49, 5, 35, 20, 50, 6, 36, 21, 51, 7, 37, 22, 52, 8, 38, 23, 53, 9, 39, 24, 54, 10, 40, 25, 55, 11, 41, 26, 56, 12, 42, 27, 57, 13, 43, 28, 58, 14, 44, 29, 59, 15, 45, 30, 60
64	78", 84"	1, 33, 17, 49, 2, 34, 18, 50, 3, 35, 19, 51, 4, 36, 20, 52, 5, 37, 21, 53, 6, 38, 22, 54, 7, 39, 23, 55, 8, 40, 24, 56, 9, 41, 25, 57, 10, 42, 26, 58, 11, 43, 27, 59, 12, 44, 28, 60, 13, 45, 29, 61, 14, 46, 30, 62, 15, 47, 31, 63, 16, 48, 32, 64
68	90", 96"	1, 35, 18, 52, 2, 36, 19, 53, 3, 37, 20, 54, 4, 38, 21, 55, 5, 39, 22, 56, 6, 40, 23, 57, 7, 41, 24, 58, 8, 42, 25, 59, 9, 43, 26, 60, 10, 44, 27, 61, 11, 45, 28, 62, 12, 46, 29, 63, 13, 47, 30, 64, 14, 48, 31, 65, 15, 49, 32, 66, 16, 50, 33, 67, 17, 51, 34, 68
72	102", 108"	1, 37, 19, 55, 2, 38, 20, 56, 3, 39, 21, 57, 4, 40, 22, 58, 5, 41, 23, 59, 6, 42, 24, 60, 7, 43, 25, 61, 8, 44, 26, 62, 9, 45, 27, 63, 10, 46, 28, 64, 11, 47, 29, 65, 12, 48, 30, 66, 13, 49, 31, 67, 14, 50, 32, 68, 15, 51, 33, 69, 16, 52, 34, 70, 17, 53, 35, 71, 18, 54, 36, 72
76	114", 120"	1, 39, 20, 58, 2, 40, 21, 59, 3, 41, 22, 60, 4, 42, 23, 61, 5, 43, 24, 62, 6, 44, 25, 63, 7, 45, 26, 64, 8, 46, 27, 65, 9, 47, 28, 66, 10, 48, 29, 67, 11, 49, 30, 68, 12, 50, 31, 69, 13, 51, 32, 70, 14, 52, 33, 71, 15, 53, 34, 72, 16, 54, 35, 73, 17, 55, 36, 74, 18, 56, 37, 75, 19, 57, 38, 76
80	126", 132"	1, 41, 21, 61, 2, 42, 22, 62, 3, 43, 23, 63, 4, 44, 24, 64, 5, 45, 25, 65, 6, 46, 26, 66, 7, 47, 27, 67, 8, 48, 28, 68, 9, 49, 29, 69, 10, 50, 30, 70, 11, 51, 31, 71, 12, 52, 32, 72, 13, 53, 33, 73, 14, 54, 34, 74, 15, 55, 35, 75, 16, 56, 36, 76, 17, 57, 37, 77, 18, 58, 38, 78, 19, 59, 39, 79, 20, 60, 40, 80
84	144"	1, 43, 22, 64, 2, 44, 23, 65, 3, 45, 24, 66, 4, 46, 25, 67, 5, 47, 26, 68, 6, 48, 27, 69, 7, 49, 28, 70, 8, 50, 29, 71, 9, 51, 30, 72, 10, 52, 31, 73, 11, 53, 32, 74, 12, 54, 33, 75, 13, 55, 34, 76, 14, 56, 35, 77, 15, 57, 36, 78, 16, 58, 37, 79, 17, 59, 38, 80, 18, 60, 39, 81, 19, 61, 40, 82, 20, 62, 41, 83, 21, 63, 42, 84

DRAWN BY: SCHULTE

CHKD BY: K ROSS/ KLR

APPD BY: *[Signature]*

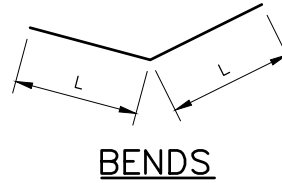
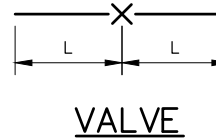
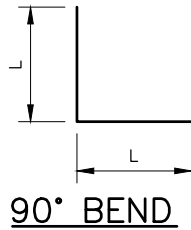
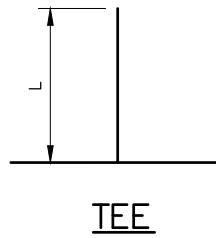
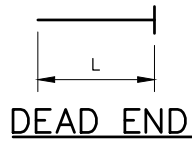
ORIGINATION DATE: JULY 2021

REVISION DATE:

33143
STUD NUT
TIGHTENING SEQUENCE TABLE



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LENGTH OF RESTRAINED PIPE

NOMINAL PIPE ∅	FITTING			
	90° BEND, TEE, DEAD END, VALVE	45° BEND	22 1/2° BEND	11 1/4° BEND
4"	30'	9'	2'	1'
6"	46'	13'	3'	1'
8"	61'	18'	5'	1'
12"	90'	26'	7'	2'
16"	116'	34'	9'	2'
20"	141'	41'	11'	3'

NOTES:

1. LENGTH OF RESTRAINED PIPE IS MEASURED DISTANCE EACH WAY FROM VALVES AND BENDS.
2. MINIMUM 4 FEET 6 INCH BURY DEPTH REQUIRED.
3. BASED ON 150 POUNDS PER SQUARE INCH WORKING PRESSURE.
4. RESTRAIN CROSSES IN ALL DIRECTIONS.
5. WHEN REDUCERS ARE USED ON A VALVE INSTALLATION THE LENGTH OF RESTRAINT SHALL BE BASED ON THE SIZE OF THE PIPE NOT THE SIZE OF THE VALVE.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

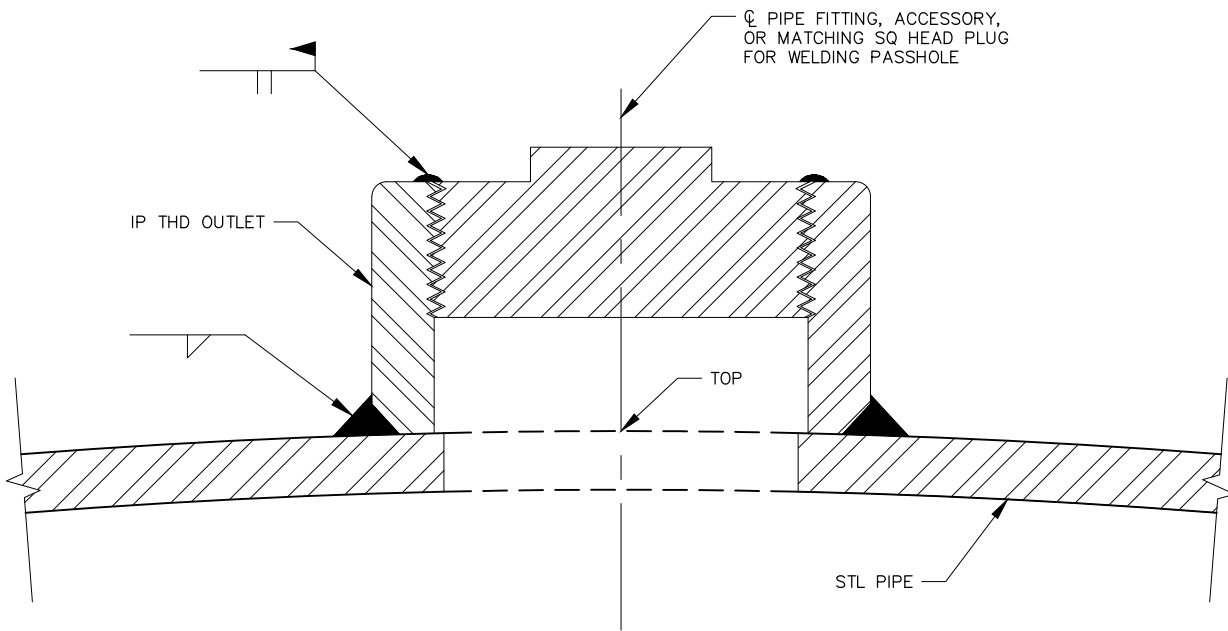
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

33144
LENGTH OF RESTRAINED PIPE



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NOTE:

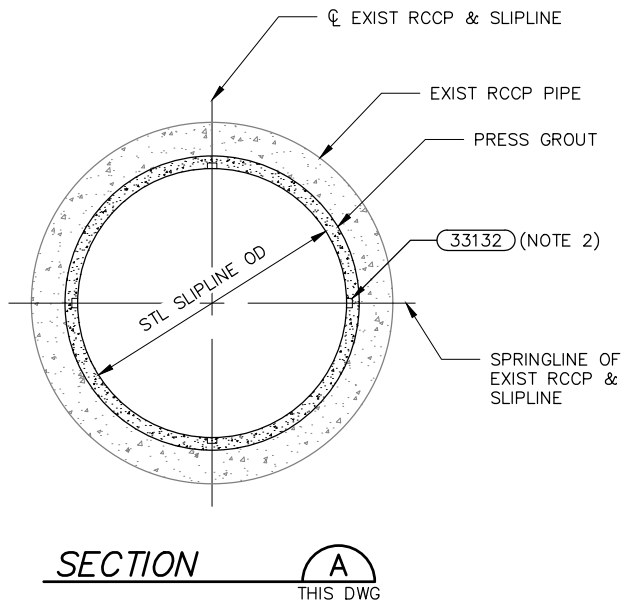
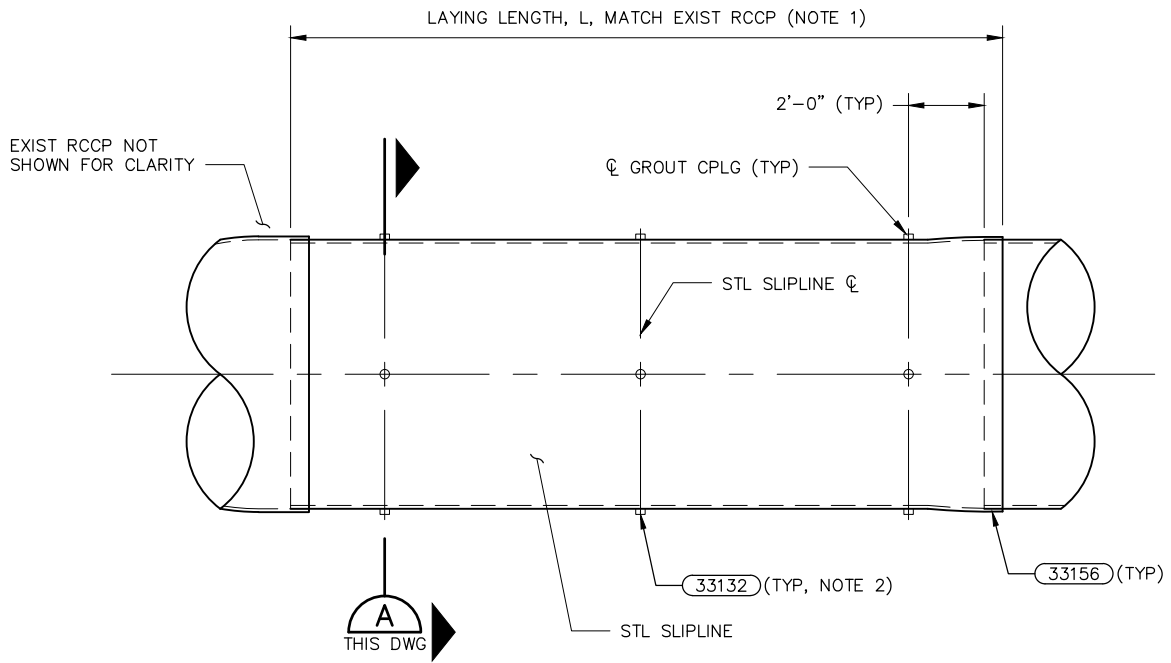
LINING AND COATING NOT SHOWN FOR CLARITY.

DRAWN BY: WENKHEIMER
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33150
THREADED OUTLET
(STEEL PIPE)**



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NOTES:

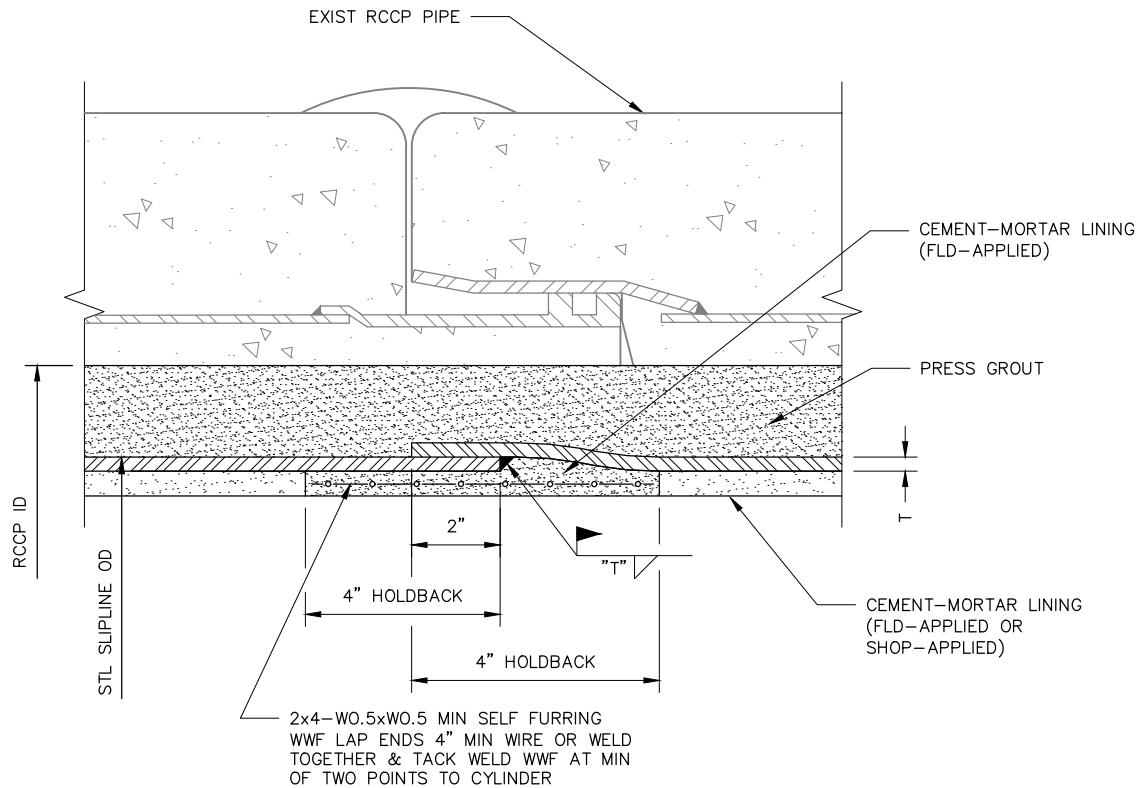
1. STEEL SLIPLINE PIPES SHALL BE FABRICATED ACCORDING TO EXISTING REINFORCED CONCRETE CYLINDER PIPE LAYOUT DRAWINGS SO THAT JOINT NUMBERS, STATIONS, ELEVATIONS, DEFLECTIONS, AND ROTATIONS OF THE SLIPLINE PIPE JOINTS MATCH THOSE OF THE EXISTING PIPE JOINTS IN WHICH THEY ARE INSTALLED.
2. THE QUANTITY AND LOCATION OF THE GROUT COUPLINGS MAY BE MODIFIED AS NECESSARY.

DRAWN BY: VAICIKAUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33155
SLIPLINE ELEVATION
AND SECTION**

D DENVER WATER

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denverwater.org



NOTE:

EXISTING REINFORCED CONCRETE CYLINDER PIPE
REINFORCEMENT NOT SHOWN FOR CLARITY.

DRAWN BY: VA/CIKAUSKAS

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

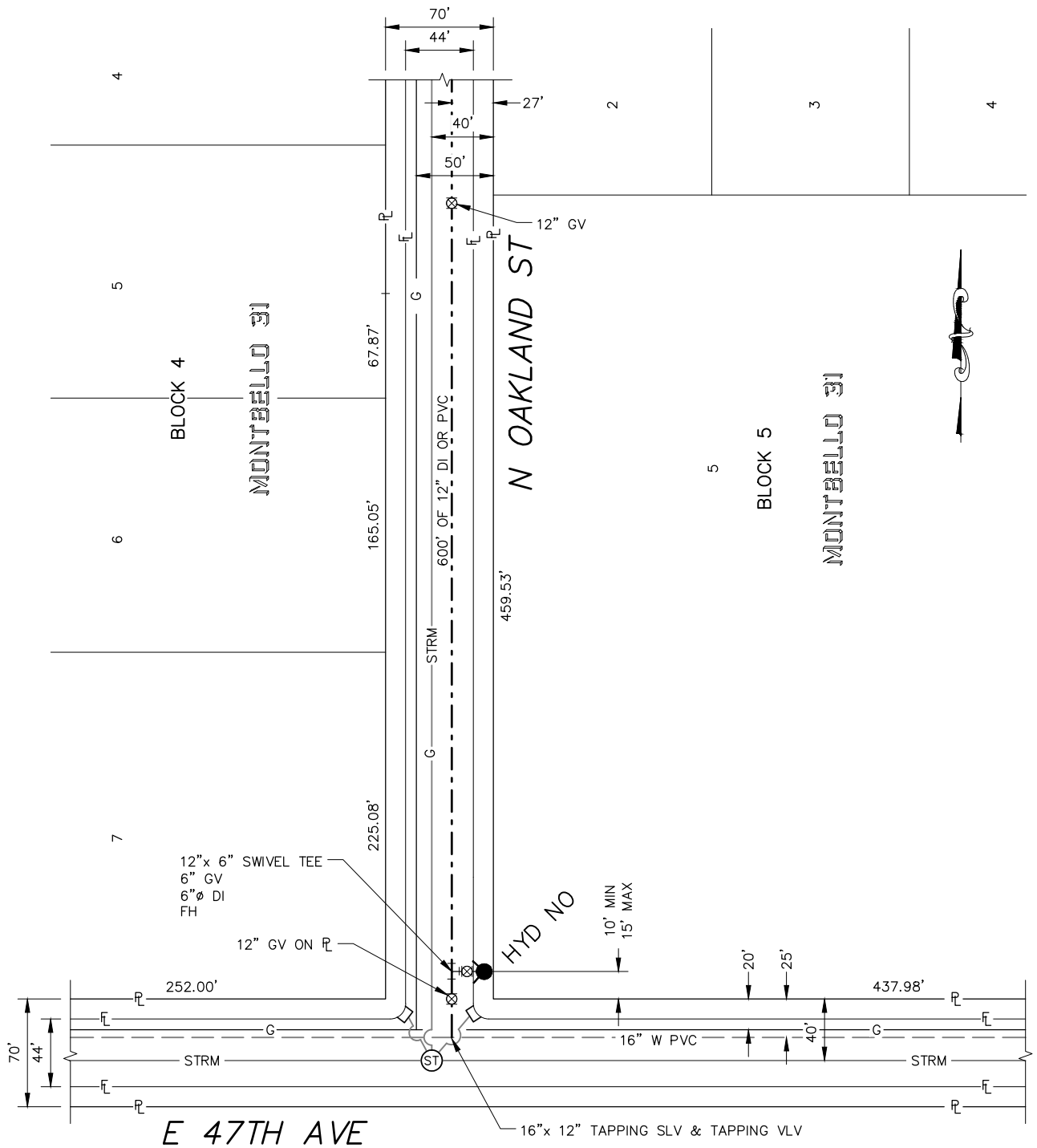
ORIGINATION DATE: JULY 2021

REVISION DATE:

33156
SLIPLINE WELDED LAP JOINT



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NOTES:

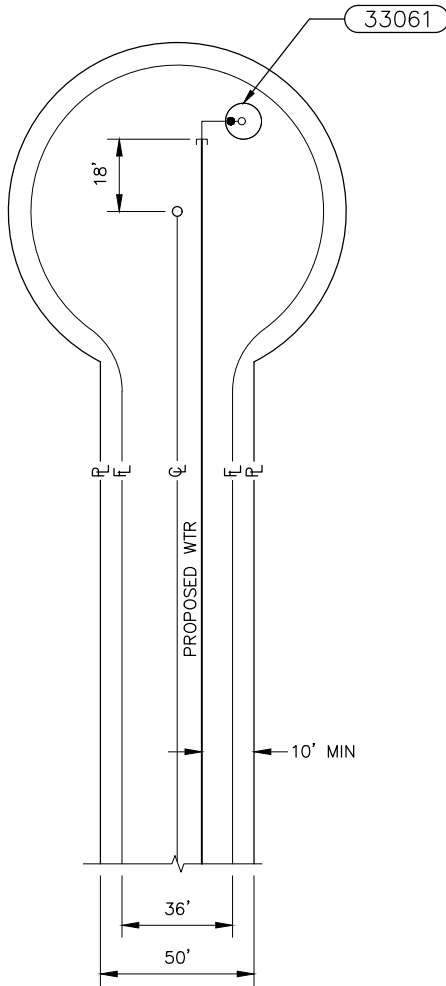
1. SEE TYPICAL PUBLIC RIGHT-OF-WAY CROSS SECTION, (33025).
2. FIRE HYDRANTS LOCATED AT POINTS OTHER THAN CORNER INTERSECTIONS SHALL BE LOCATED AT A LOT LINE EXTENDED.
3. HYDRANT NUMBER WILL BE ASSIGNED BY DENVER WATER.
4. REFER TO DENVER WATER CAD STANDARDS FOR SYMBOLS AND LEGEND.
5. WATER LINE PLANS SHALL BE DRAFTED IN ACCORDANCE WITH THE DENVER WATER CAD STANDARDS.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**33200
WATER DISTRIBUTION
SYSTEM TYPICAL LAYOUT**

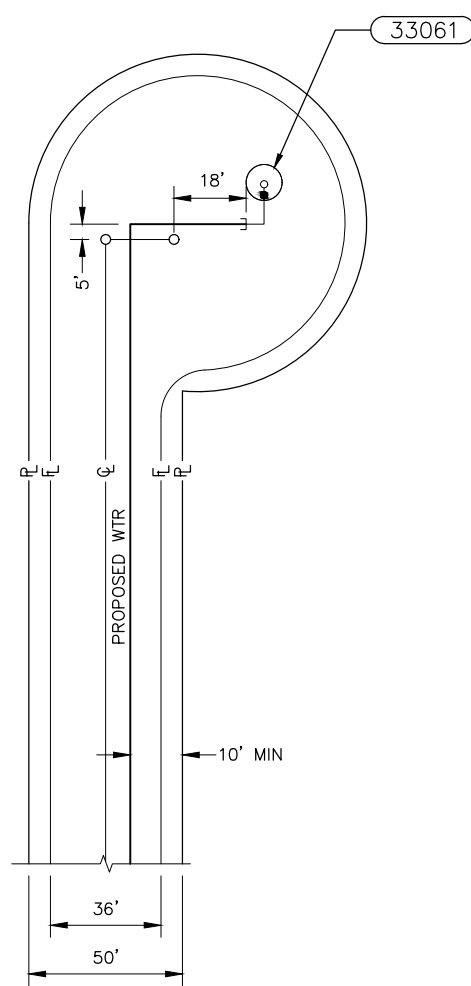
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**STRAIGHT
CUL-DE-SAC**

LAY PIPE TO 18'-0"
BEYOND THE CTR
(RADIUS POINT)
OF THE CUL-DE-SAC



**OFFSET
CUL-DE-SAC**

LAY PIPE TO 5'-0" BEYOND THE
POINT OF TANGENCY THEN TO 18'-0"
BEYOND THE CTR (RADIUS POINT) OF
THE CUL-DE-SAC

NOTES:

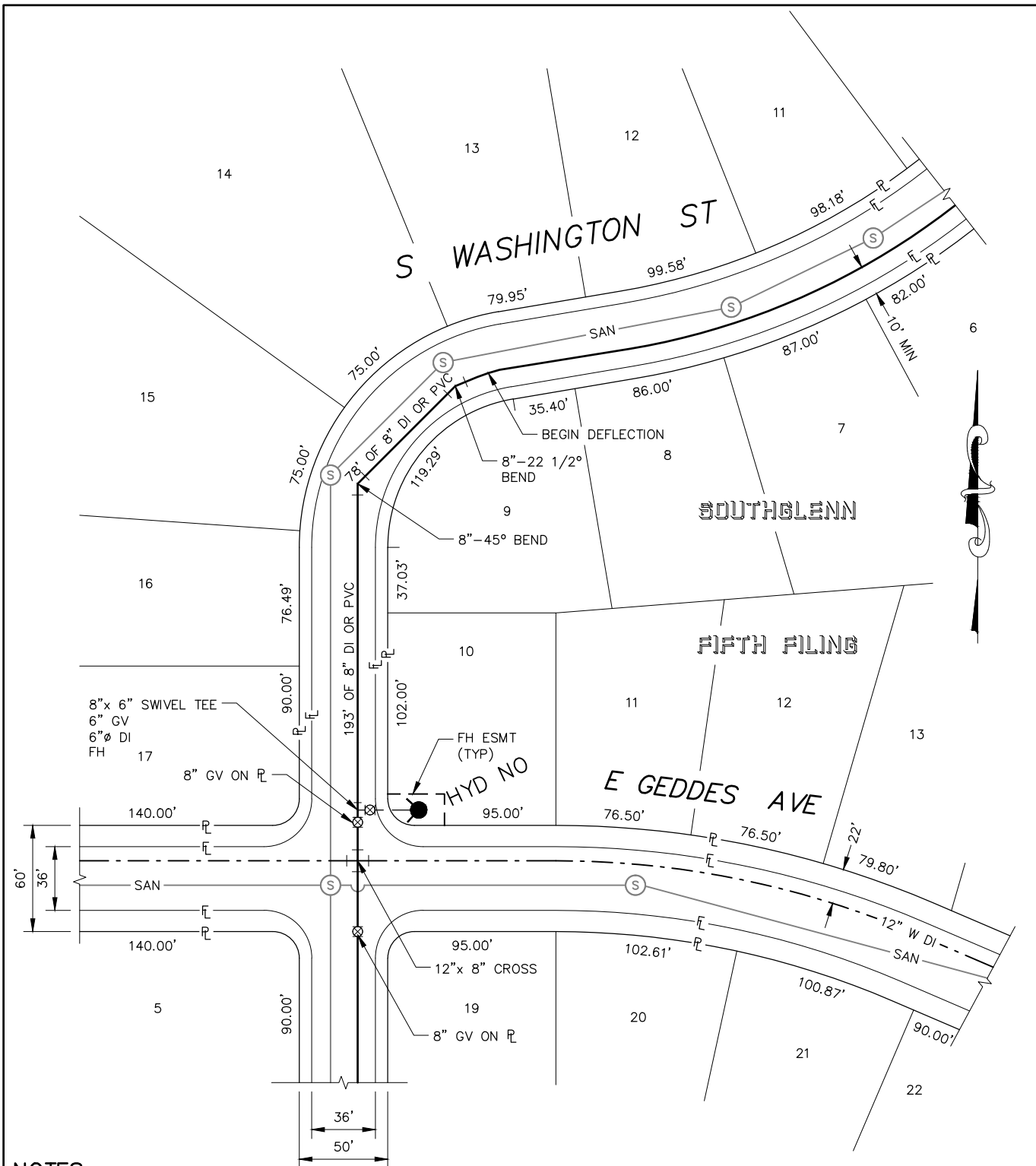
1. SEE TYPICAL PUBLIC RIGHT-OF-WAY SECTION, (33205).
2. FIRE HYDRANTS LOCATED AT POINTS OTHER THAN CORNER INTERSECTIONS SHALL BE LOCATED AT A LOT LINE EXTENDED.
3. REFER TO DENVER WATER CAD STANDARDS FOR SYMBOLS AND LEGEND.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**33201
WATER DISTRIBUTION
SYSTEM TYPICAL LAYOUT
FOR CUL-DE-SAC**



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NOTES:

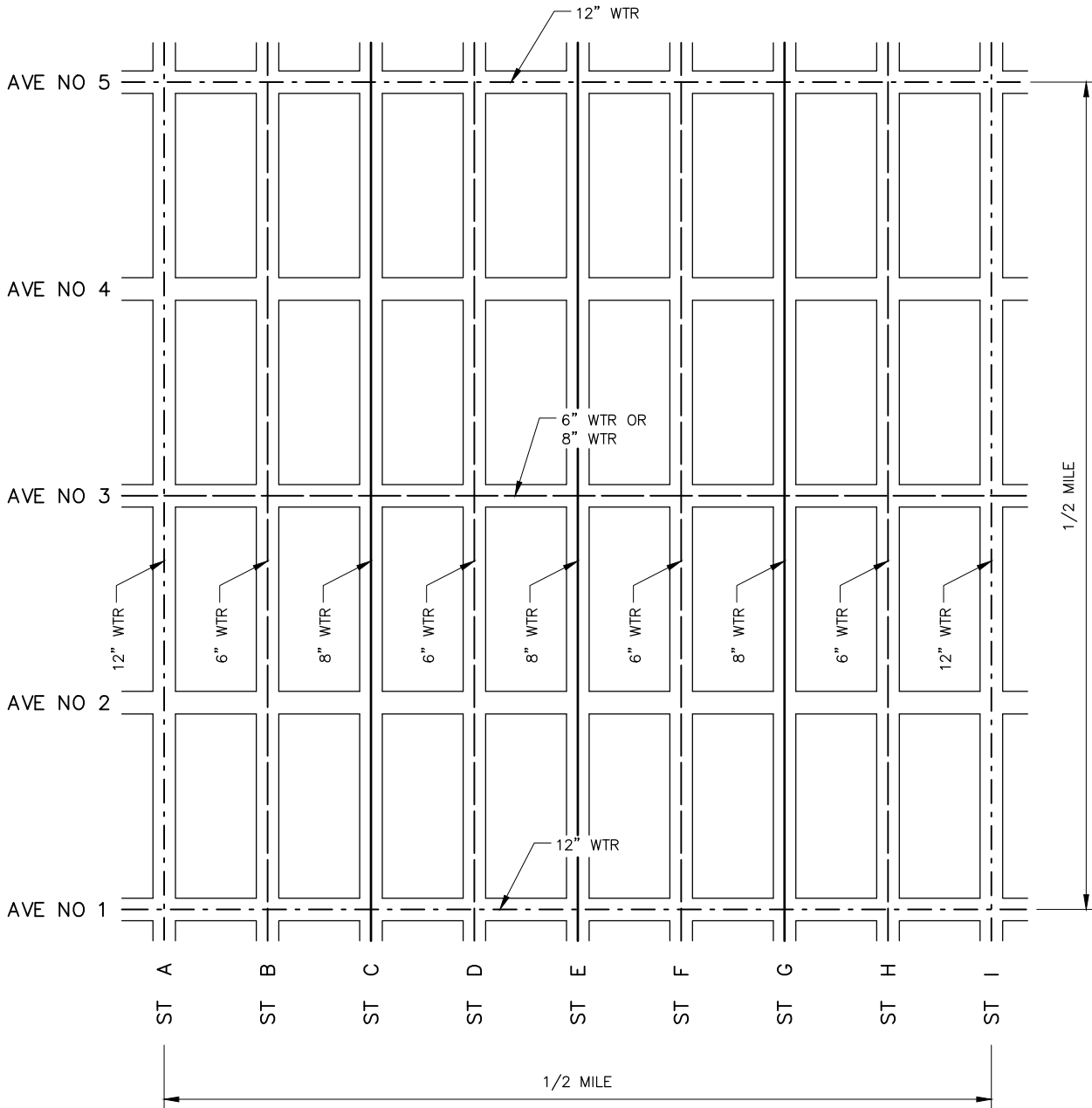
1. SEE TYPICAL PUBLIC RIGHT-OF-WAY SECTION, (33205).
2. FIRE HYDRANTS LOCATED AT POINTS OTHER THAN CORNER INTERSECTIONS SHALL BE LOCATED AT A LOT LINE EXTENDED.
3. HYDRANT NUMBER WILL BE ASSIGNED BY DENVER WATER.
4. REFER TO DENVER WATER CAD STANDARDS FOR SYMBOLS AND LEGEND.
5. WATER LINE PLANS SHALL BE DRAFTED IN ACCORDANCE WITH THE DENVER WATER CAD STANDARDS.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33202
WATER DISTRIBUTION
SYSTEM TYPICAL LAYOUT
FOR CURVED STREETS

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DRAWN BY: BAIREs

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

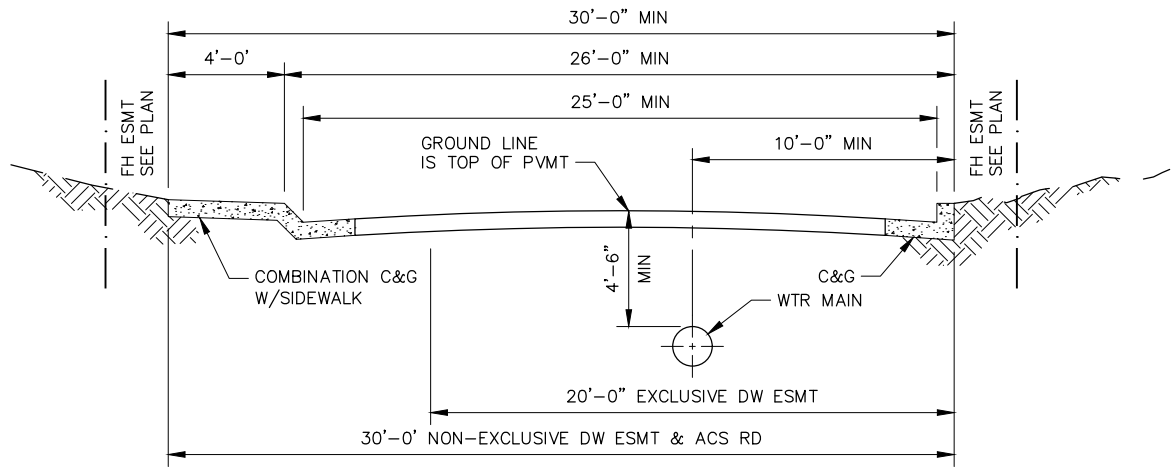
ORIGINATION DATE: JULY 2021

REVISION DATE:

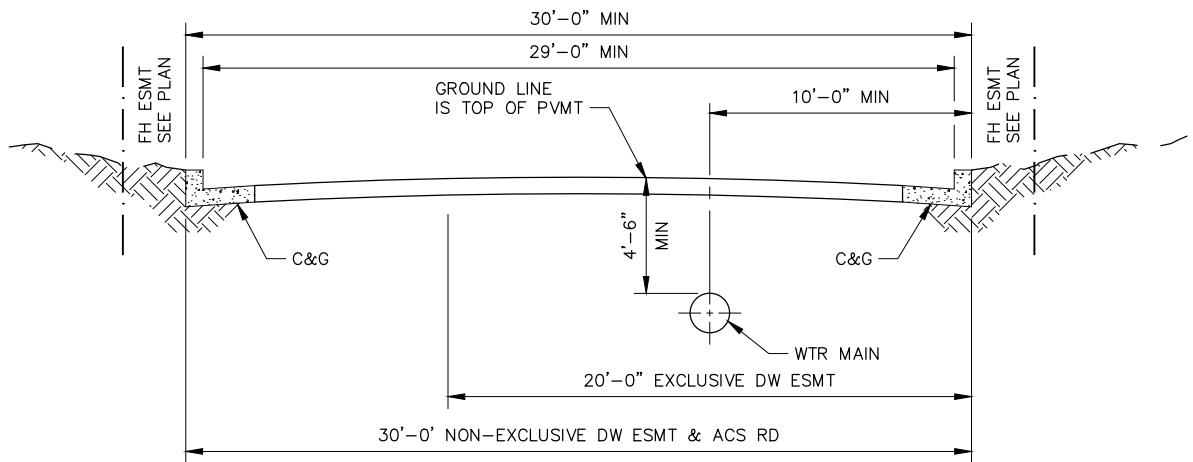
33203
 TYPICAL QUARTER SECTION
 HYDRAULIC GRID SYSTEM

D DENVER WATER

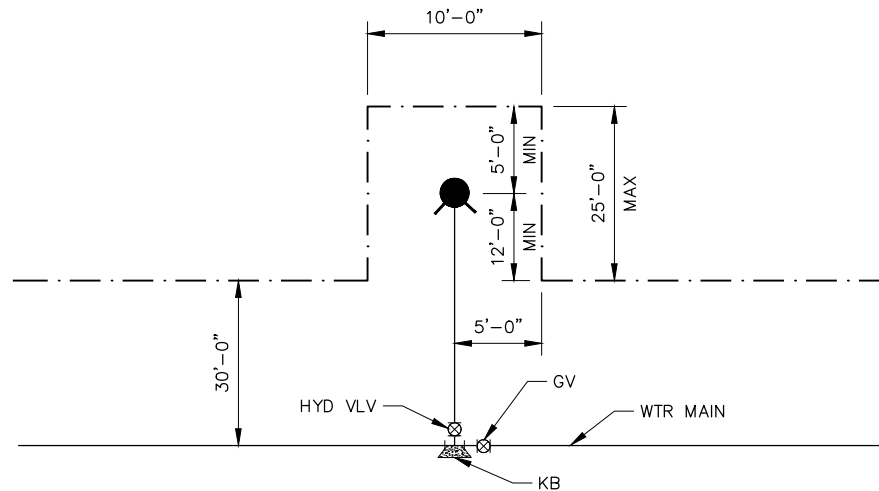
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CURB AND GUTTER WITH SIDEWALK



CURB AND GUTTER ONLY

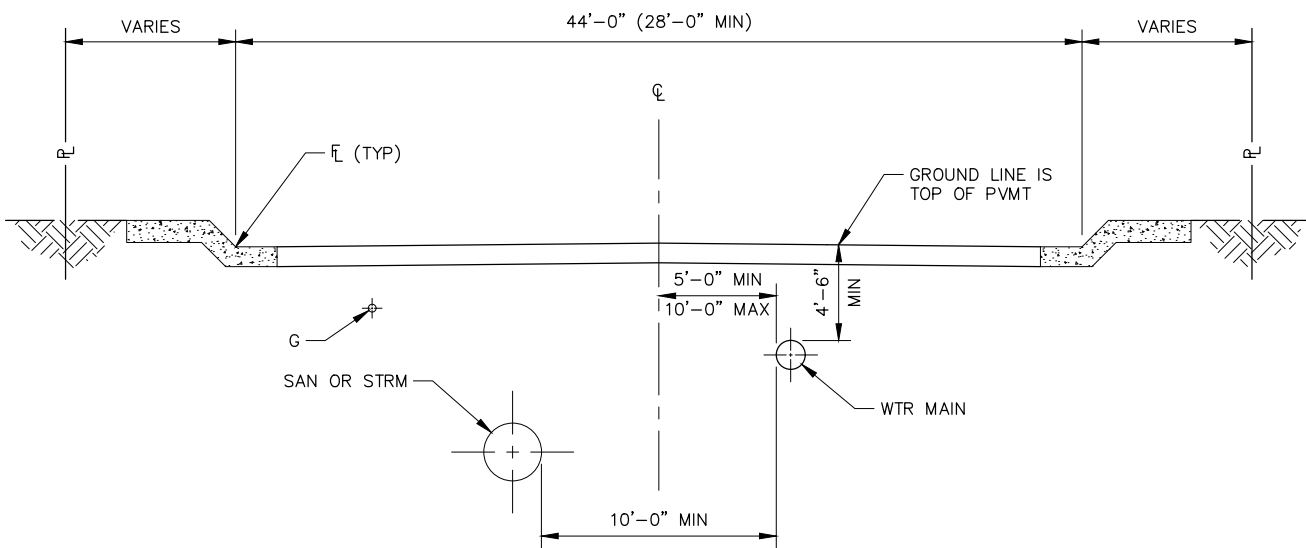


FIRE HYDRANT EASEMENT PLAN

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

**33204
TYPICAL PRIVATE
STREET SECTION**

DENVER WATER
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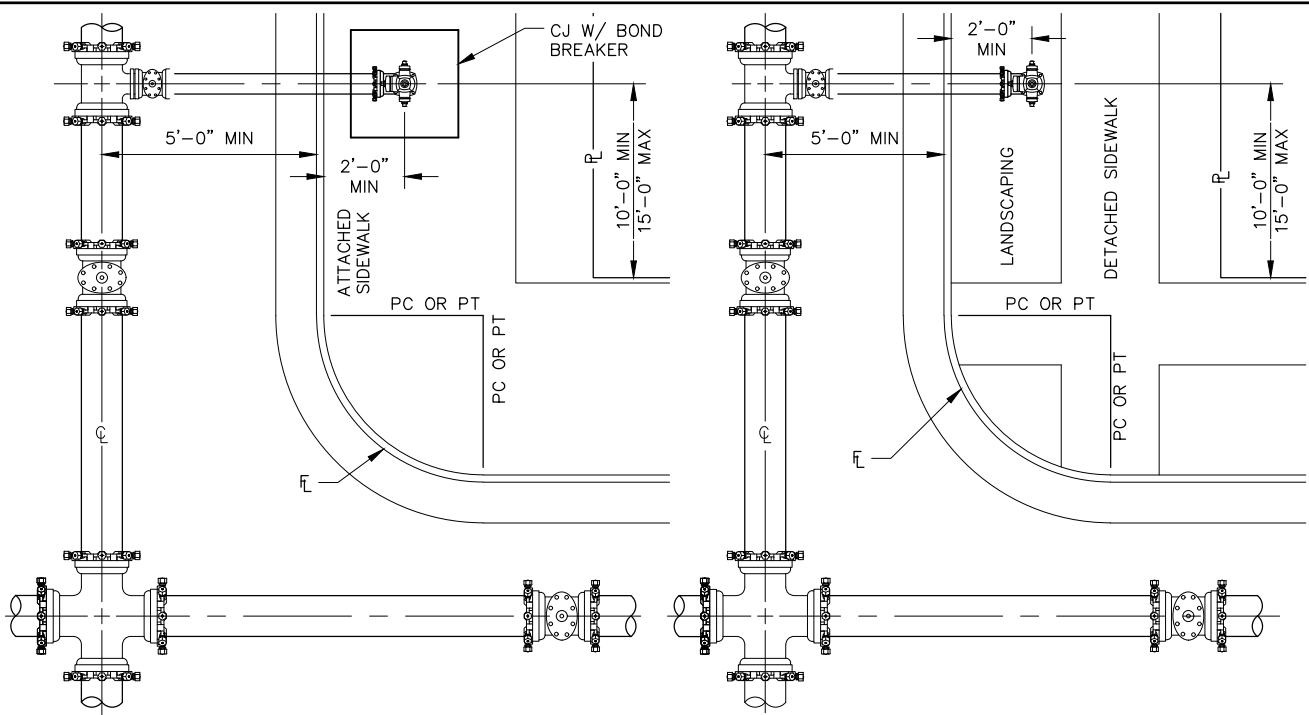
TYPICAL RIGHT-OF-WAY SECTION

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33205
TYPICAL PUBLIC
RIGHT-OF-WAY SECTION

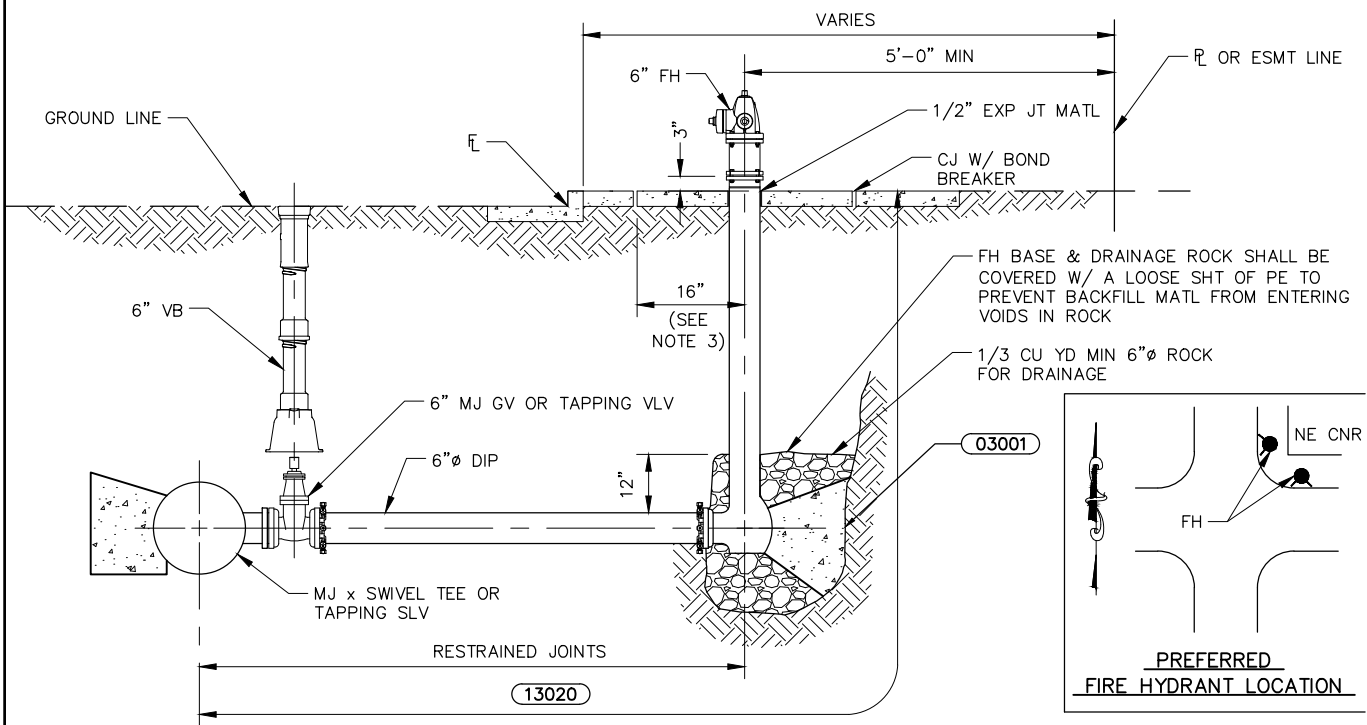


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TYPICAL ATTACHED SIDEWALK

TYPICAL DETACHED SIDEWALK



NOTES:

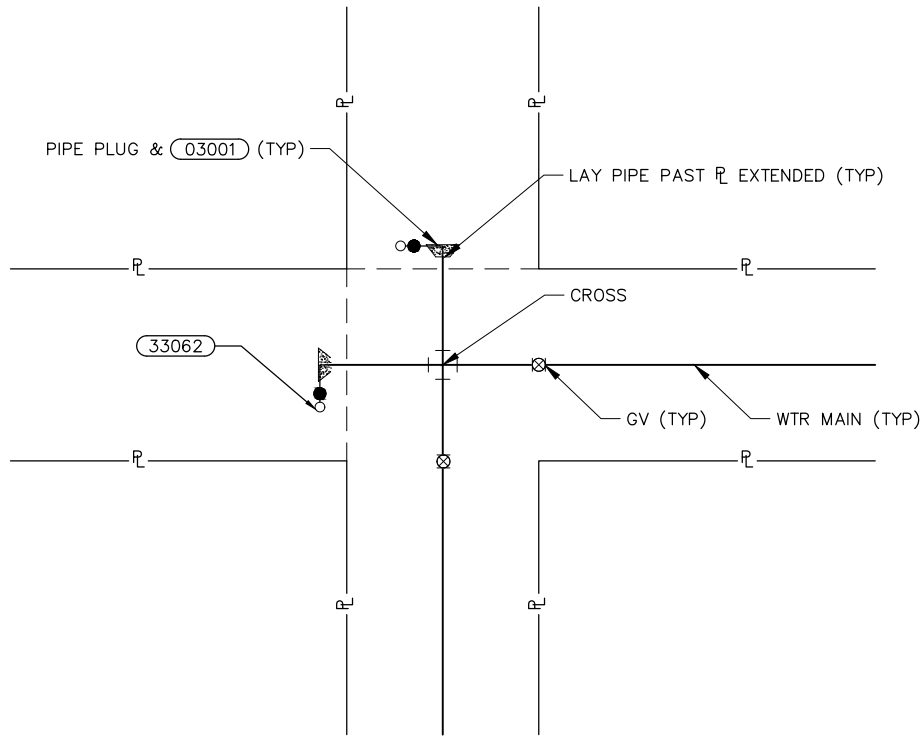
1. NO HORIZONTAL OR VERTICAL BENDS ARE ALLOWED IN FIRE HYDRANT BRANCH.
2. DO NOT COVER OR PLUG DRAIN HOLES WITH CONCRETE.
3. PROVIDE A 32 INCH BY 32 INCH BY 4 INCH CONCRETE PAD WITH CONSTRUCTION JOINT BOND BREAKERS WHEN FIRE HYDRANT IS INSTALLED IN SIDEWALK OR SIMILAR PAVED AREA.
4. FIRE HYDRANT SHALL NOT BE INSTALLED WITHIN CURB RAMP.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

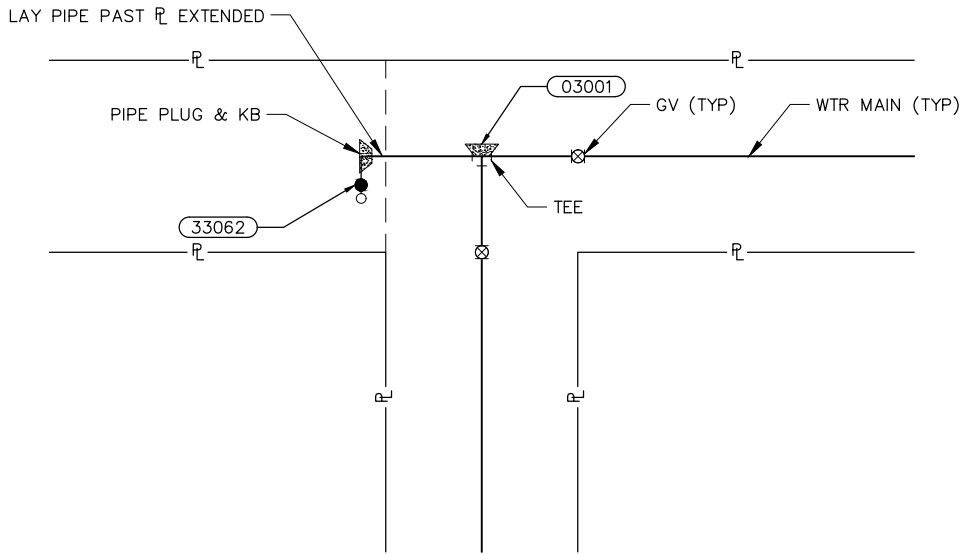
33206
PLAN, PROFILE, & LOCATION
FOR FIRE HYDRANTS, MAINS,
& VALVES

D DENVER WATER

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FOUR-WAY INTERSECTION



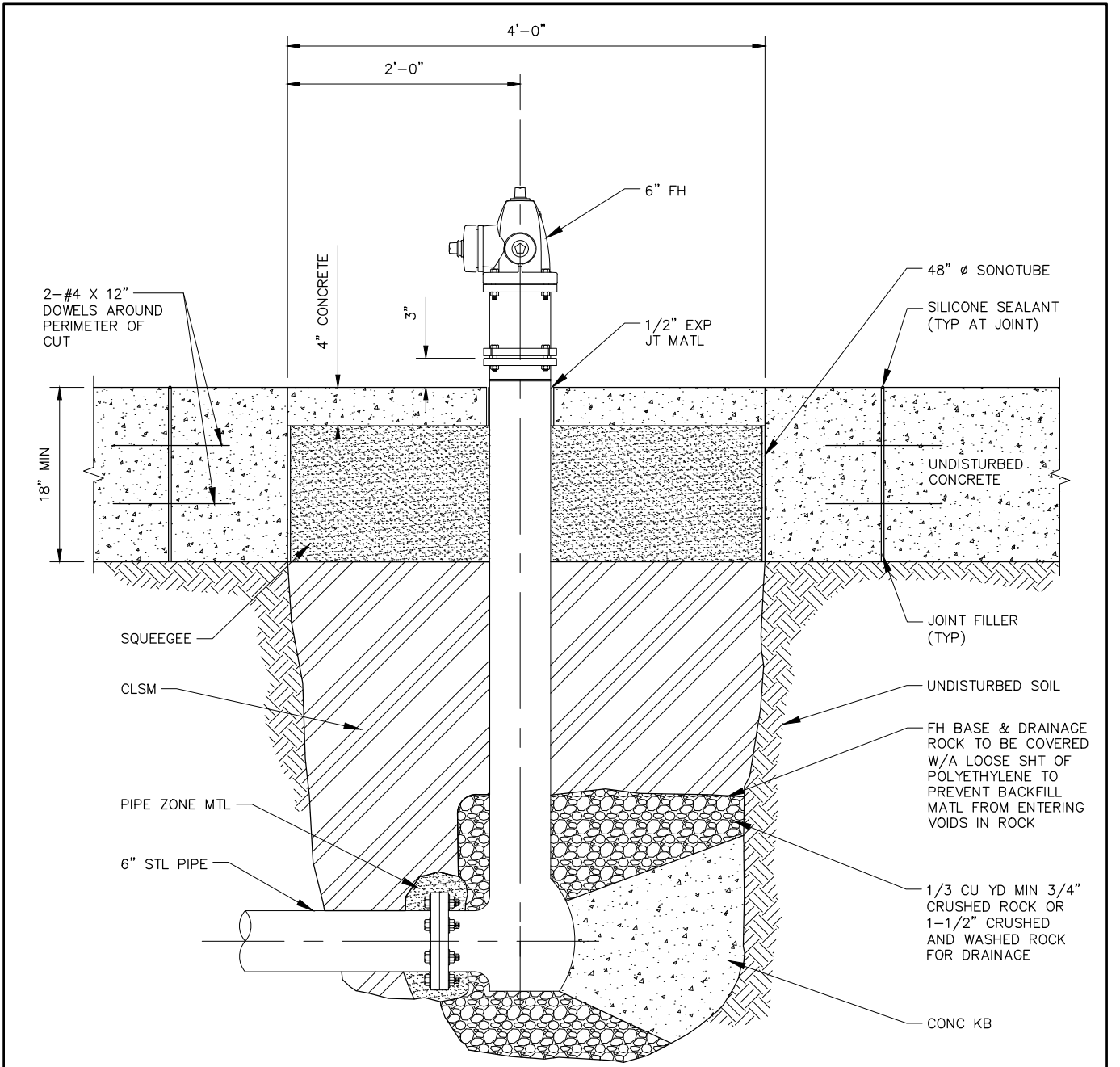
THREE-WAY INTERSECTION

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33207
PIPING AT STREET
INTERSECTIONS FOR
FUTURE CONNECTIONS

D DENVER WATER

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NOTES:

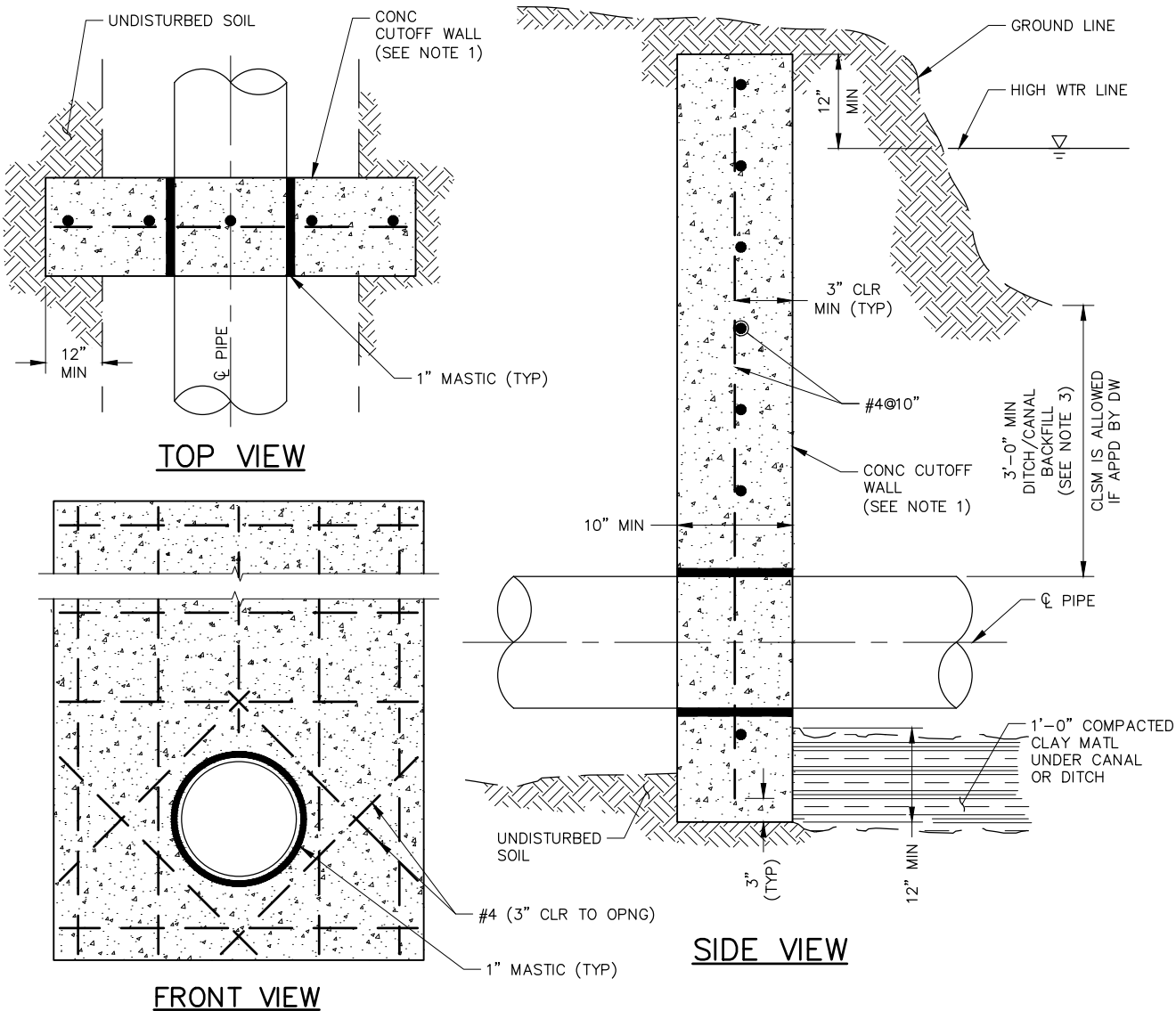
1. NO HORIZONTAL OR VERTICAL BENDS ARE ALLOWED IN THE FIRE HYDRANT BRANCH.
2. PROVIDE A 48-INCH DIAMETER SONOTUBE AROUND CIRCUMFERENCE OF FIRE HYDRANT.
3. COORDINATE CONSTRUCTION ACTIVITIES WITH DENVER INTERNATIONAL AIRPORT AND DENVER WATER CONSTRUCTION INSPECTION.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33208
DENVER INTERNATIONAL
AIRPORT AIRSIDE FIRE
HYDRANT ASSEMBLY

DENVER WATER

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NOTES:

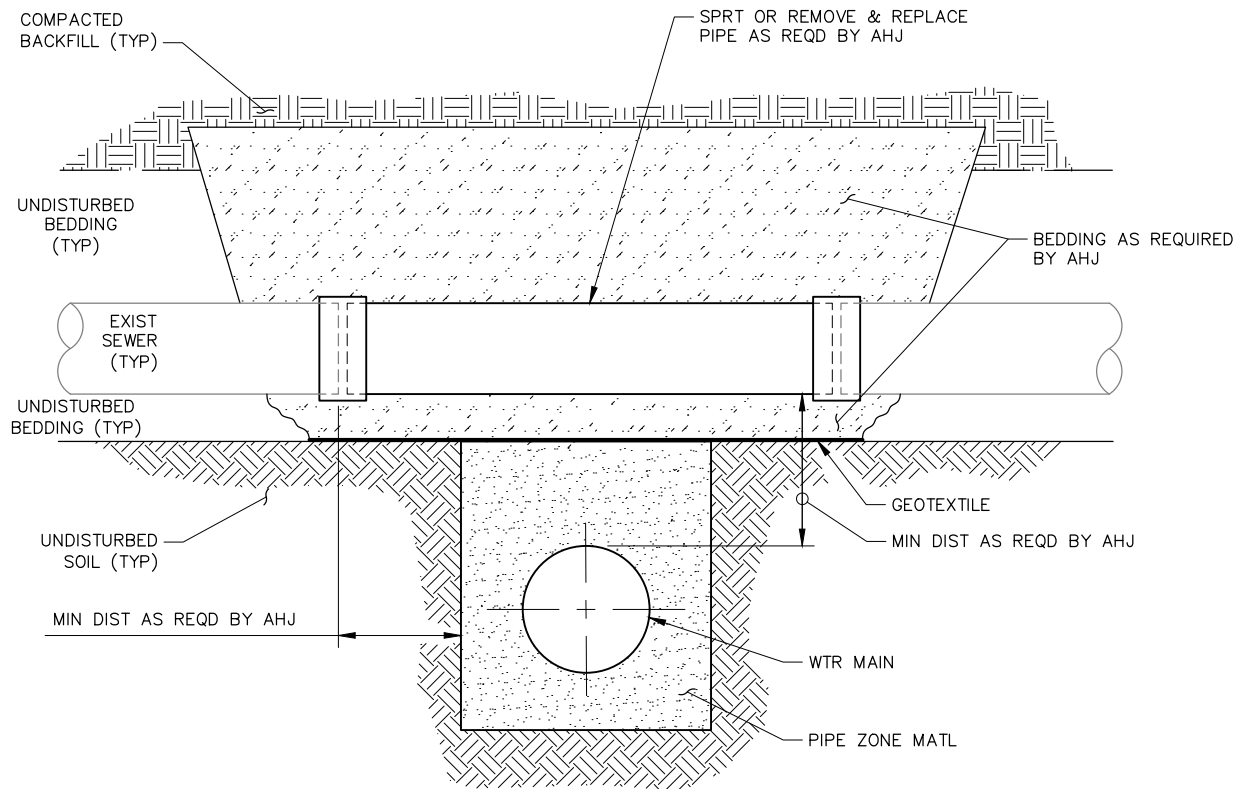
1. THE LOCATION RELATIVE TO THE DITCH OR CANAL, HEIGHT, AND WIDTH OF THE CONCRETE CUTOFF WALL WILL BE DETERMINED BY DENVER WATER AND OWNER.
2. THE PIPELINE CROSSING SHALL BE PERPENDICULAR TO THE DITCH OR CANAL.
3. DITCH/CANAL BACKFILL SPECIFICATIONS:
 - A) MATERIAL
 - PLASTICITY INDEX: GREATER THAN 7
 - GRADATION: 100 PERCENT PASSING NUMBER 4 SIEVE
50 PERCENT MINIMUM PASSING NUMBER 200 SIEVE
 - B) COMPACTION
 - 95 PERCENT MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D 698 WITH MOISTURE CONTENT FROM OPTIMUM TO 2 PERCENT ABOVE OPTIMUM.
 - PROVIDE A COPY OF A SOILS TEST REPORT WITH REQUIRED FINAL DENSITY FROM A CERTIFIED SOILS LAB PRIOR TO ANY MATERIAL INSTALLATION AT THE SITE.
 - NO ORGANIC FILL IS ALLOWED.
 - 12 INCH MINIMUM CLAY MATERIAL SHALL BE PLACED AND COMPACTED UNDER THE INSTALLATION.
 - CLAY MATERIAL SHALL ADHERE TO THE ABOVE REFERENCED SPECIFICATIONS AND SHALL BE INSTALLED THE ENTIRE LENGTH AND WIDTH OF EXCAVATION.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

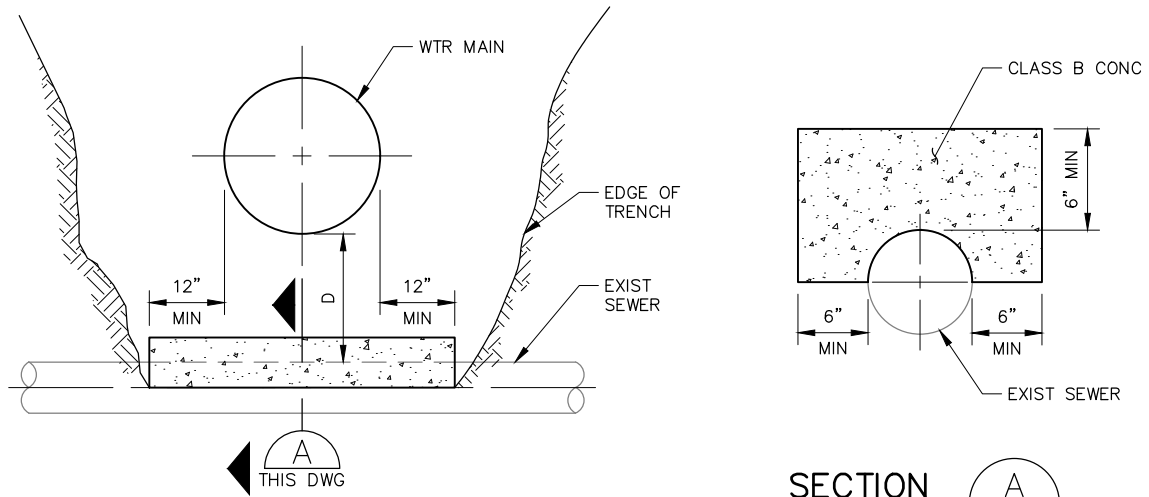
33214
DITCH OR CANAL CROSSING

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SEWER CROSSING OVER



SEWER CROSSING UNDER WITH D LESS THAN 2'

NOTES:

1. ANY EXISTING SEWER DAMAGED DURING INSTALLATION SHALL BE REPLACED AS REQUIRED BY APPLICABLE SEWER JURISDICTION.
2. ANY SUBDRAIN UNDER THE SEWER SHALL BE REPLACED SUCH THAT NO FLOW SHALL ENTER THE WATER LINE TRENCH.
3. CONFIRM REQUIREMENTS OF THIS DETAIL WITH AUTHORITY HAVING JURISDICTION.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

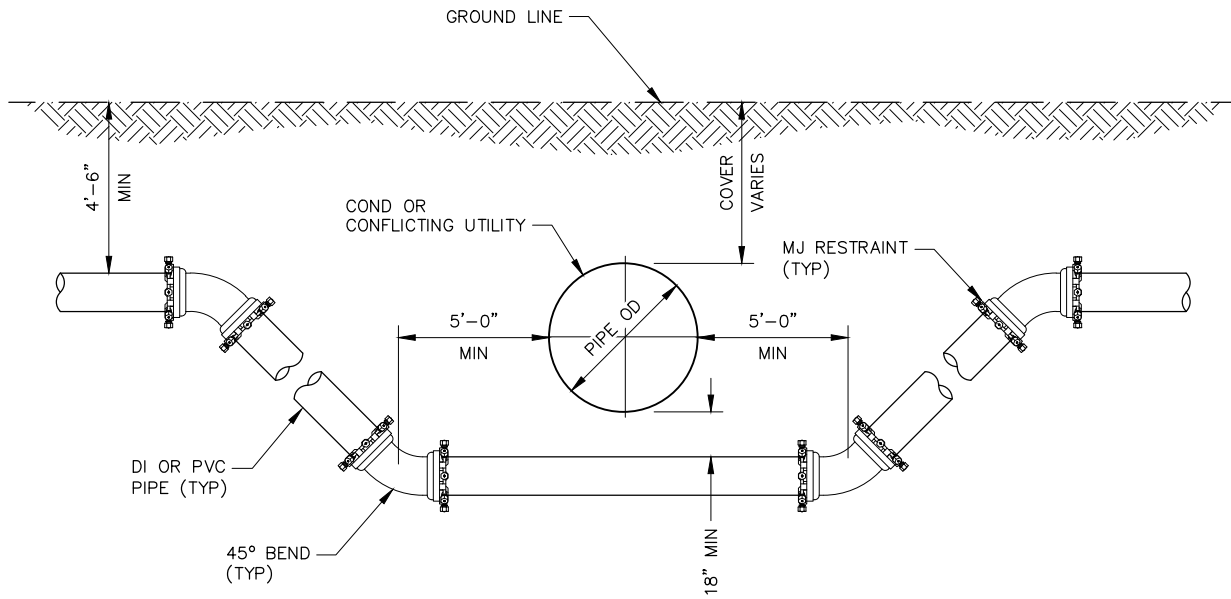
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

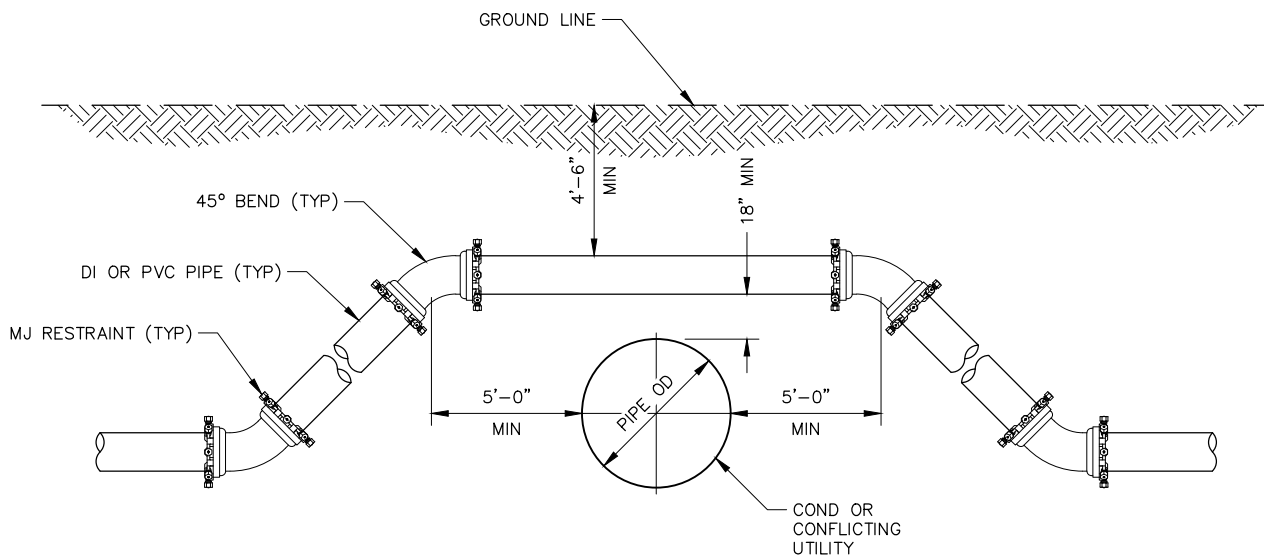
**33215
STORM AND SANITARY
SEWER CROSSING**

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CROSSING UNDER



CROSSING OVER

NOTE:

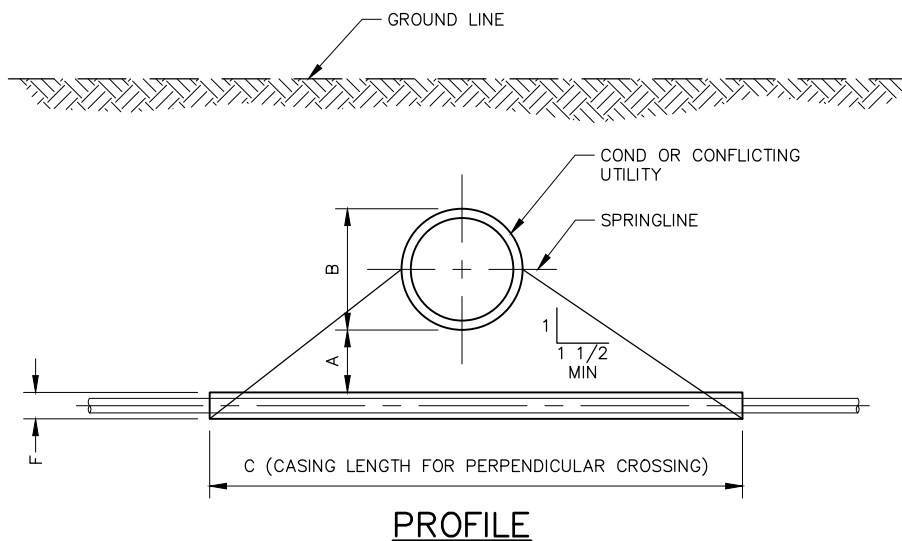
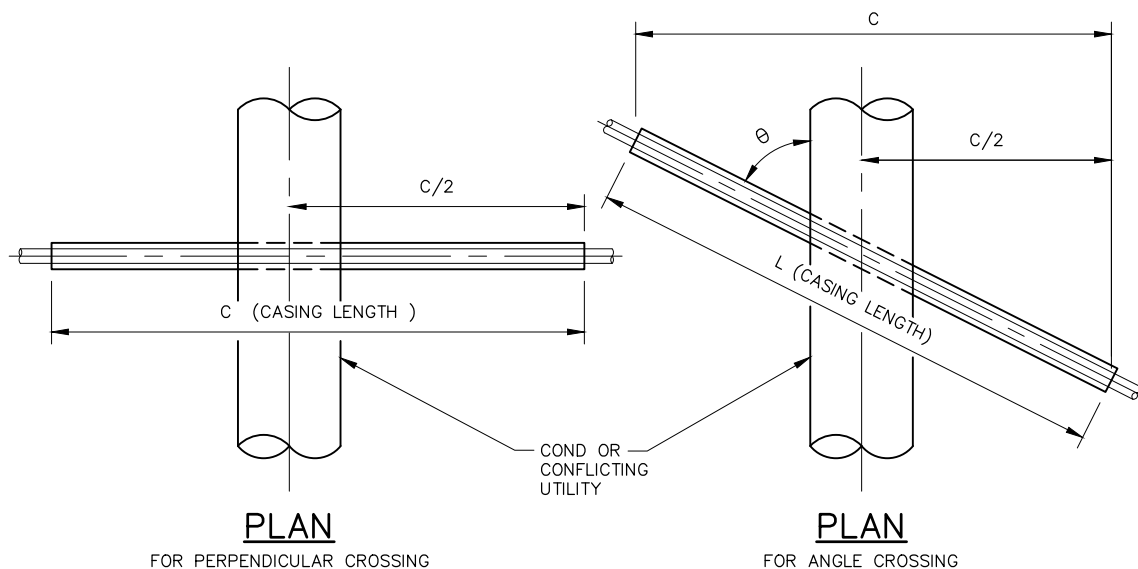
A BORED CROSSING MAY BE REQUIRED BY DENVER WATER.

DRAWN BY: BAIREs
CHKD BY: K ROSS / KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33216
OPEN CUT CROSSING OVER
OR UNDER CONDUIT OR
CONFLICTING UTILITY



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FORMULA FOR FINDING C: $C = B + (2)(1.5) \left[\frac{B}{2} + A + F \right]$

PERPENDICULAR CROSSING CASING LENGTH — C
 OD DW COND — B
 CONSTANT — (2)
 RATIO OF MIN SLOPE — 1.5

CASING OD — B
 VERT DIST BTWN CASING & DW COND — A
 1/2 OD DW COND — F

FORMULA FOR FINDING L: $L = \frac{C}{\sin \theta}$

NOTES:

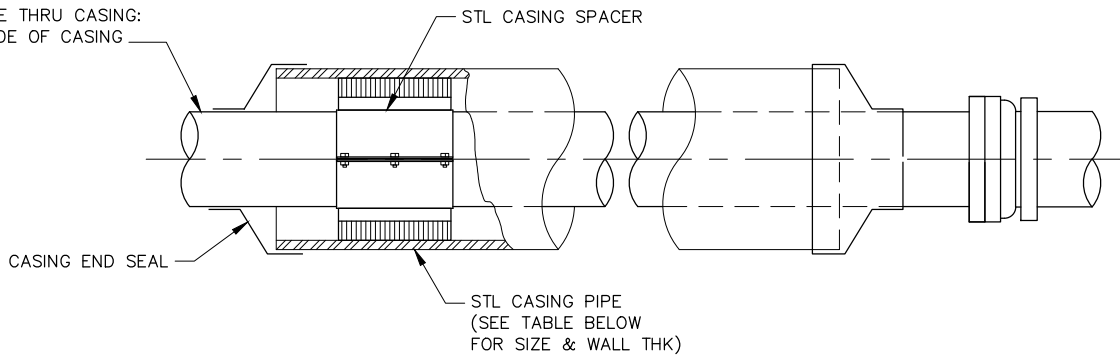
1. THE BORING AND CASING METHOD AND MATERIALS SHALL BE APPROVED IN WRITING BY DENVER WATER PRIOR TO CONSTRUCTION.
2. SOIL AT ENDS OF CASING SHALL BE STABLE AT ALL TIMES.
3. CATHODIC PROTECTION SHALL BE PROVIDED FOR STEEL CASING AS REQUIRED BY DENVER WATER.
4. CASING PIPE SHALL BE STRAIGHT, ROUND, AND OF NEW MATERIAL.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

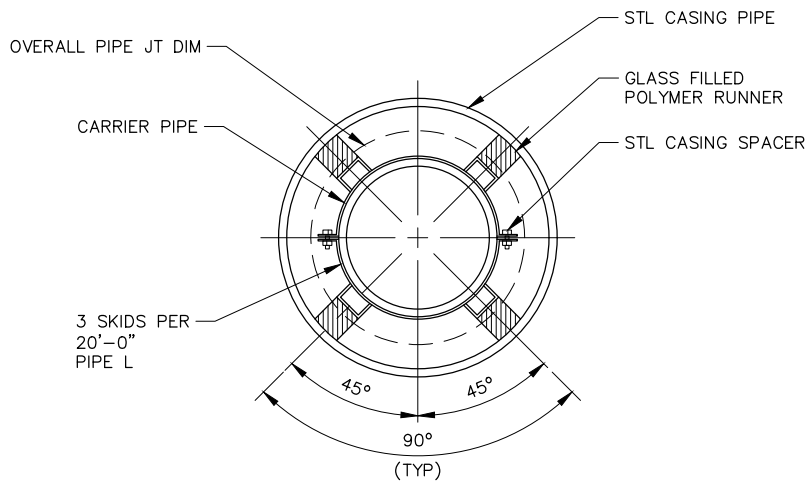
**33217
BORED CROSSING**

DENVER WATER
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CARRIER PIPE THRU CASING:
5'-0" OUTSIDE OF CASING



SLED



PIPE CASING

CARRIER PIPE NOMINAL ϕ	CASING PIPE	
	MIN OD	MIN WALL THICKNESS
4"	12"	0.25"
6"	16"	0.3125"
8"	18"	0.3125"
12"	22"	0.375"
16"	28"	0.500"
20"	32"	0.500"

NOTE:

CASING LENGTH CALCULATED ACCORDING TO 33217.

DRAWN BY: BAIREs

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

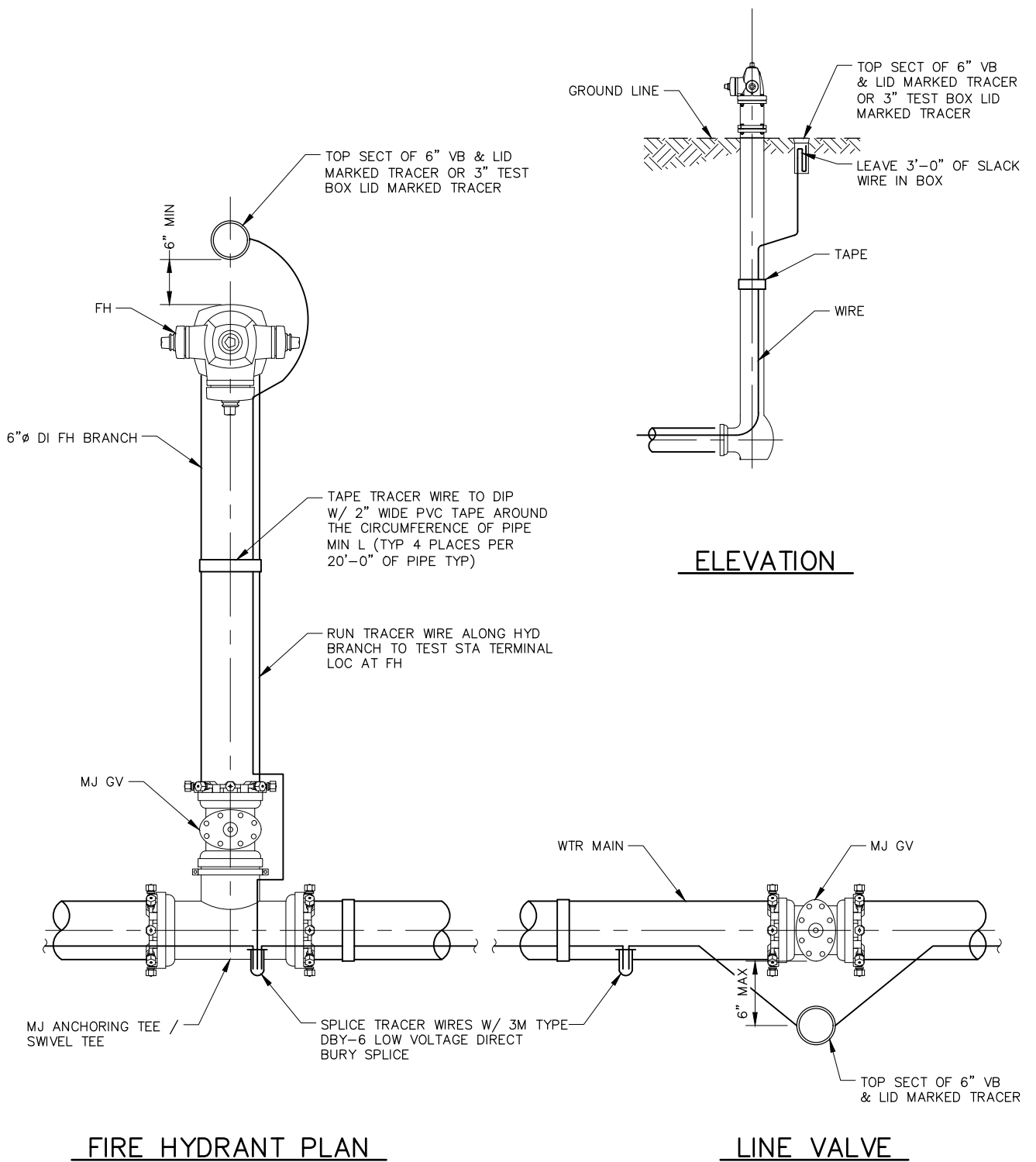
ORIGINATION DATE: JULY 2021

REVISION DATE:

**33218
BORE CASING DETAIL**



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DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

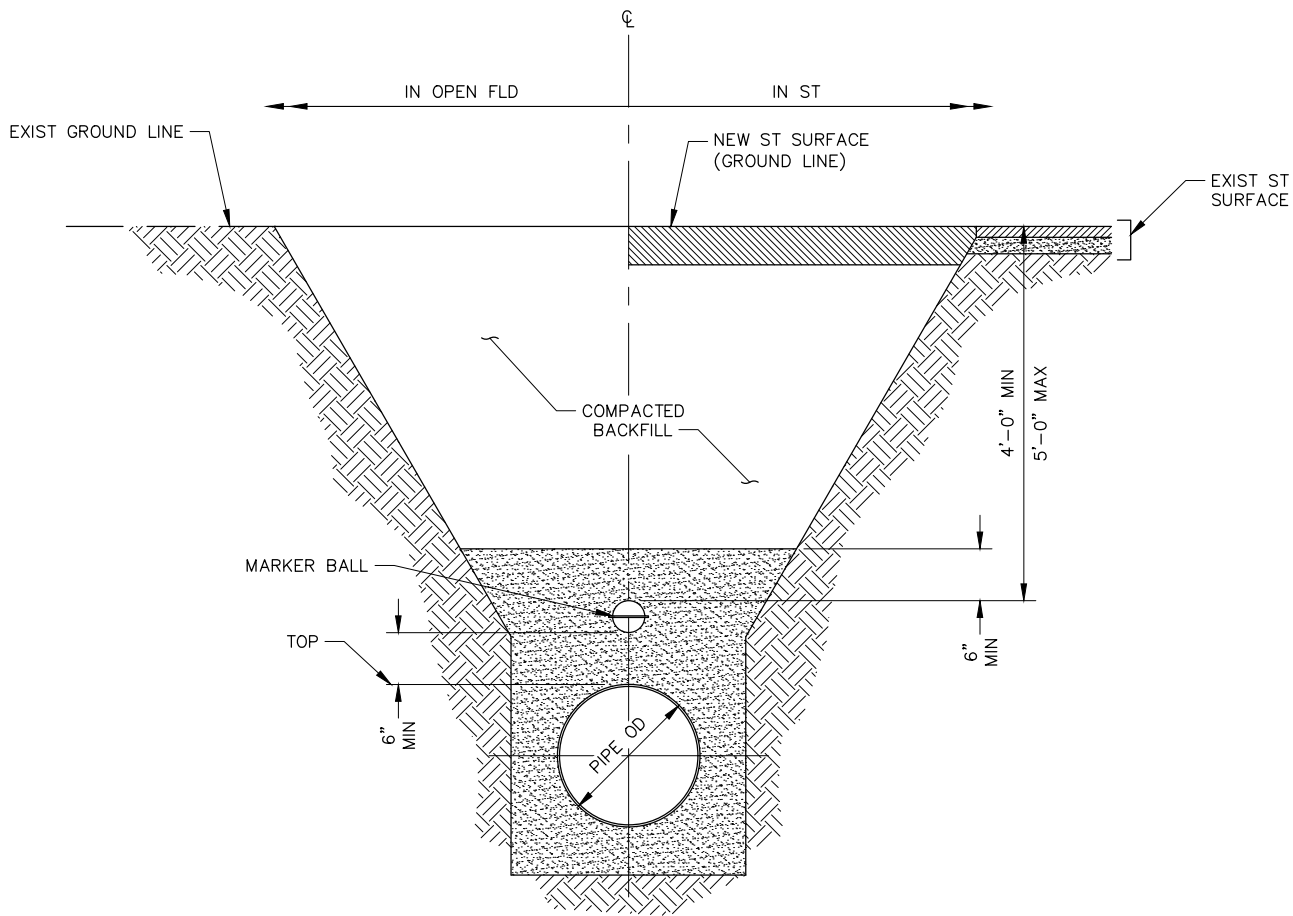
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

**33225
TRACER WIRE INSTALLATION
FOR PVC WATER MAIN**



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NOTES:

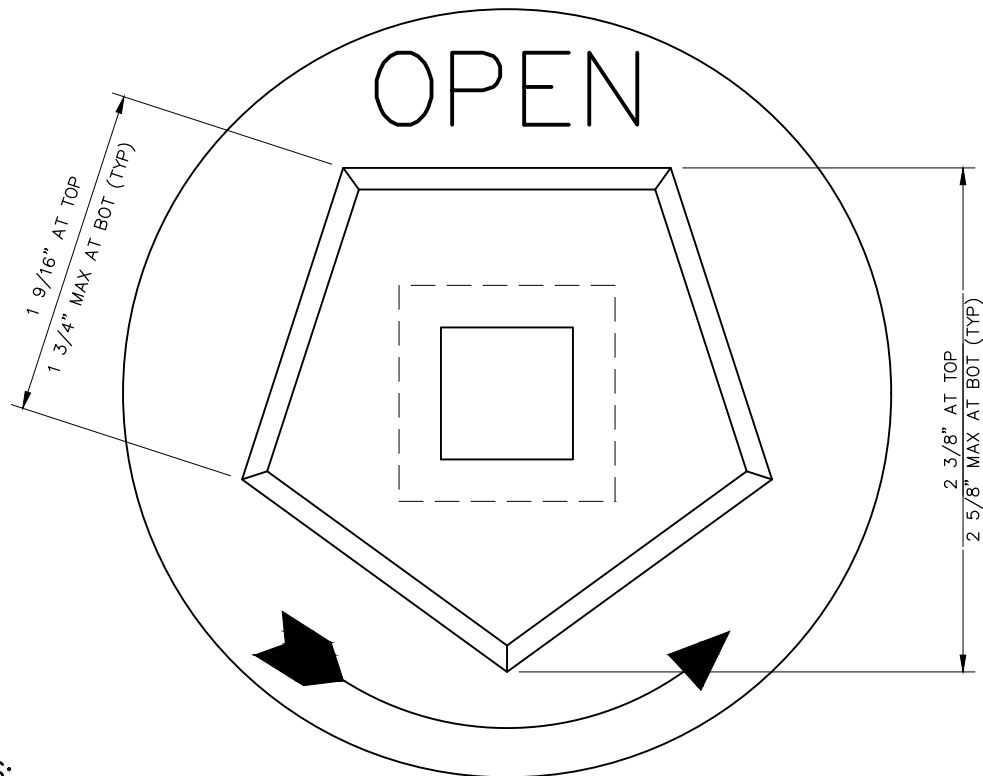
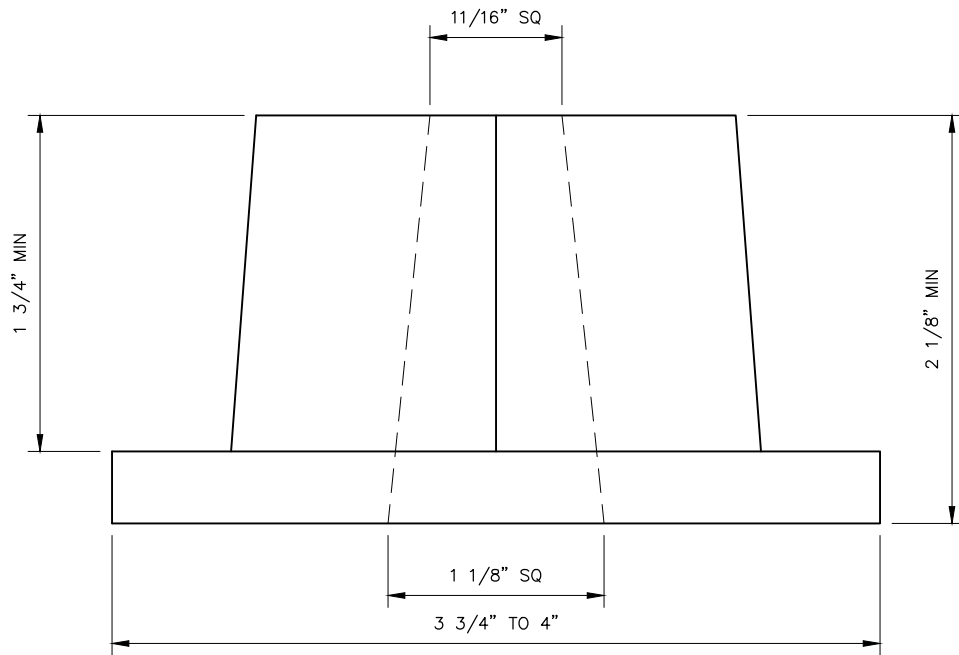
1. INSTALL MARKER BALLS AT 4 FEET MINIMUM, 5 FEET MAXIMUM DEPTH. IF PIPE OR APPURTENANCE IS MORE THAN 5 FEET DEEP, BACKFILL TO 4 FEET DEEP AND INSTALL MARKER BALLS.
2. INSTALL MARKER BALLS AFTER PIPE OR APPURTENANCE IS FULLY BEDDED.
3. COVER MARKER BALL WITH 6 INCHES OF BEDDING BY HAND TO KEEP THEM FROM MOVING. ACCOMPLISH THIS BY TWISTING THE MARKING BALL INTO THE BEDDING AND THEN COVERING IT UP.
4. BACKFILL THE TRENCH AFTER MARKER BALL HAS BEEN COVERED.
5. INSTALL THE FIRST MARKER BALL AT THE PROPERTY LINE VALVE RECORDING THE LOCATION WITH GPS COORDINATES.
6. INSTALL MARKER BALLS EVERY 40 FEET ALONG PIPE INSTALLATION.
7. INSTALL MARKER BALLS AT ALL HORIZONTAL BENDS.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33226
NON-PROGRAMMABLE
MARKER BALL INSTALLATION



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NOTES:

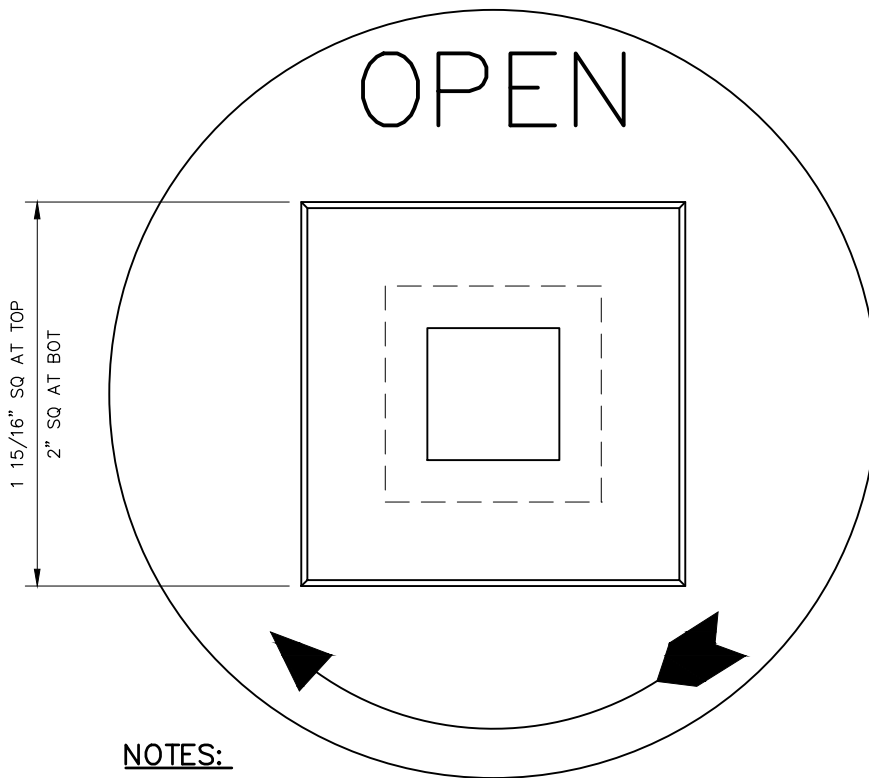
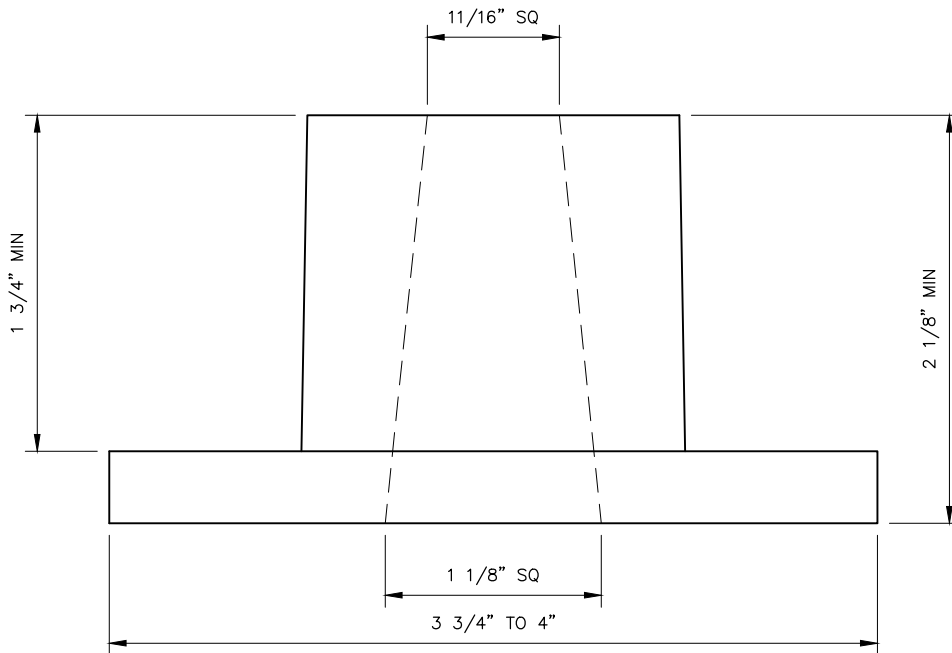
1. NUT MATERIAL SHALL BE CAST IRON IN ACCORDANCE WITH ASTM A 126 CLASS B OR DUCTILE IRON IN ACCORDANCE WITH ASTM A 536.
2. HOLE THROUGH NUT TO MATCH VALVE ACTUATOR SHAFT OR VALVE STEM EXTENSION. HOLE SHOWN FITS VALVE OPERATOR EXTENSION ON (05012).
3. NUT SHALL BE COATED WITH FUSION-BONDED EPOXY, OR LIQUID EPOXY, MINIMUM 16 MIL DRY FILM THICKNESS IN ACCORDANCE WITH AWWA C210, FEDERAL COLOR NO 2577U.
4. AN ARROW AND THE WORD OPEN SHALL BE CAST ON THE FLANGE BASE TO INDICATE DIRECTION OF OPENING IN ACCORDANCE WITH AWWA C509.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33252
RECYCLE WATER SYSTEM
PENTAGON OPERATING NUT

D DENVER WATER

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NOTES:

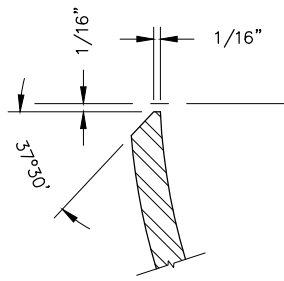
1. NUT MATERIAL SHALL BE CAST IRON IN ACCORDANCE WITH ASTM A 126 CLASS B OR DUCTILE IRON IN ACCORDANCE WITH ASTM A 536.
2. HOLE THROUGH NUT TO MATCH VALVE ACTUATOR SHAFT OR VALVE STEM EXTENSION. HOLE SHOWN FITS VALVE OPERATOR EXTENSION ON (05012).
3. NUT SHALL BE COATED WITH FUSION-BONDED EPOXY, OR LIQUID EPOXY, MINIMUM 16 DRY FILM THICKNESS DFT IN ACCORDANCE WITH AWWA C210. FEDERAL COLOR NO 38913.
4. AN ARROW AND THE WORD OPEN SHALL BE CAST ON THE FLANGE BASE TO INDICATE DIRECTION OF OPENING IN ACCORDANCE WITH AWWA C509.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

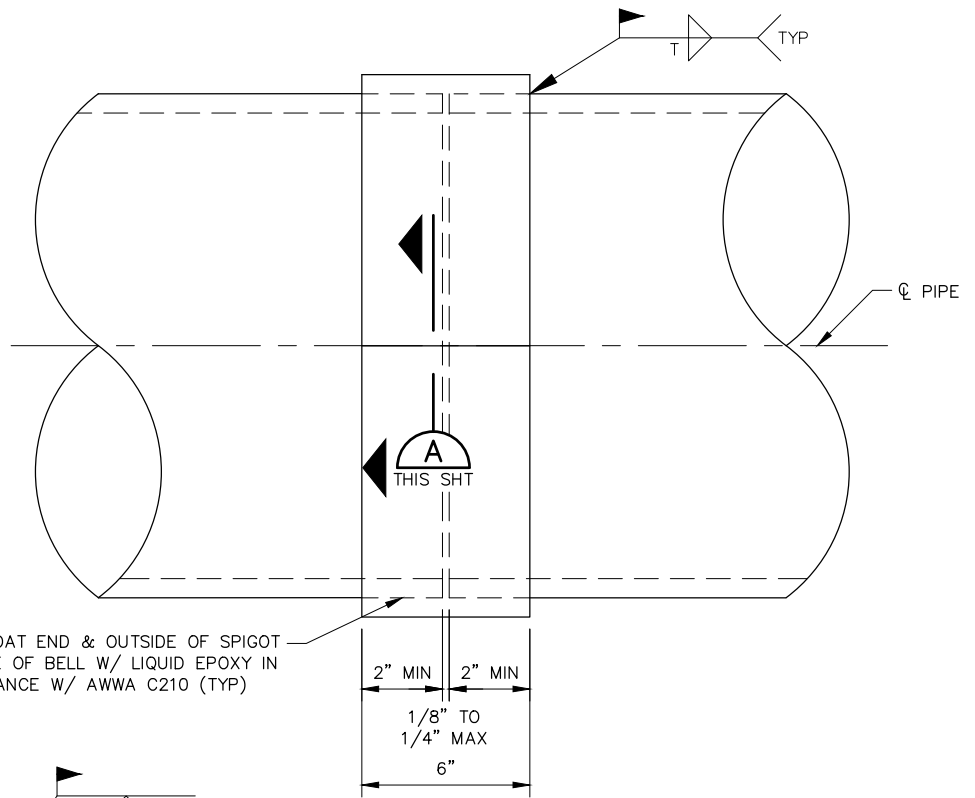
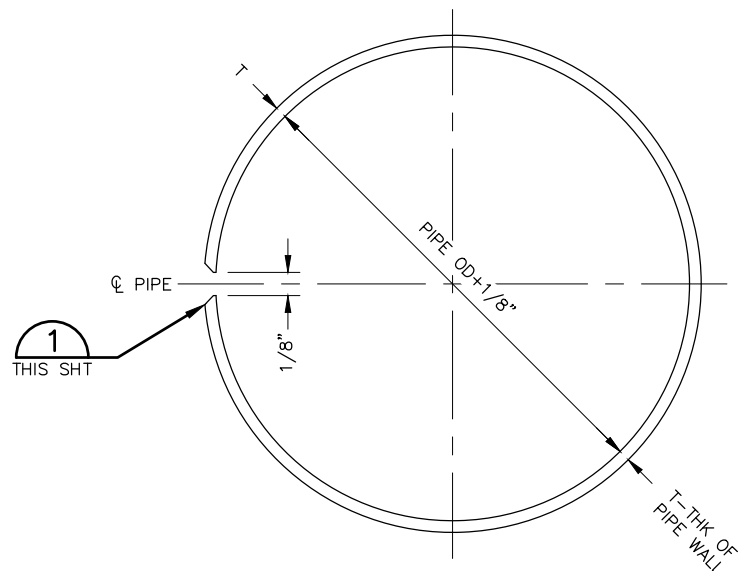
33253
POTABLE WATER SYSTEM
SQUARE OPERATION NUT



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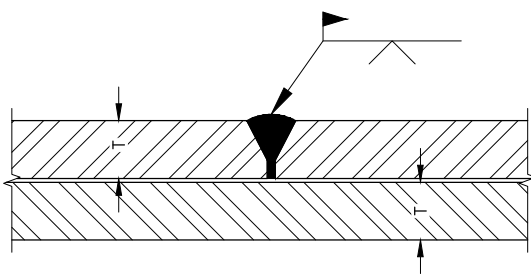


DETAIL 1
THIS SHT



SHOP COAT END & OUTSIDE OF SPIGOT & INSIDE OF BELL W/ LIQUID EPOXY IN ACCORDANCE W/ AWWA C210 (TYP)

ELEVATION



SECTION A
THIS SHT

NOTE:

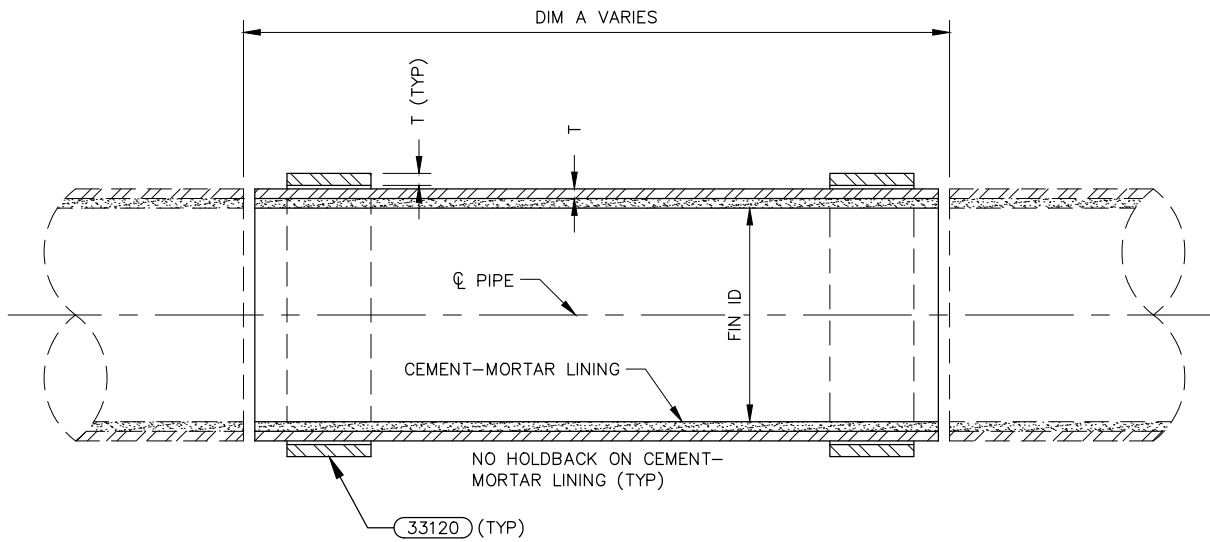
AFTER INSTALLATION, CLOSURE ASSEMBLY SHALL BE FIELD COATED WITH SAME BASIC COATING AS MAIN PIPELINE.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

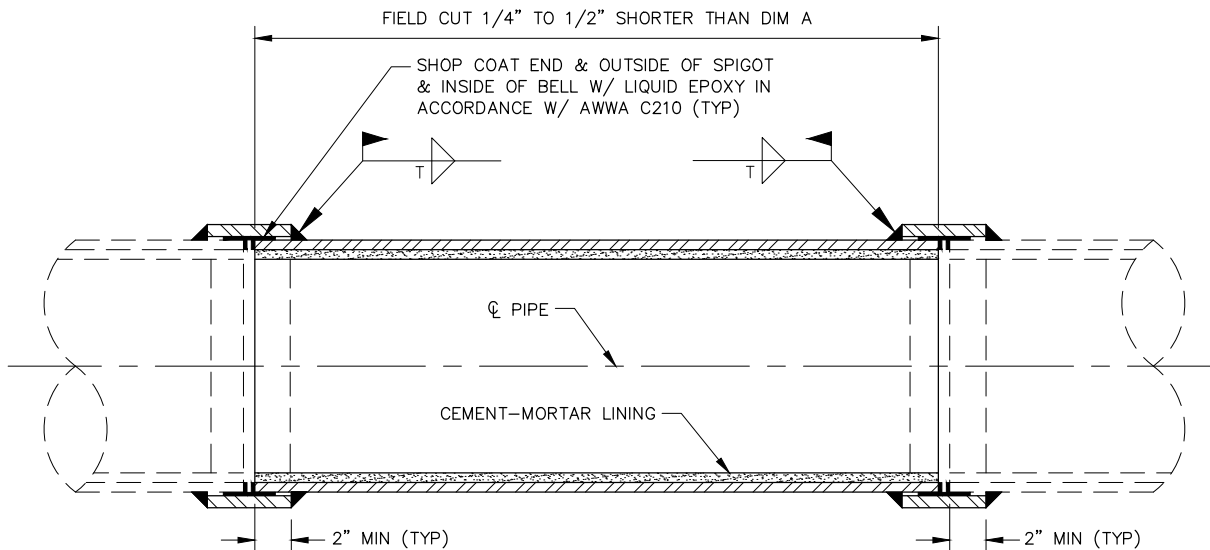
33254
ONE PIECE BUTTSTRAP
20" & SMALLER

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OPEN POSITION



CLOSED POSITION

NOTE:

AFTER INSTALLATION, CLOSURE ASSEMBLY SHALL BE FIELD COATED WITH SAME COATING AS MAIN PIPELINE.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33255
20" & SMALLER CLOSURE
(STEEL PIPE)



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NOTES

1. AN ON-SITE PRECONSTRUCTION MEETING WITH DENVER WATER IS REQUIRED FOR TAPS AND SERVICE LINES 1-INCH AND LARGER AND PROJECTS INVOLVING MORE THAN ONE TAP AND SERVICE. PRECONSTRUCTION MEETINGS AND METER INSPECTIONS MAY BE SCHEDULED BY CALLING DENVER WATER AT 303-628-6145.
2. THE METER AND AMR/AMI DEVICE LOCATION SHALL BE APPROVED BY DENVER WATER METER INSPECTION. METER SETTINGS 1-INCH AND LARGER SHALL BE APPROVED IN THE FIELD BY DENVER WATER PRIOR TO THE INSTALLATION OF ANY SERVICE LINE OR TAP.
3. SERVICE LINES WILL NOT BE ACTIVATED UNLESS THE TAP, METER SETTING, AND SERVICE LINE ARE IN ACCORDANCE WITH THE CURRENT VERSION OF THE DENVER WATER ENGINEERING STANDARDS, APPROVED PROJECT DRAWINGS, AND WRITTEN METER INSPECTION INSTRUCTIONS, AS APPLICABLE. DEVIATIONS FROM THESE PLANS AND STANDARDS MUST BE APPROVED IN ADVANCE AND IN WRITING BY DENVER WATER.
4. METER PITS AND VAULTS SHALL BE FLUSH WITH THE FINAL GRADE OF THE LANDSCAPE, WHICH MUST INCLUDE PROPER DEPTH OF SOIL AMENDMENT. IF THE STREET OR GROUND IS NOT TO FINAL GRADE AT THE TIME OF THE METER INSTALLATION OR INSPECTION, THE OWNER MUST RAISE OR LOWER THE METER PIT/VAULT WHEN FINAL GRADE IS ESTABLISHED. THE METER SETTING MUST BE ADJUSTED TO THE ENGINEERING STANDARDS AFTER THE METER PIT/VAULT GRADE HAS BEEN ADJUSTED.
5. PROTECT CURB BOXES, METER PITS, METER VAULTS, AND AMR/AMI DEVICES THROUGHOUT CONSTRUCTION. NO METER MAY BE REMOVED FROM ITS INSTALLED LOCATION UNTIL THE EXISTING TAP HAS BEEN CUT AT THE MAIN.
6. BACKFLOW PREVENTION DEVICES MAY BE REQUIRED IN ACCORDANCE WITH THE DENVER WATER ENGINEERING STANDARDS AND STANDARD DRAWINGS. IF REQUIRED, THEY MUST BE IN PLACE BEFORE THE FINAL METER INSPECTION.
7. FURNISH METER PITS WITH A PLASTIC FROST LID IN ACCORDANCE WITH SPECIFICATION SECTION 33 14 17.
8. THE AMR/AMI DEVICE WILL MOUNT THROUGH THE CAST IRON LID OR UNDER THE COMPOSITE LID, OR A REMOTE AMR DEVICE WILL BE REQUIRED. FURNISH METERS WITH ELECTRONIC DIGITAL ENCODER REGISTERS OR MECHANICALLY ENCODED REGISTERS WITH A REMOTE AMR DEVICE FOR EACH REGISTER.
9. A REMOTE AMR DEVICE WILL BE INSTALLED AT A LOCATION DETERMINED BY DENVER WATER AT THE TIME OF METER INSPECTION. AMR DEVICES WILL TYPICALLY BE INSTALLED ON THE OUTSIDE OF THE BUILDING FACING A PUBLIC STREET. OWNER MUST PROVIDE CONDUIT AND SIGNAL WIRE FROM THE METER TO THE AMR DEVICE LOCATION.
10. MASTER METER AND READ AND BILL DISTRIBUTORS MAY IMPOSE ADDITIONAL STANDARDS NOT REQUIRED BY DENVER WATER.

DRAWN BY: *MCMILLEN*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

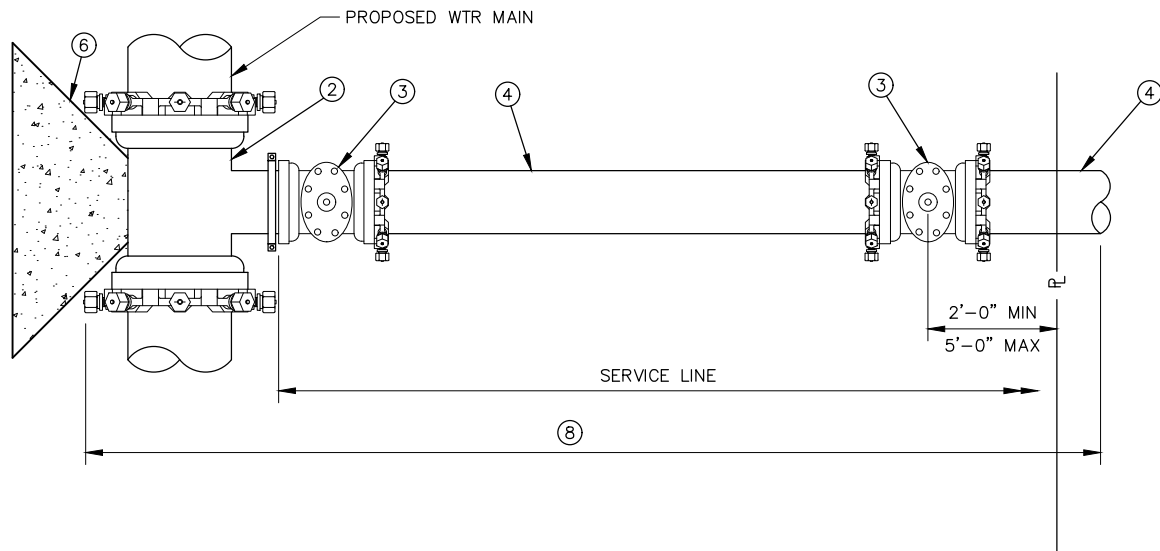
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

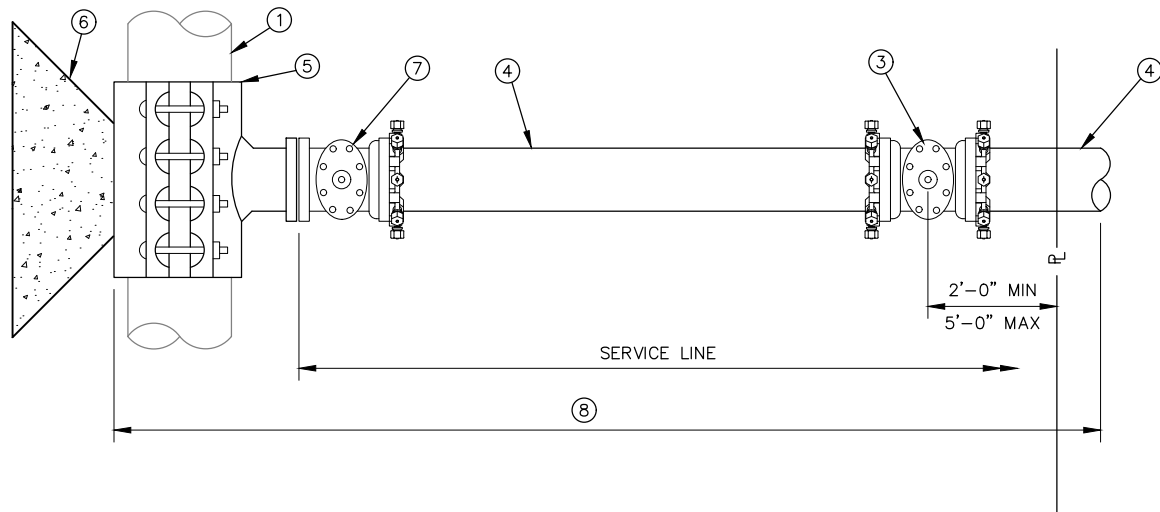
33260
GENERAL METER AND
SERVICE NOTES



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PROPOSED MAIN



EXISTING MAIN

KEYED NOTES:

- ① EXIST WTR MAIN
- ② MJ ANCHORING TEE
- ③ MJ GV
- ④ DIP FULLY RESTRAINED
- ⑤ TAPPING SLV
- ⑥ CONC KB
- ⑦ TAPPING VLV FLG x MJ
- ⑧ PE WRAPPED

DRAWN BY: BAIREs

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

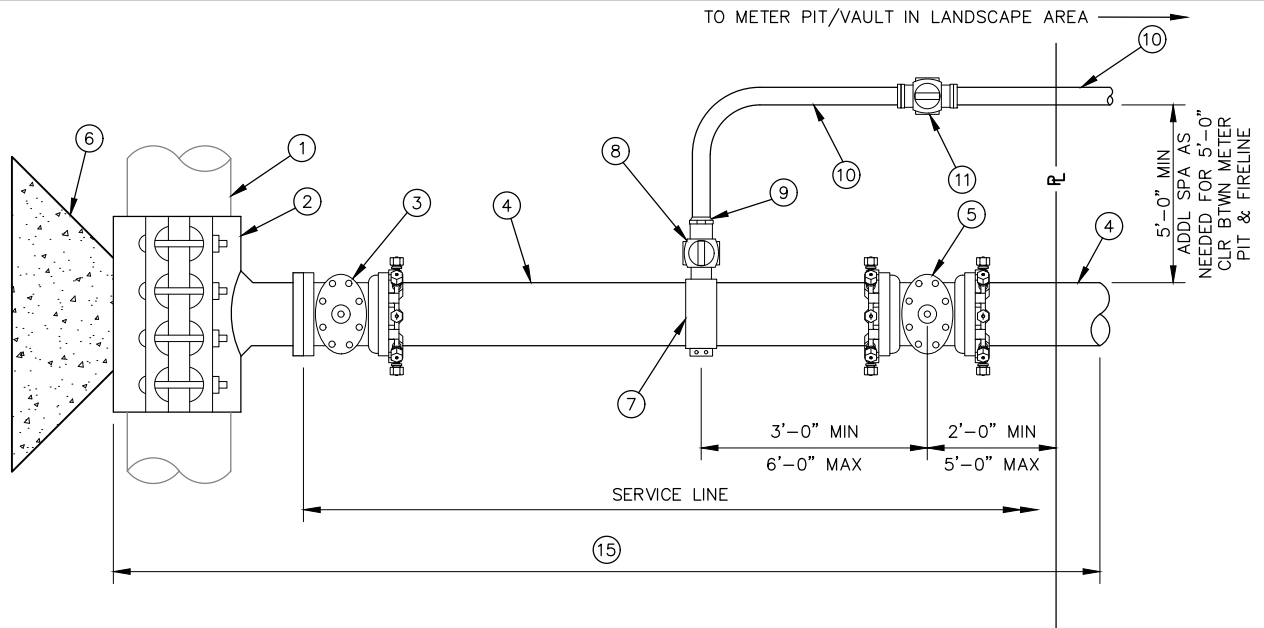
ORIGINATION DATE: JULY 2021

REVISION DATE:

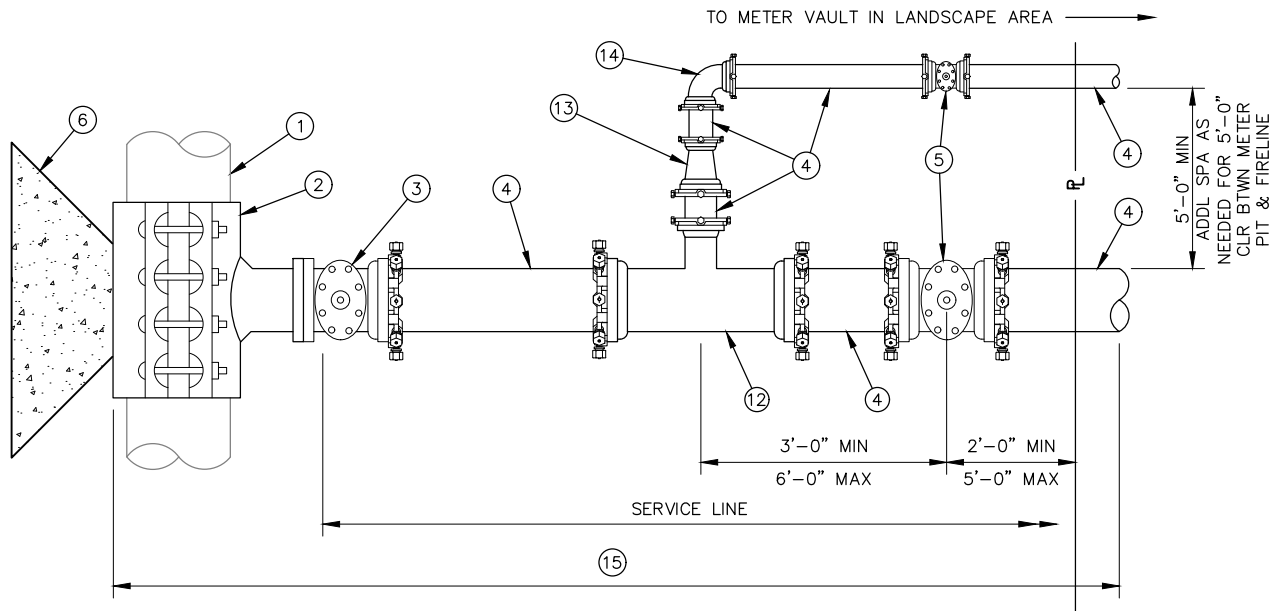
33261
3" AND LARGER DOMESTIC
AND FIRELINE CONNECTION



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2" & SMALLER DOMESTIC



3" DOMESTIC

KEYED NOTES:

- ① EXIST WTR MAIN
- ② TAPPING SLV OR ANCHORING TEE
- ③ TAPPING VLV OR MJ GV
- ④ DIP FULLY RESTRAINED
- ⑤ MJ GV
- ⑥ CONC KB
- ⑦ TAPPING SADDLE
- ⑧ CORP STOP
- ⑨ SERVICE INSULATOR
- ⑩ TYPE "K" Cu PIPE
- ⑪ CURB STOP
- ⑫ MJ TEE
- ⑬ 4"x 3" MJ RDCR
- ⑭ 90° MJ ELB
- ⑮ PE WRAPPED

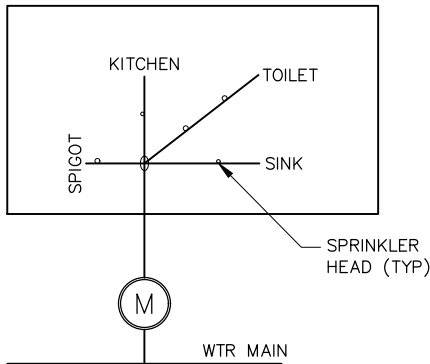
NOTE:

THE MINIMUM LINE SIZE RATIO FOR FIRE SERVICE LINE TO DOMESTIC SERVICE LINE IS 4:1, RESPECTIVELY.

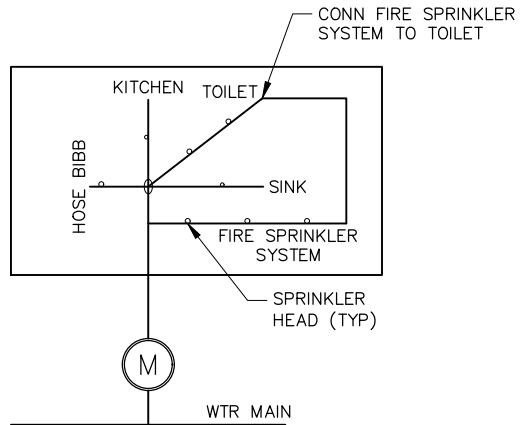
DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33262
FIRELINE CONNECTION
WITH DOMESTIC SERVICE TAP

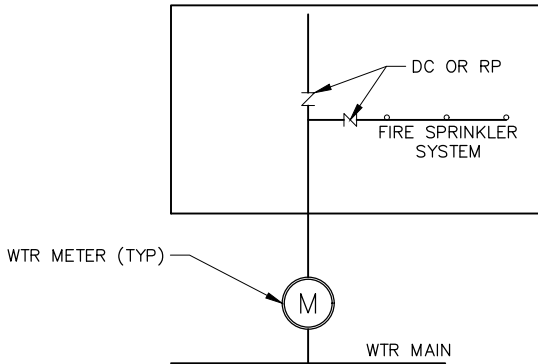
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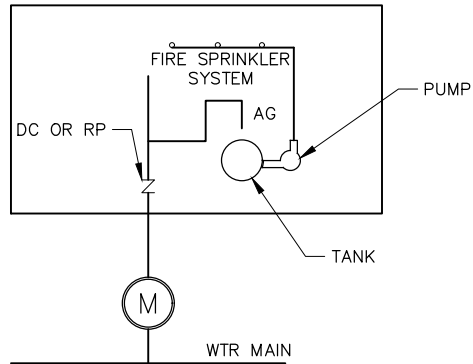
OPTION 1
MULTI-PURPOSE PIPING SYSTEM
(PREFERRED)



OPTION 2
MULTI-PURPOSE PIPING SYSTEM
(PASSIVE PURGE)



OPTION 3
BRANCHED



OPTION 4
TANK

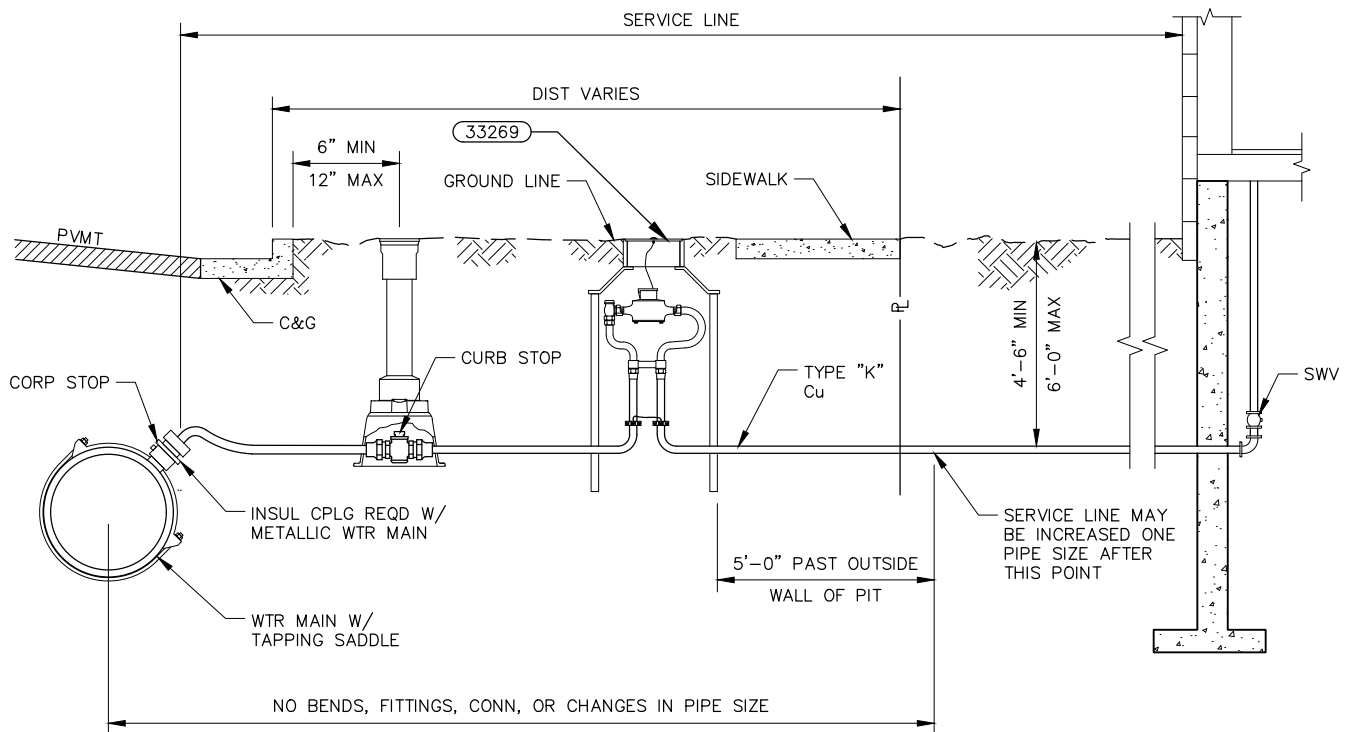
NOTES:

1. CHEMICAL ADDITIVES REQUIRE THE INSTALLATION OF A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER ON THE SPRINKLER SYSTEM BRANCH LINE.
2. OPTION 1 SYSTEM SHALL HAVE ALL BRANCH LINES TERMINATE AT A FIXTURE.
3. OPTION 2 SYSTEM SHALL HAVE NO DEAD-END LINES, SYSTEM PIPING SHALL BE CONSTRUCTED TO MOVE WATER THROUGH THE ENTIRE SYSTEM TO THE FIXTURE END POINT.
4. OPTIONS 3 AND 4 SHALL BE APPROVED BY DENVER WATER, THE LOCAL FIRE DEPARTMENT, AND IF APPLICABLE, THE DISTRIBUTOR PRIOR TO APPLICATION FOR WATER SUPPLY LICENSE.
5. OPTION 4 WILL REQUIRE AN AIR GAP IF THE WATER SUPPLY TO THE TANK IS HARD PIPED. A DC OR RP SHALL BE REQUIRED AT THE WATER ENTRY POINT DEPENDING ON THE HAZARD.

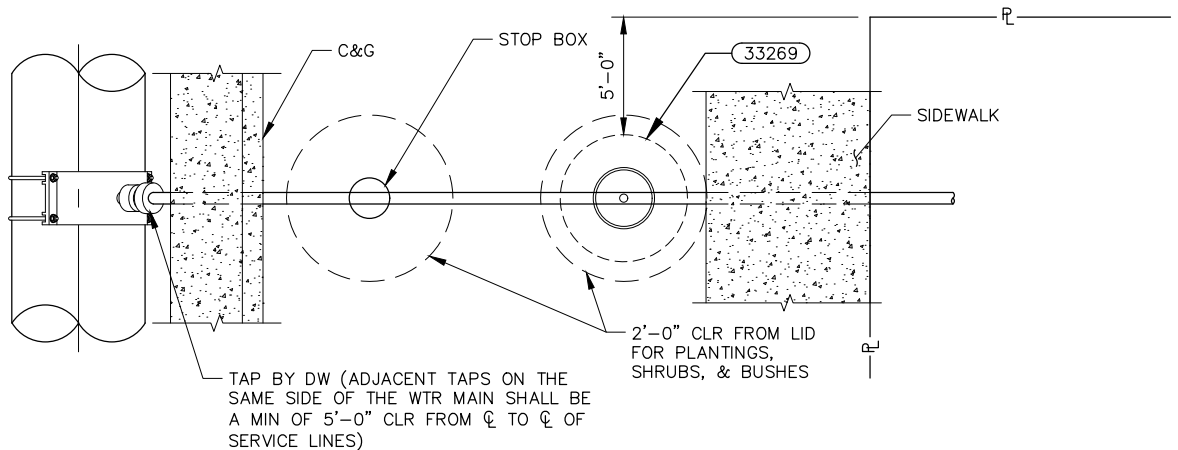
DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33263
NATIONAL FIRE PROTECTION
ASSOCIATION 13D RESIDENTIAL
SPRINKLER SERVICES

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ELEVATION



PLAN

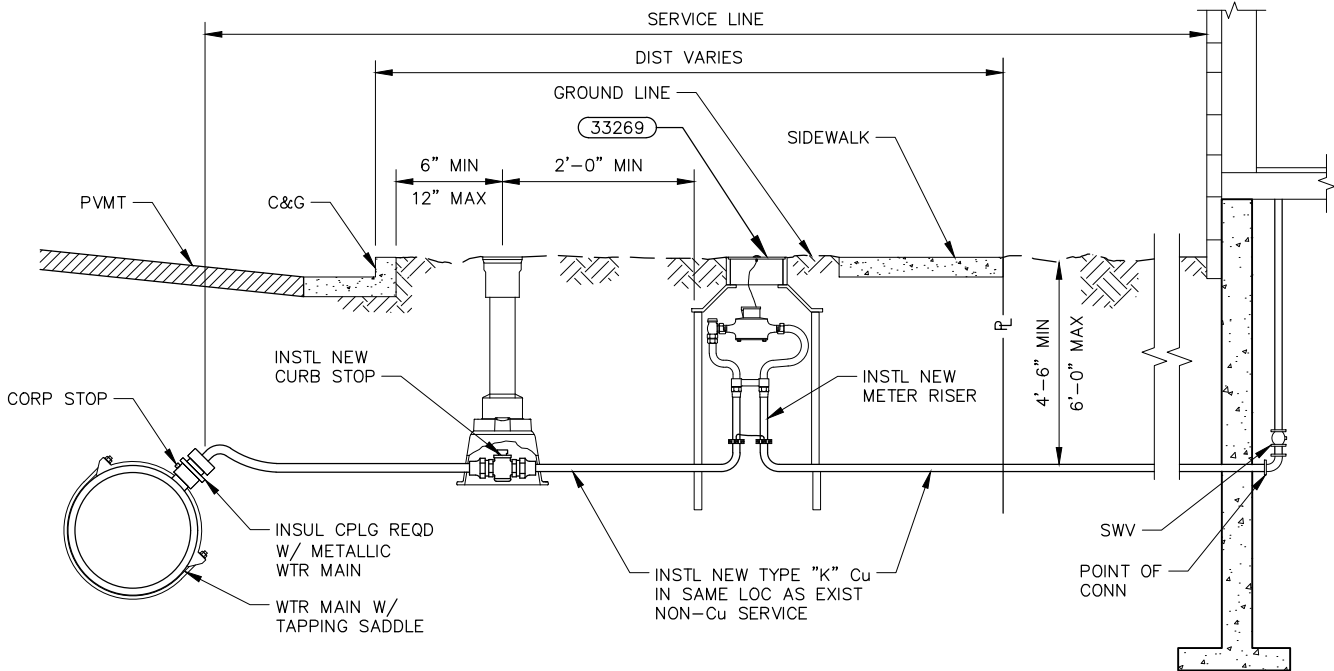
NOTES:

1. IF THERE IS A TREE LAWN BETWEEN THE CURB AND SIDEWALK, INSTALL THE STOP BOX AND THE METER SETTING IN THE TREE LAWN. IF NO TREE LAWN EXISTS, AND THE SIDEWALK IS ADJACENT TO THE BACK OF THE CURB, THE CURB STOP BOX SHALL BE 6 INCHES TO 12 INCHES FROM THE BACK SIDE OF THE SIDEWALK.
2. LOCATE THE STOP BOX IN A PUBLIC RIGHT-OF-WAY, 6 INCHES TO 12 INCHES FROM THE BACKSIDE OF THE CURB OR SIDEWALK, IN A LANDSCAPED AREA, 24 INCHES FROM THE INLET SIDE OF THE METER PIT UNLESS PRIOR APPROVAL IS OBTAINED FROM THE DENVER WATER METER INSPECTOR. FOR A CURB STOP LOCATED BENEATH PAVEMENT, USE A ROADWAY BOX OVER A STANDARD STOP BOX WITH A BOND BREAKER. THE CURB STOP CANNOT BE LOCATED BENEATH PARKING AREAS.
3. INSTALL METER PIT AND SERVICE LINE IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.

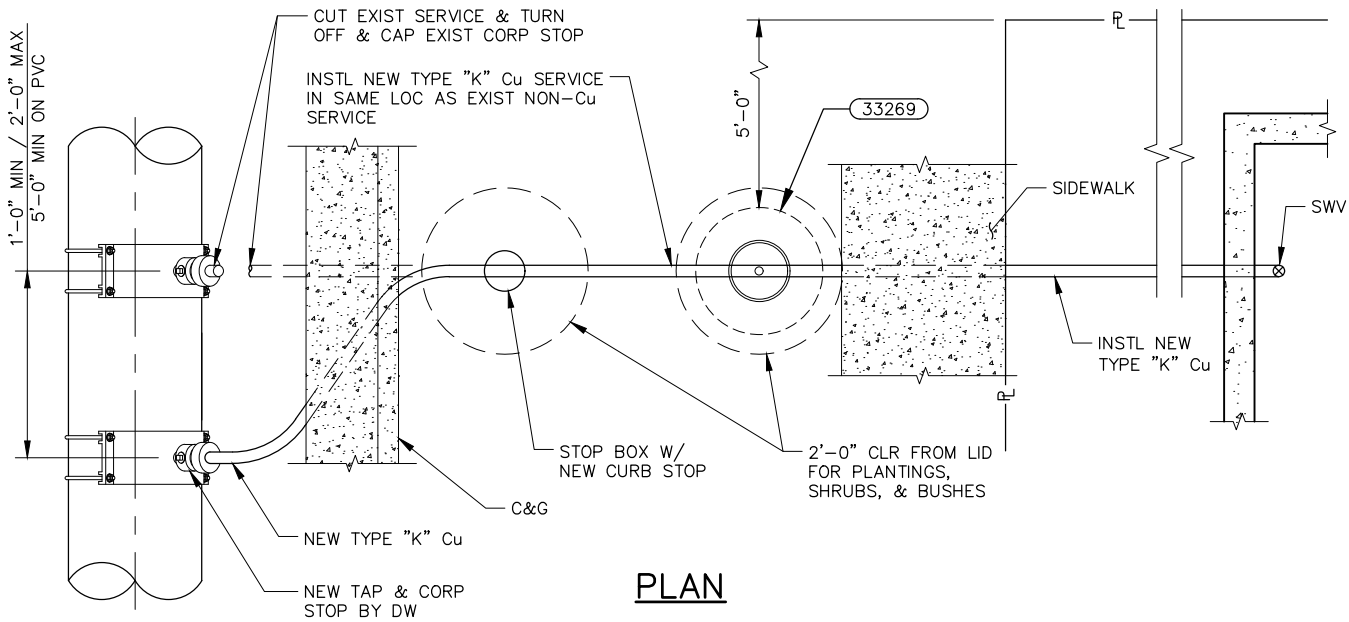
DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33264
3/4" & 1" SERVICE LINE,
STOP BOX, & OUTSIDE
METER INSTALLATION

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REPLACEMENT ELEVATION



PLAN

NOTES:

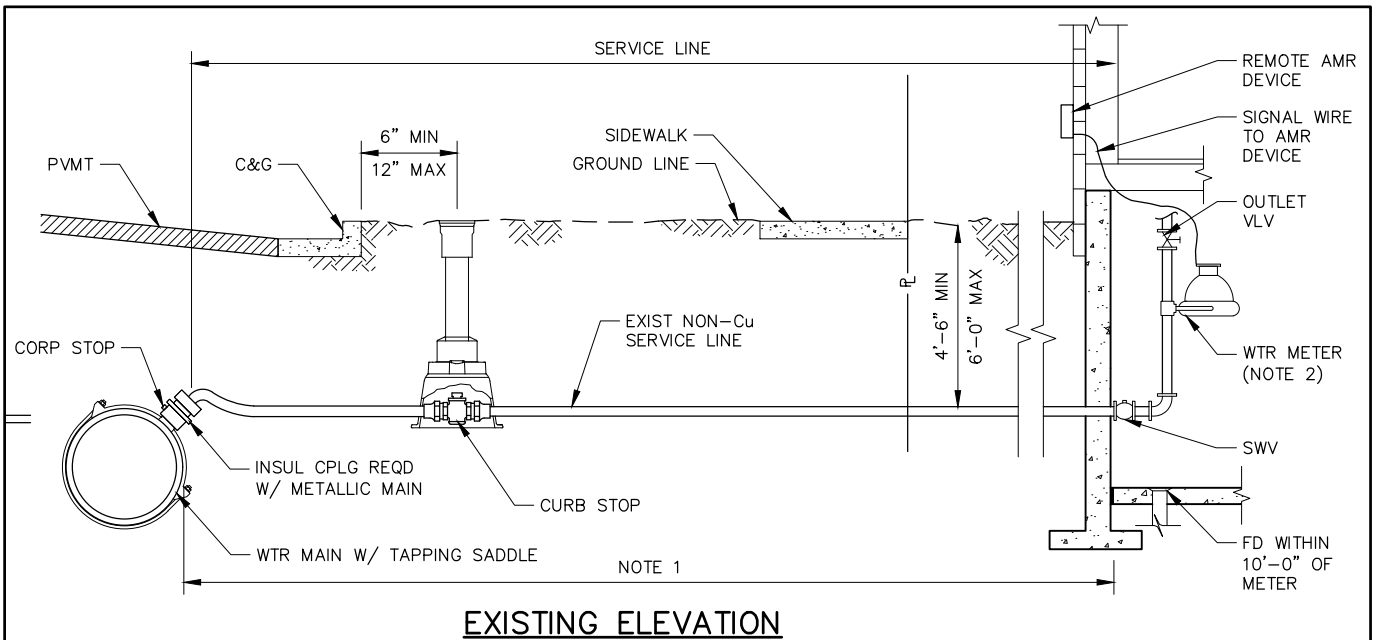
1. LIMITS OF NON-COPPER SERVICE LINE REPLACEMENT EXTENDS FROM THE TAP TO THE FIRST BRASS FITTING INSIDE THE STRUCTURE.
2. INSTALL METER PIT AND SERVICE LINE IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.
3. REPLACE ALL NON-COPPER COMPONENTS OF THE SERVICE LINE FROM THE MAIN TO THE FIRST COPPER OR BRASS FITTING WITHIN THE STRUCTURE.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

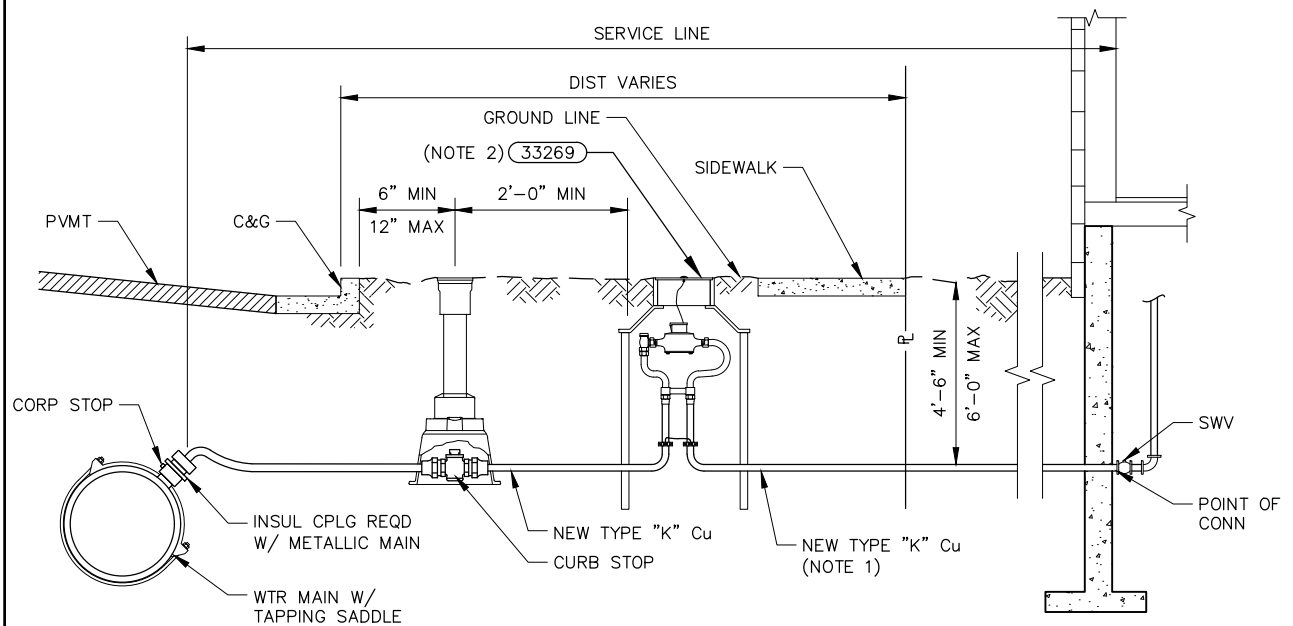
33265
2" & SMALLER NON-COPPER
SERVICE LINE REPLACEMENT



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EXISTING ELEVATION



RELOCATION ELEVATION

NOTES:

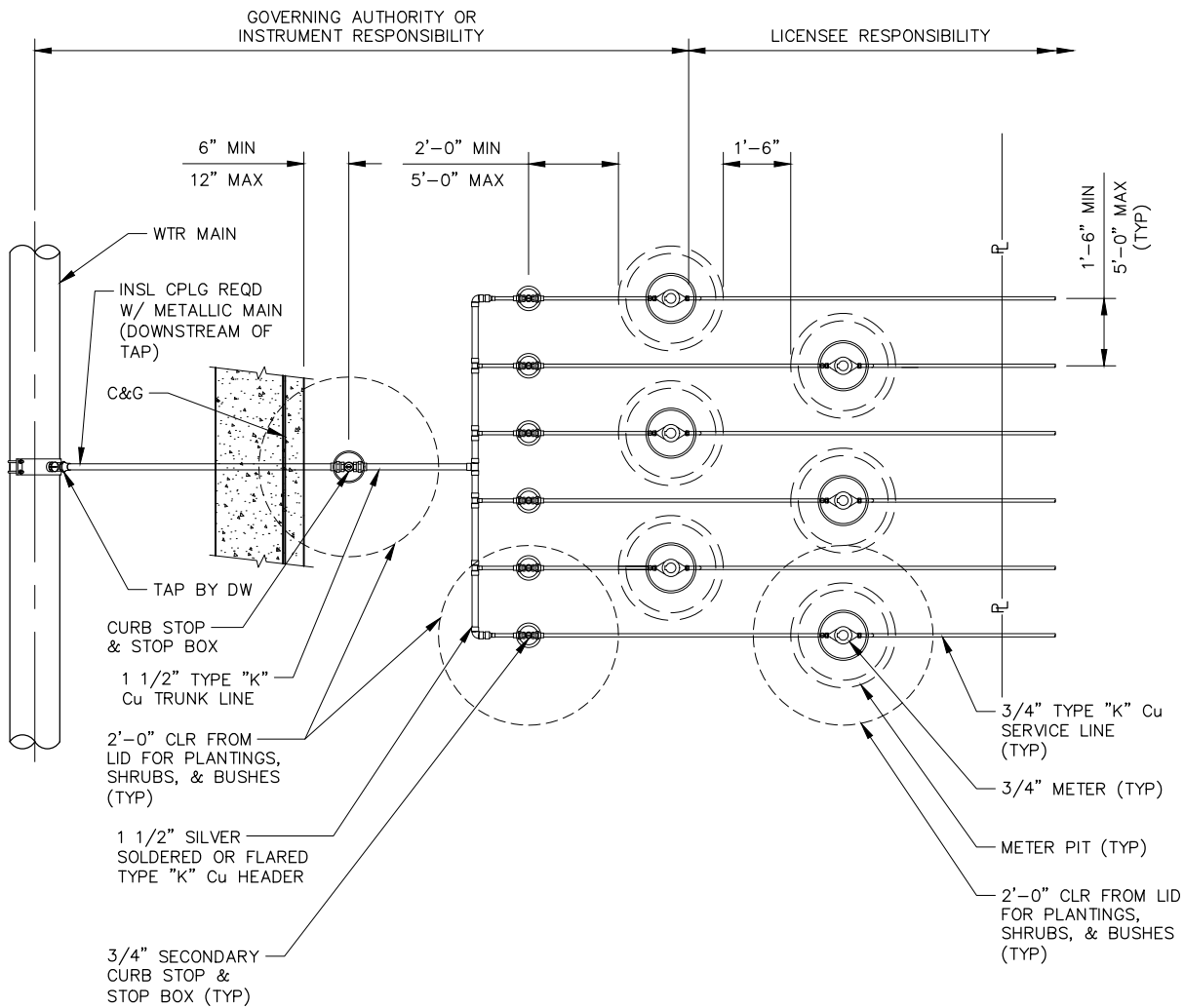
1. LIMITS OF REPLACEMENT OF NON-COPPER SERVICE LINE EXTENDS FROM THE TAP TO THE FIRST BRASS FITTING INSIDE THE STRUCTURE.
2. RELOCATE METER FROM AN INSIDE SETTING TO AN OUTSIDE SETTING IN ACCORDANCE WITH (33269).
3. INSTALL METER PIT AND SERVICE LINE IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.
4. FOR REPLACEMENTS ON PVC MAINS, MAINTAIN THE EXISTING TAP LOCATION, REMOVE AND REPLACE THE TAPPING SADDLE WITH A NO-LEAD MODEL LISTED IN SPECIFICATION SECTION 33 14 17; OR, MAKE A NEW TAP 5'-0" MINIMUM FROM THE EXISTING TAP IN ACCORDANCE WITH SPECIFICATION SECTION 33 14 17.
5. ON EXISTING SERVICE LINES WITH COPPER FROM THE MAIN TO METER, REPLACE THE NON-COPPER SERVICE LINE FROM THE METER TO THE FIRST BRASS FITTING INSIDE THE STRUCTURE.

DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33266
2" & SMALLER NON-COPPER
SERVICE LINE REPLACEMENT &
INSIDE METER RELOCATION

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NOTES:

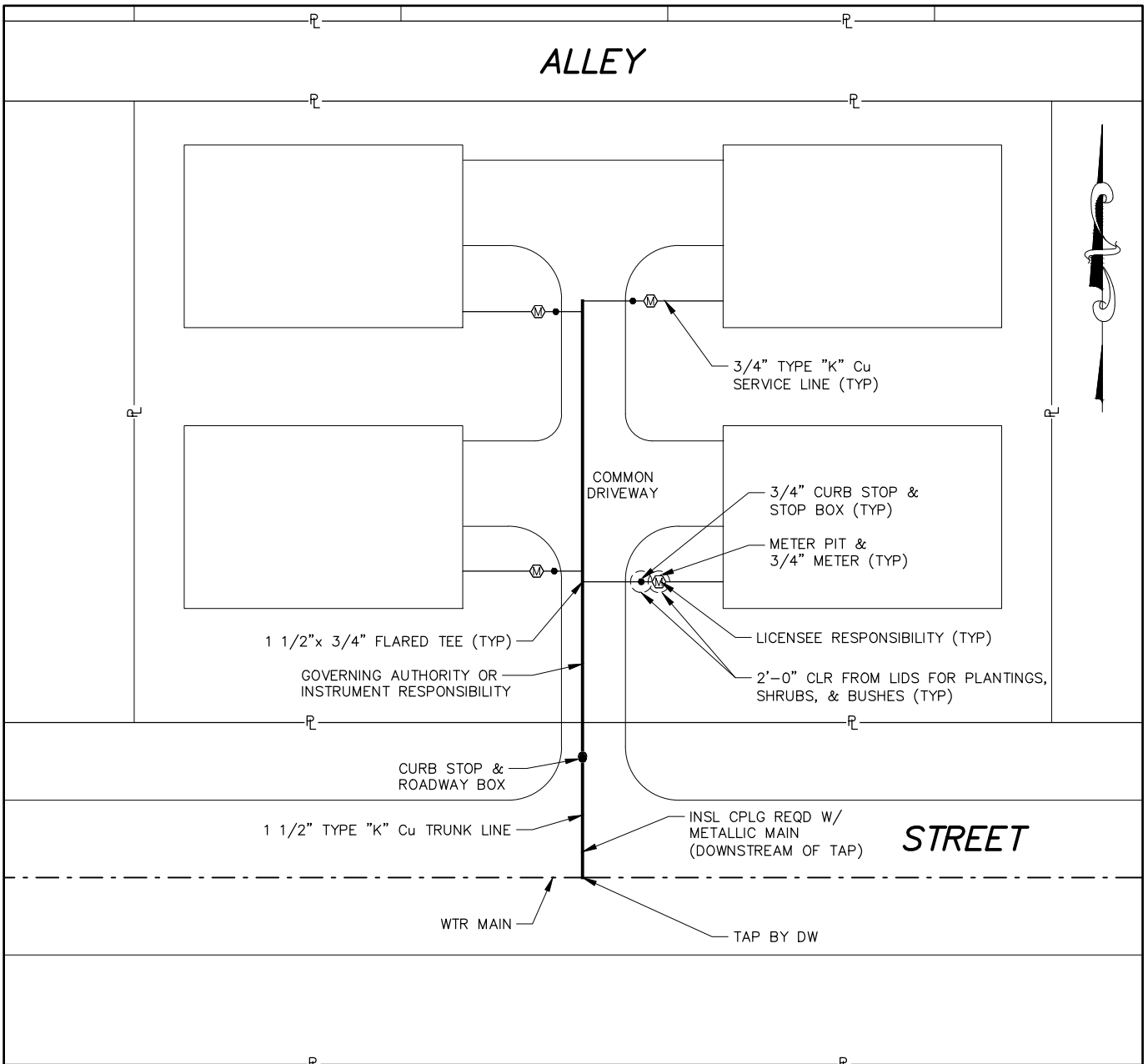
1. THIS STANDARD DRAWING APPLIES TO DEVELOPMENTS WITH 3 TO 6 UNITS PLUS A COMMON PROPERTY.
2. METER PITS SHALL BE IN ACCORDANCE WITH (33269).
3. IRRIGATION USE SHALL HAVE A DEDICATED IRRIGATION SERVICE LINE. IRRIGATION SERVICE IS NOT ALLOWED ON A MANIFOLD.
4. NFPA 13D DEMAND SHALL HAVE A DEDICATED SERVICE LINE. FIRE SERVICE IS NOT ALLOWED ON A MANIFOLD.
5. MANIFOLD SHALL BE INSPECTED BY DENVER WATER PRIOR TO BACKFILL.
6. IDENTIFICATION TAGS SHALL BE ATTACHED IN ACCORDANCE WITH SPECIFICATION SECTION 33 14 17.
7. RESIDENTIAL FIXTURE UNITS THAT DEMAND A 1 INCH SERVICE LINE SHALL HAVE A 2 INCH MANIFOLD TRUNK LINE AND A 1-INCH SERVICE LINE.
8. INSTALL METER PIT IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

33267
MANIFOLD SERVICE LINE
WITH INDIVIDUAL METER PITS



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NOTES:

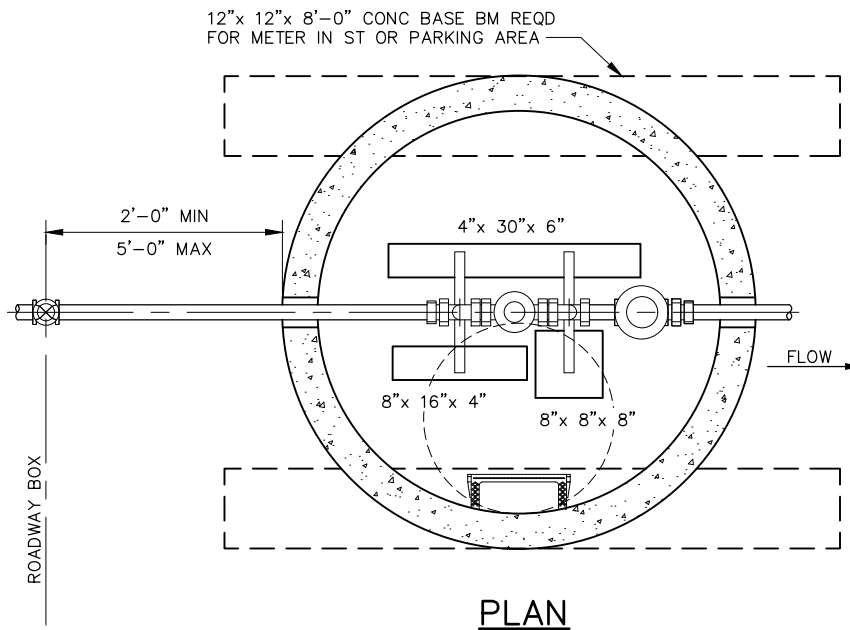
1. THIS STANDARD DRAWING APPLIES TO DEVELOPMENTS WITH 3 TO 6 UNITS PLUS A COMMON PROPERTY.
2. METER PITS SHALL BE IN ACCORDANCE WITH (33269).
3. IRRIGATION USE SHALL HAVE A DEDICATED IRRIGATION SERVICE LINE. IRRIGATION SERVICE IS NOT ALLOWED ON A MANIFOLD.
4. NFPA 13D DEMAND SHALL HAVE A DEDICATED SERVICE LINE. FIRE SERVICE IS NOT ALLOWED ON A MANIFOLD.
5. MANIFOLD SHALL BE INSPECTED BY DENVER WATER PRIOR TO BACKFILL.
6. IDENTIFICATION TAGS SHALL BE ATTACHED IN ACCORDANCE WITH SPECIFICATION SECTION 33 14 17.
7. RESIDENTIAL FIXTURE UNITS THAT DEMAND A 1-INCH SERVICE LINE SHALL HAVE A 2-INCH MANIFOLD TRUNK LINE AND A 1-INCH SERVICE LINE.
8. INSTALL METER PIT IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.

DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

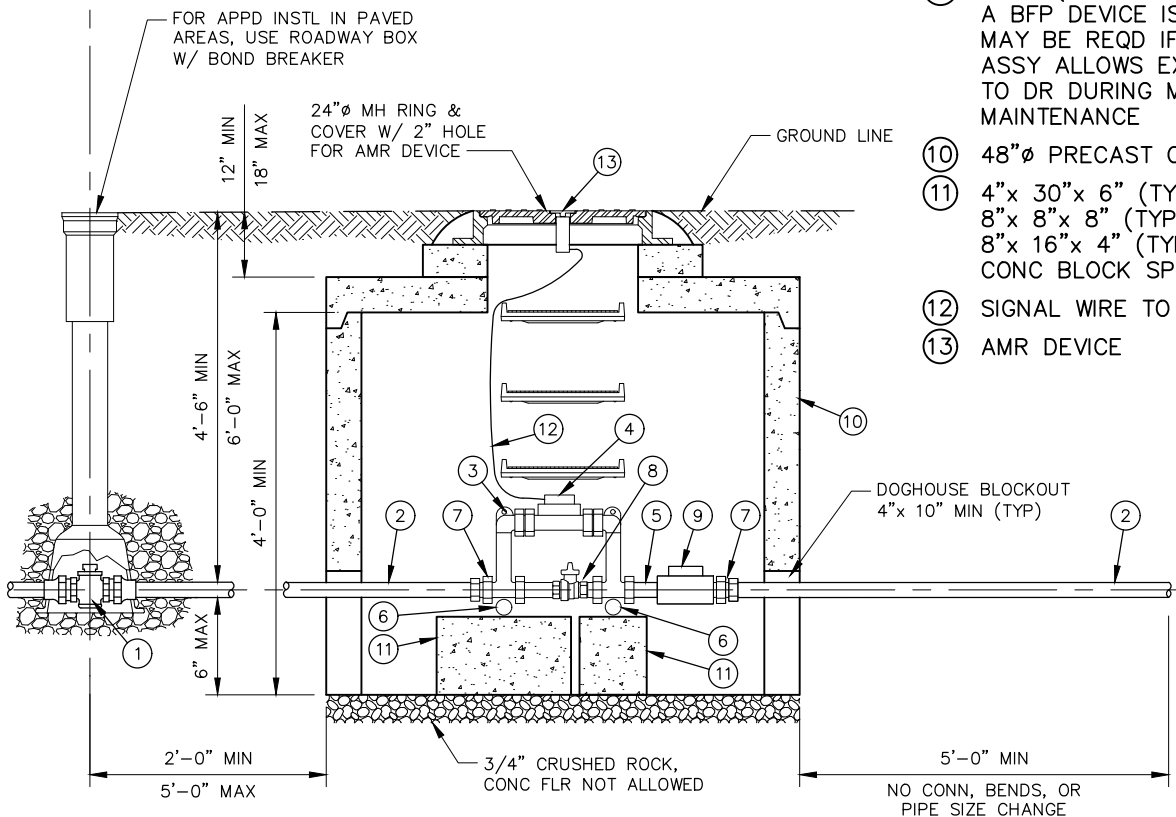
33268
MANIFOLD SERVICE LINE
WITH SHARED ACCESS

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PLAN



ELEVATION

KEYED NOTES:

- ① CURB STOP
- ② TYPE "K" Cu TUBING
- ③ 1 1/2" OR 2" COPPERSETTER/ METER YOKE W/ BYPASS
- ④ WTR METER W/ ENCODER REGISTER
- ⑤ 3" NIPPLE BTWN COPPERSETTER & CHKV
- ⑥ 1" x 23" BSP-40
- ⑦ IRON PIPE TO FLARE CPLG FROM INLET SIDE OF COPPERSETTER & OUTLET SIDE OF CHKV
- ⑧ BYPASS W/ VLV WILL BE 1" FOR 1 1/2" COPPERSETTERS & 1 1/2" OR 1 1/4" FOR 2" COPPERSETTERS; NO BYPASS FOR IRR METERS
- ⑨ CHKV (CHKV NOT REQD WHERE A BFP DEVICE IS INSTL) CHKV MAY BE REQD IF DIST TO BFP ASSY ALLOWS EXCESSIVE WTR TO DR DURING METER MAINTENANCE
- ⑩ 48" Ø PRECAST CONC MH
- ⑪ 4" x 30" x 6" (TYP OF 2) OR 8" x 8" x 8" (TYP OF 4) OR 8" x 16" x 4" (TYP OF 4) CONC BLOCK SPRT
- ⑫ SIGNAL WIRE TO AMR DEVICE
- ⑬ AMR DEVICE

NOTES:

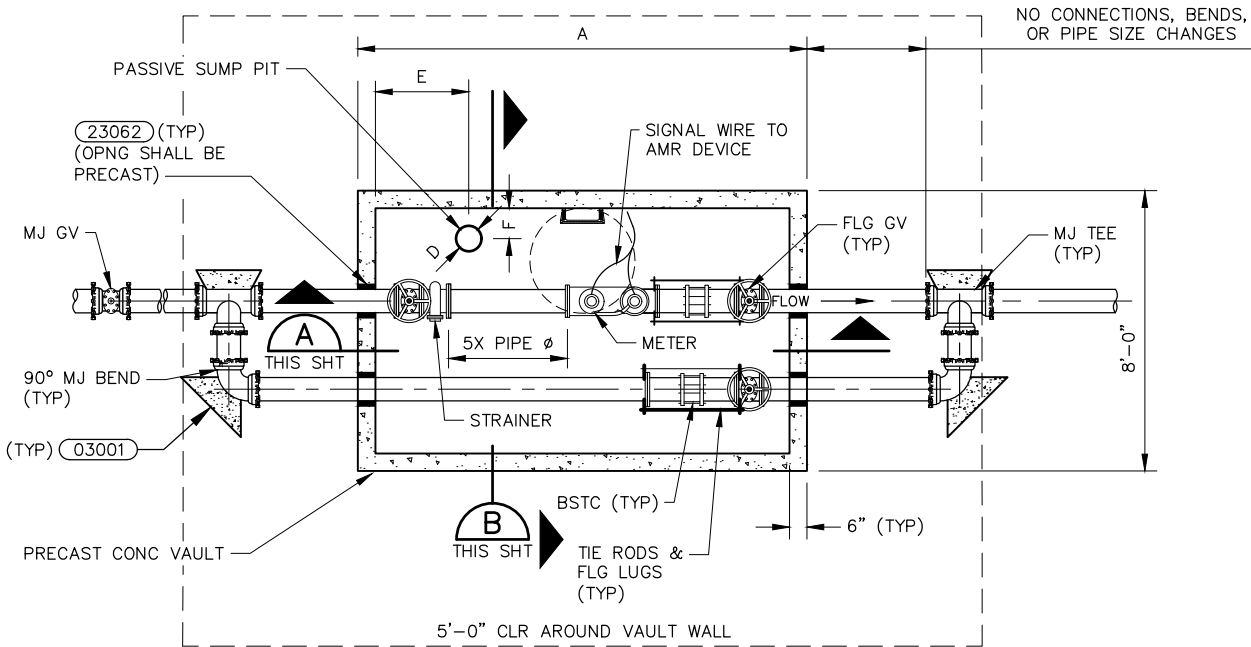
1. CURB STOP SHALL BE 2 FEET MINIMUM FROM THE INLET SIDE OF THE METER MANHOLE.
2. THE COPPERSETTER OR METER YOKE SHALL BE 12 INCH HIGH MAXIMUM.
3. GROUT DOGHOUSE BLOCKOUTS AFTER SERVICE LINE INSTALLATION.
4. INSTALL METER MANHOLE AND SERVICE LINE IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

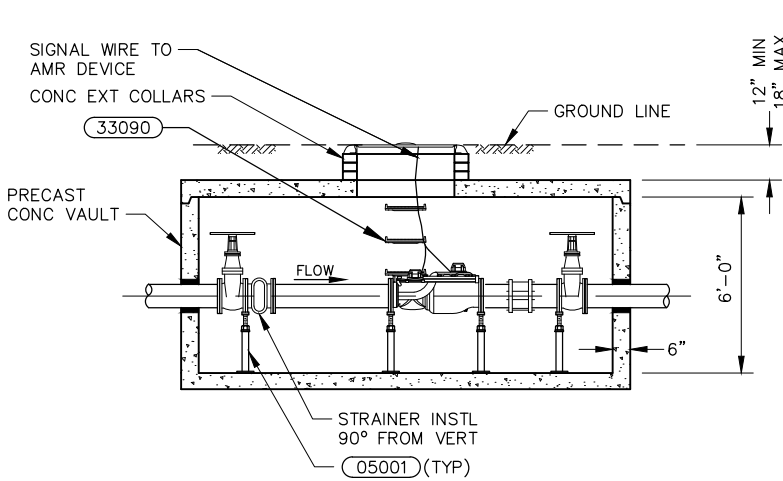
33270
OUTSIDE SETTING FOR
1 1/2" & 2" METER W/ CHECK
VALVE & BYPASS IN MANHOLE

DENVER WATER

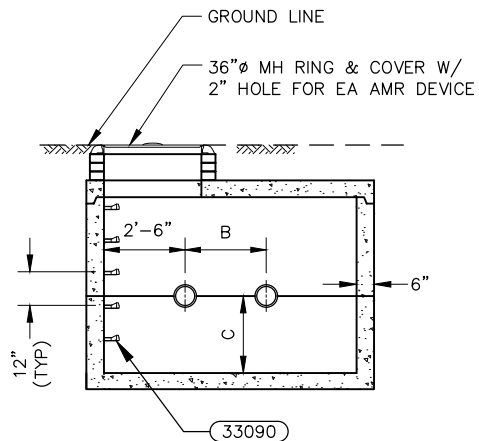
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PLAN



SECTION A
THIS SHT



SECTION B
THIS SHT

METER SIZE & NOMINAL PIPE ϕ	PRECAST VAULT DIMENSIONS			SUMP		
	A	B	C	D	E	F
3"	9'-0"	2'-0"	2'-2"	12" ϕ	2'-2"	1'-6"
4"	9'-0"	2'-6"	2'-2"	12" ϕ	2'-2"	1'-6"
6"	9'-0"	2'-6"	2'-2"	12" ϕ	2'-2"	1'-6"
8"	13'-6"	2'-6"	2'-6"	18" ϕ	2'-6"	1'-9"
10"	13'-6"	2'-6"	2'-6"	18" ϕ	2'-6"	1'-9"

NOTES:

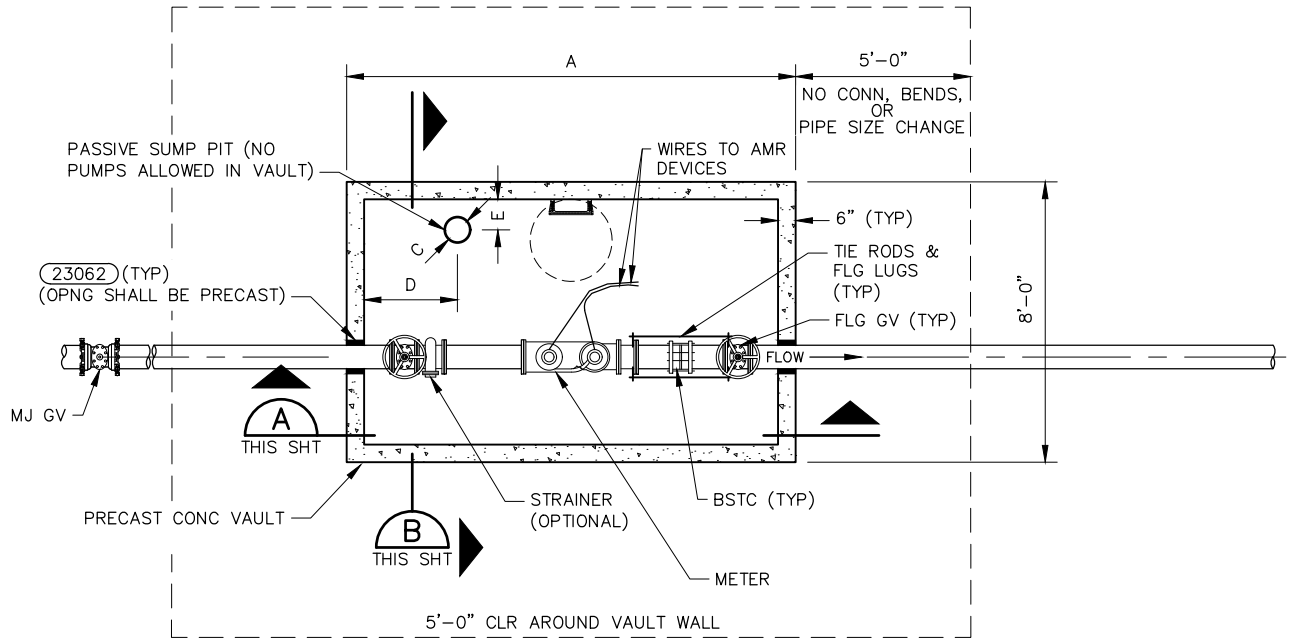
1. VALVES INSIDE THE VAULT SHALL BE NON-RISING STEM, RIGHT HAND OPEN VALVES WITH HAND WHEEL OPERATORS.
2. A CHECK VALVE IS REQUIRED BETWEEN COUPLING AND GATE VALVE IF BACKFLOW PREVENTION ASSEMBLY IS MORE THAN 150 FEET FROM VAULT.
3. INSTALL METER VAULT AND SERVICE LINE IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.
4. SERVICE LINES SHALL NOT CROSS INSIDE THE METER VAULT.

DRAWN BY: BAIREs
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

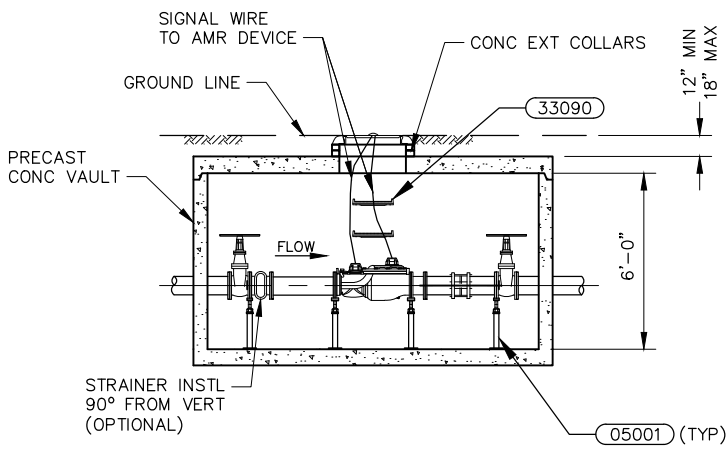
**33271
 LARGE METER IN VAULT**



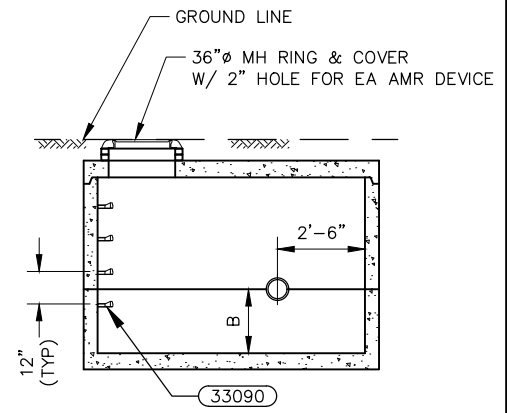
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 F: 303.628.6199
 denverwater.org



PLAN



SECTION A
THIS SHT



SECTION A
THIS SHT

NOTES:

1. TREATED/POTABLE WATER VALVES INSIDE THE VAULT SHALL BE NON-RISING STEM, RIGHT HAND OPEN VALVES WITH HAND WHEEL OPERATORS.
2. RECYCLED WATER VALVES INSIDE THE VAULT SHALL BE NON-RISING STEM, LEFT HAND OPEN VALVES WITH HAND WHEEL OPERATORS.
3. A CHECK VALVE IS REQUIRED BETWEEN COUPLING AND GATE VALVE IF BACKFLOW PREVENTION ASSEMBLY IS MORE THAN 150 FEET FROM VAULT.
4. INSTALL METER VAULT AND SERVICE LINE IN ACCORDANCE WITH SPECIFICATION SECTION 33 19 13.
5. SERVICE LINES SHALL NOT CROSS INSIDE THE METER VAULT.

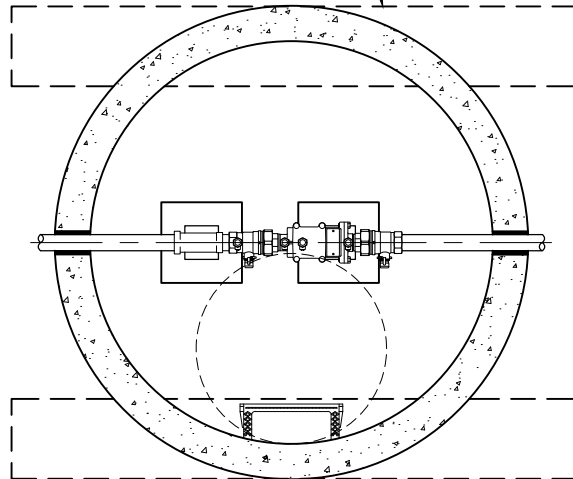
METER SIZE & NOMINAL PIPE Ø	PRECAST VAULT DIMENSIONS		SUMP		
	A	B	C	D	E
3"	9'-0"	2'-2"	12"Ø	2'-2"	1'-6"
4"	9'-0"	2'-2"	12"Ø	2'-2"	1'-6"
6"	9'-0"	2'-2"	12"Ø	2'-2"	1'-6"
8"	13'-6"	2'-6"	18"Ø	2'-6"	1'-9"
10"	13'-6"	2'-6"	18"Ø	2'-6"	1'-9"

DRAWN BY: BAIREZ
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

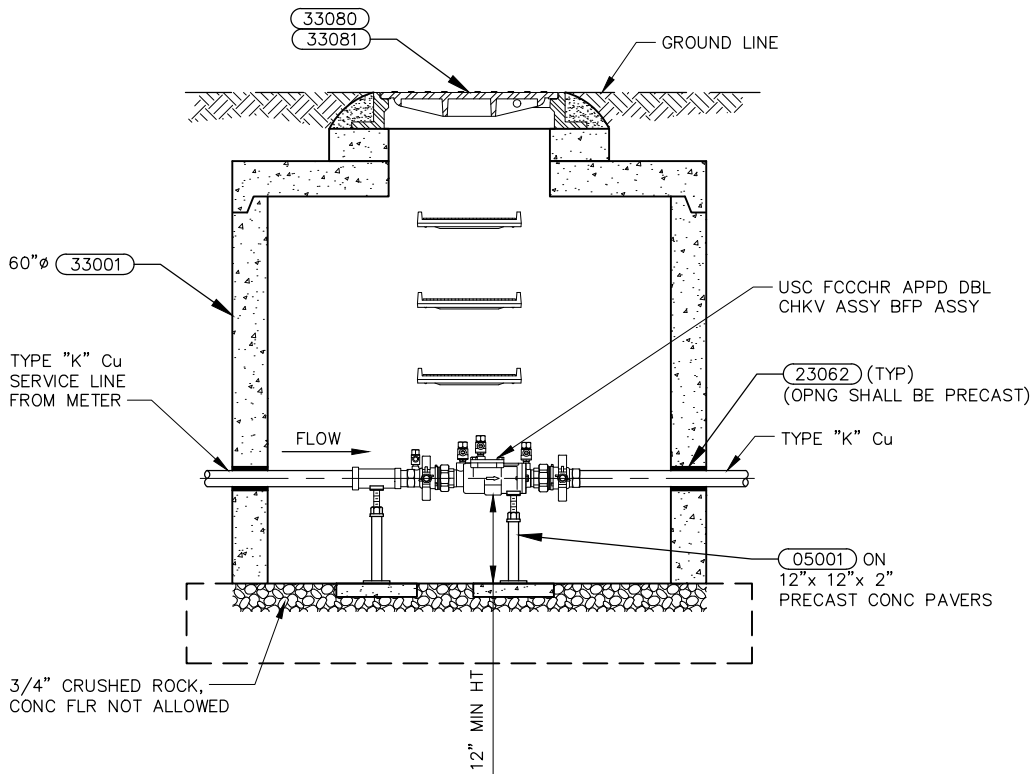
33272
LARGE METER IN VAULT
(IRRIGATION SERVICE ONLY)

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12" x 12" x 8'-0" CONC BASE BM REQD
FOR METER IN ST OR PARKING AREA



PLAN



ELEVATION

NOTES:

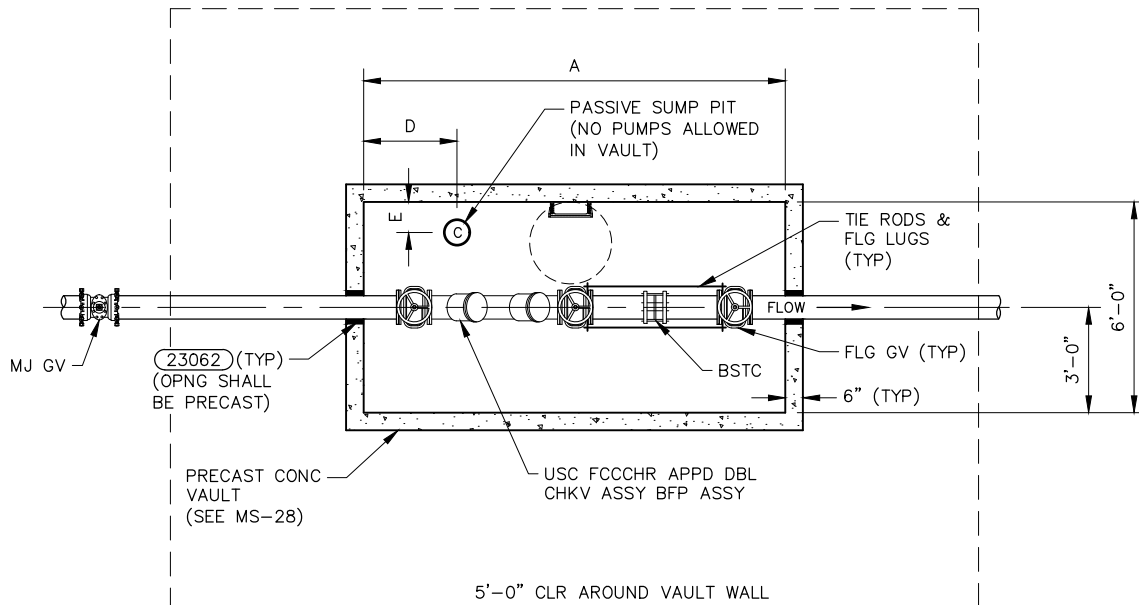
1. DIAMETER OF FITTINGS, NIPPLE, AND TUBING SHALL BE EQUAL IN DIAMETER TO THE BACKFLOW PREVENTER.
2. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR INSTALLATION INSTRUCTIONS.

DRAWN BY: BAIREs
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

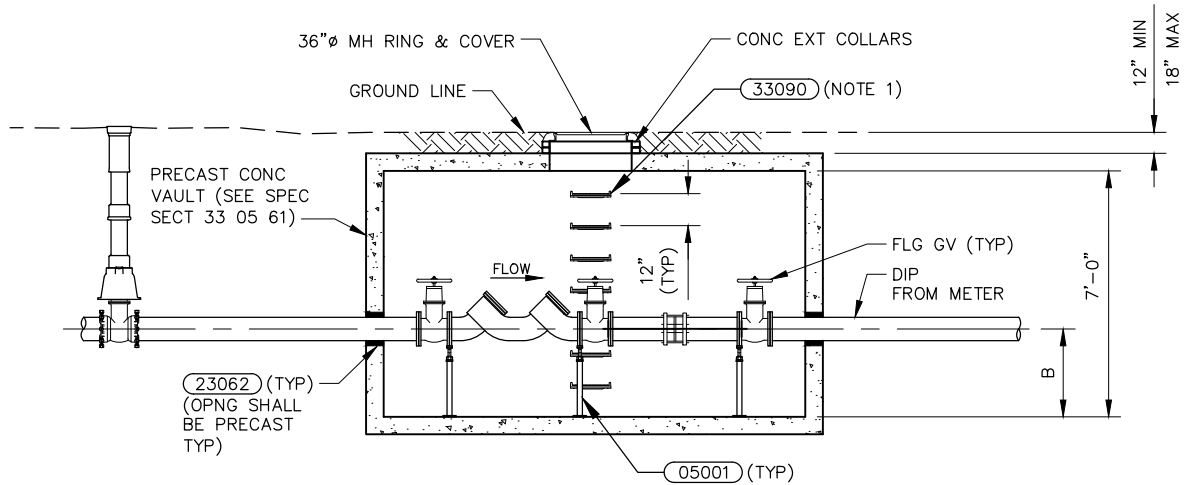
33280
OUTSIDE SETTING FOR 2"
& SMALLER DOUBLE CHECK
VALVE ASSEMBLY IN MANHOLE



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PLAN



ELEVATION

NOMINAL PIPE Ø	PRECAST VAULT DIMENSIONS		SUMP		
	A	B	C	D	E
2 1/2"	10'-0"	2'-6"	12"Ø	2'-2"	1'-6"
3"	10'-0"	2'-6"	12"Ø	2'-2"	1'-6"
4"	10'-0"	2'-6"	12"Ø	2'-2"	1'-6"
6"	14'-0"	2'-6"	18"Ø	2'-6"	1'-9"
8"	14'-0"	2'-6"	18"Ø	2'-6"	1'-9"
10"	14'-0"	2'-6"	18"Ø	2'-6"	1'-9"

NOTES:

1. THE DISTANCE BETWEEN RUNGS, CLEATS, AND STEPS SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER.
2. VALVES INSIDE THE VAULT SHALL BE NON-RISING STEM, RIGHT HAND OPEN VALVES WITH HAND WHEEL OPERATORS.
3. SERVICE LINES SHALL NOT CROSS INSIDE THE METER PIT.

DRAWN BY: BAIREZ

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

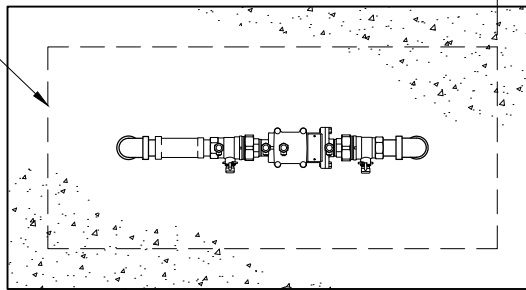
REVISION DATE:

33281
OUTSIDE SETTING FOR 2 1/2"
TO 10" DOUBLE CHECK
VALVE ASSEMBLY IN VAULT

D DENVER WATER

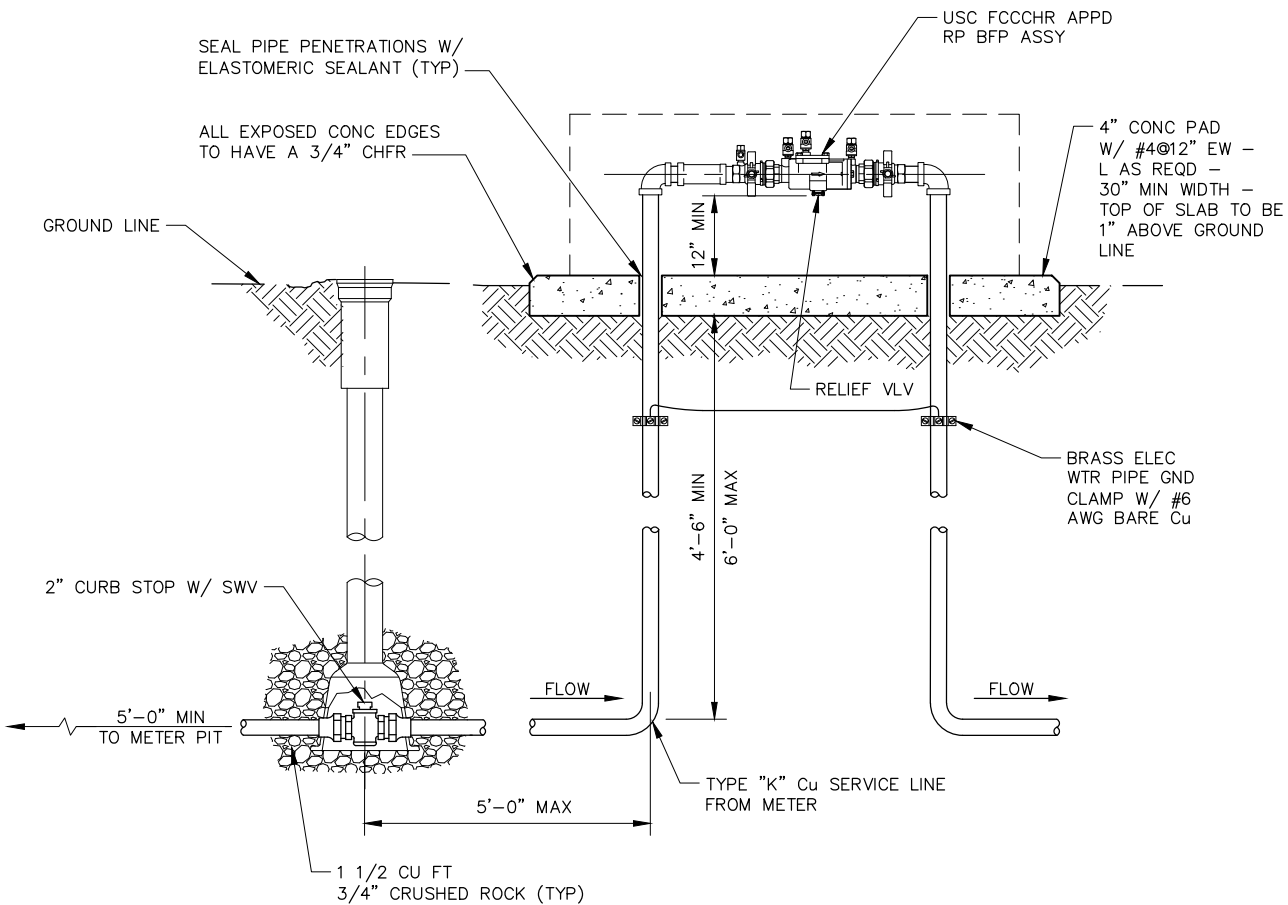
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SPEC ENCLOSURE
(HEATED/NON-HEATED)



6" CLR
ALL SIDES

PLAN



ELEVATION

NOTES:

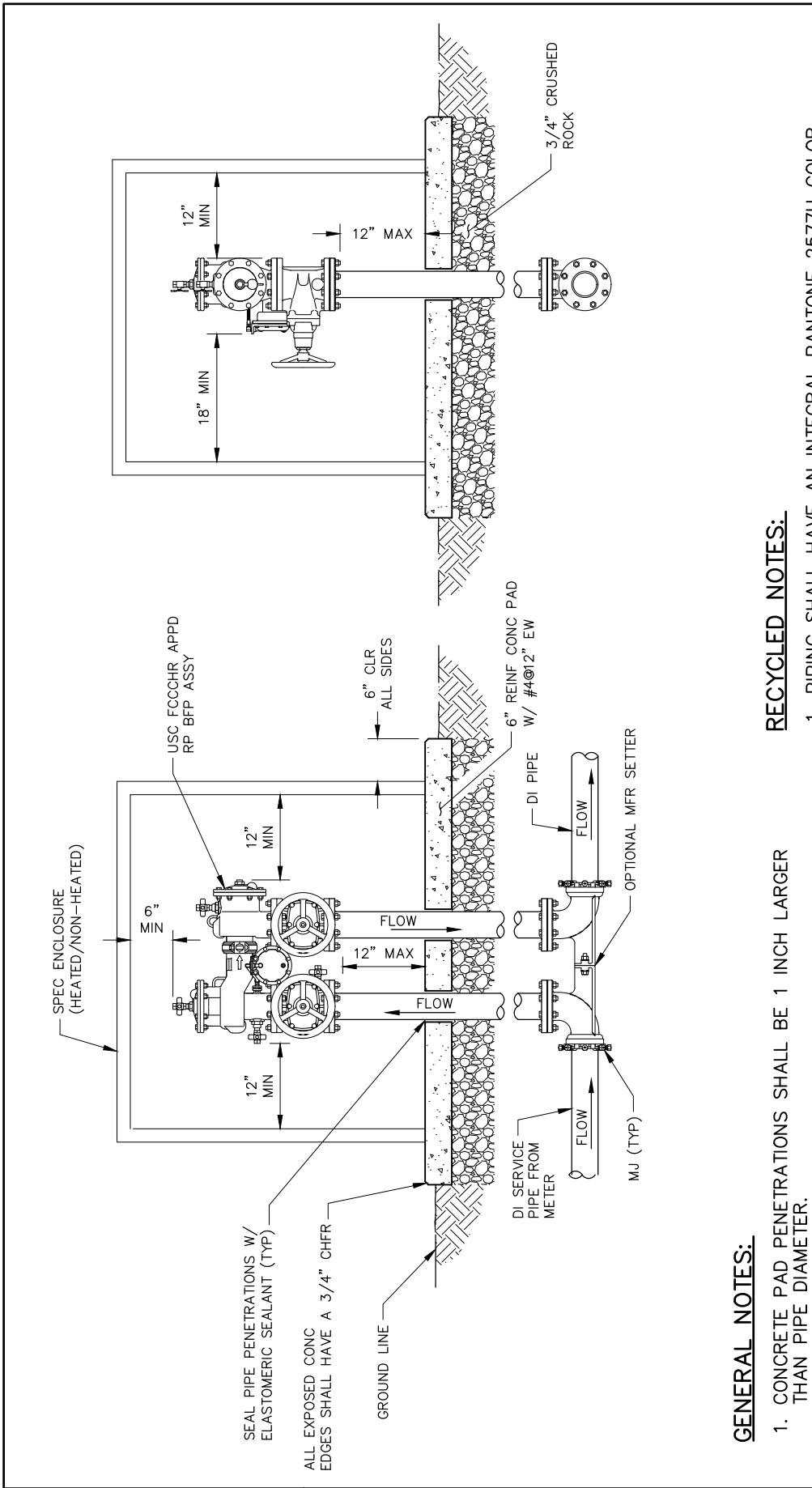
1. CONCRETE PAD PENETRATIONS SHALL BE 1 INCH LARGER THAN PIPE DIAMETER.
2. DIAMETER OF FITTINGS, NIPPLE, AND TUBING SHALL BE EQUAL IN DIAMETER TO THE BACKFLOW PREVENTER.
3. HEATED ENCLOSURE SHALL HAVE SEPARATE APPROVED ELECTRICAL SERVICE AND SHALL BE SIZED TO ALLOW ADEQUATE ROOM FOR TESTING AND MAINTENANCE.
4. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR INSTALLATION INSTRUCTIONS.

DRAWN BY: BAIREs
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33282
**OUTSIDE SETTING FOR 2" &
 SMALLER REDUCED PRESSURE
 PRINCIPLE ASSEMBLY IN
 ENCLOSURE**

D DENVER WATER

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GENERAL NOTES:


1. CONCRETE PAD PENETRATIONS SHALL BE 1 INCH LARGER THAN PIPE DIAMETER.
2. REFER TO LOCAL CODES AND MANUFACTURER REQUIREMENTS FOR INSTALLATION INSTRUCTIONS.
3. HEATED ENCLOSURE SHALL HAVE SEPARATE APPROVED ELECTRICAL SERVICE AND SHALL BE SIZED TO ALLOW ADEQUATE ROOM FOR TESTING AND MAINTENANCE.
4. PIPING FOR 3 INCH AND LARGER SHALL BE DUCTILE IRON FROM THE METER TO THE BACKFLOW PREVENTION ASSEMBLY AND DOWNSTREAM FROM THE BACKFLOW PREVENTION ASSEMBLY TO THE MANUFACTURER'S SETTER OR 90 DEGREE BEND.

RECYCLED NOTES:

1. PIPING SHALL HAVE AN INTEGRAL PANTONE 2577U COLOR AND BE EMBOSSED OR INTEGRALLY STAMPED "CAUTION: RECYCLED WATER-DO NOT DRINK".
2. THE BACKFLOW ASSEMBLY OPERATING VALVE HANDLES SHALL BE PAINTED PANTONE 2577U IN COLOR AND TAGGED WITH AN INERT PLASTIC LABEL WITH BLACK PRINTING ON A WHITE FIELD READING "CAUTION: RECYCLED WATER-DO NOT DRINK".
3. ENCLOSURES SHALL BE IDENTIFIED WITH SIGNAGE "RECYCLED WATER USED FOR IRRIGATION-DO NOT DRINK" ON THE ACCESS DOOR.

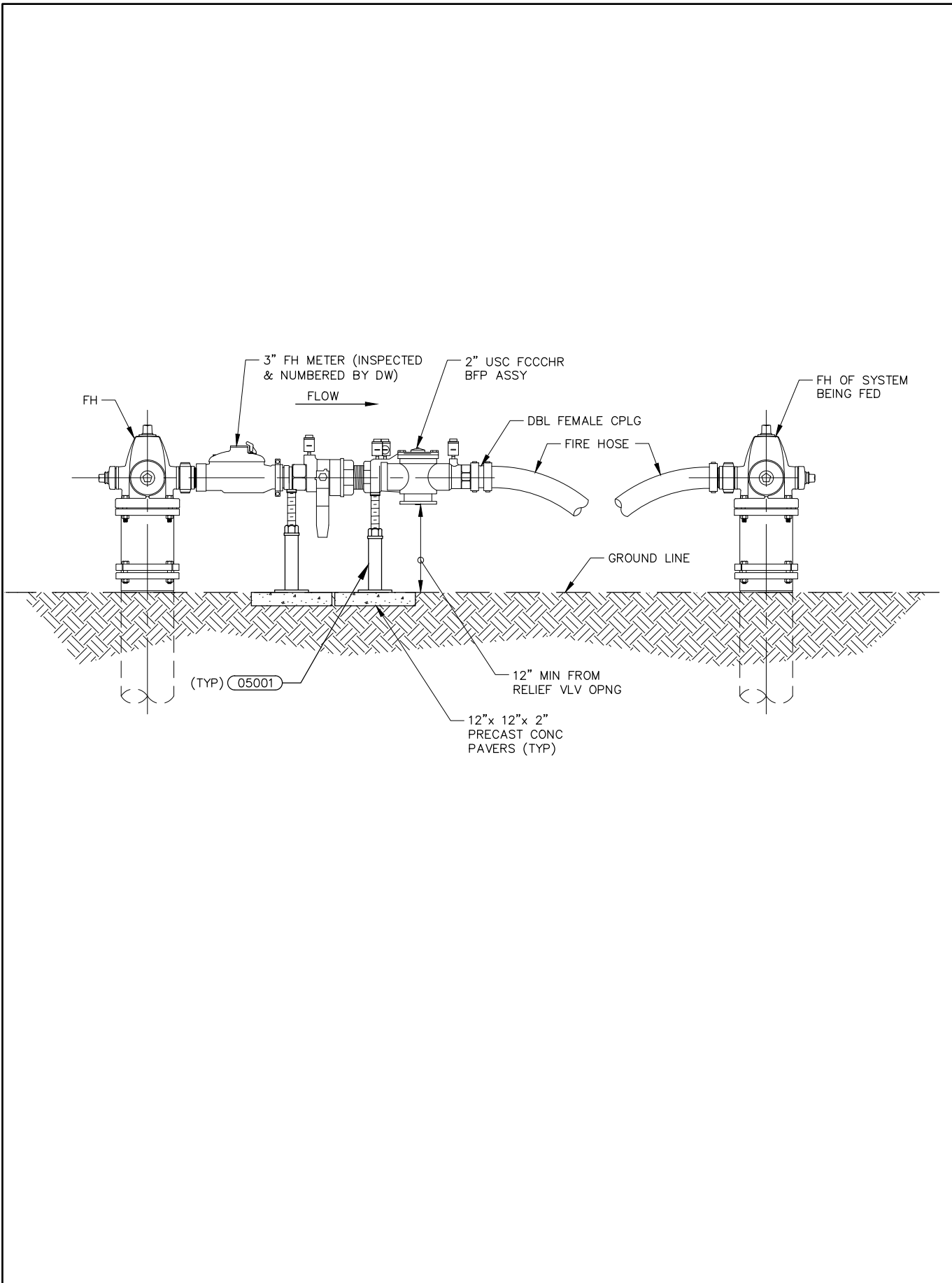
DRAWN BY: BAIREZ
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

33283
OUTSIDE SETTING FOR 3" & LARGER REDUCED PRESSURE PRINCIPLE ASSEMBLY N-TYPE, ABOVE GROUND



DENVER WATER

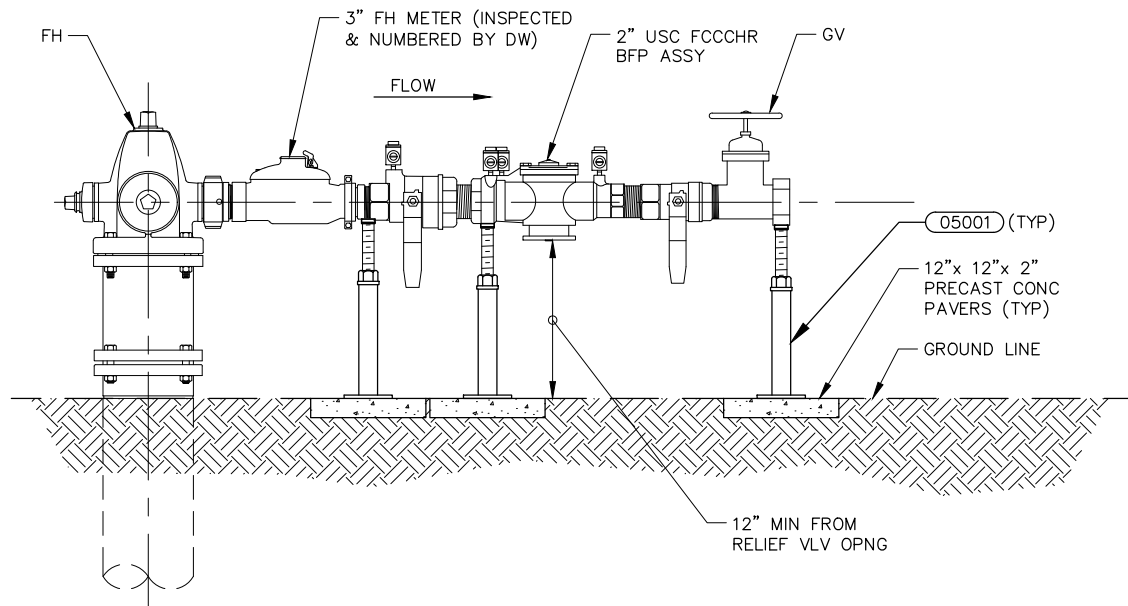
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DRAWN BY: <i>BAIRES</i>
CHKD BY: <i>K ROSS/KLR</i>
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: <i>JULY 2021</i>
REVISION DATE:

33290
STANDARD DESIGN FOR
HYDRANT INTERCONNECTION


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NOTES:

1. USE OF A DENVER WATER HYDRANT REQUIRES A VALID HYDRANT USE PERMIT.
2. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE APPROVED BY DENVER WATER AND FULLY SUPPORTED WHEN CONNECTED TO THE FIRE HYDRANT.
3. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL BE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH APPROVED.
4. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE TESTED ANNUALLY AND A COPY OF THE TEST SHALL BE SUBMITTED TO DENVER WATER.
5. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO FIRE HYDRANT DURING USE.
6. SUPPORT OF BACKFLOW PREVENTION ASSEMBLY IN LIEU OF (05001) SHALL BE APPROVED IN WRITING BY DENVER WATER.
7. PROTECT HOSE IN TRAFFIC CONDITIONS WITH RAMP.

DRAWN BY: *BAIRES*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

ORIGINATION DATE: *JULY 2021*

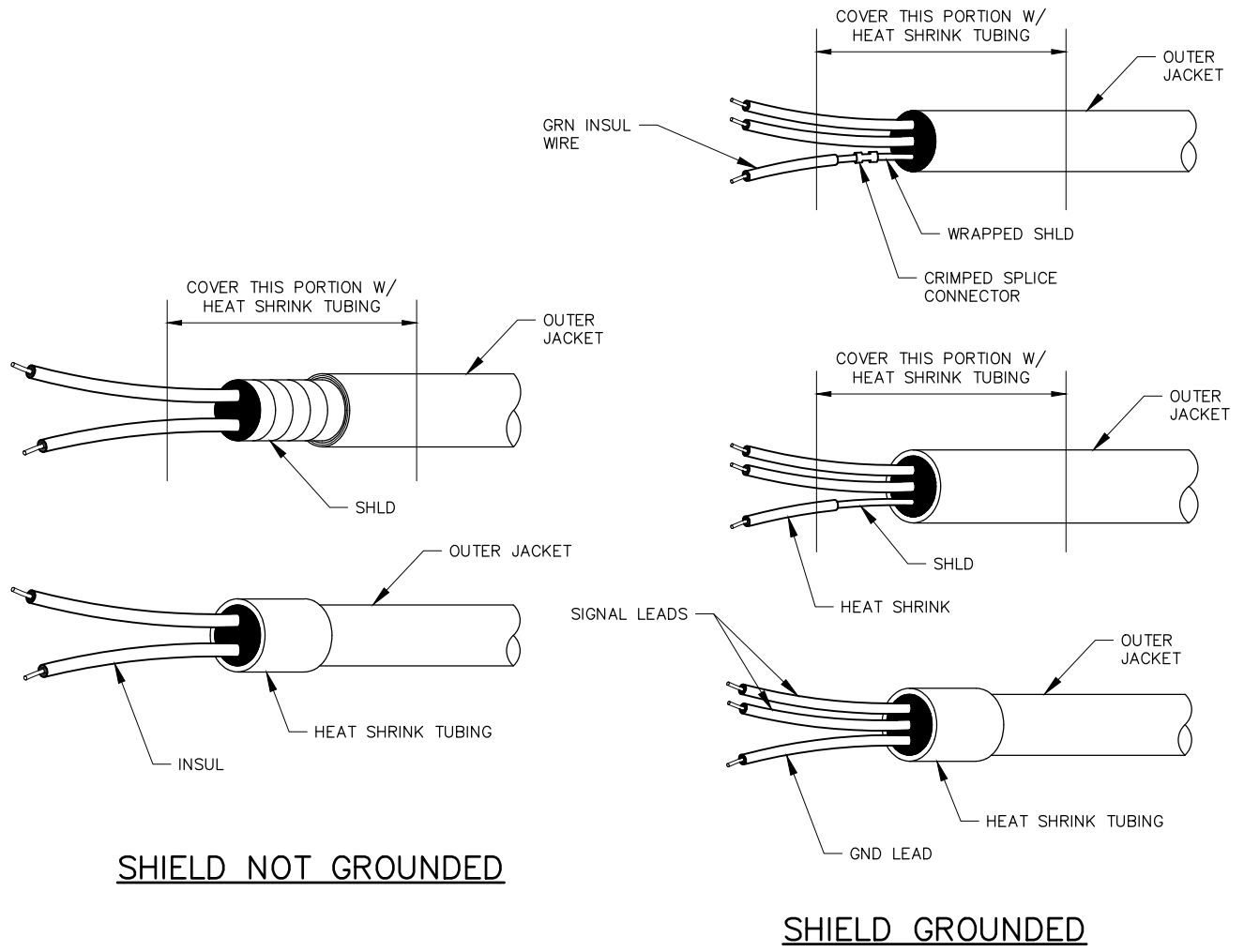
REVISION DATE:

**33291
STANDARD HYDRANT
METER INSTALLATION**



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INTENTIONALLY BLANK



SHIELD NOT GROUNDED

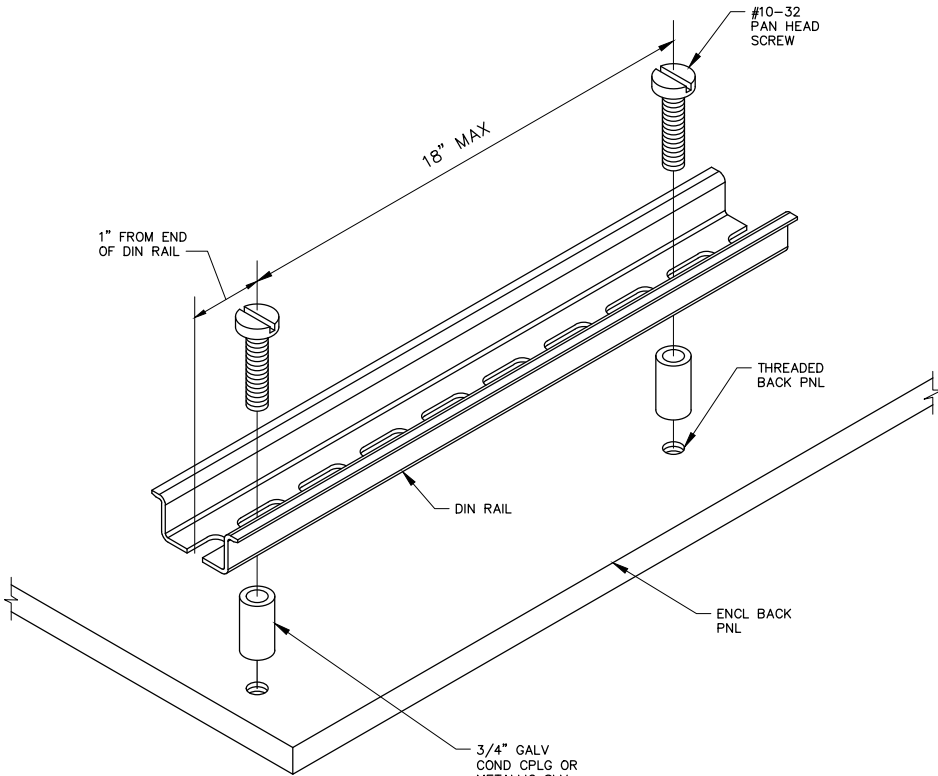
SHIELD GROUNDED

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

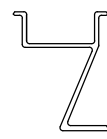
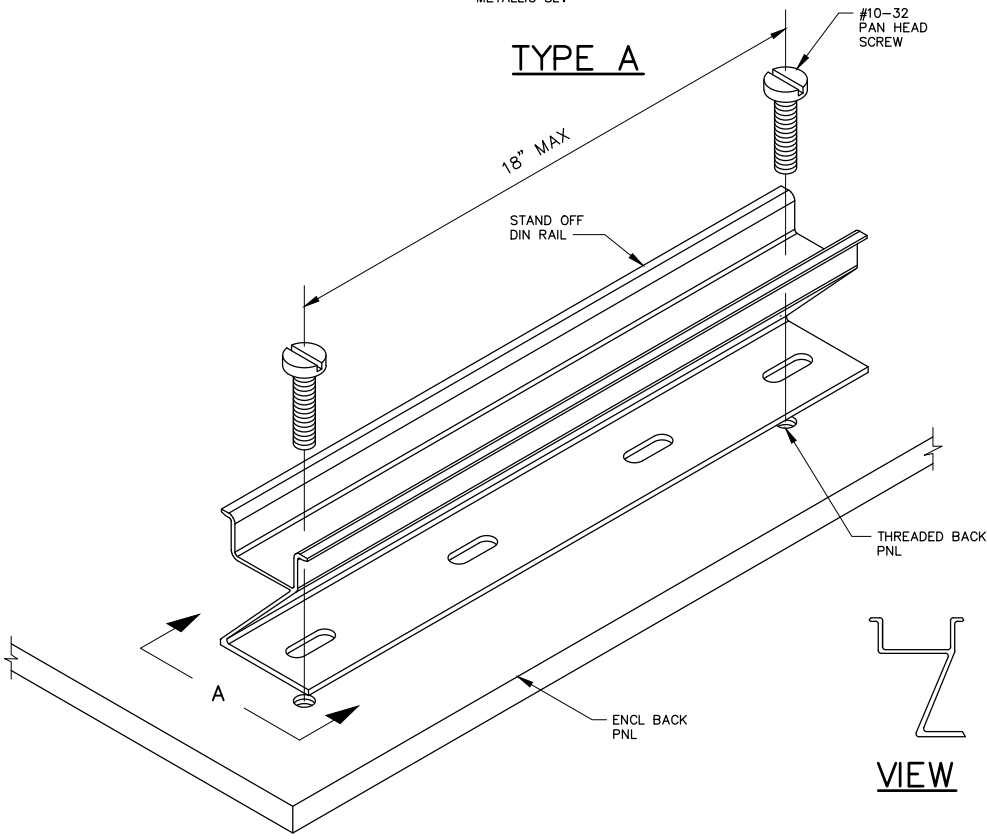
**40501
SHIELDED CABLE
TERMINATION**



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TYPE A



VIEW

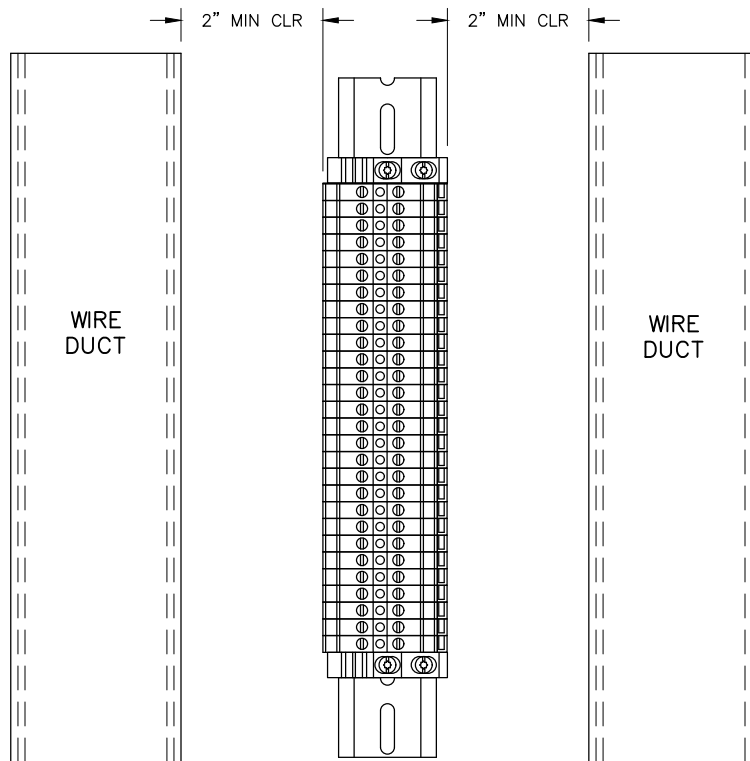
RAISED
TYPE B

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

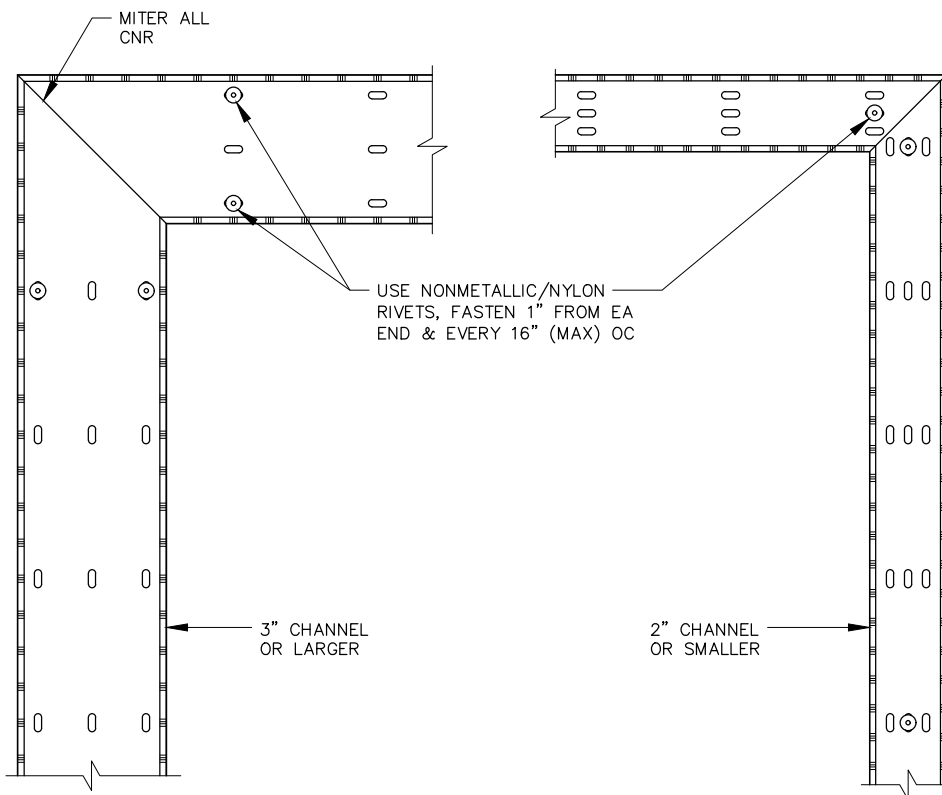
40502
DIN RAIL MOUNTING

D DENVER WATER

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TERMINAL BLOCK CLEARANCE



MOUNTING

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

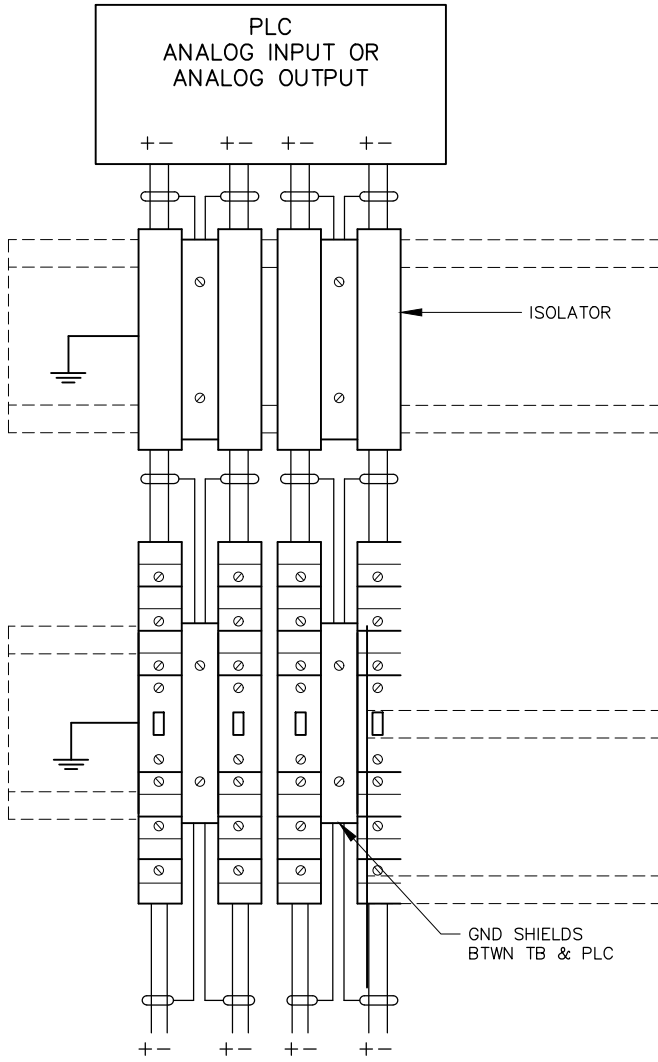
ORIGINATION DATE: JULY 2021

REVISION DATE:

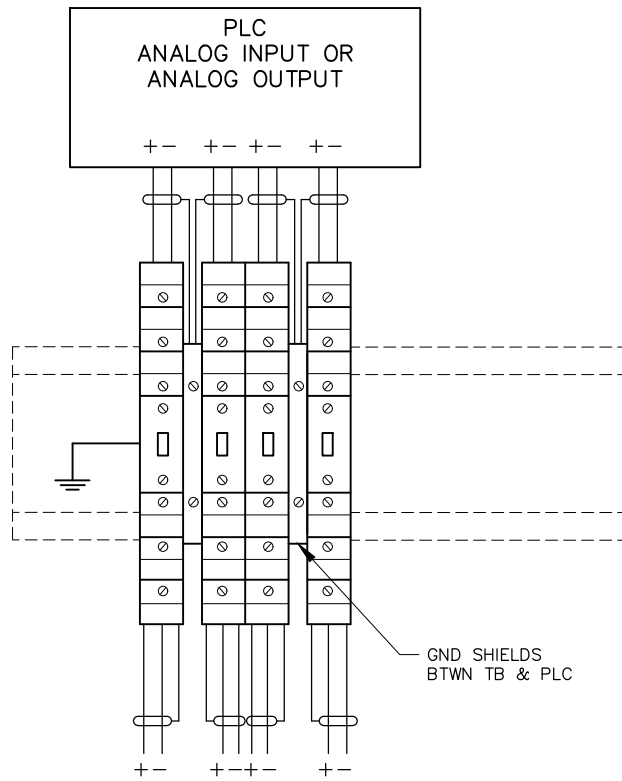
**40503
PANEL WIRING DUCT**



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DEVICE OR COMPONENT
ANALOG INPUT OR ANALOG
OUTPUT ISOLATED



DEVICE OR COMPONENT
ANALOG INPUT OR ANALOG
OUTPUT NON-ISOLATED

NOTE:

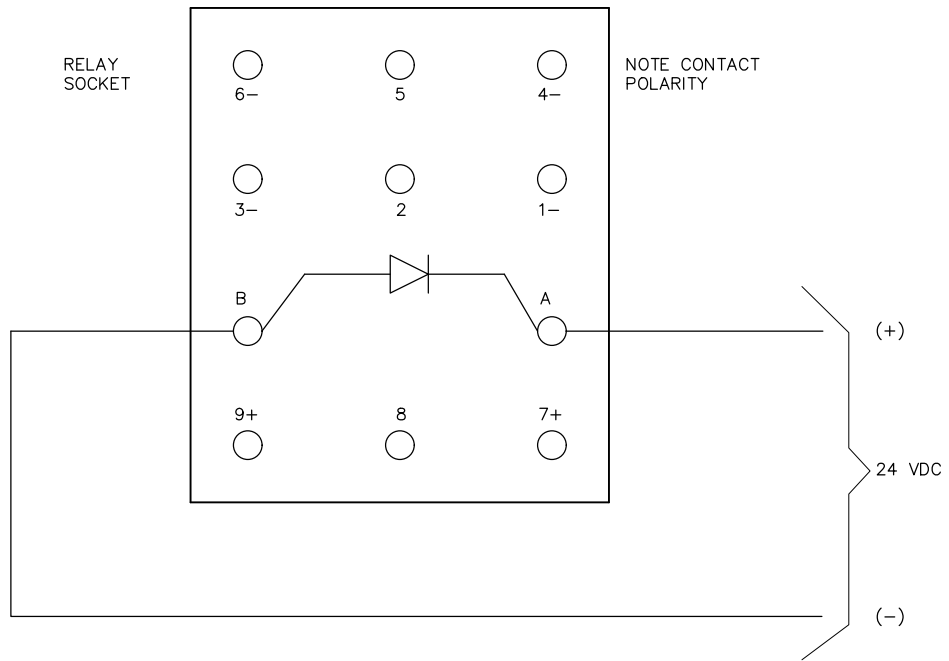
TERMINAL BLOCKS FOR ANALOG CIRCUITS SHALL BE DISCONNECT TYPE.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

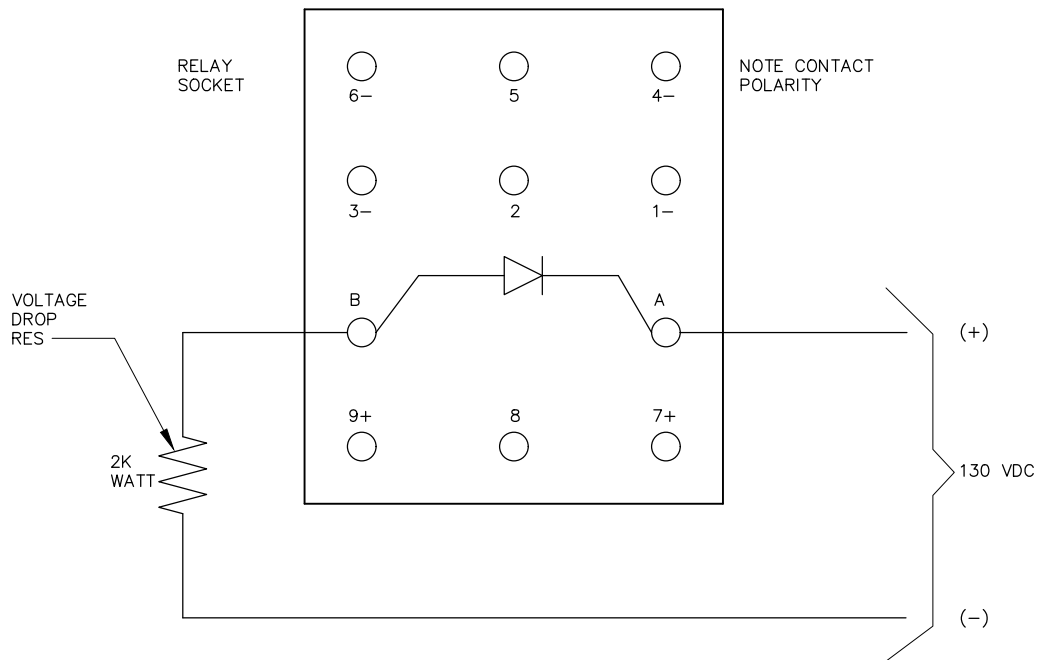
40504 ANALOG SIGNAL SHIELD TERMINATIONS



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24VDC
TYPE A



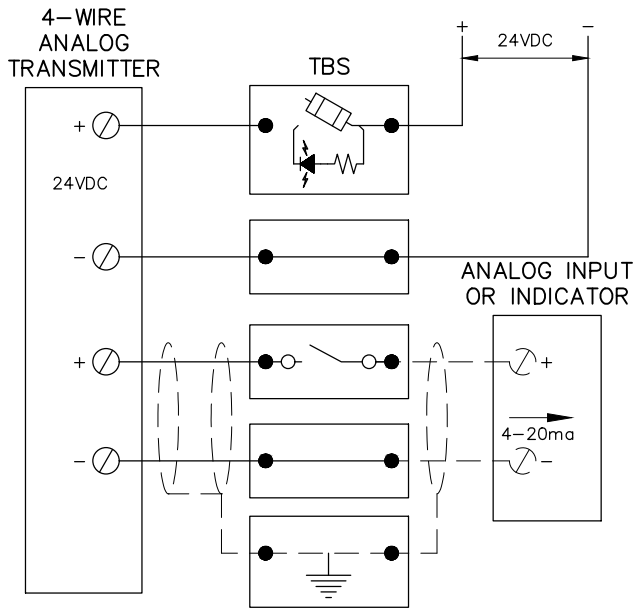
125VDC
TYPE B

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

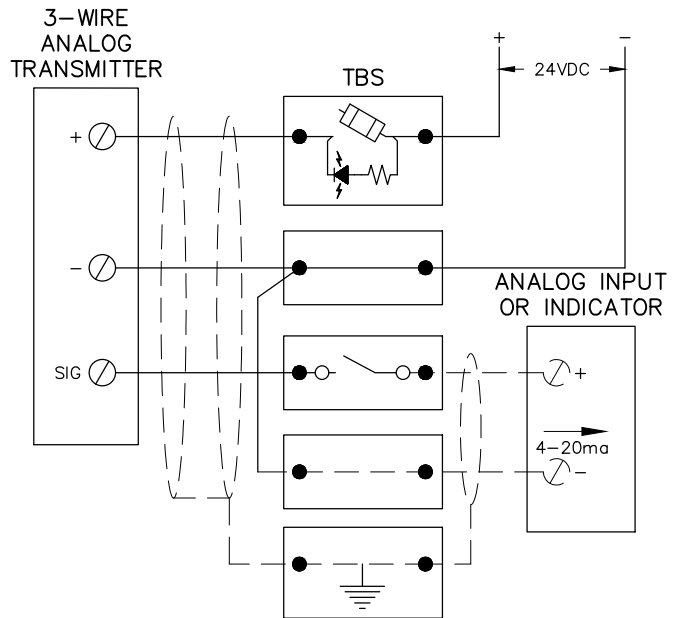
40505
DC RELAY BASE
CONFIGURATION



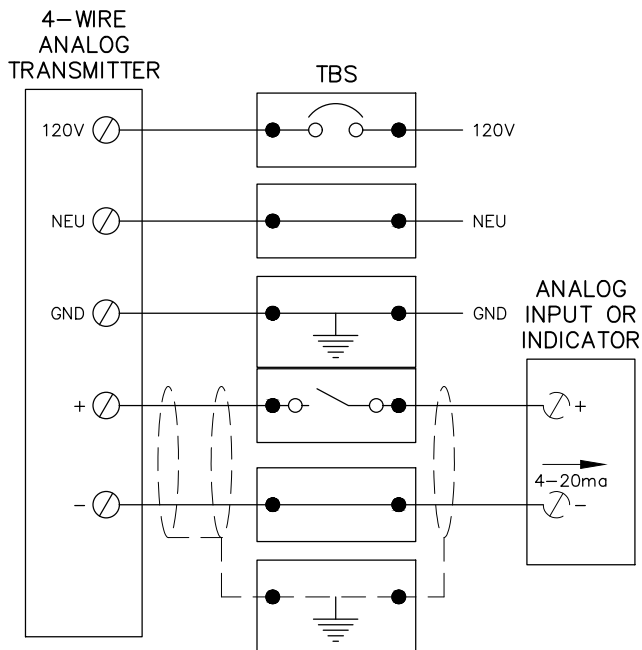
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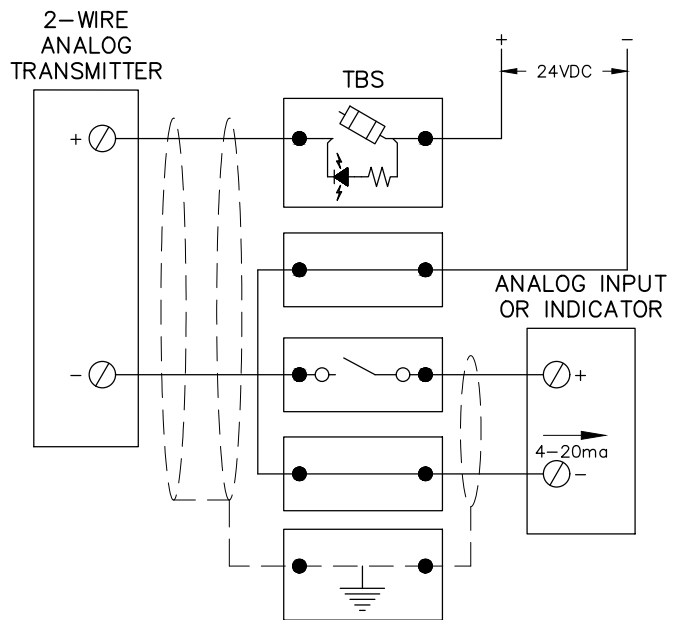
FOUR-WIRE TRANSMITTER
TYPE A



24VDC THREE-WIRE TRANSMITTER
TYPE C



120VAC FOUR-WIRE TRANSMITTER
TYPE B



24VDC TWO-WIRE TRANSMITTER
TYPE D

NOTES:

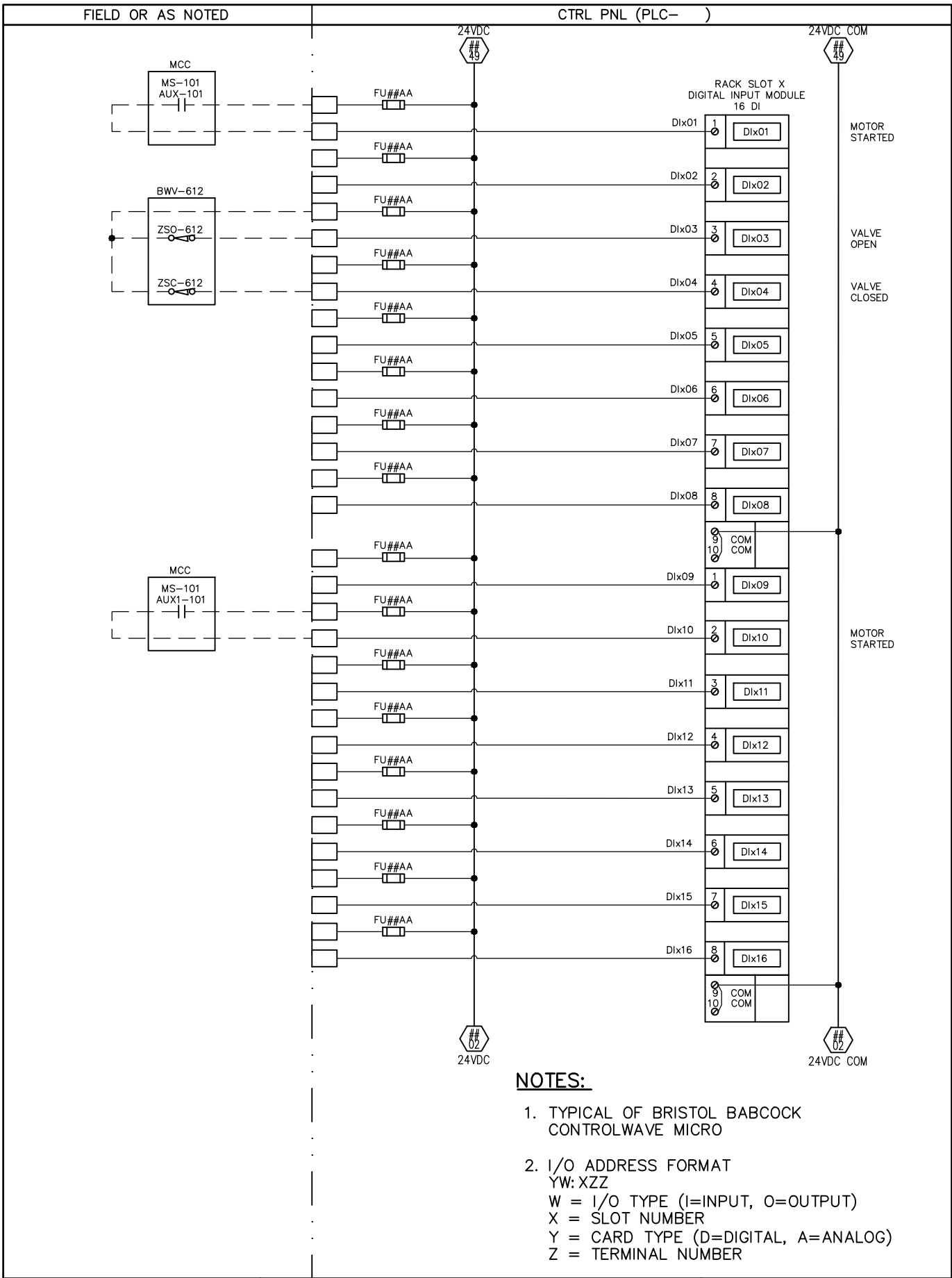
1. GROUND SHIELD AT CLOSEST OPPORTUNITY TO THE LOOP POWER SOURCE.
2. NO PROTECTION OR DISCONNECTING MEANS ON (-) 24 VOLTS DIRECT CURRENT OF GROUND POWER SUPPLIES.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40506
ANALOG
INSTRUMENT/TRANSMITTER
SCHEMATICS**



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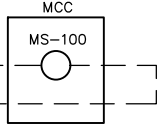
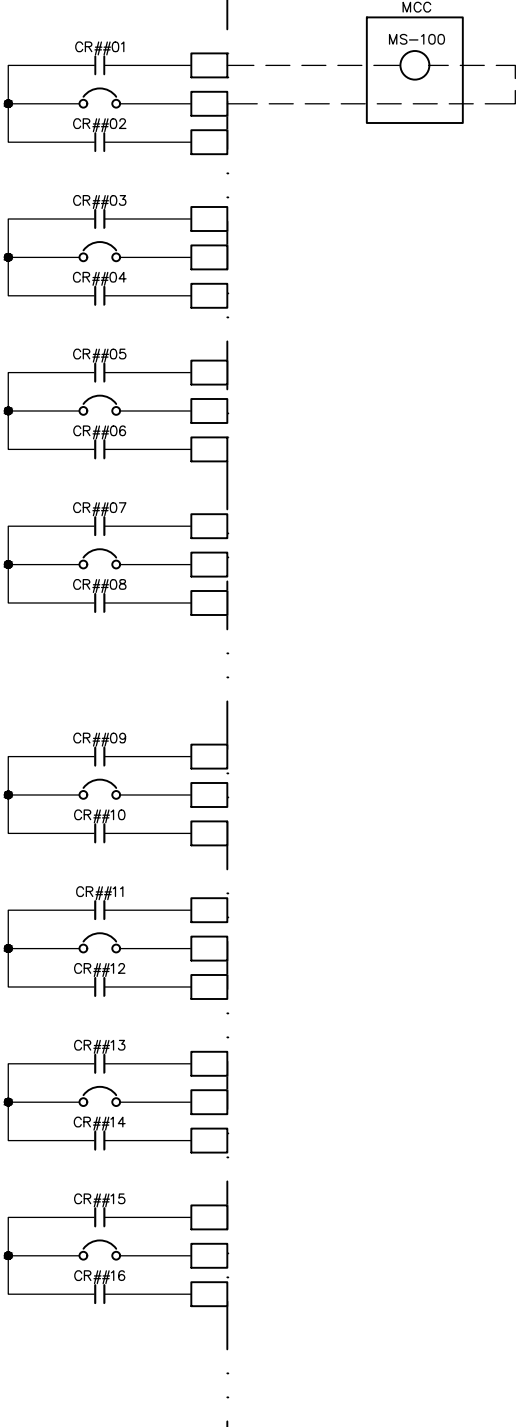
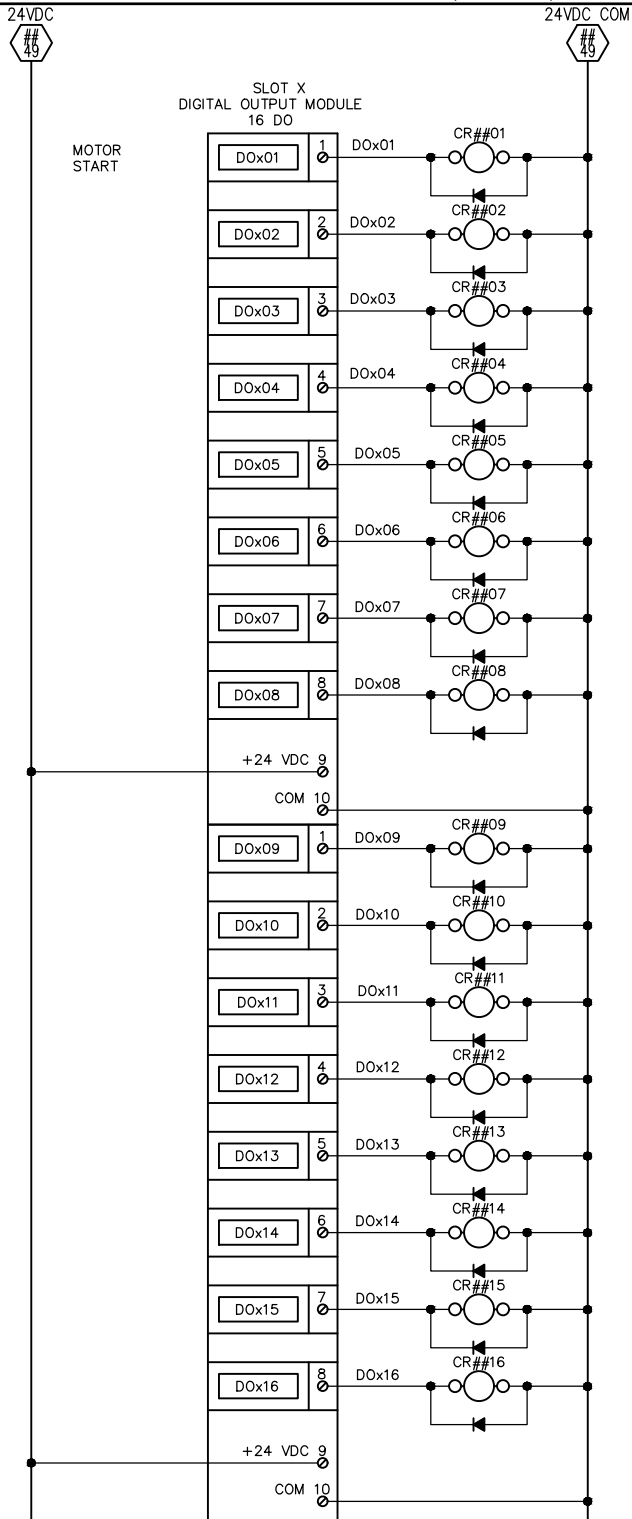
NOTES:

1. TYPICAL OF BRISTOL BABCOCK CONTROLWAVE MICRO
2. I/O ADDRESS FORMAT
 YW: XZZ
 W = I/O TYPE (I=INPUT, O=OUTPUT)
 X = SLOT NUMBER
 Y = CARD TYPE (D=DIGITAL, A=ANALOG)
 Z = TERMINAL NUMBER

DRAWN BY: ORTEGA
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

**40507
 TYPICAL DISCRETE
 INPUT WIRING DIAGRAM**

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NOTES:

1. TYPICAL OF BRISTOL BABCOCK CONTROLWAVE MICRO
2. I/O ADDRESS FORMAT
 YW: XZZ
 W = I/O TYPE (I=INPUT, O=OUTPUT)
 X = SLOT NUMBER
 Y = CARD TYPE (D=DIGITAL, A=ANALOG)
 Z = TERMINAL NUMBER

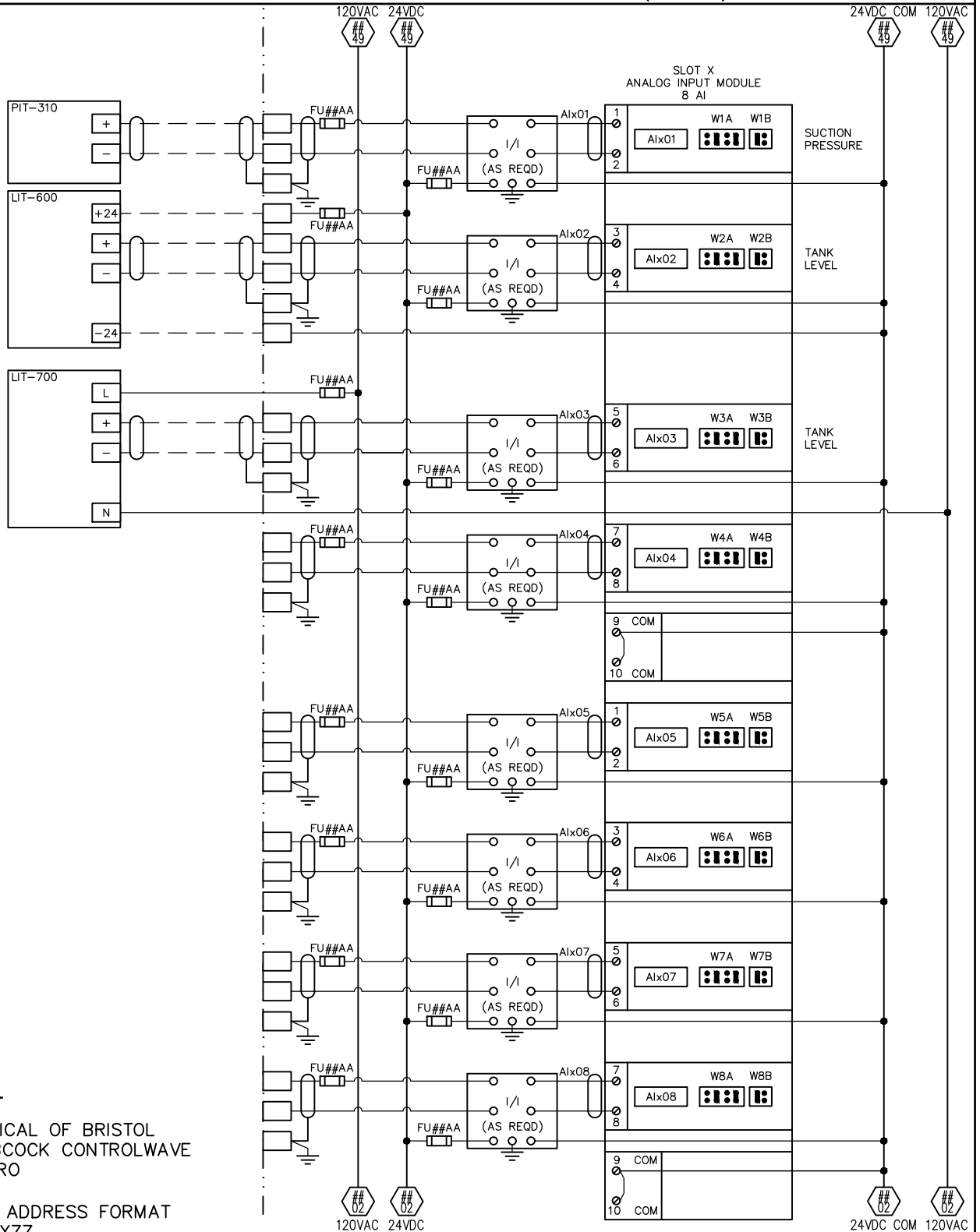
3. ## = PAGE NUMBER
 AA = LINE NUMBER

DRAWN BY: ORTEGA
CHKD BY: K ROSS/ KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

40508
TYPICAL DISCRETE
OUTPUT WIRING DIAGRAM



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NOTES:

1. TYPICAL OF BRISTOL BABCOCK CONTROLWAVE MICRO
2. I/O ADDRESS FORMAT
 YW: XZZ
 W = I/O TYPE (I=INPUT, O=OUTPUT)
 X = SLOT NUMBER
 Y = CARD TYPE (D=DIGITAL, A=ANALOG)
 Z = TERMINAL NUMBER
3. ## = PAGE NUMBER
 AA = LINE NUMBER

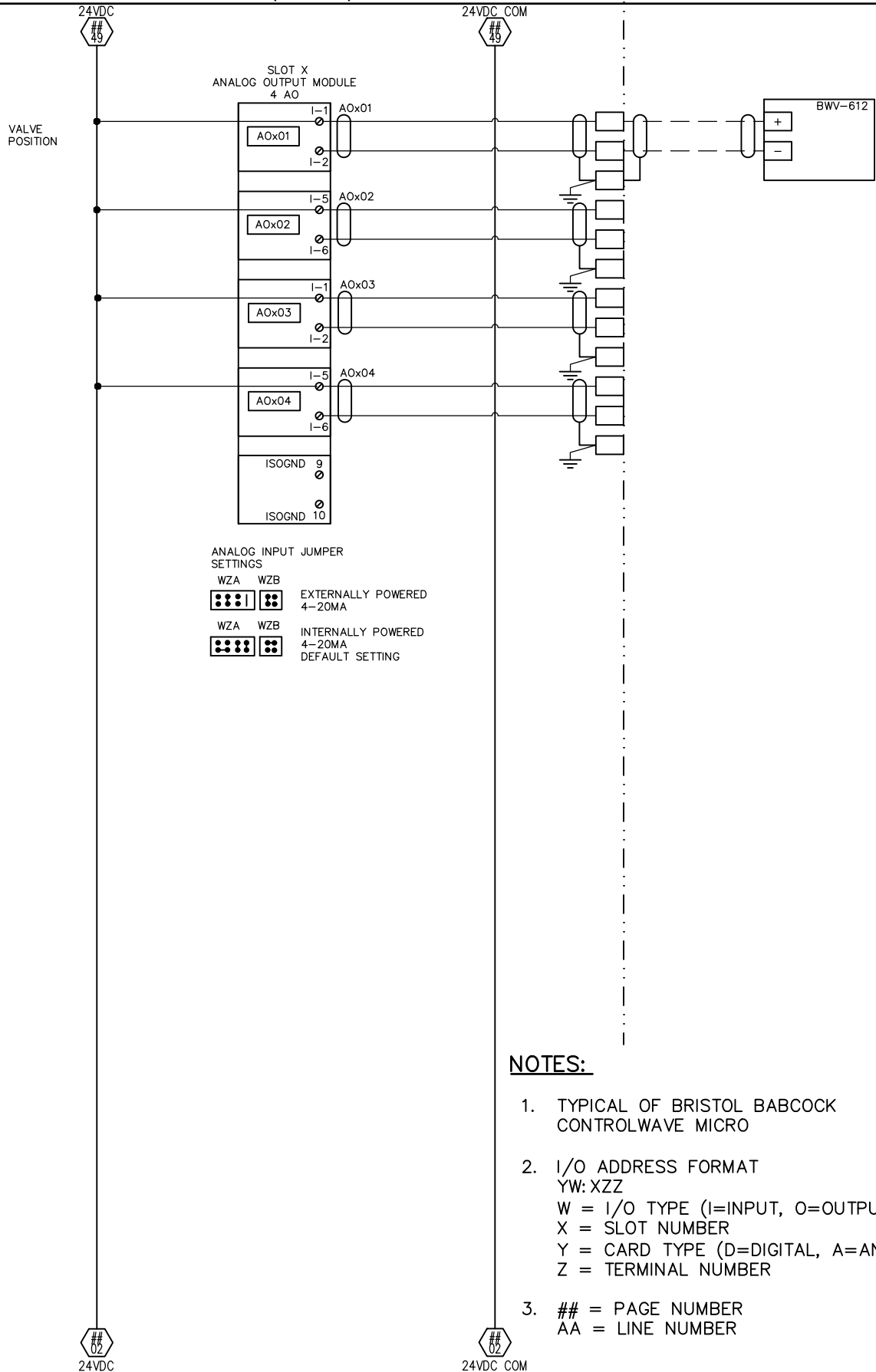
ANALOG INPUT JUMPER SETTINGS
 WZA WZB

 EXTERNALLY POWERED
 4-20MA
 INTERNALLY POWERED
 4-20MA
 DEFAULT SETTING

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40509
 TYPICAL ANALOG
 INPUT WIRING DIAGRAM**

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NOTES:

1. TYPICAL OF BRISTOL BABCOCK CONTROLWAVE MICRO
2. I/O ADDRESS FORMAT
YW: XZZ
W = I/O TYPE (I=INPUT, O=OUTPUT)
X = SLOT NUMBER
Y = CARD TYPE (D=DIGITAL, A=ANALOG)
Z = TERMINAL NUMBER
3. ## = PAGE NUMBER
AA = LINE NUMBER

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

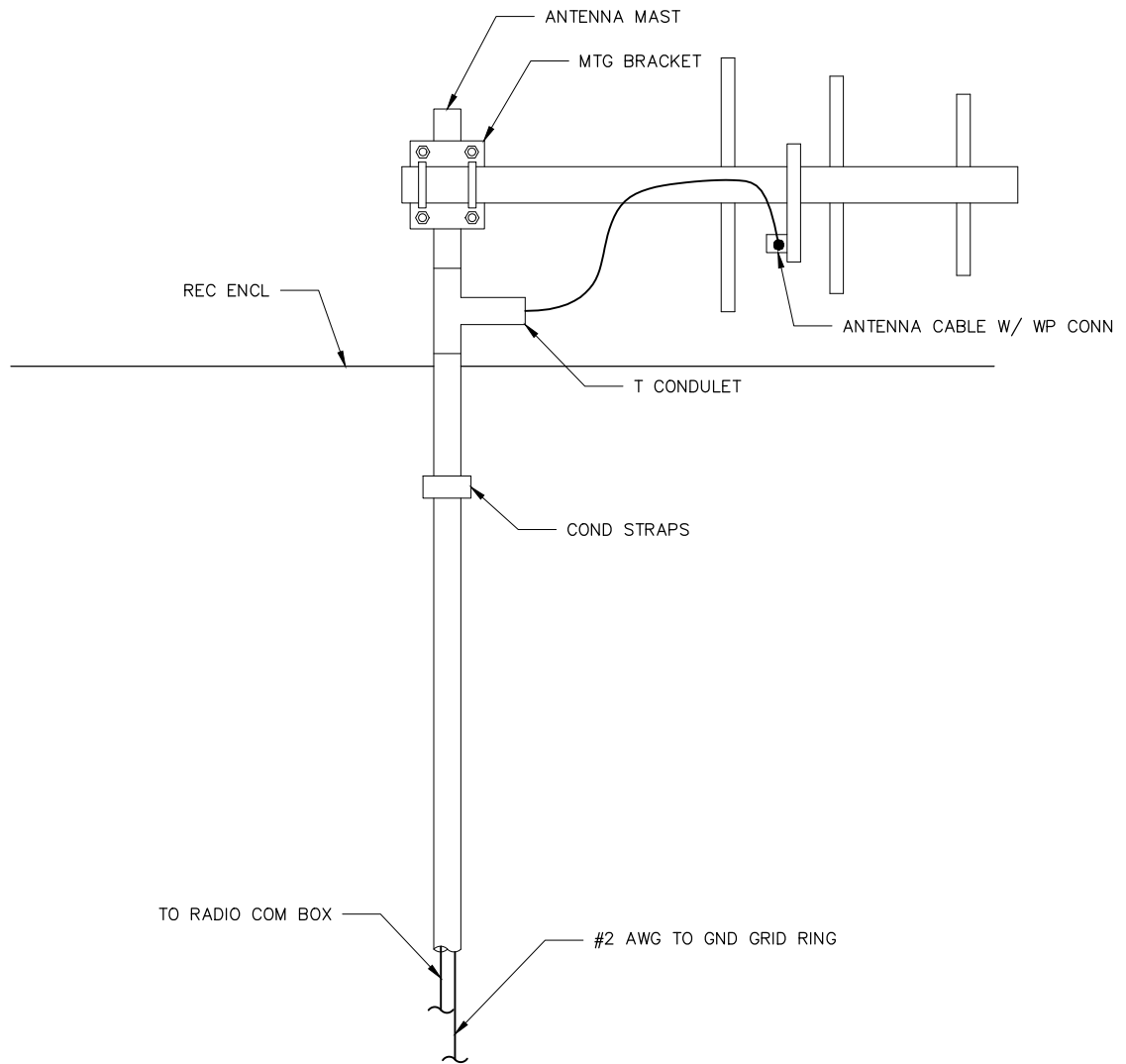
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40510
TYPICAL ANALOG
OUTPUT WIRING DIAGRAM**



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NOTES:

1. GROUND PIGTAILS TO THE RECTIFIER ENCLOSURE SHALL BE #1/0 AWG BARE COPPER CONDUCTOR.
2. CONNECTIONS SHALL BE EXOTHERMIC TYPE.
3. GROUND ANTENNA MAST, ENCLOSURES, AND SURGE SUPPRESSOR TO GROUND GRID SYSTEM.
4. MOUNT RADIO, 12VDC POWER SUPPLY, AND 24VAC TRANSFORMER INSIDE RADIO COMMUNICATIONS BOX.
5. APPLY JOINT SEALER TYPE 2 IN ACCORDANCE WITH SPECIFICATION SECTION 07 92 00 TO RIGHT ANGLE EDGE BETWEEN ENCLOSURE AND CONCRETE PAD.
6. APPLY HYDROPHILIC WATERSTOP AROUND CONDUIT PENETRATIONS THROUGH THE CONCRETE PAD IN ACCORDANCE WITH (23068).
7. PROVIDE LOCKABLE SIDE ACCESS DOOR.
8. COORDINATE WITH CATHODIC PROTECTION SUBCONTRACTOR FOR GROUND BED PENETRATIONS INTO CABINET.

DRAWN BY: VAICIKAIUSKAS
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

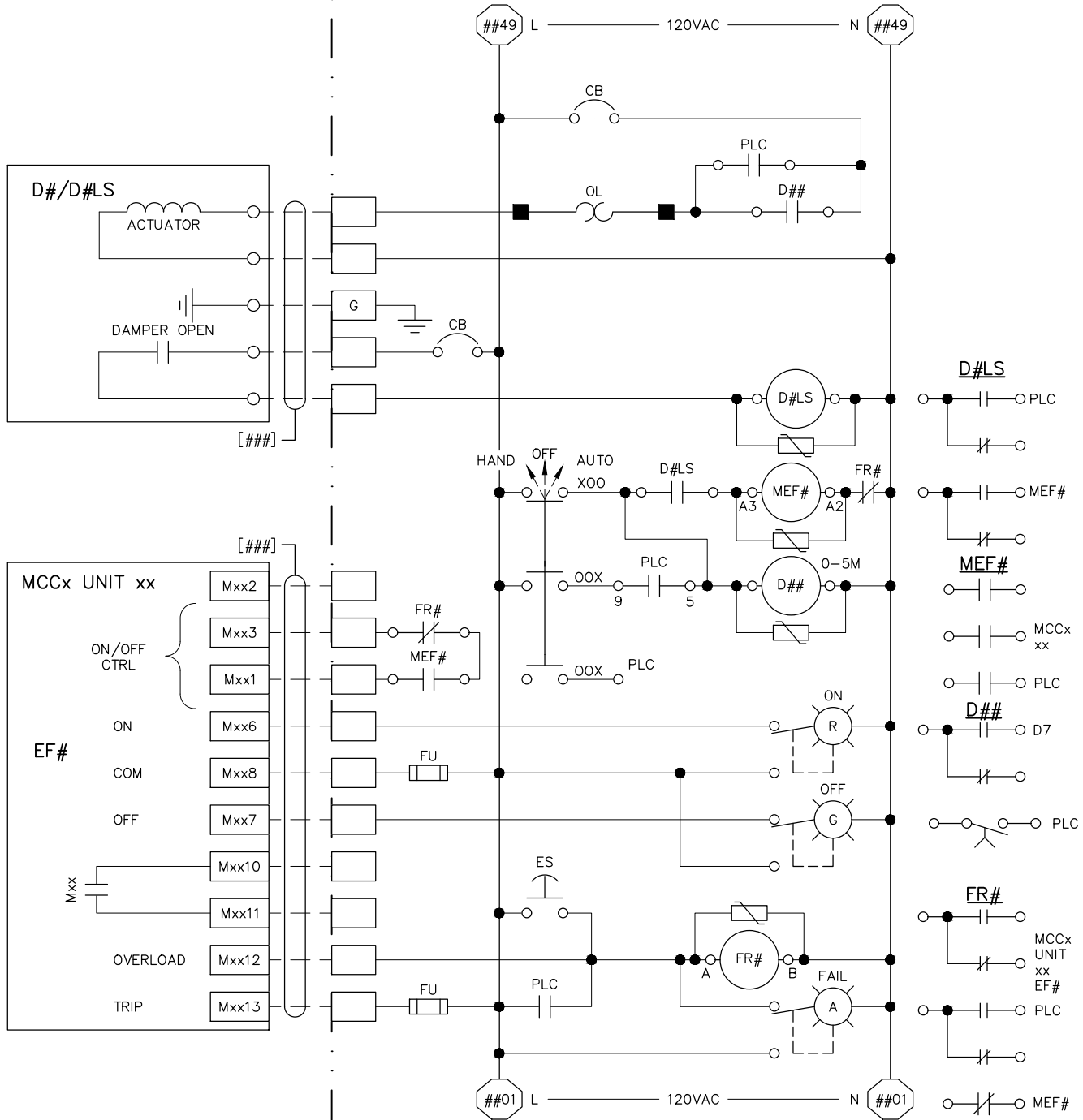
**40511
YAGI ANTENNA MOUNTING**

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FILD OR AS NOTED

CTRL PNL



DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

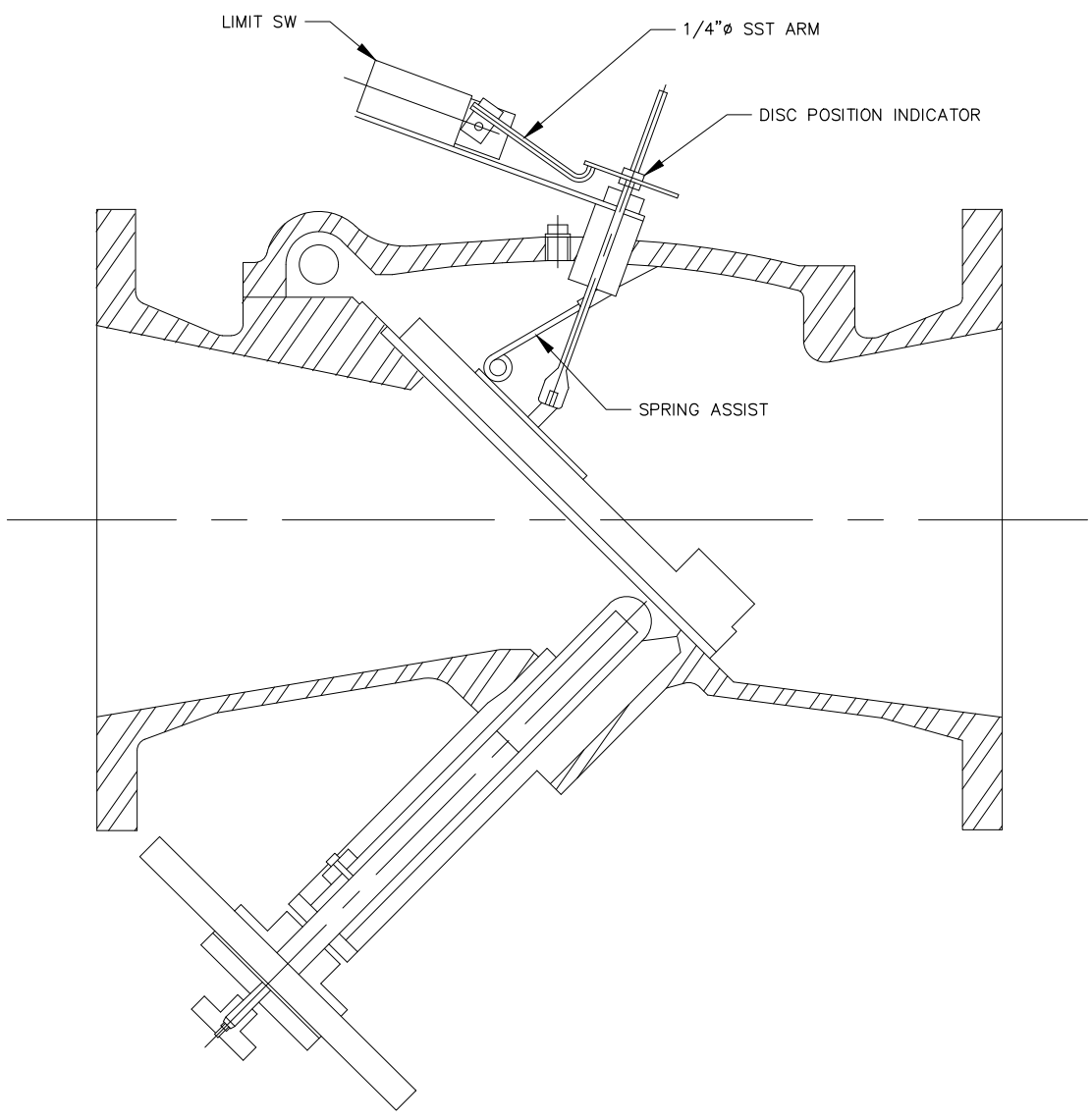
ORIGINATION DATE: JULY 2021

REVISION DATE:

40512
EXHAUST FAN AND DAMPER
CONTROL SCHEMATIC



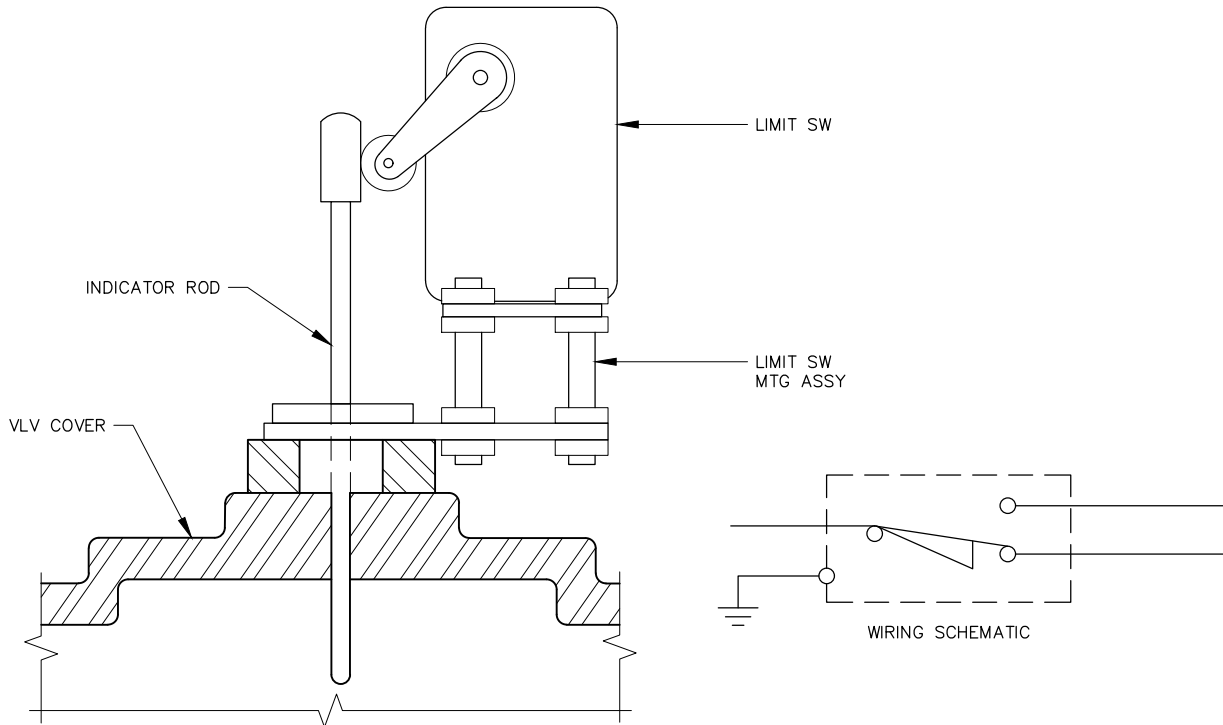
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DRAWN BY: BERKNESS
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

40515
CHECK VALVE LIMIT SWITCH

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NOTE:

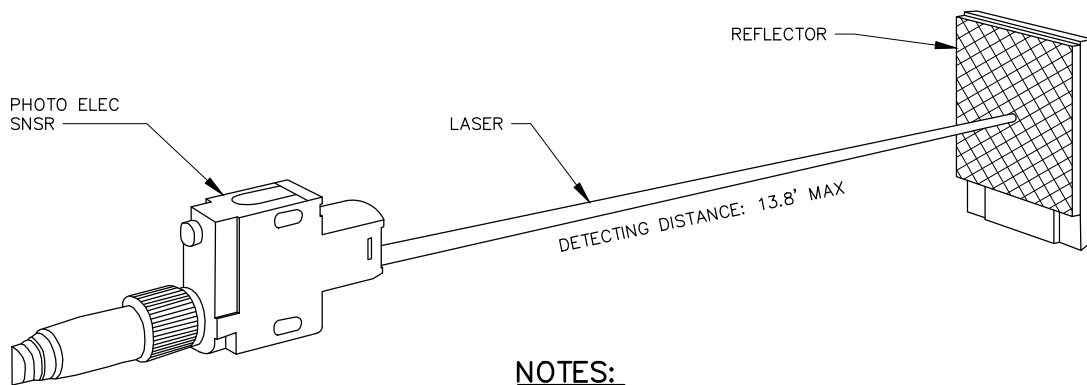
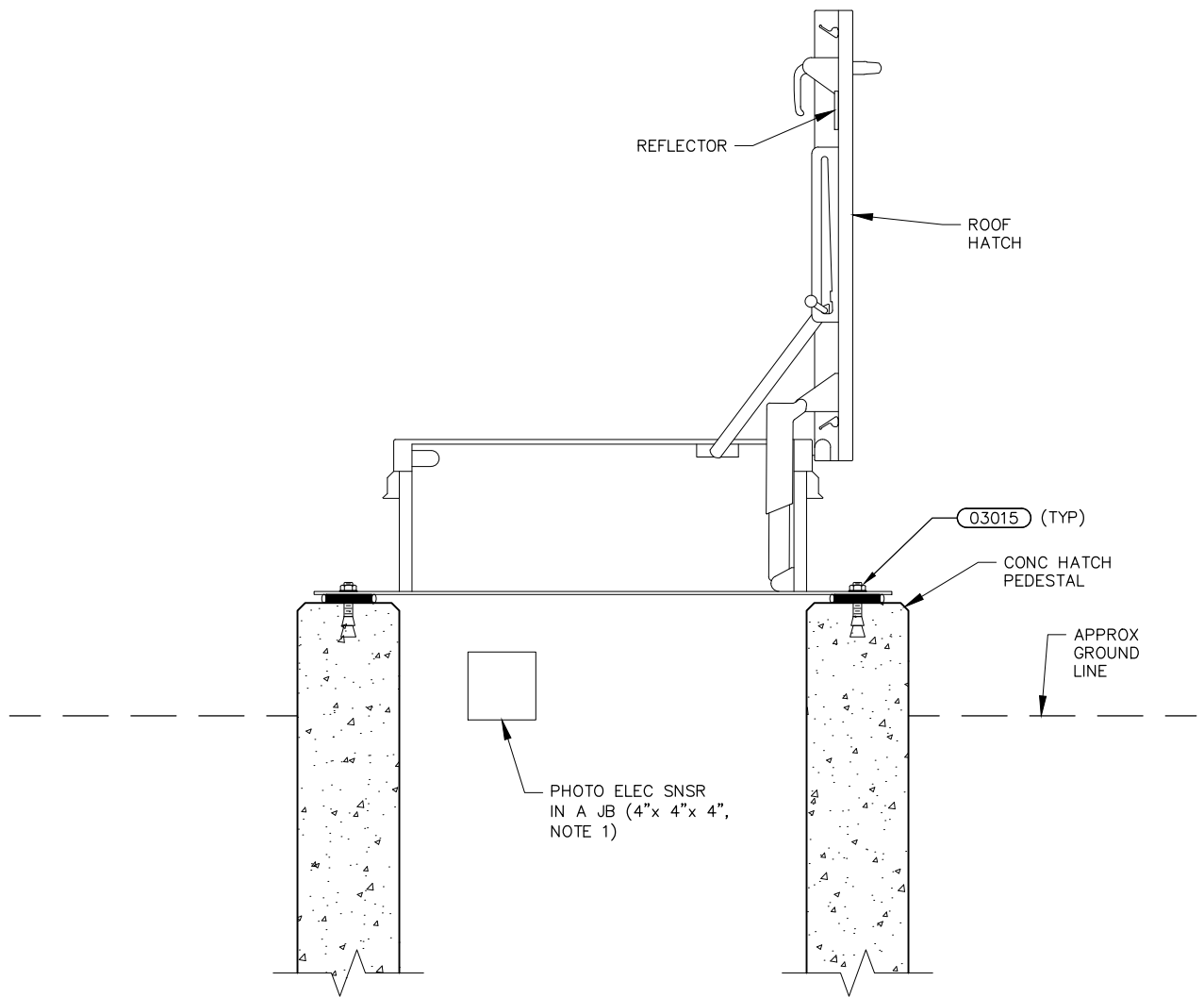
SINGLE POLE DOUBLE THROW (SPDT) LIMIT SWITCH RATED 10A, 250V, NEMA 4 ENCLOSURE WITH UL AND CANADIAN STANDARDS ASSOCIATION (CSA) LISTINGS.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40520
RISING STEM VALVE
LIMIT SWITCH**



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NOTES:

1. COORDINATE LOCATION OF PHOTO ELECTRIC SENSOR WITH THE ENGINEER BEFORE INSTALLATION.
2. THIS DETAIL IS INTENDED FOR PHOTO ELECTRIC SENSOR MOUNTING USE ONLY. REFER TO CIVIL DRAWINGS FOR INFORMATION ON STRUCTURAL COMPONENTS.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

ORIGINATION DATE: JULY 2021

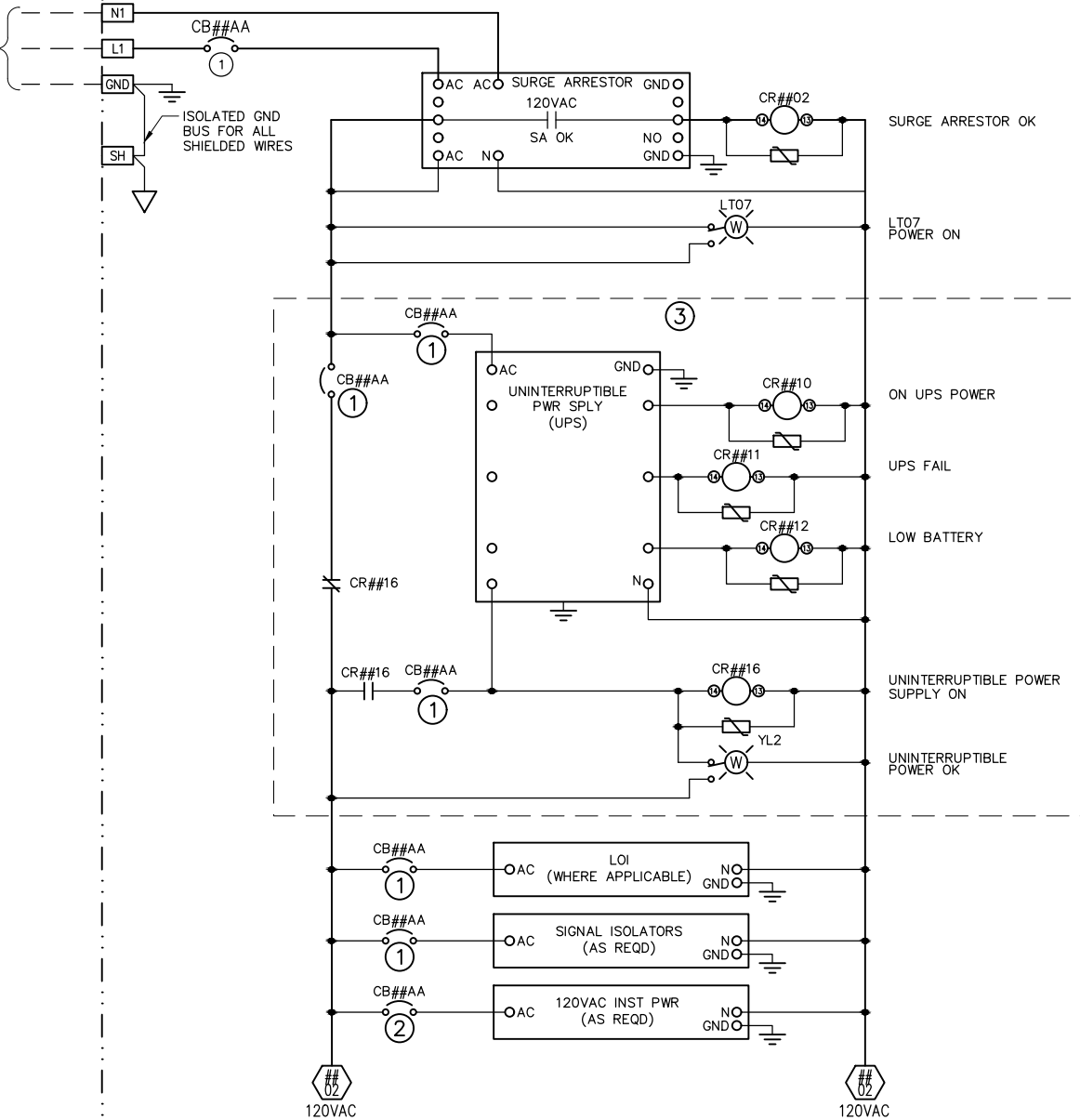
REVISION DATE:

**40521
PHOTO ELECTRIC SENSOR
ON ACCESS HATCH**



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120VAC, 1 ϕ , 60Hz
PWR



KEYED NOTES:

- ① SIZE BASED ON PROTECTION NEEDS.
- ② SIZE BASED ON PROTECTION NEEDS. PROVIDE SEPARATE CIRCUIT BREAKERS FOR EACH INSTRUMENT POWERED FROM THE PLC CABINET.
- ③ UPS AND WIRING TO BE FURNISHED WHEN THE PLC IS NOT FED FROM AN EXTERNAL UPS.

NOTES:

1. SCHEMATIC ILLUSTRATES DESIGN INTENT ONLY. PROVIDE ALL NECESSARY COMPONENTS TO MEET PROJECT REQUIREMENTS.
2. THIS DETAIL IS TO BE USED AS PART OF DETAILS 40523, 40524, AND 40525.
3. ## = PAGE NUMBER
AA = LINE NUMBER

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

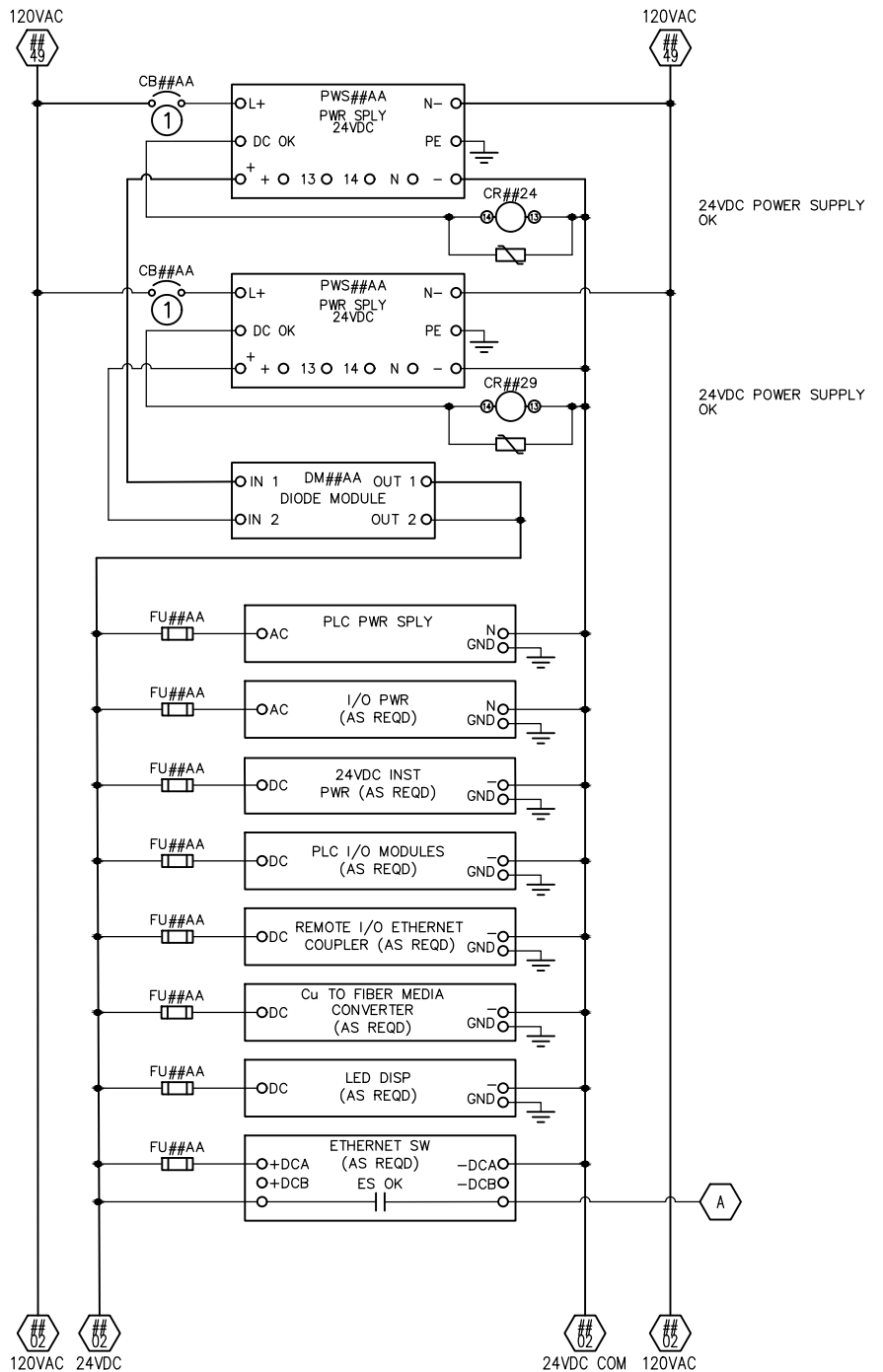
ORIGINATION DATE: JULY 2021

REVISION DATE:

40522
TYPICAL PLC
SCHEMATIC NO 1



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KEYED NOTE:

① SIZE BASED ON PROTECTION NEEDS.

NOTES:

1. SCHEMATIC ILLUSTRATES DESIGN INTENT ONLY. PROVIDE ALL NECESSARY COMPONENTS TO MEET PROJECT REQUIREMENTS.
2. THIS DETAIL IS TO BE USED AS PART OF DETAILS 40522, 40524, AND 40525.
3. ## = PAGE NUMBER
AA = LINE NUMBER

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

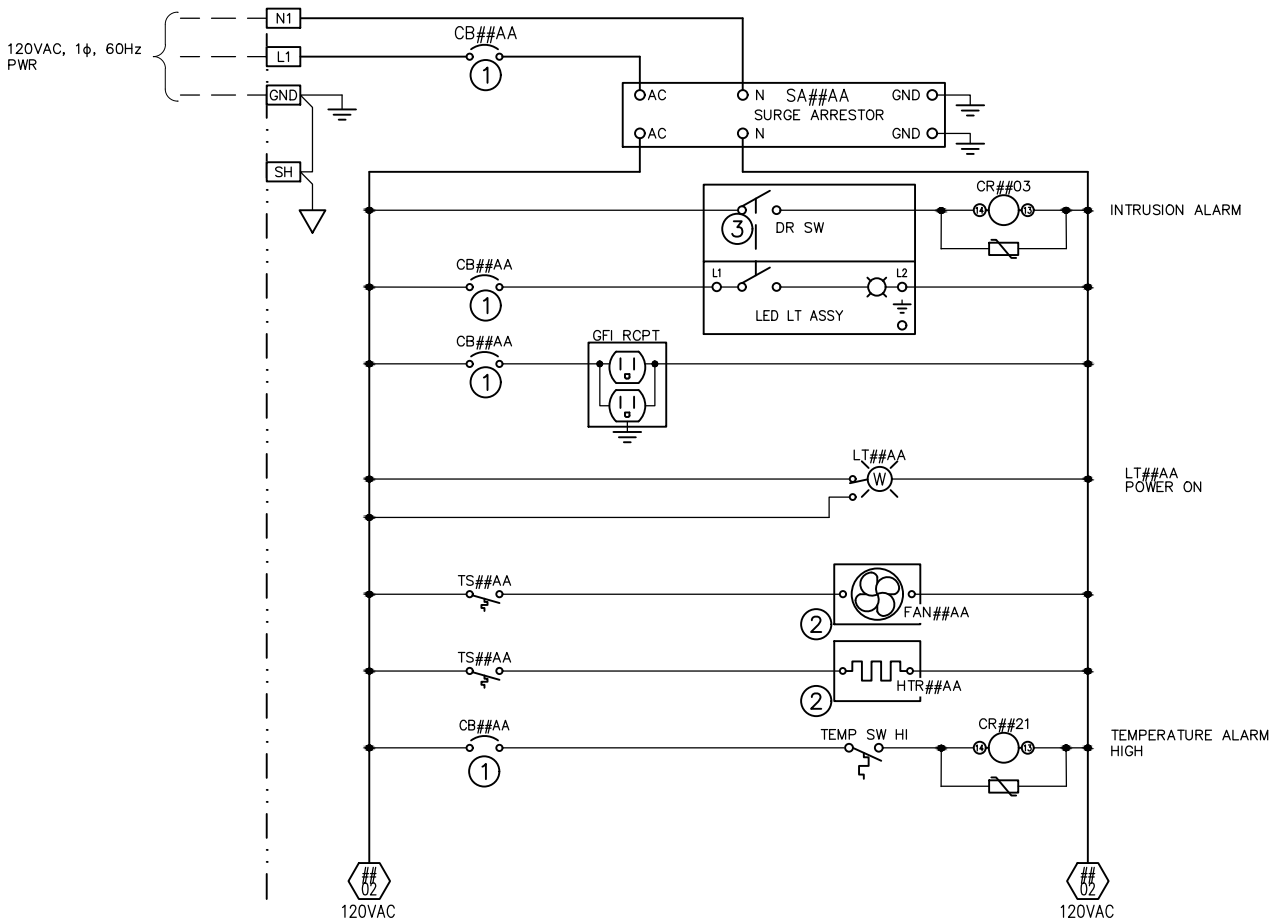
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40523
TYPICAL PLC
SCHEMATIC NO 2**



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KEYED NOTES:

- ① SIZE BASED ON PROTECTION NEEDS.
- ② VERIFY LOADS BASED ON TEMPERATURE CALCULATIONS. PROVIDE ADDITIONAL CIRCUIT IF REQUIRED.
- ③ INTEGRAL SWITCH WITH LIGHT. PROVIDES DISCRETE INPUT TO THE PLC TO ALARM FOR INTRUSION.

NOTES:

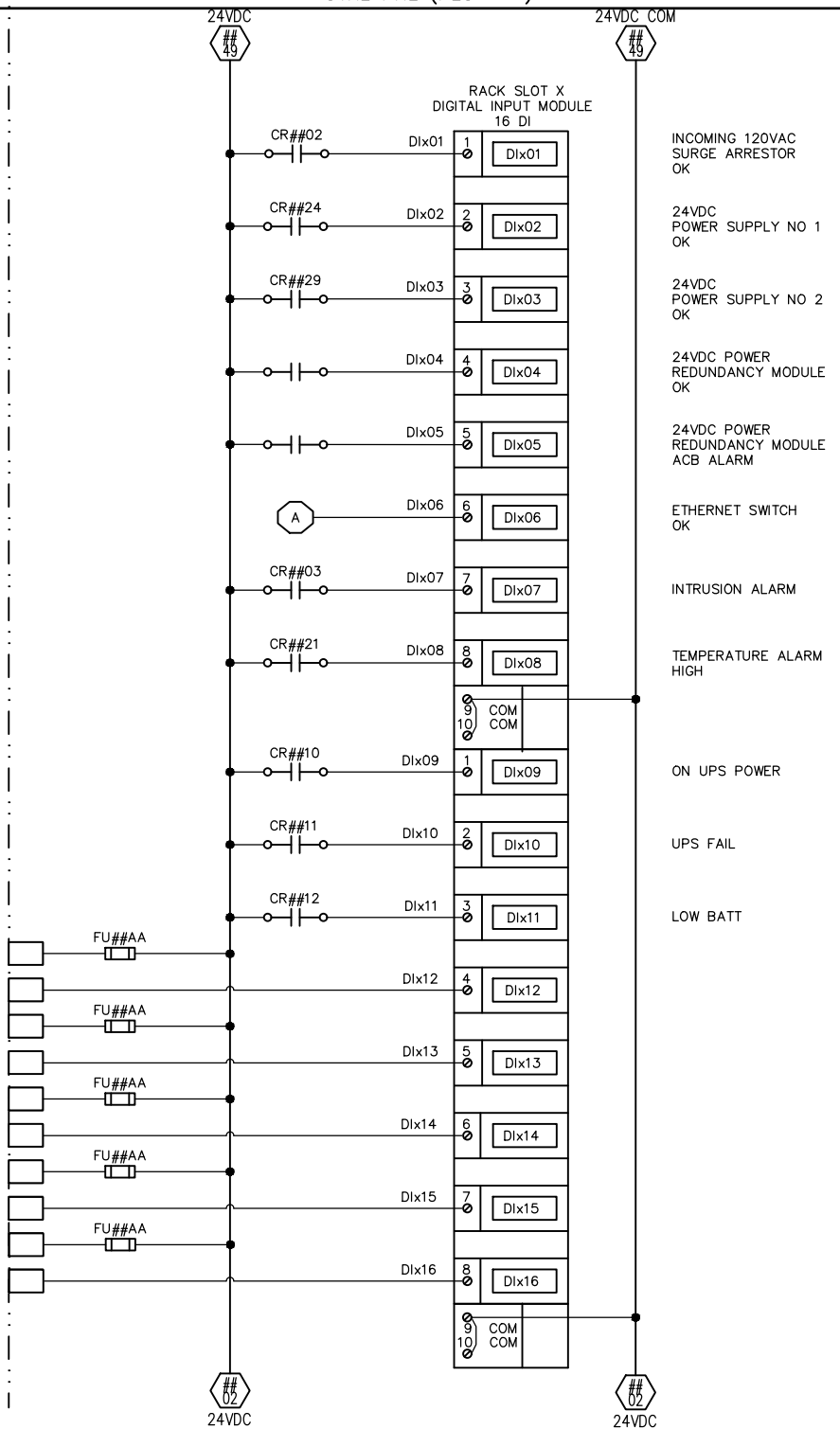
- 1. SCHEMATIC ILLUSTRATES DESIGN INTENT ONLY. PROVIDE ALL NECESSARY COMPONENTS TO MEET PROJECT REQUIREMENTS.
- 2. THIS DETAIL IS TO BE USED AS PART OF DETAILS 40522, 40523, AND 40525.
- 3. ## = PAGE NUMBER
AA = LINE NUMBER

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40524
TYPICAL PLC
SCHEMATIC NO 3**



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NOTES:

1. TYPICAL OF BRISTOL BABCOCK CONTROLWAVE MICRO
2. I/O ADDRESS FORMAT
YW: XZZ
W = I/O TYPE (I=INPUT, O=OUTPUT)
X = SLOT NUMBER
Y = CARD TYPE (D=DIGITAL, A=ANALOG)
Z = TERMINAL NUMBER
3. ## = PAGE NUMBER
AA = LINE NUMBER
4. SCHEMATIC ILLUSTRATES DESIGN INTENT ONLY. PROVIDE ALL NECESSARY COMPONENTS TO MEET PROJECT REQUIREMENTS.
5. THIS DETAIL IS TO BE USED AS PART OF DETAILS 40522, 40523, AND 40524.

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

ORIGINATION DATE: JULY 2021

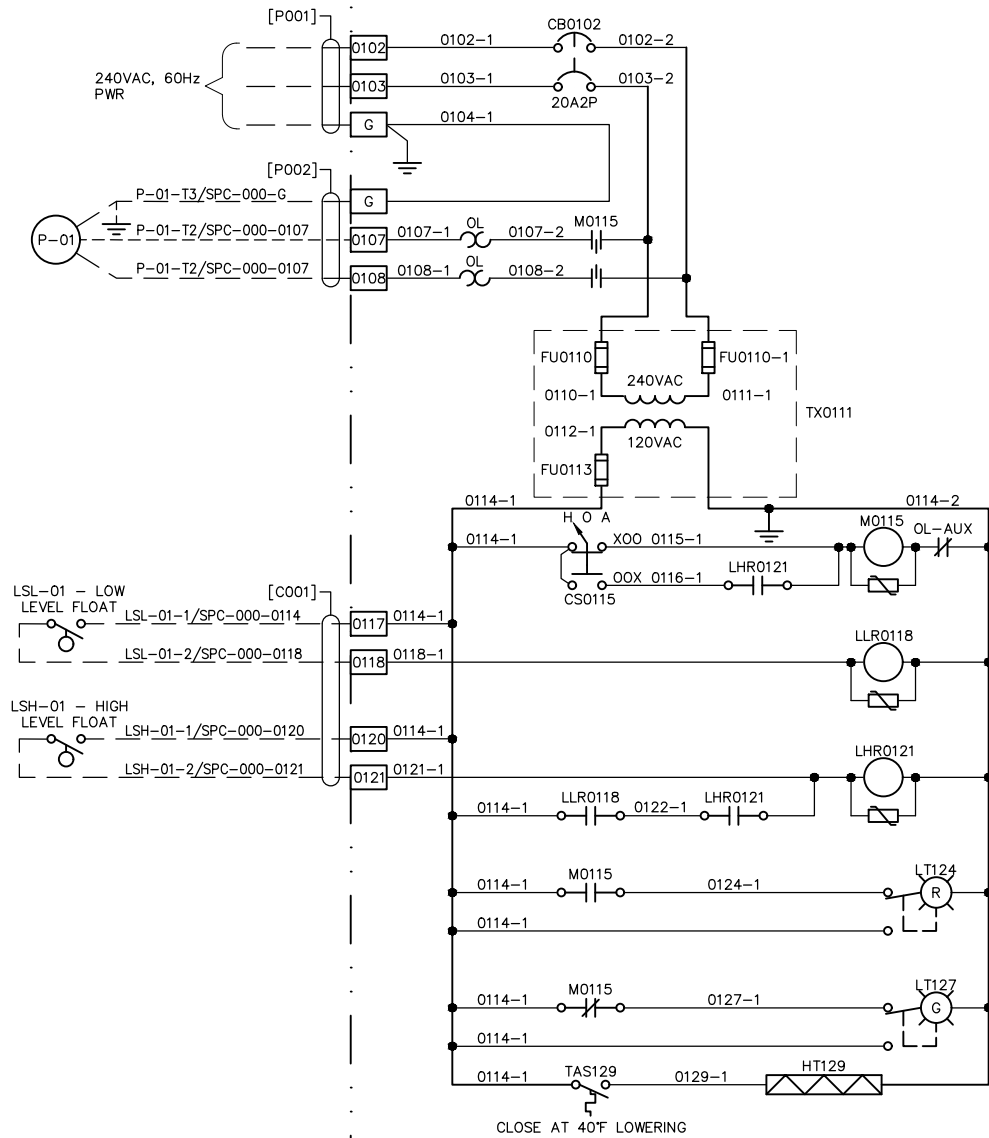
REVISION DATE:

**40525
TYPICAL PLC
SCHEMATIC NO 4
DIAGNOSTICS**



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- M0115**
- — □ SUMP PUMP (0107)
- — □ SUMP PUMP (0108)
- — □ INDICATING LIGHT (0124)
- — □ INDICATING LIGHT (0127)
- LLR0118**
- — □ LHR0121 (0122)
- — □
- — □
- LHR0121**
- — □ LHR0121 (0122)
- — □
- — □ M0115 (0115)
- — □

CLOSE AT 40F LOWERING

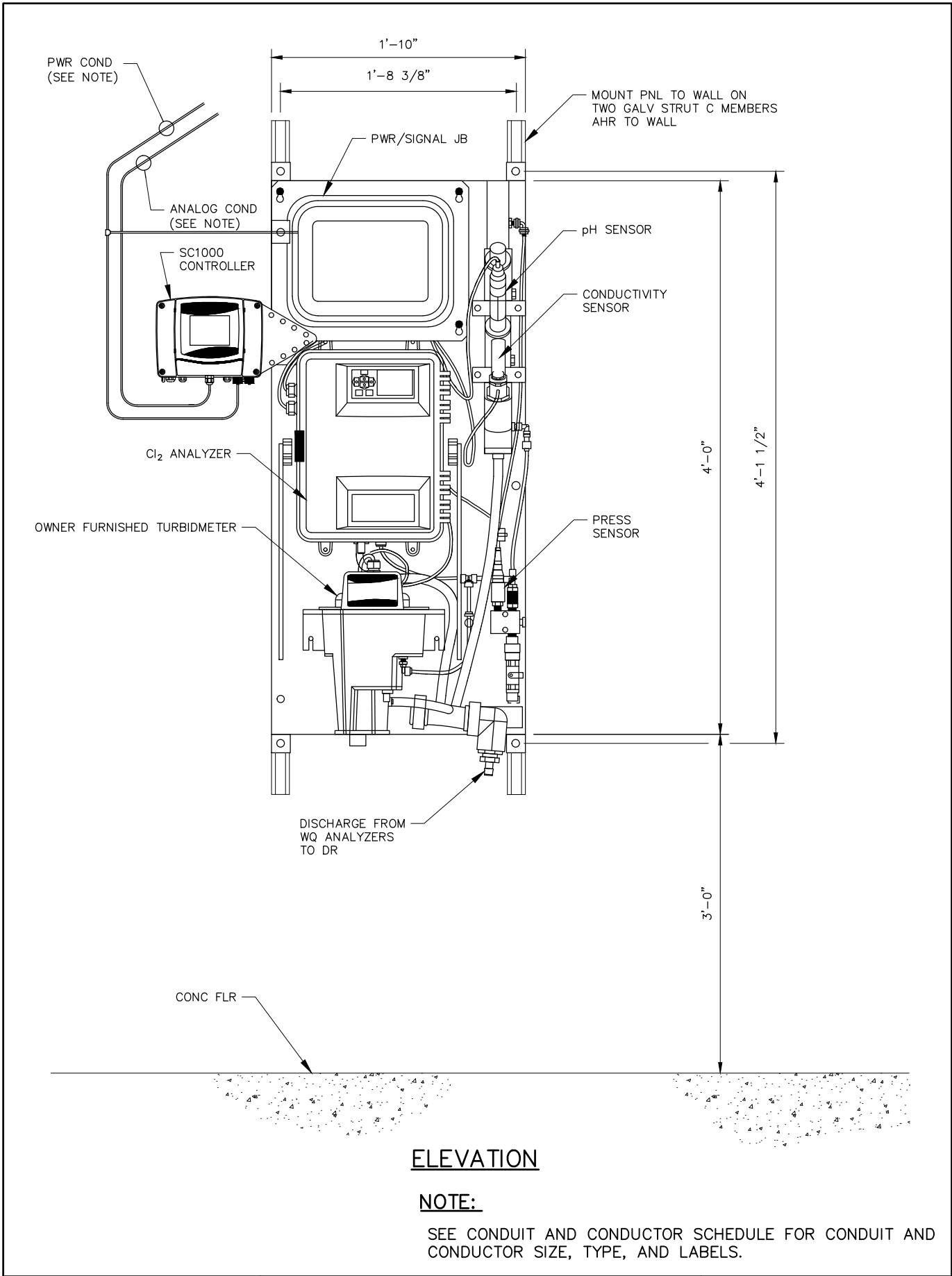
NOTES:

1. APPLY THE LABELING PHILOSOPHY AS SHOWN.
2. LABELING IS SHOWN FOR DRAWING 01. FOR SUBSEQUENT DRAWINGS FOLLOW THE ##AA FORMAT
= PAGE NUMBER
AA = LINE NUMBER

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

40526
WIRING DIAGRAM
FORMAT AND LABELING

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ELEVATION

NOTE:

SEE CONDUIT AND CONDUCTOR SCHEDULE FOR CONDUIT AND CONDUCTOR SIZE, TYPE, AND LABELS.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40532
WATER QUALITY MONITORING
STATION PANEL**

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ANALOG TERMINAL TABLE	
TYPE	DESCRIPTION
A	FOUR-WIRE TRANSMITTER WITH (GROUNDED) 24VDC POWER SUPPLY SCHEMATIC
B	FOUR-WIRE TRANSMITTER WITH (UNGROUNDED) 24VDC POWER SUPPLY SCHEMATIC
C	FOUR-WIRE (120VAC) TRANSMITTER SCHEMATIC
D	24VDC THREE-WIRE ANALOG TRANSMITTER SCHEMATIC
E	24VDC TWO-WIRE TRANSMITTER SCHEMATIC

NOTES:

1. ANALOG TERMINALS CONFORM TO THE ANALOG TERMINAL TABLE FOR THE DESCRIPTION INDICATED UNLESS OTHERWISE NOTED ON THE DRAWINGS.
2. SELECT THE ANALOG TERMINAL TYPE THAT APPLIES TO EACH APPLICATION.
3. GROUND SHIELD AT CLOSEST OPPORTUNITY TO THE LOOP POWER DEVICE.

DRAWN BY: *ORTEGA*

CHKD BY: *K ROSS/KLR*

APPD BY: *[Signature]*

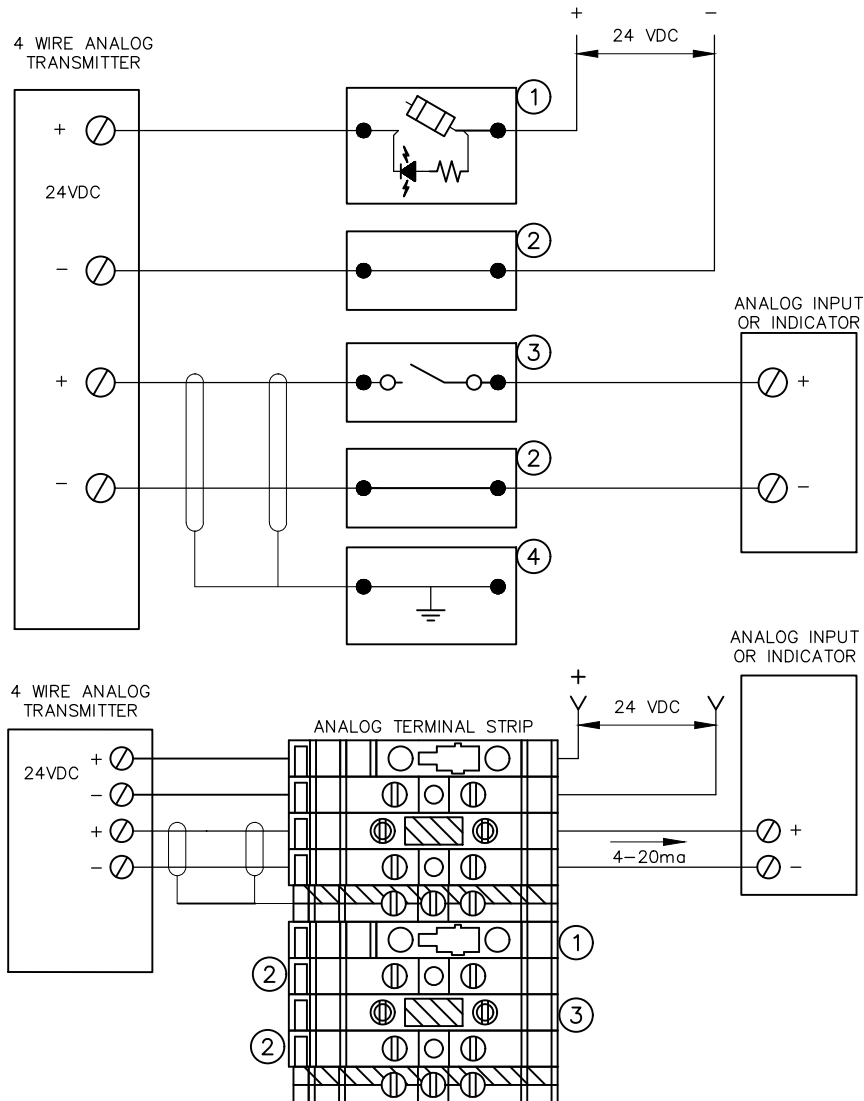
ORIGINATION DATE: *JULY 2021*

REVISION DATE:

40533
ANALOG TERMINAL TABLE
AND NOTES



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KEYED NOTES:

- ① FUSED TERMINAL/DISCONNECT BLOCK
- ② FEED THROUGH TERMINAL BLOCK
- ③ TEST BLOCK WITH KNIFE DISCONNECT SWITCH
- ④ GROUNDING TERMINAL BLOCK

NOTE:

(-)24VDC RETURNS OR COMMONS CANNOT BE PROTECTED OR HAVE A DISCONNECTING MEANS ON SYSTEMS WITH GROUNDED 24VDC POWER SUPPLIES.

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

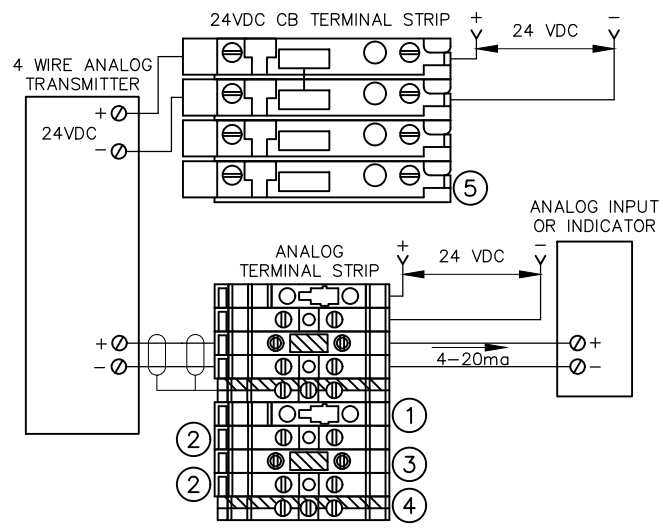
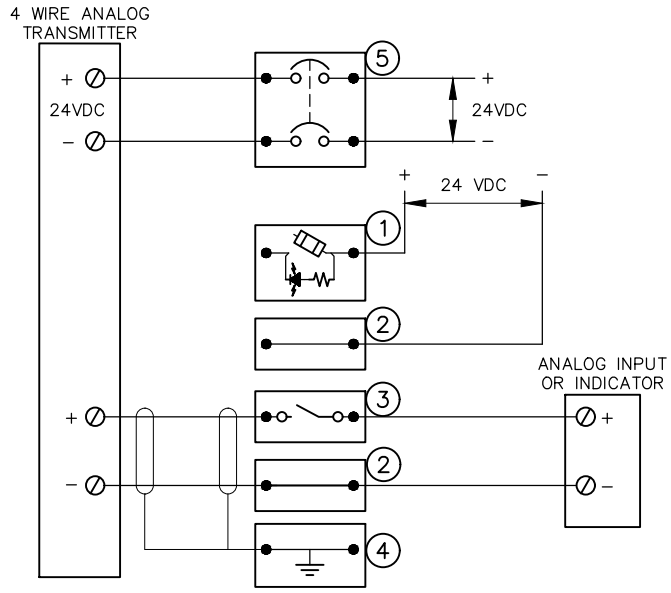
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40534
TYPE A
ANALOG TERMINAL
SCHEMATIC**



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KEYED NOTES:

- ① FUSED TERMINAL/DISCONNECT BLOCK
- ② FEED THROUGH TERMINAL BLOCK
- ③ TEST BLOCK WITH KNIFE DISCONNECT SWITCH
- ④ GROUNDING TERMINAL BLOCK
- ⑤ 2 POLE 24VDC CIRCUIT BREAKER

NOTE:

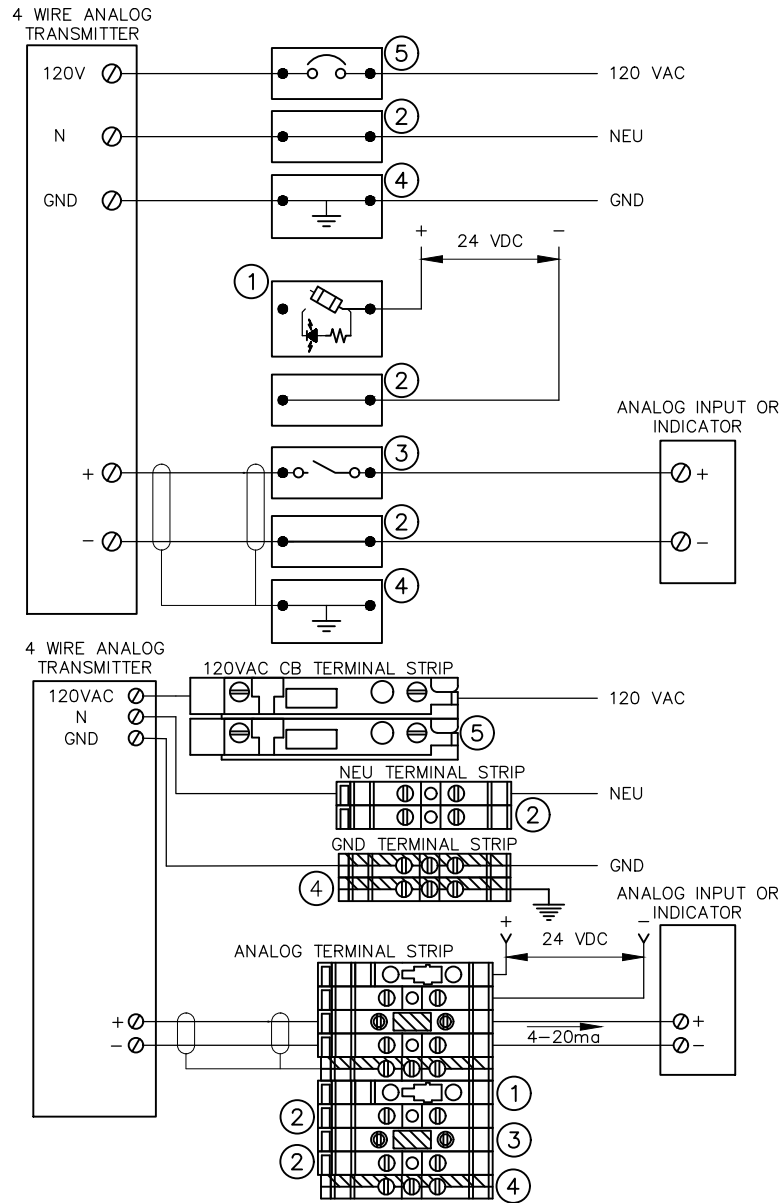
PROVIDE (-)24VDC RETURNS WITH PROTECTION ON ALL UNGROUNDED 24VDC POWER SUPPLIES.

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40535
TYPE B
ANALOG TERMINAL
SCHEMATIC**

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KEYED NOTES:

- ① FUSED TERMINAL/DISCONNECT BLOCK
- ② FEED THROUGH TERMINAL BLOCK
- ③ TEST BLOCK WITH KNIFE DISCONNECT SWITCH
- ④ GROUNDING TERMINAL BLOCK
- ⑤ 120VAC CIRCUIT BREAKER

NOTE:

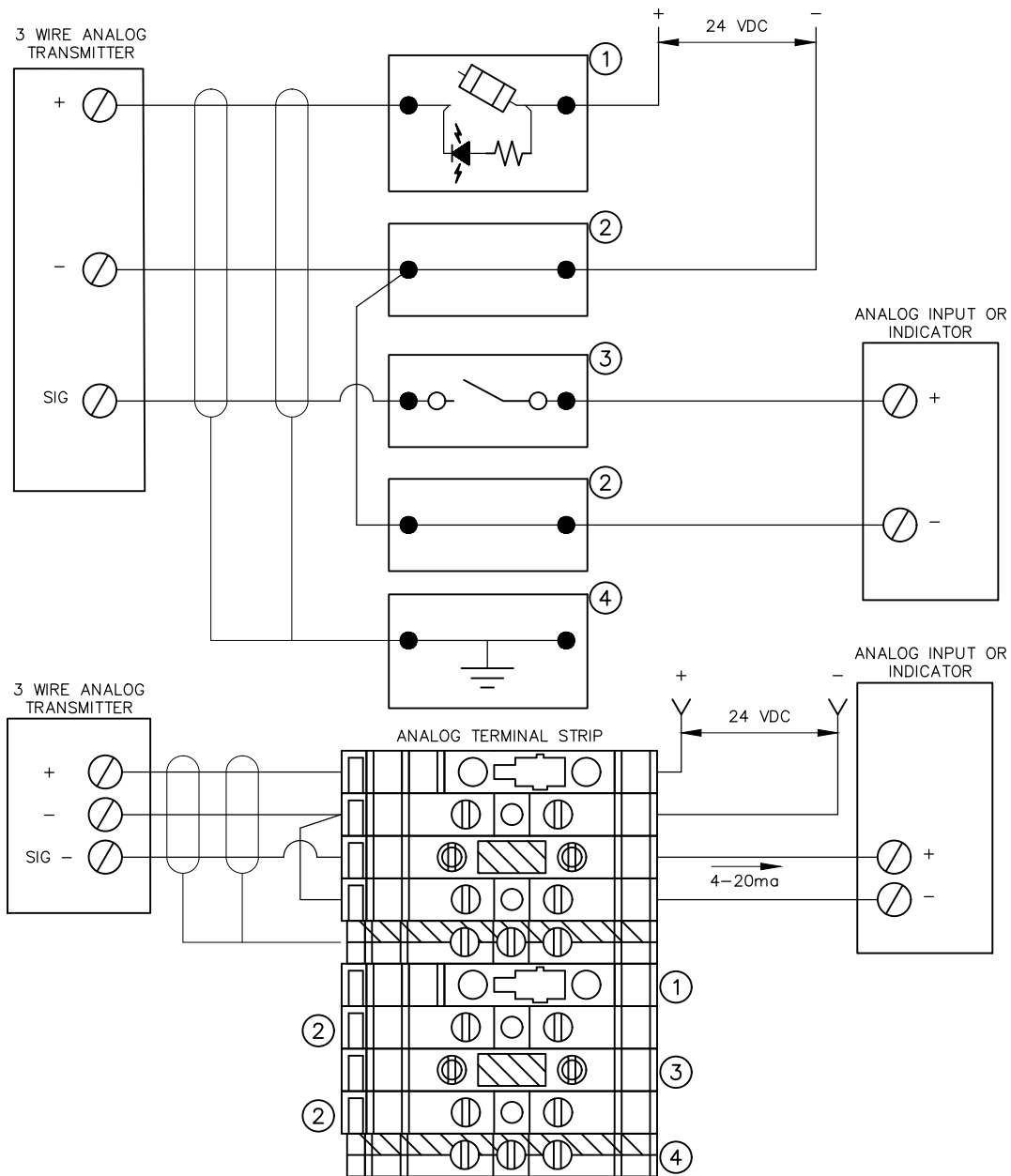
PROVIDE 120VAC CIRCUIT BREAKER FOR EACH INSTRUMENT.

DRAWN BY: ORTEGA
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40536
TYPE C
ANALOG TERMINAL
SCHEMATIC**



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KEYED NOTES:

- ① FUSED TERMINAL/DISCONNECT BLOCK
- ② FEED THROUGH TERMINAL BLOCK
- ③ TEST BLOCK WITH KNIFE DISCONNECT SWITCH
- ④ GROUNDING TERMINAL BLOCK

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

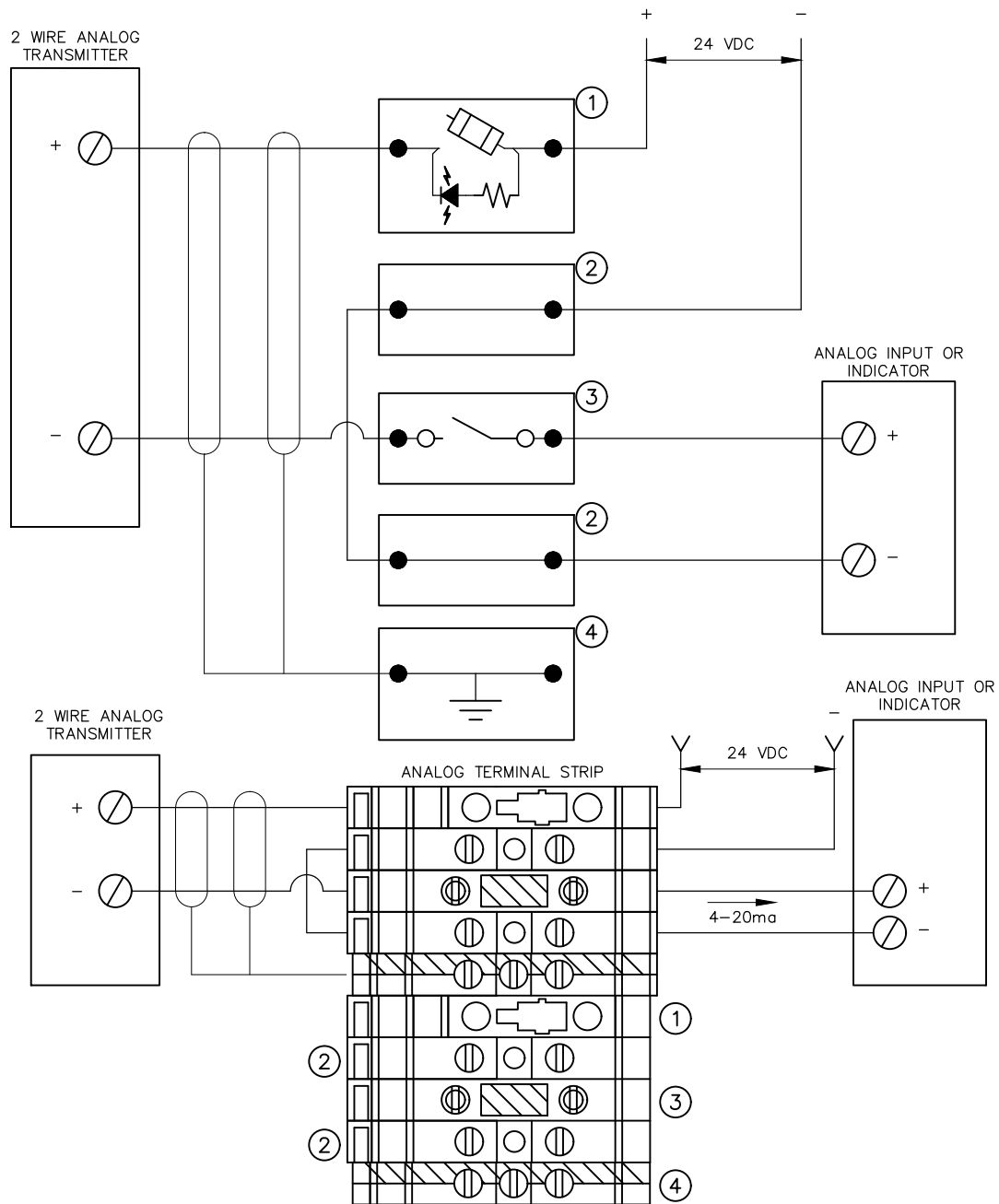
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40537
TYPE D
ANALOG TERMINAL
SCHEMATIC**



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KEYED NOTES:

- ① FUSED TERMINAL/DISCONNECT BLOCK
- ② FEED THROUGH TERMINAL BLOCK
- ③ TEST BLOCK WITH KNIFE DISCONNECT SWITCH
- ④ GROUNDING TERMINAL BLOCK

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

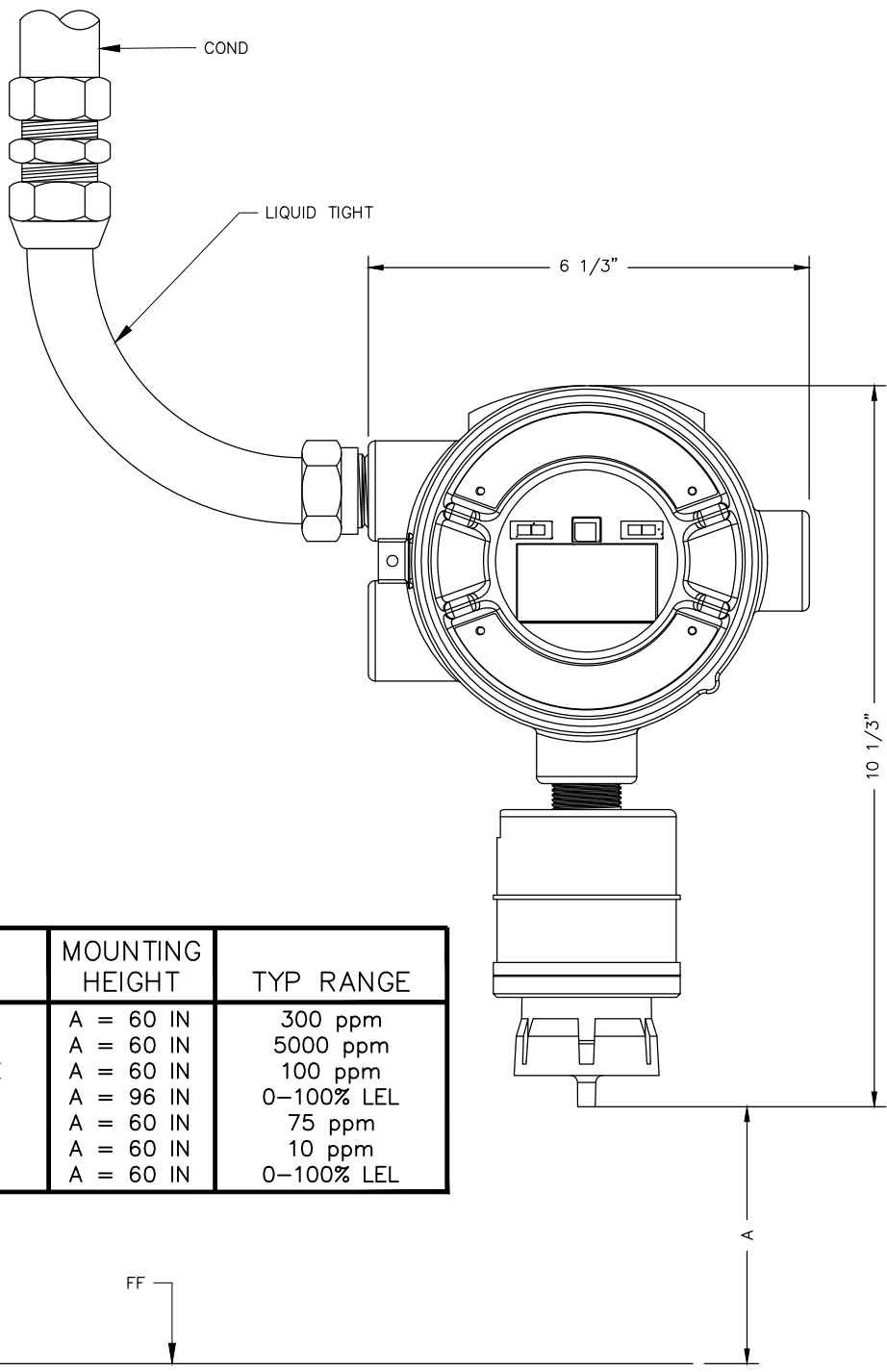
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40538
TYPE E
ANALOG TERMINAL
SCHEMATIC**



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GAS	MOUNTING HEIGHT	TYP RANGE
CARBON MONOXIDE	A = 60 IN	300 ppm
CARBON DIOXIDE	A = 60 IN	5000 ppm
HYDROGEN SULFIDE	A = 60 IN	100 ppm
HYDROGEN	A = 96 IN	0-100% LEL
AMMONIA	A = 60 IN	75 ppm
CHLORINE	A = 60 IN	10 ppm
NATURAL GAS	A = 60 IN	0-100% LEL

DRAWN BY: ORTEGA

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

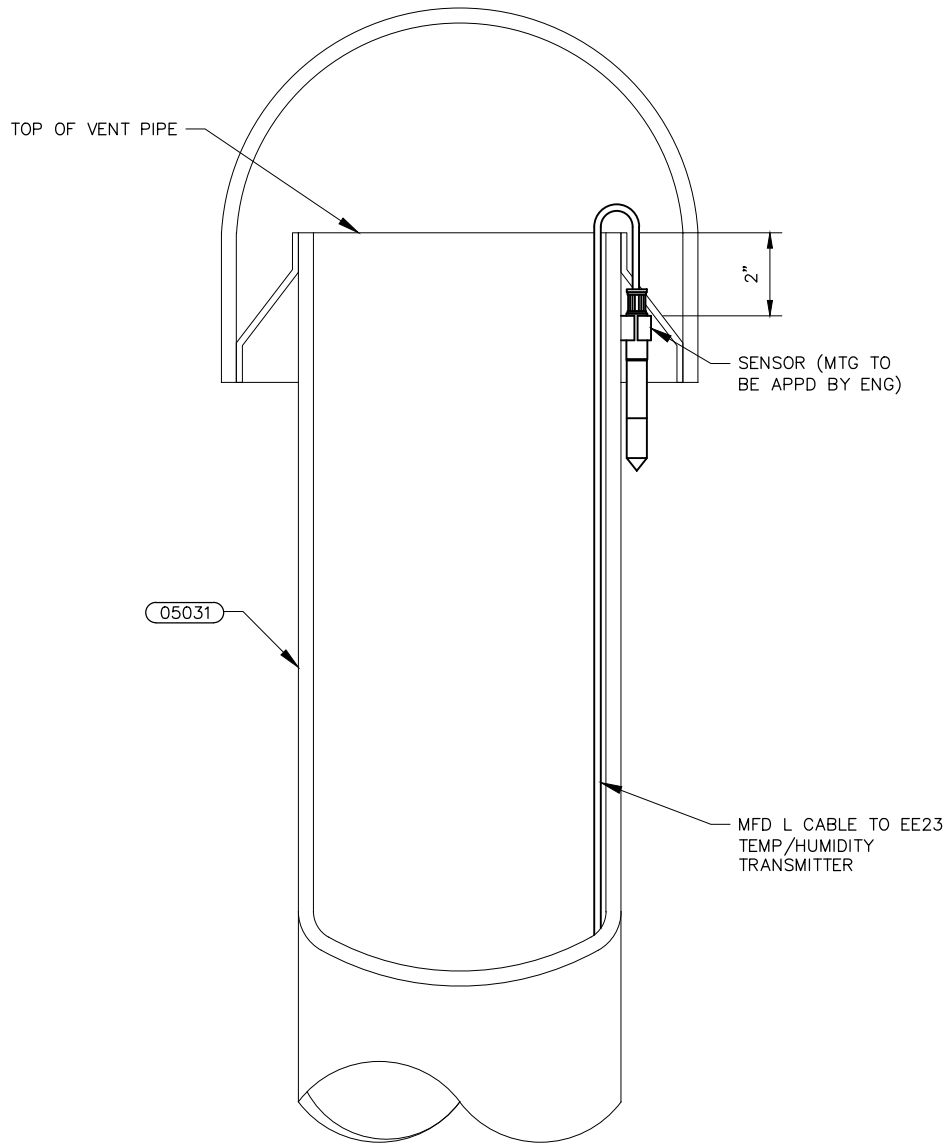
ORIGINATION DATE: JULY 2021

REVISION DATE:

40542
TOXIC GAS DETECTOR
INSTALLATION

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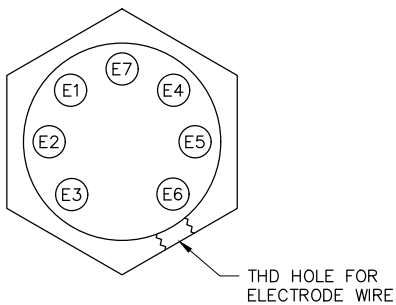
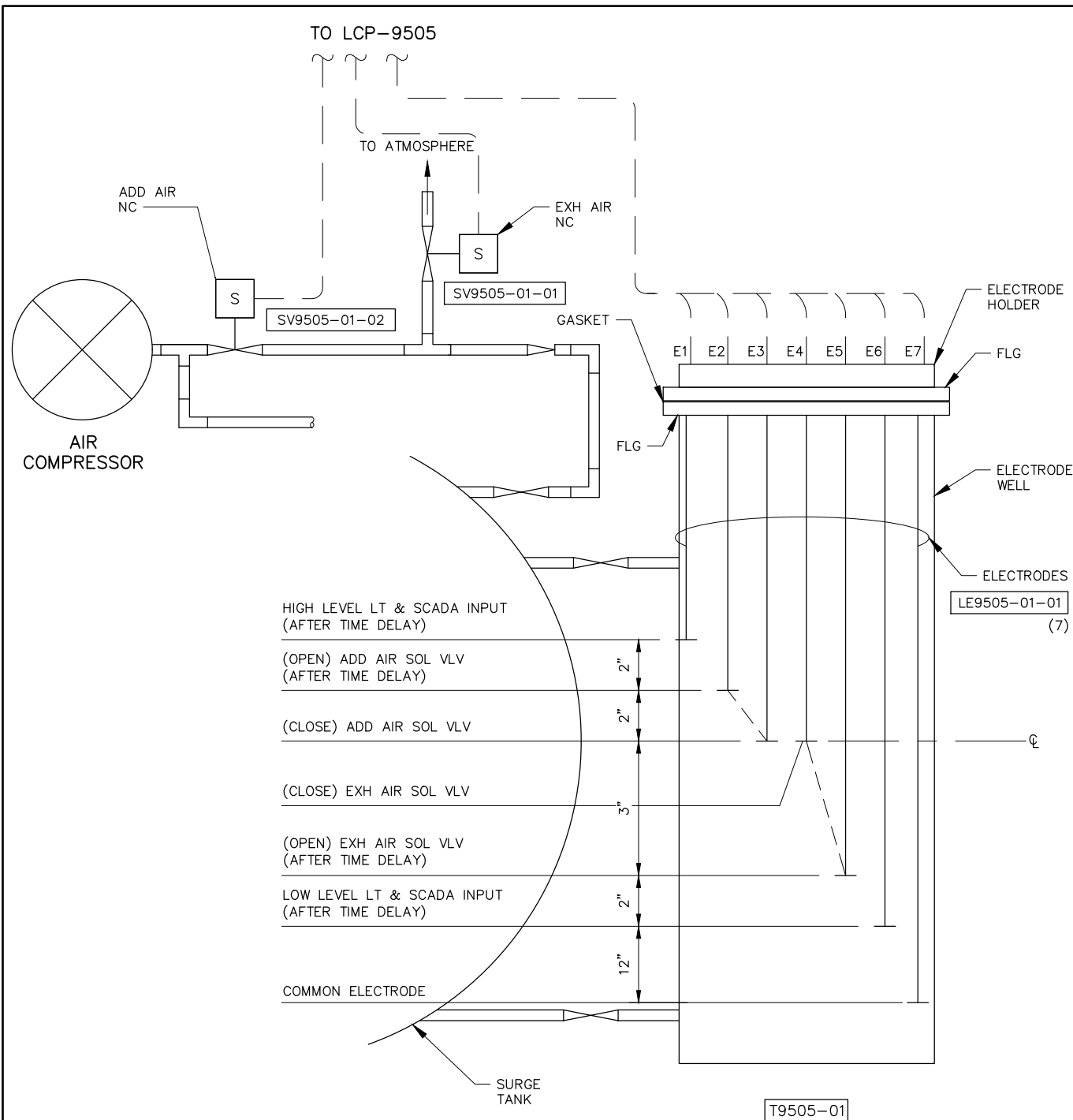
SECTION

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

40545
OUTSIDE TEMPERATURE AND
HUMIDITY SENSOR MOUNTING
IN VENT PIPE MUSHROOM CAP

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ELECTRODE HOLDER
NO SCALE

NOTE:

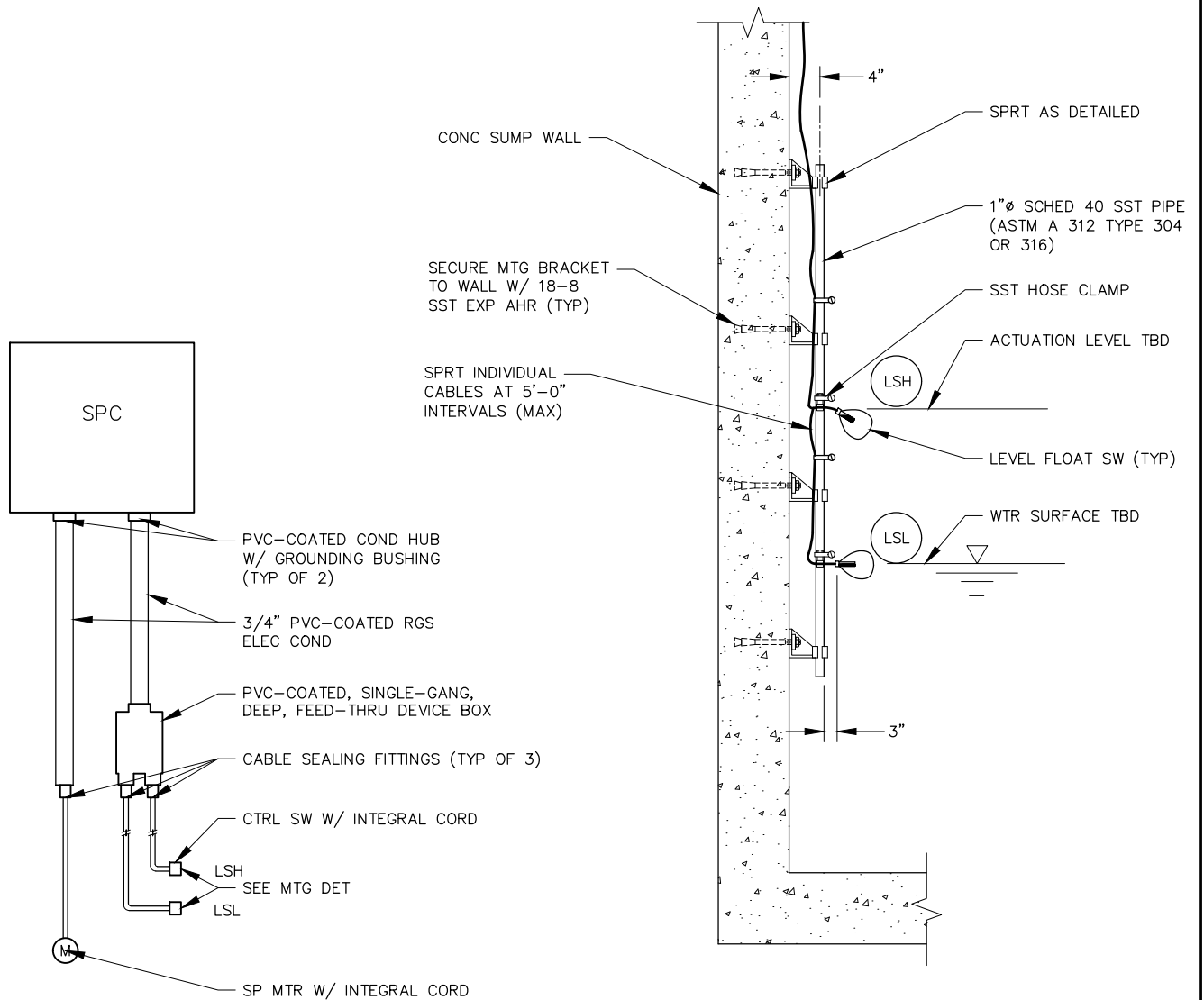
ELECTRODE DIMENSIONS FROM CENTER LINE ARE ESTIMATES. CONFIRM EXISTING AND REQUIRED ELECTRODE LENGTHS. ELECTRODE LENGTHS SHALL BE APPROVED BY ENGINEER.

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40548
SURGE TANK LEVEL
CONTROLS INSTALLATION**



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MOUNTING DETAIL

DRAWN BY: AVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

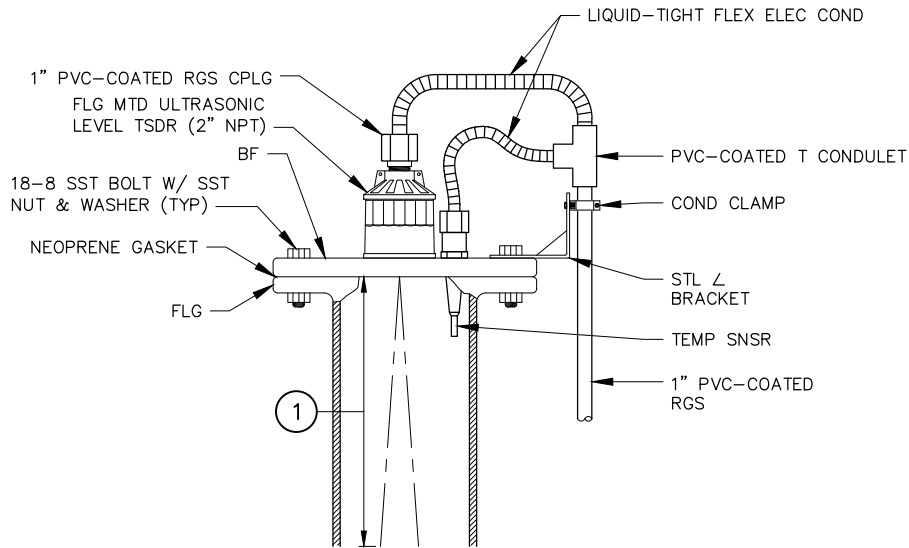
ORIGINATION DATE: JULY 2021

REVISION DATE:

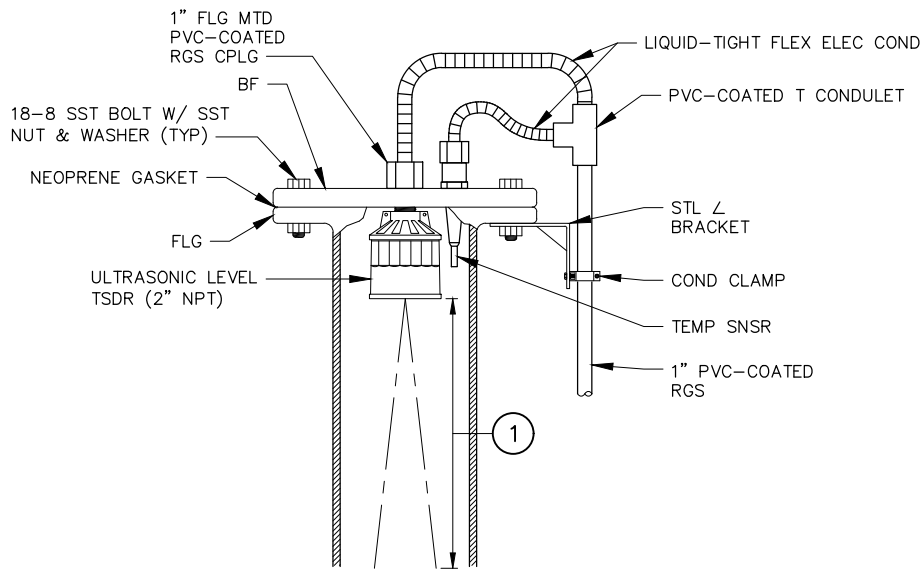
**40549
VAULT SUMP PUMP
CONTROLLER INSTALLATION**



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TYPE A – EXTERIOR MOUNTED



TYPE B – INTERIOR MOUNTED

KEYED NOTE:

- ① MINIMUM DISTANCE BETWEEN HIGHEST POSSIBLE LEVEL, INCLUDING OVERFLOW, AND PROBE FACE SHALL BE MANUFACTURER'S BLANKING ZONE PLUS 2-INCHES.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

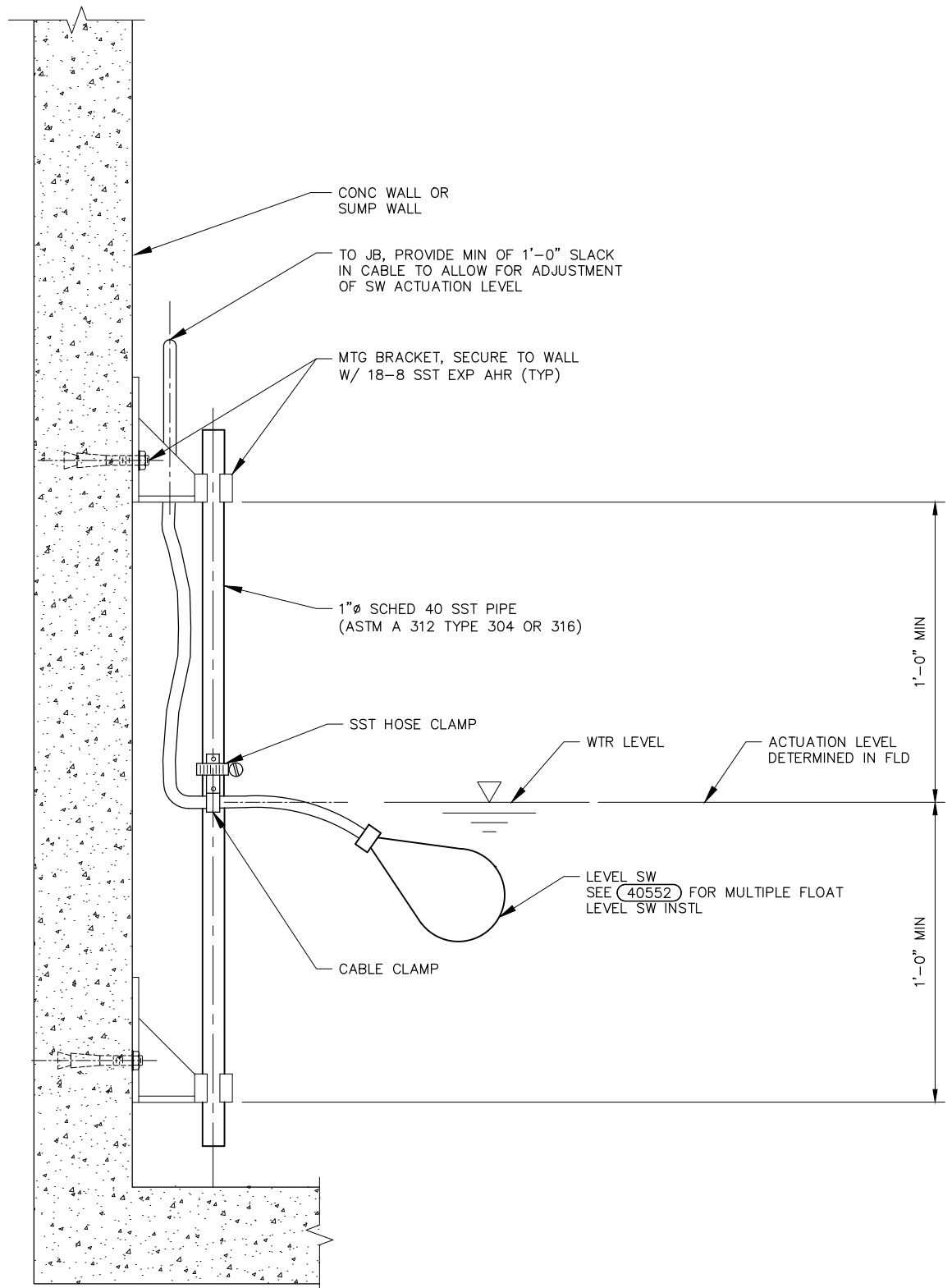
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40550
ULTRASONIC LEVEL
TRANSDUCER MOUNTING**



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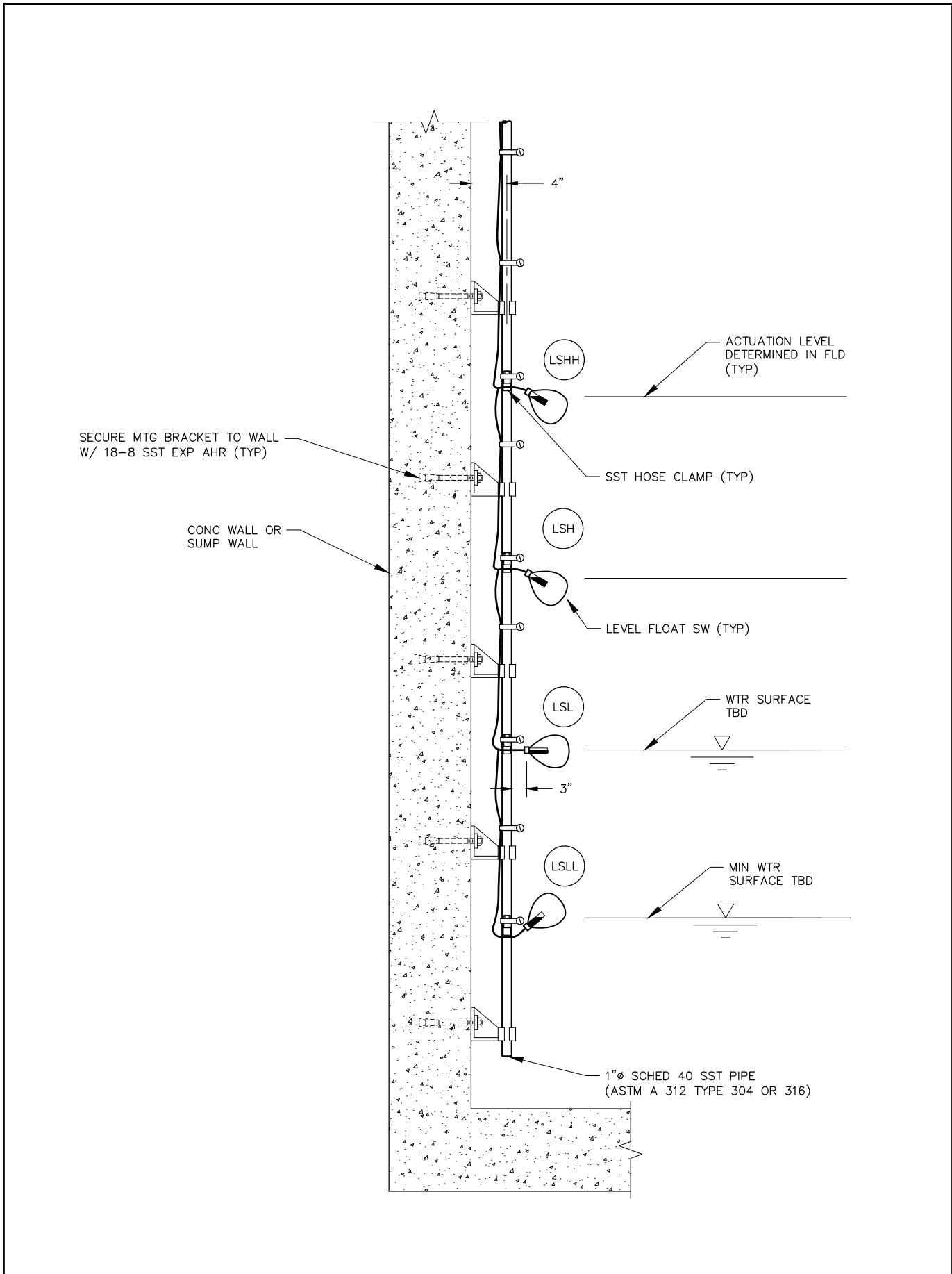


DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

40551
SINGLE FLOAT LEVEL SWITCH
INSTALLATION

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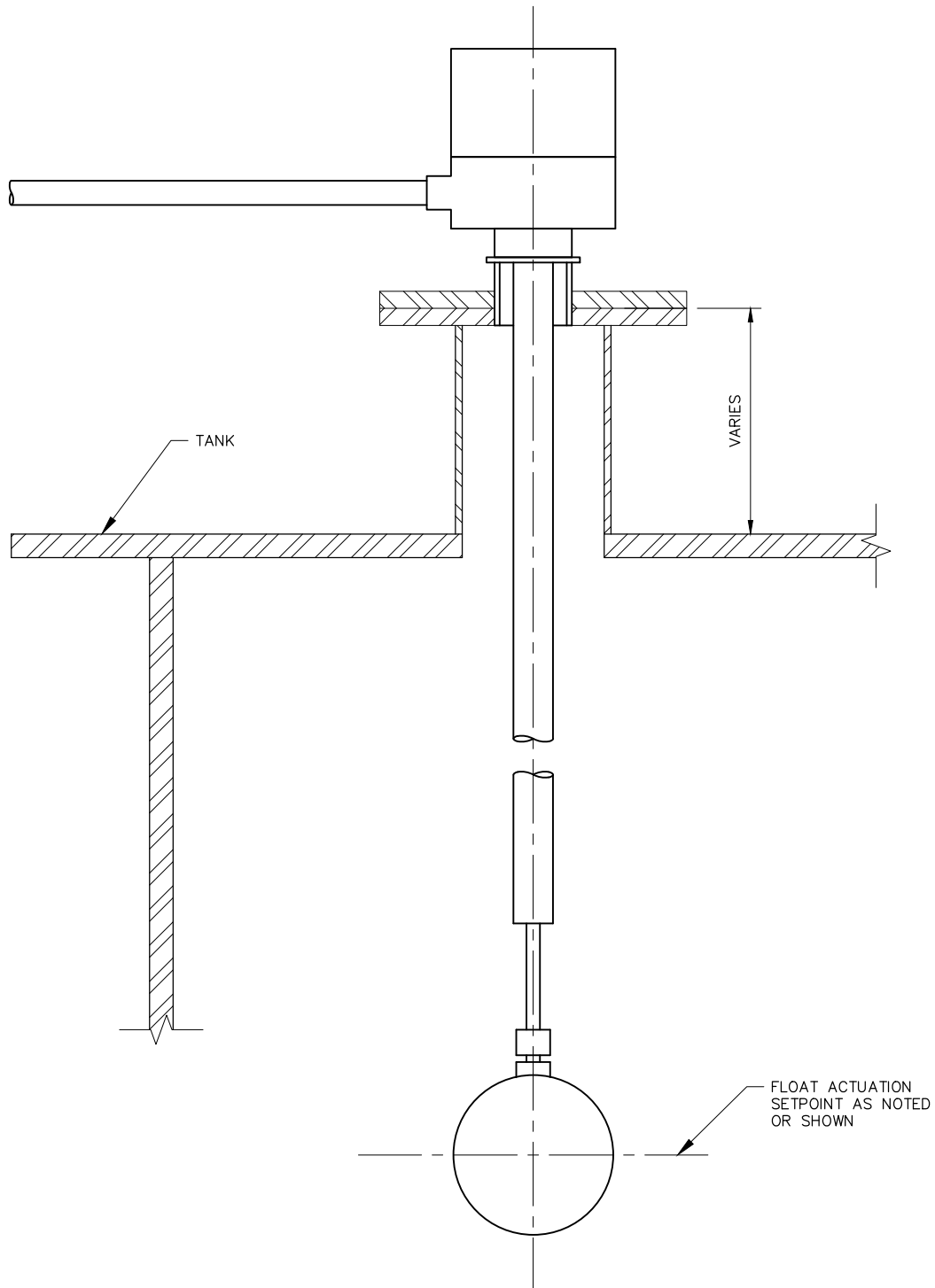


DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

40552
MULTIPLE FLOAT LEVEL
SWITCH INSTALLATION

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DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

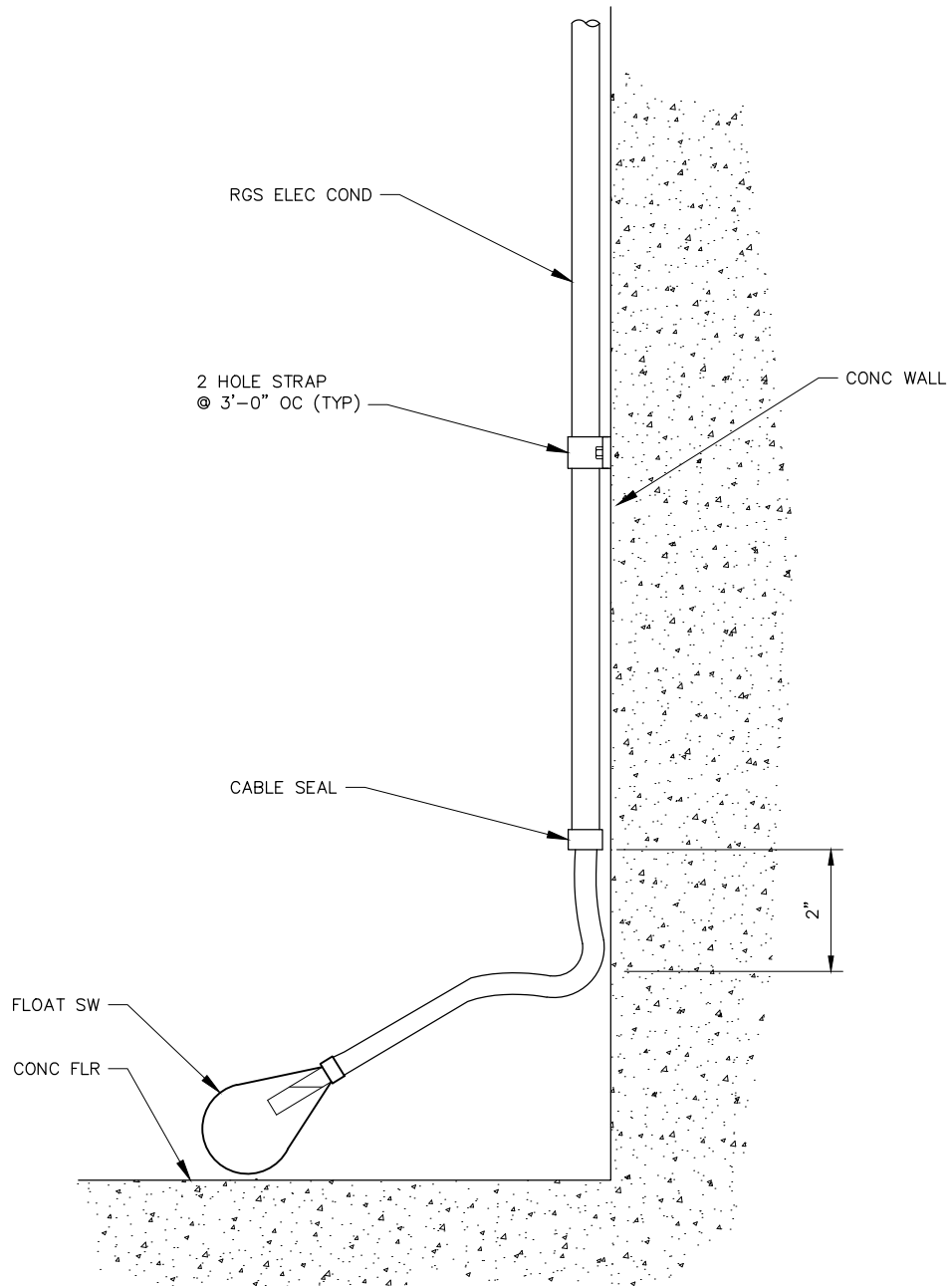
ORIGINATION DATE: JULY 2021

REVISION DATE:

40553 TANK FLOAT LEVEL SWITCH INSTALLATION



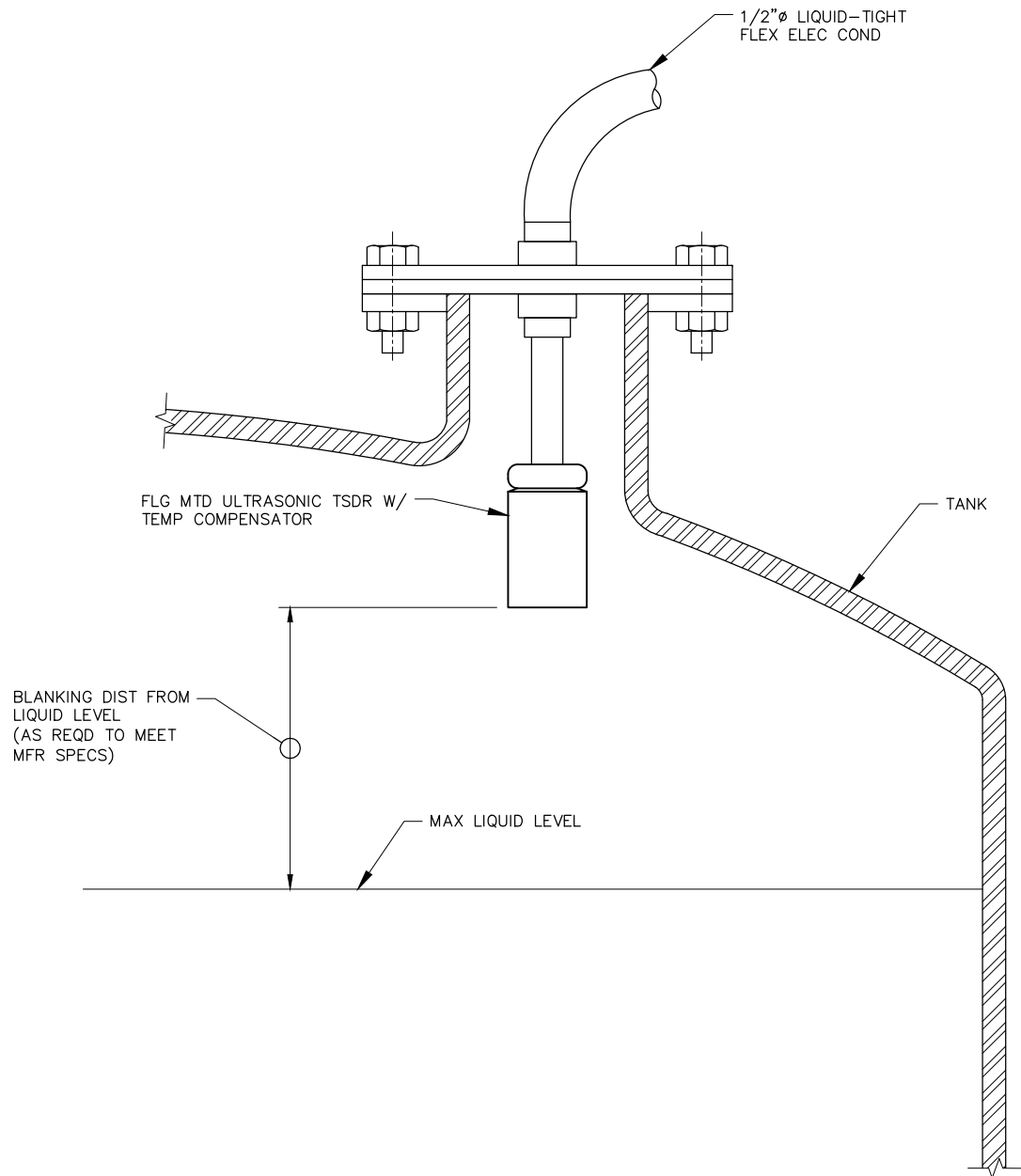
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DRAWN BY: ALVARADO
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

40554
WATER ON FLOOR LEVEL
SWITCH INSTALLATION

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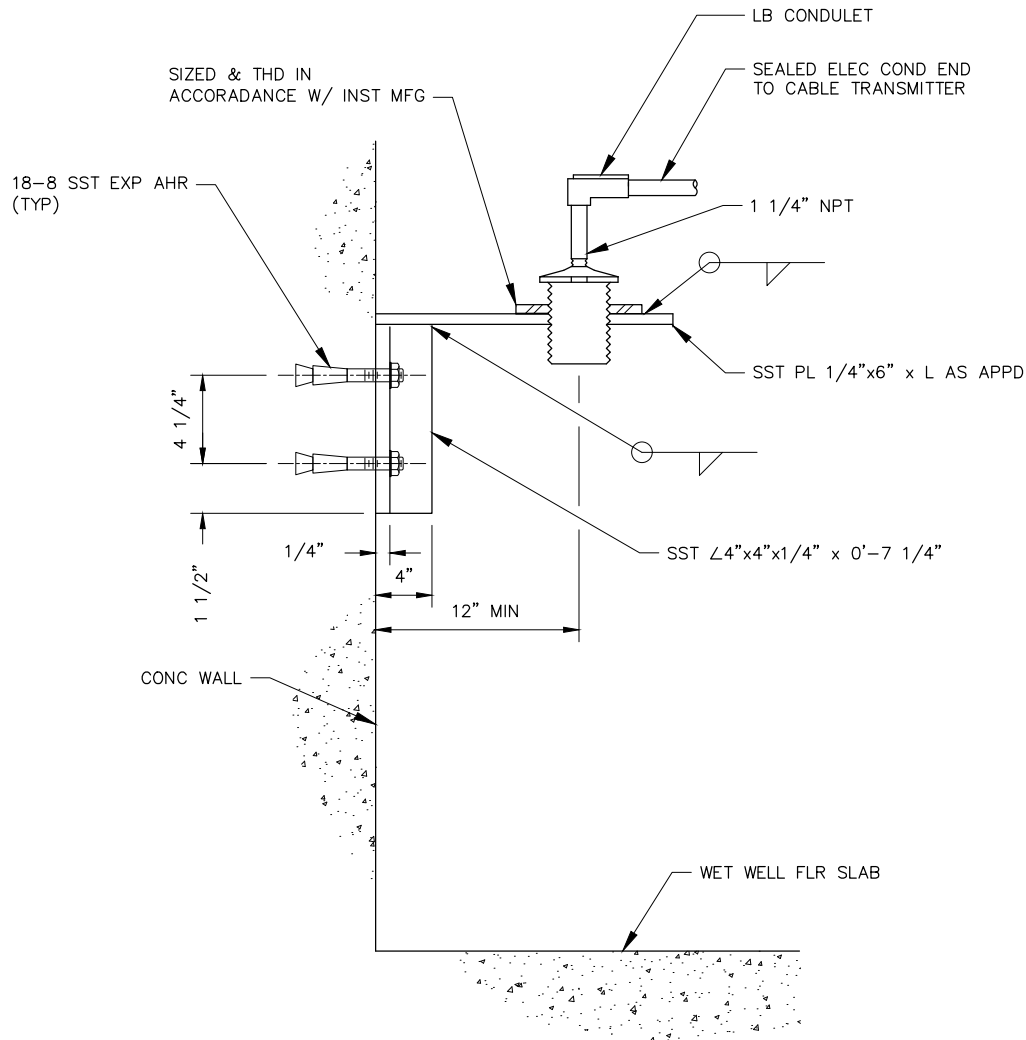


DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

40555
TANK ULTRASONIC LEVEL
ELEMENT INSTALLATION

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NOTE:

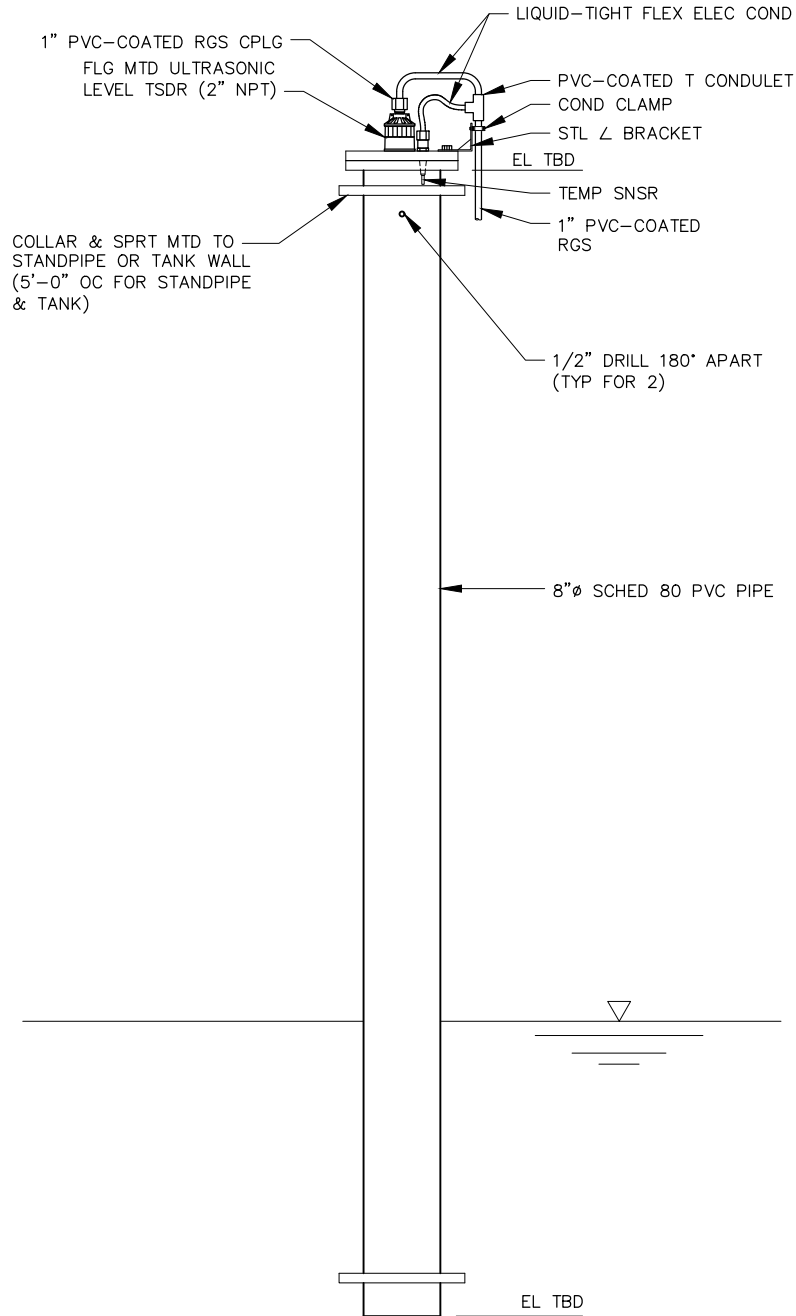
ANGLE AND PLATE MATERIAL SHALL BE ASTM A 240 TYPE 304 OR 316 (Fy = 30 KSI MINIMUM).

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40556
WALL ULTRASONIC LEVEL
ELEMENT INSTALLATION**



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NOTE:

PROVIDE ENGINEER APPROVED SUPPORT SYSTEM.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

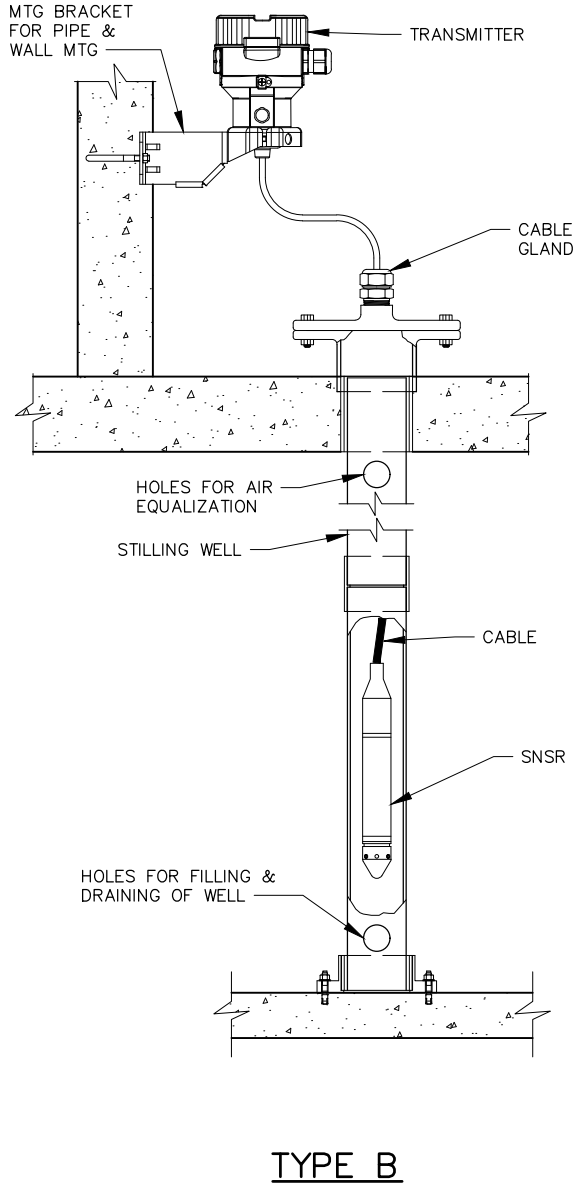
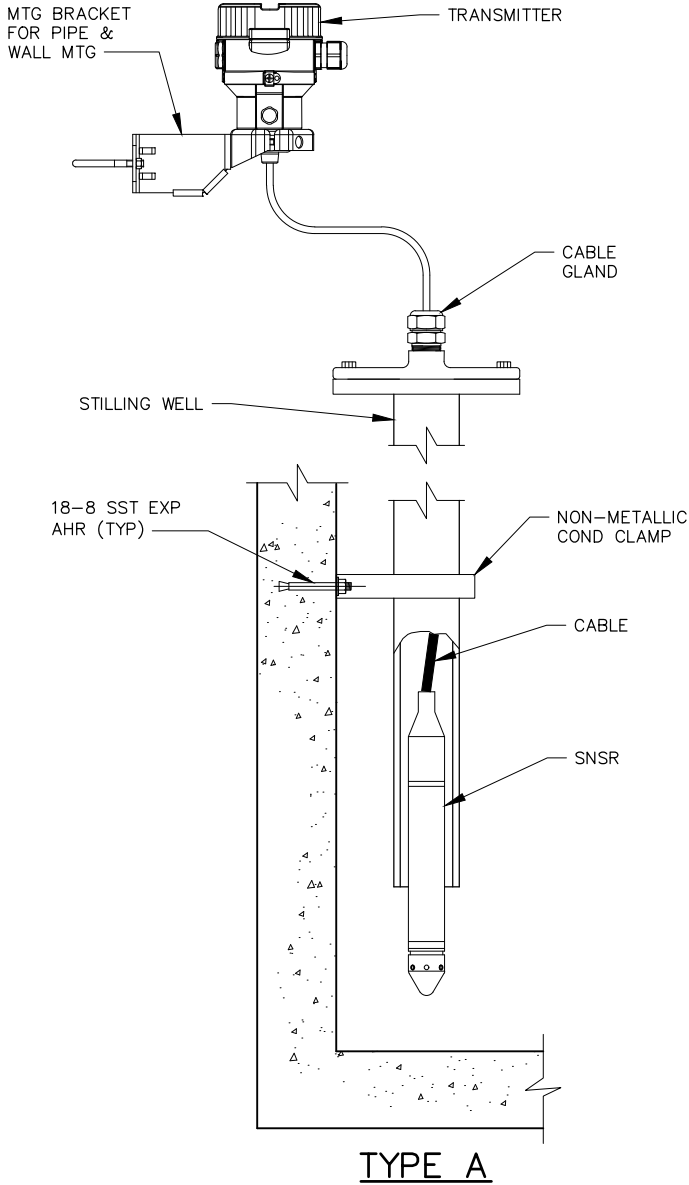
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40559
ULTRASONIC LEVEL ELEMENT
INSTALLATION (STILLING WELL)**



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DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: [Signature]

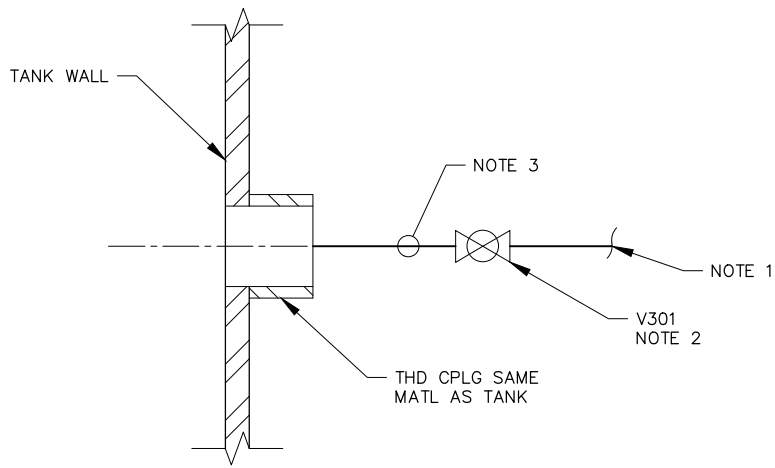
ORIGINATION DATE: JULY 2021

REVISION DATE:

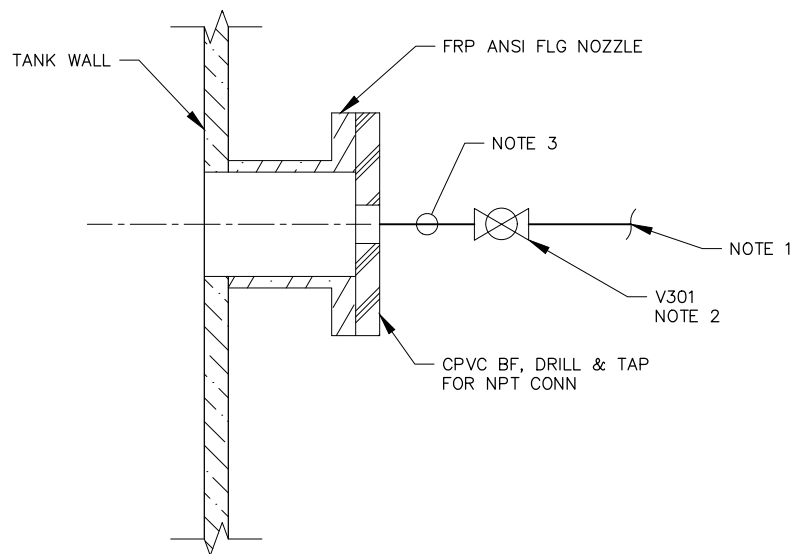
40560
SUBMERSIBLE LEVEL
PRESSURE SENSOR



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STEEL AND STAINLESS STEEL TANK



FIBER REINFORCED POLYESTER TANK

NOTES:

1. SENSING LINE TO PRESSURE INSTRUMENT.
2. VALVES: SIZE AND MATERIAL SHALL MATCH DOWNSTREAM PIPE AND FLOW STREAM REQUIREMENTS FOR MATERIALS.
3. BUSHING (SIZE AS REQUIRED) SHALL MATCH DOWNSTREAM PIPE SIZE AND CONNECTION TYPE.
4. FOR LIQUID, STEAM OR VAPOR SERVICE INSTALL PROCESS TAP HORIZONTALLY INTO THE SIDE OF THE TANK.
5. FOR AIR OR GAS SERVICE, INSTALL PROCESS TAP VERTICALLY INTO THE TOP OF THE TANK.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

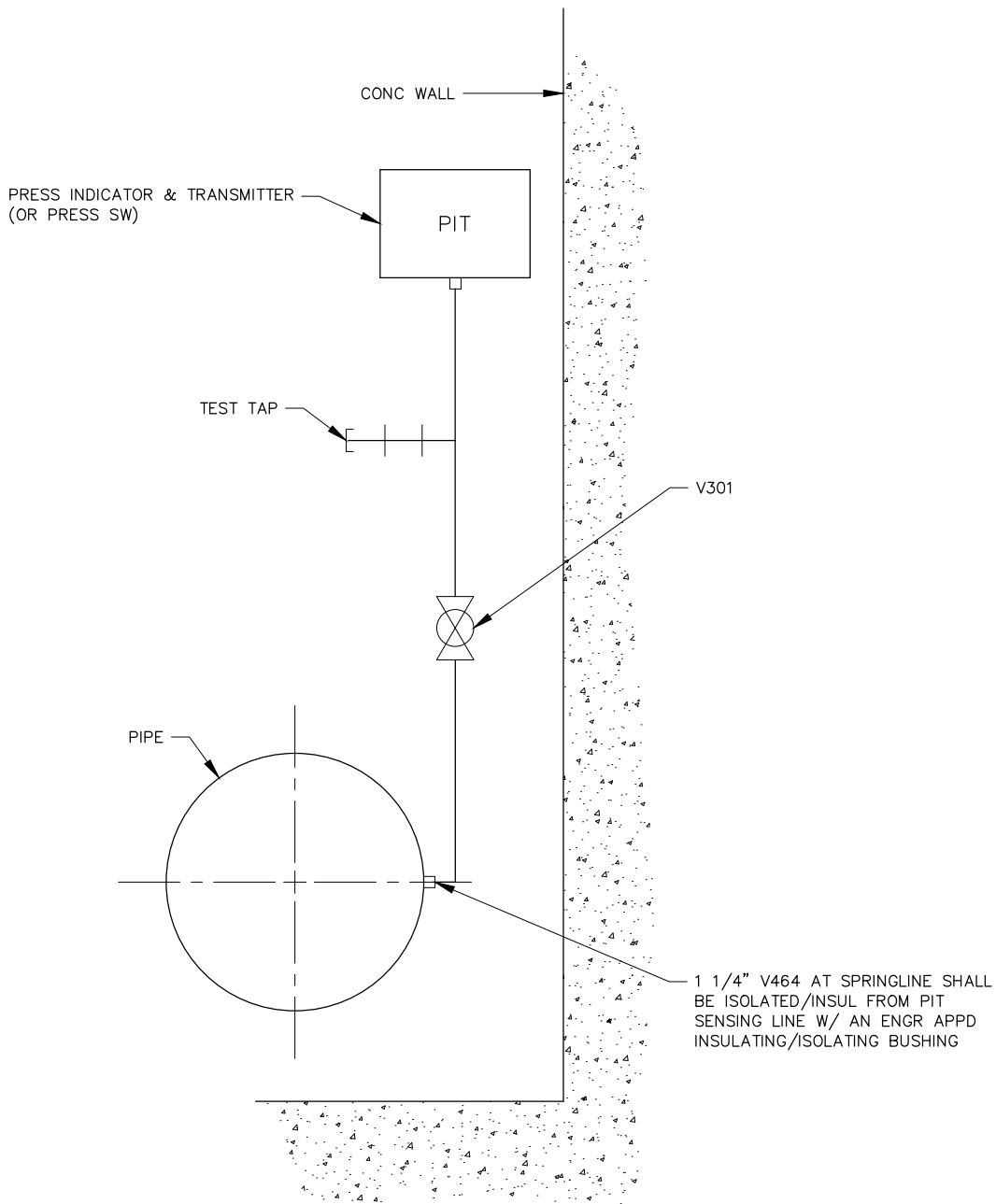
ORIGINATION DATE: JULY 2021

REVISION DATE:

40561 PRESSURE MEASUREMENT INSTALLATION (TANKS)



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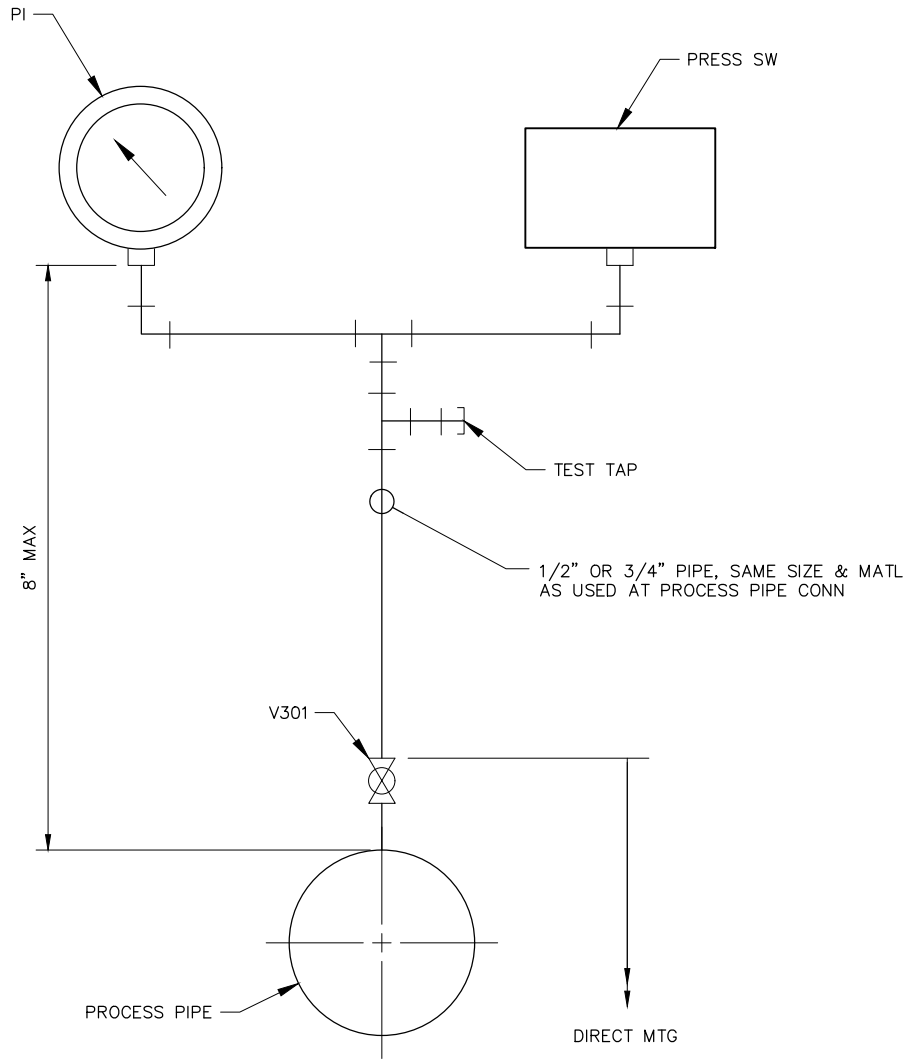


DRAWN BY: ALVARADO
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

40563
 PRESSURE INSTRUMENT
 SPRINGLINE INSTALLATION



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NOTE:

INDICATOR AND SWITCH INSTALLATION SHOWN. FOR SINGLE INSTRUMENT INSTALLATIONS, MOUNT DEVICE DIRECTLY ABOVE TEST TAP.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

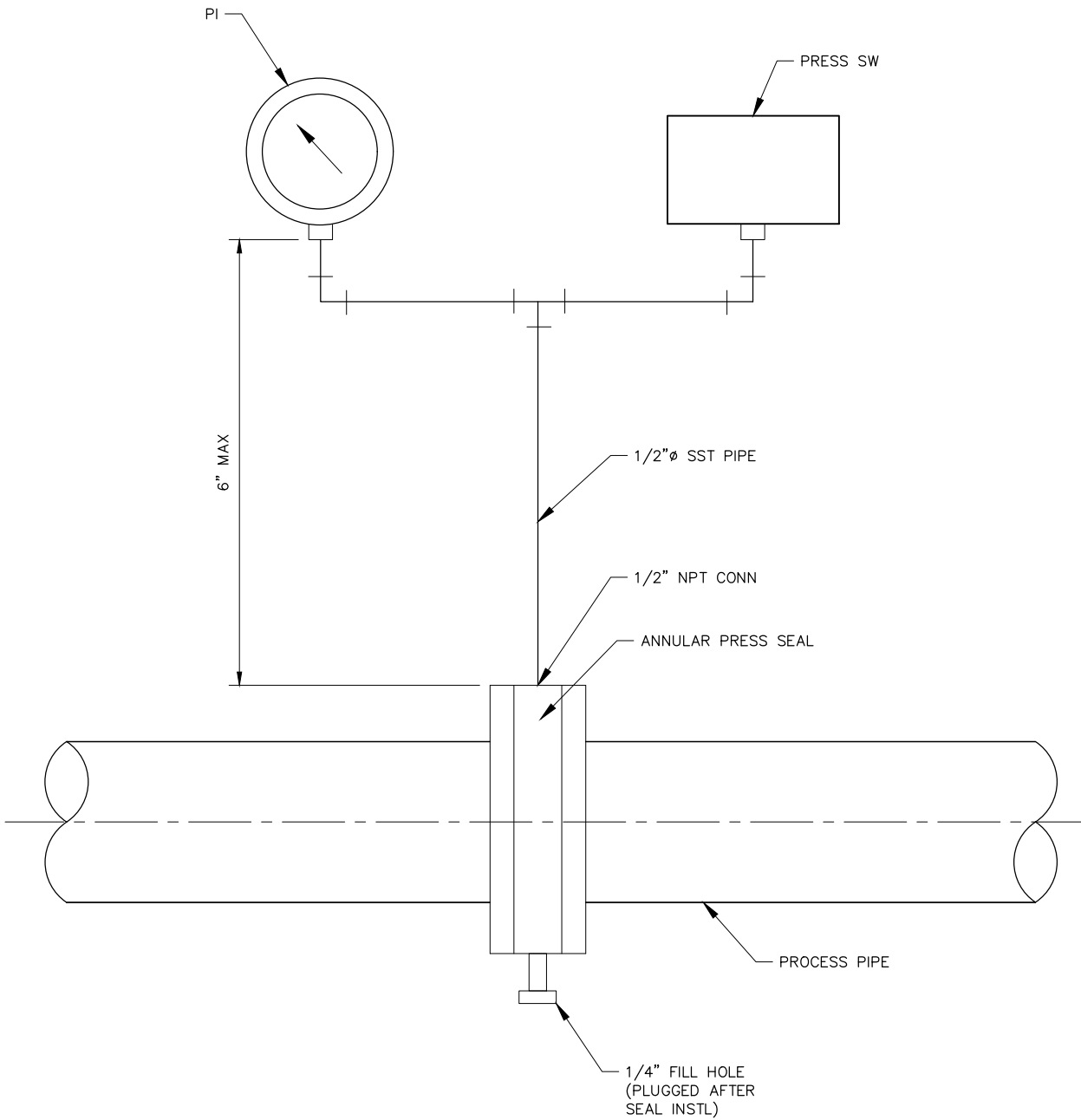
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40564
PRESSURE INSTRUMENT
INSTALLATION**



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NOTE:

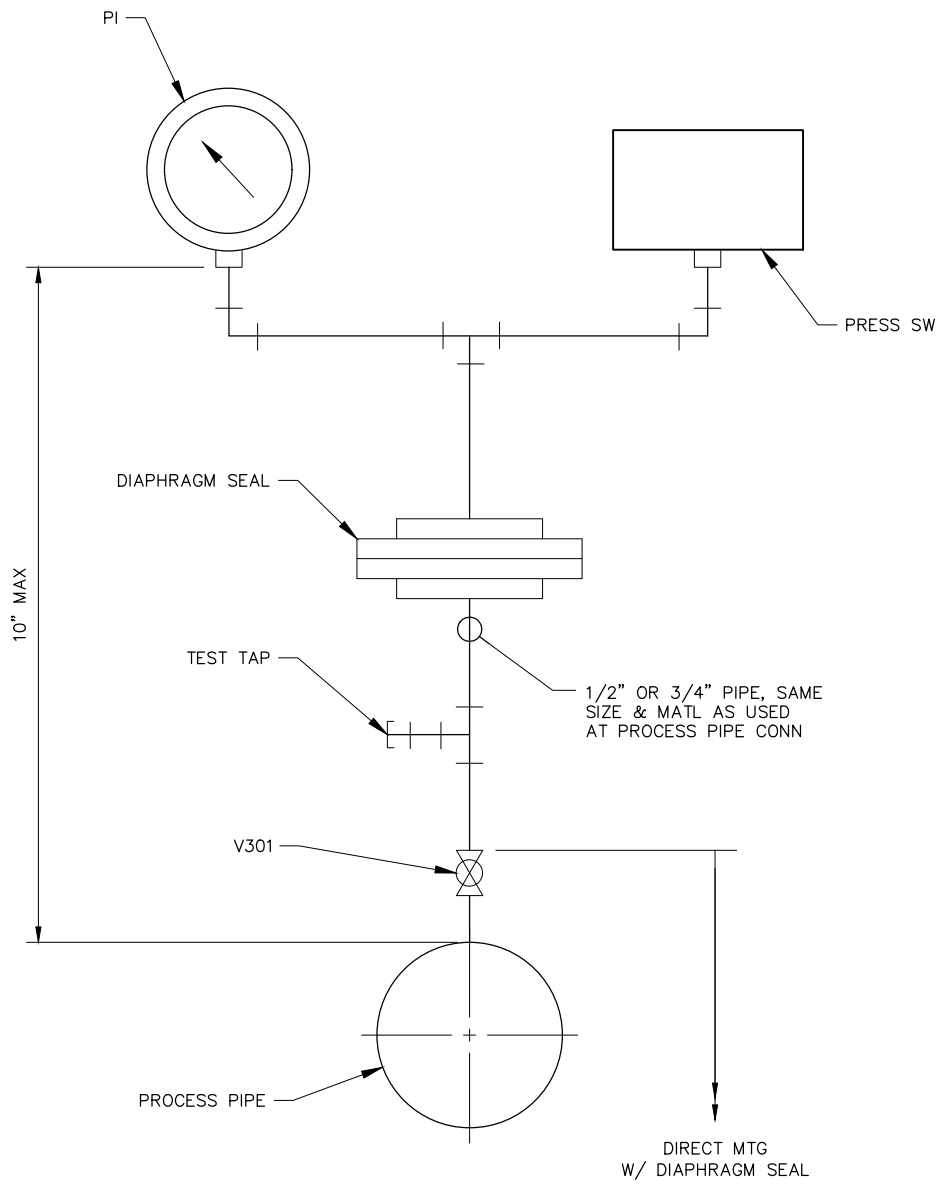
INDICATOR AND SWITCH INSTALLATION SHOWN. FOR SINGLE INSTRUMENT INSTALLATIONS, MOUNT DEVICE DIRECTLY TO SEAL.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40565
PRESSURE INSTRUMENT
INSTALLATION
(ANNULAR SEAL)**



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NOTE:

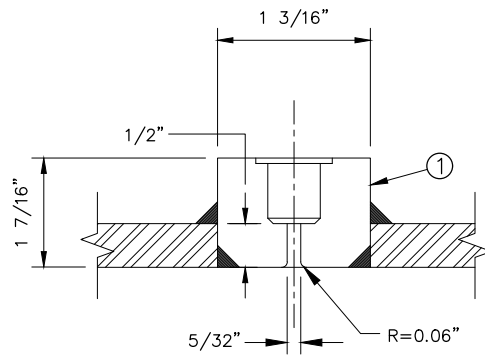
INDICATOR AND SWITCH INSTALLATION SHOWN. FOR SINGLE INSTRUMENT INSTALLATIONS, MOUNT DEVICE DIRECTLY ABOVE DIAPHRAGM SEAL.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

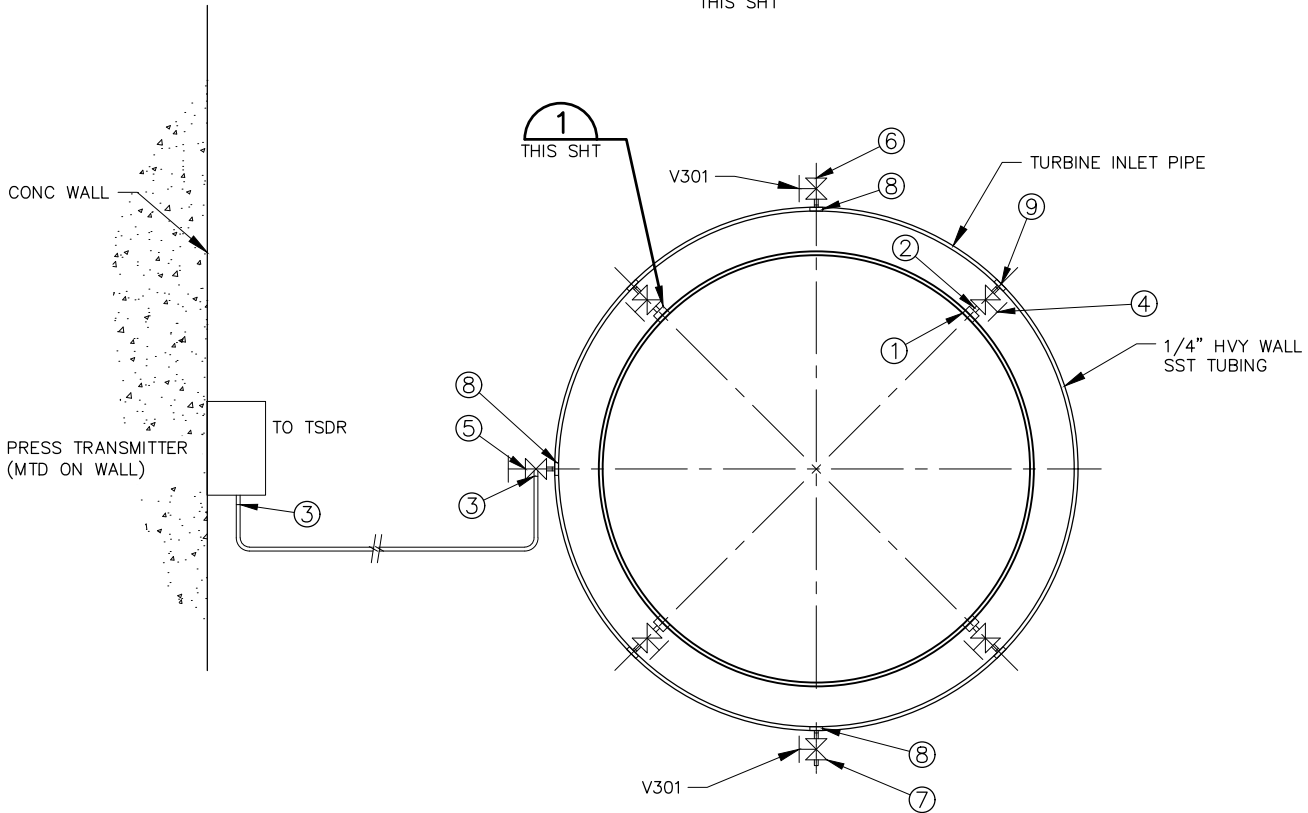
40566
PRESSURE INSTRUMENT
INSTALLATION
(DIAPHRAGM SEAL)

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DETAIL 1
THIS SHT



KEYED NOTES:

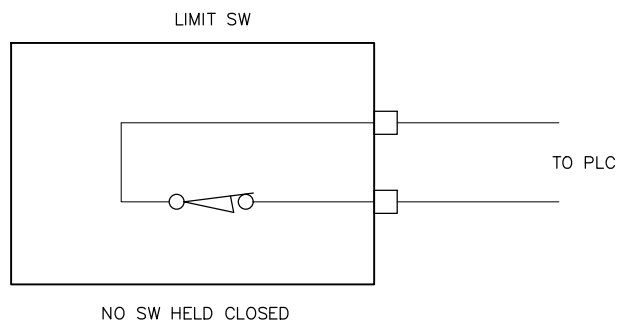
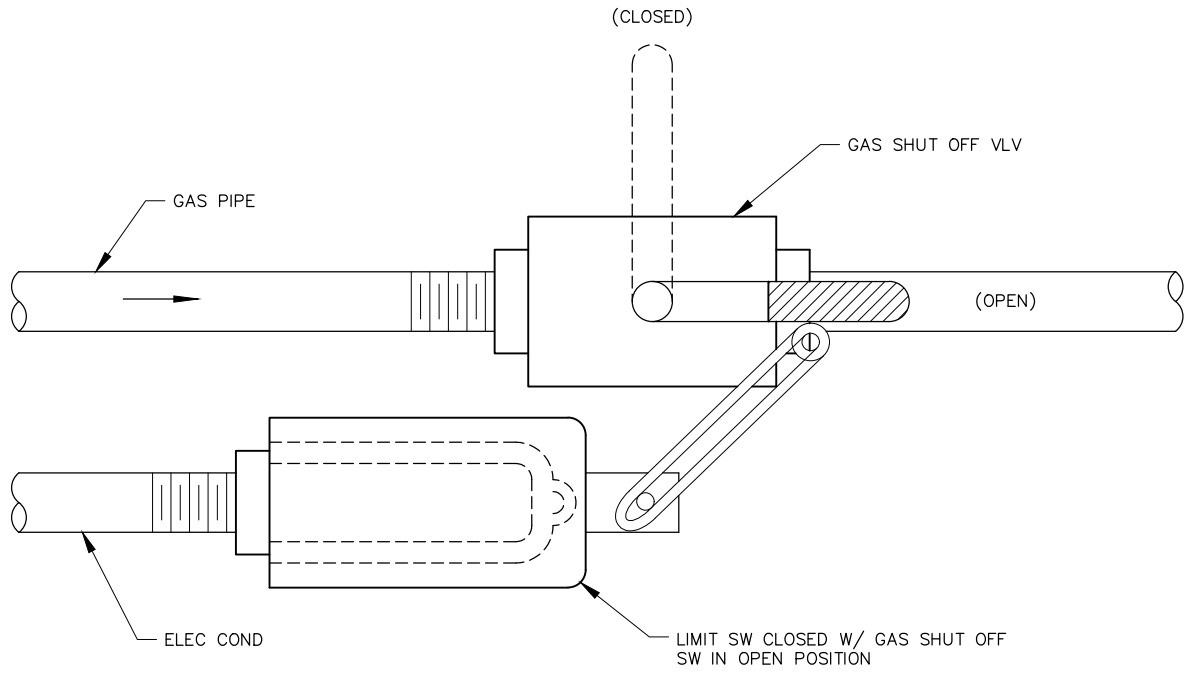
TAG	QTY	DESCRIPTION
①	4	1/4" NPT FEMALE PORT (304 SST)
②	4	SST NIPPLE (BOTH SIDES OF NEEDLE VALVE)
③	2	SST MALE CONNECTOR
④	4	SST NEEDLE VALVE
⑤	1	SST ANGLED NEEDLE VALVE
⑥	1	SST BALL BLEED VALVE
⑦	1	SST BALL DRAIN VALVE
⑧	3	SST BRANCH TEE
⑨	4	SST UNION TEE

DRAWN BY: ALVARADO
 CHKD BY: K ROSS/KLR
 APPD BY: *[Signature]*
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

40569
PENSTOCK PRESSURE RING




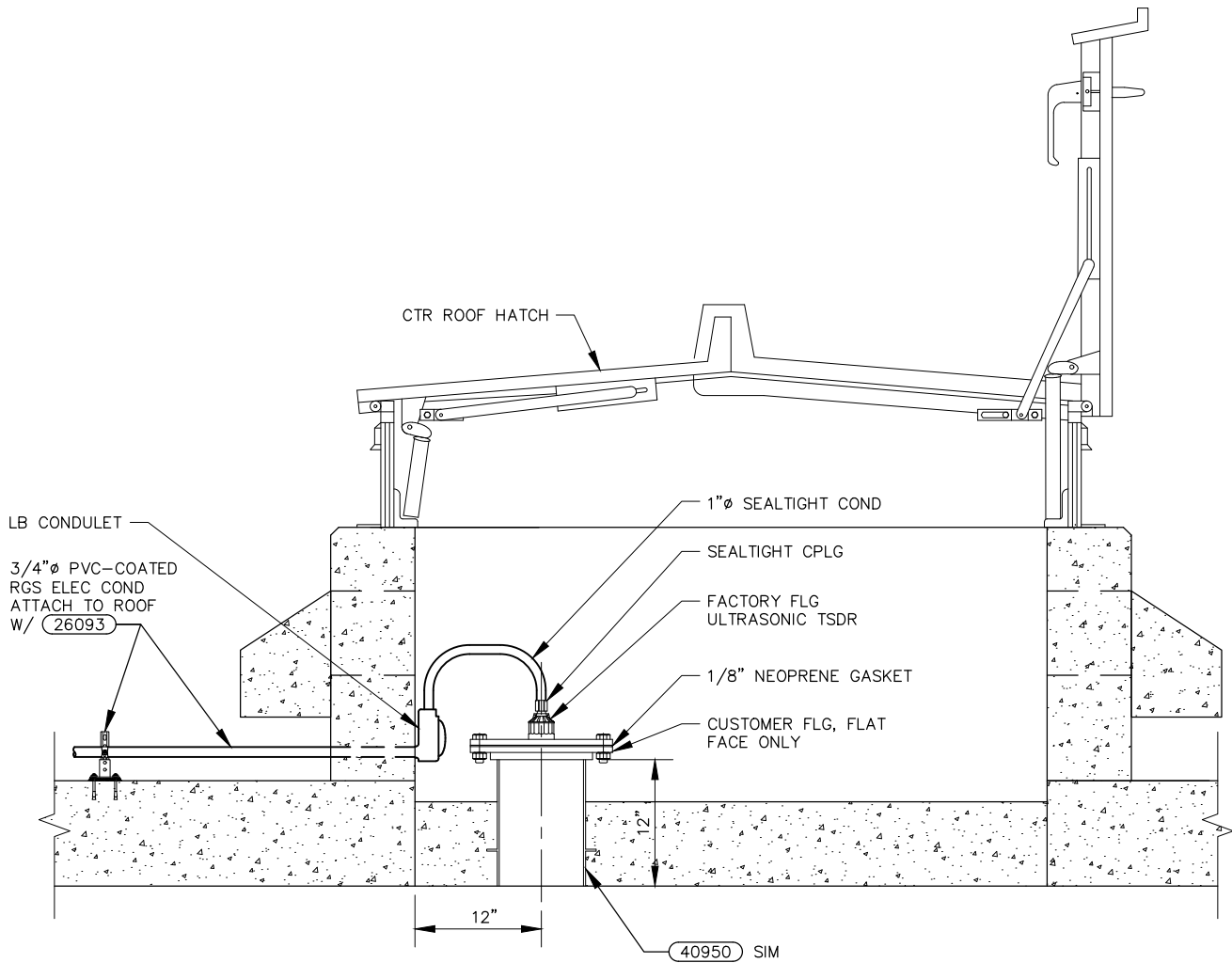
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DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

40570
NATURAL GAS SUPPLY
POSITION SWITCH

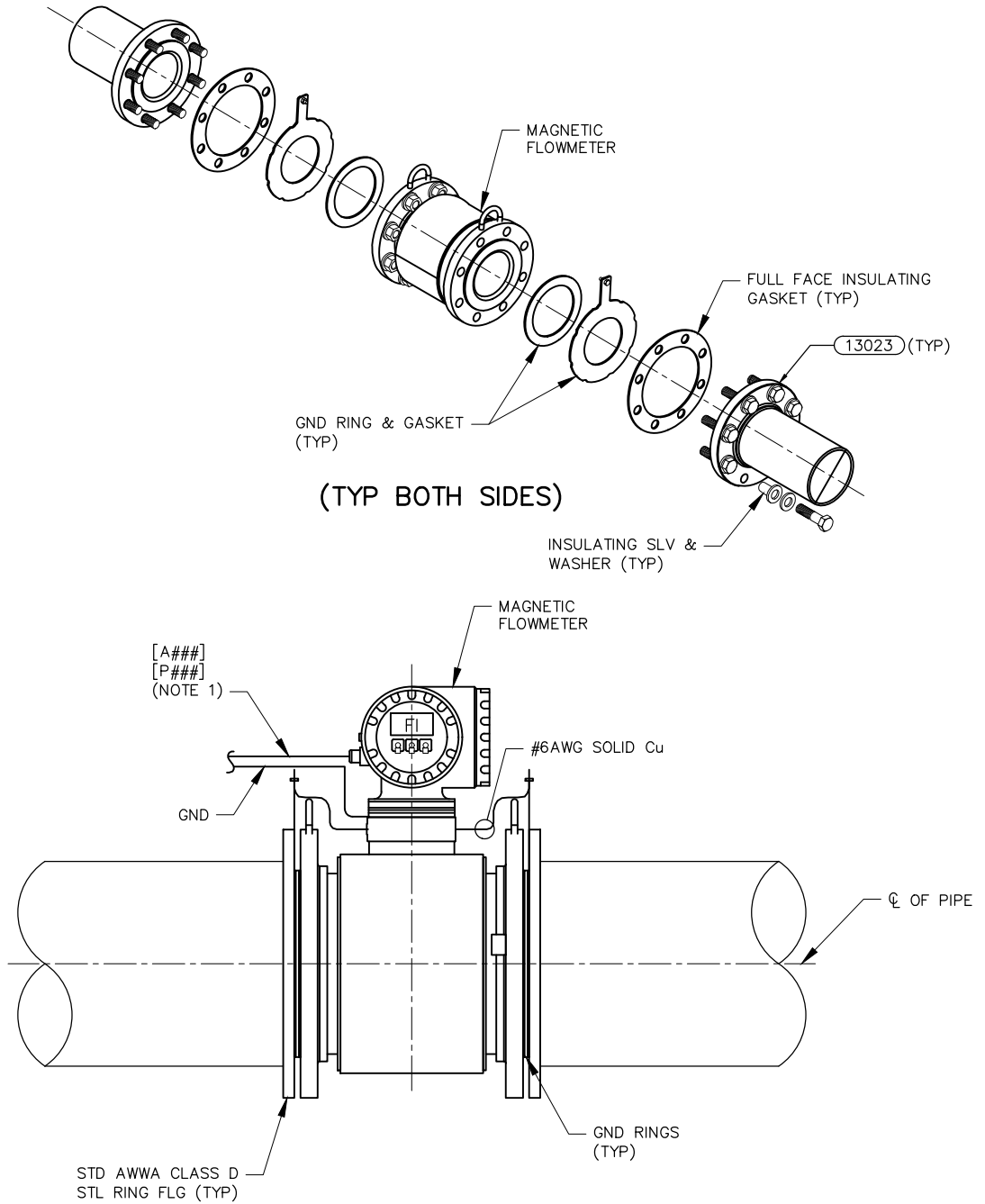

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DRAWN BY: BERKNESS
 CHKD BY: K ROSS/KLR
 APPD BY: [Signature]
 ORIGINATION DATE: JULY 2021
 REVISION DATE:

40572
ULTRASONIC LEVEL
ELEMENT INSTALLATION
(RESERVOIR ROOF)

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NOTES:

1. SEE CONDUIT AND CONDUCTOR SCHEDULE FOR ELECTRICAL CONDUIT NUMBERS.
2. DETAIL APPLIES TO FLOWMETERS WITH LOCAL OR REMOTE MOUNT TRANSMITTERS.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

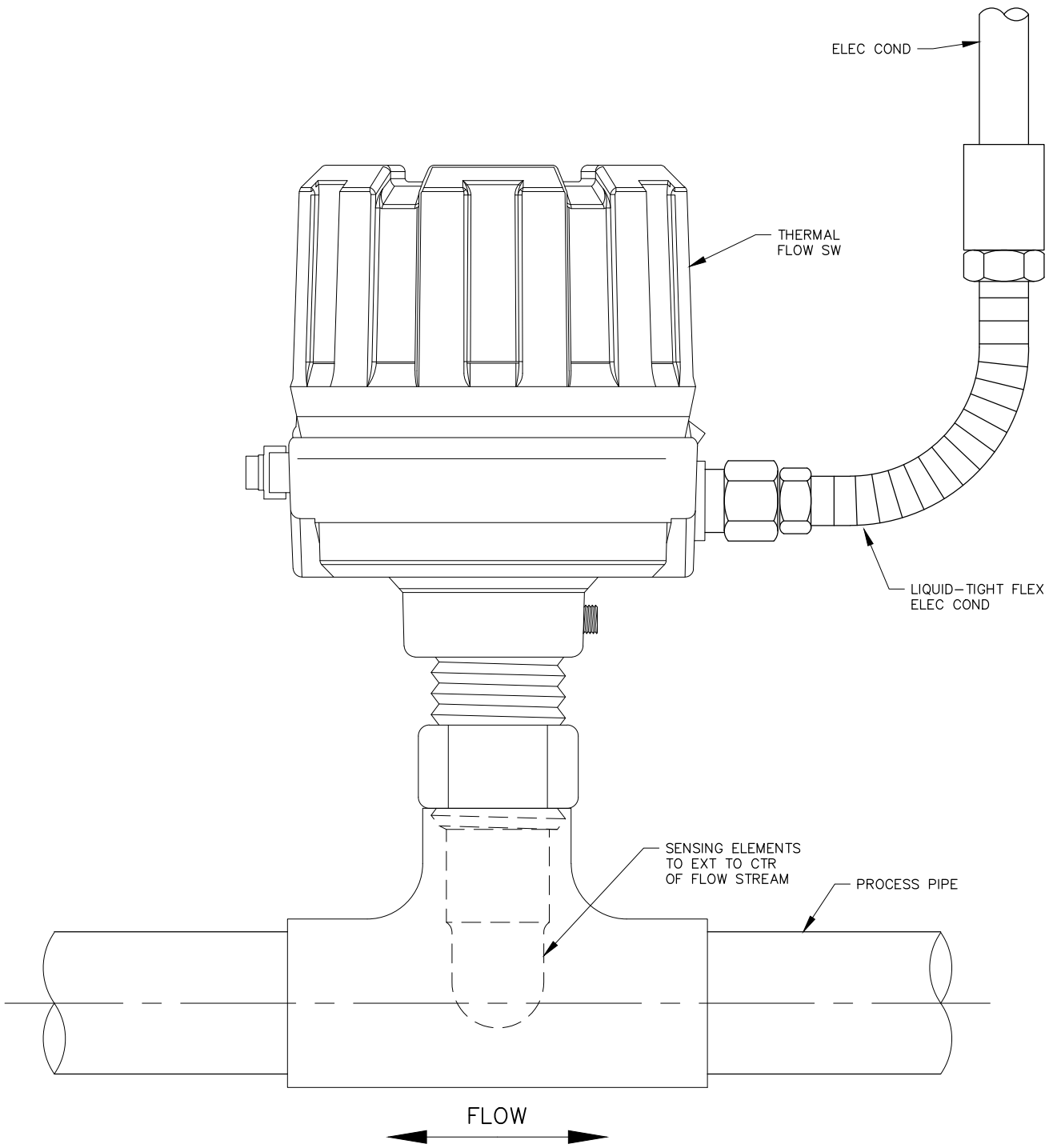
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40581
MAGNETIC FLOWMETER
INSTALLATION**



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NOTE:

SPHERICAL TIP SENSING ELEMENT SHALL BE USED WITH LIQUID APPLICATIONS. TWIN TIP SENSING ELEMENT SHALL BE USED WITH AIR APPLICATIONS.

DRAWN BY: ROMERO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

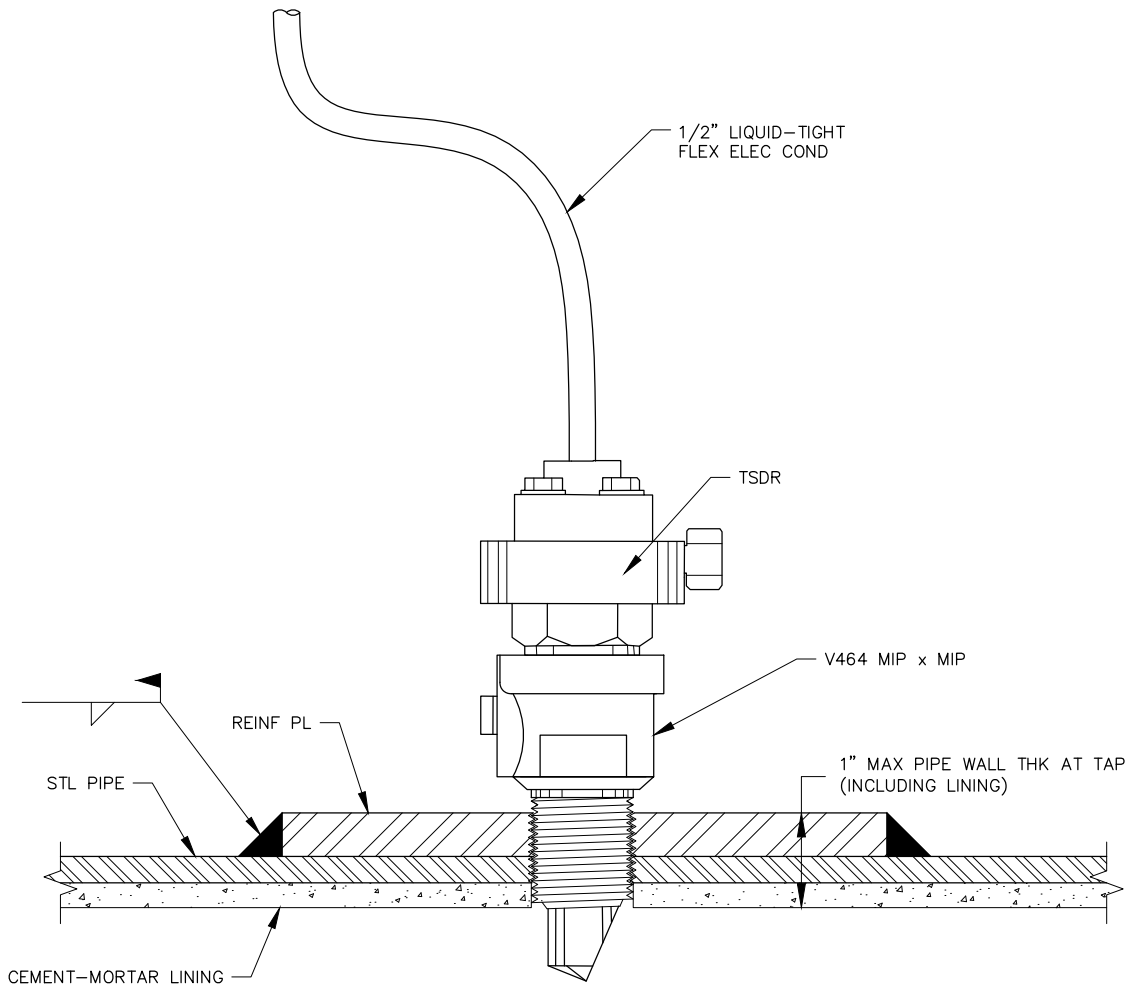
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40583
THERMAL FLOW SWITCH**



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NOTE:

PROVIDE TRANSDUCER WITH A BRONZE CORPORATION STOP FEEDTHROUGH WITH BALL VALVE WHICH ALLOWS FOR THE COMPLETE REMOVAL OF THE TRANSDUCER FOR REPAIR, REPLACEMENT, OR CLEANING WITHOUT DEWATERING PIPE.

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

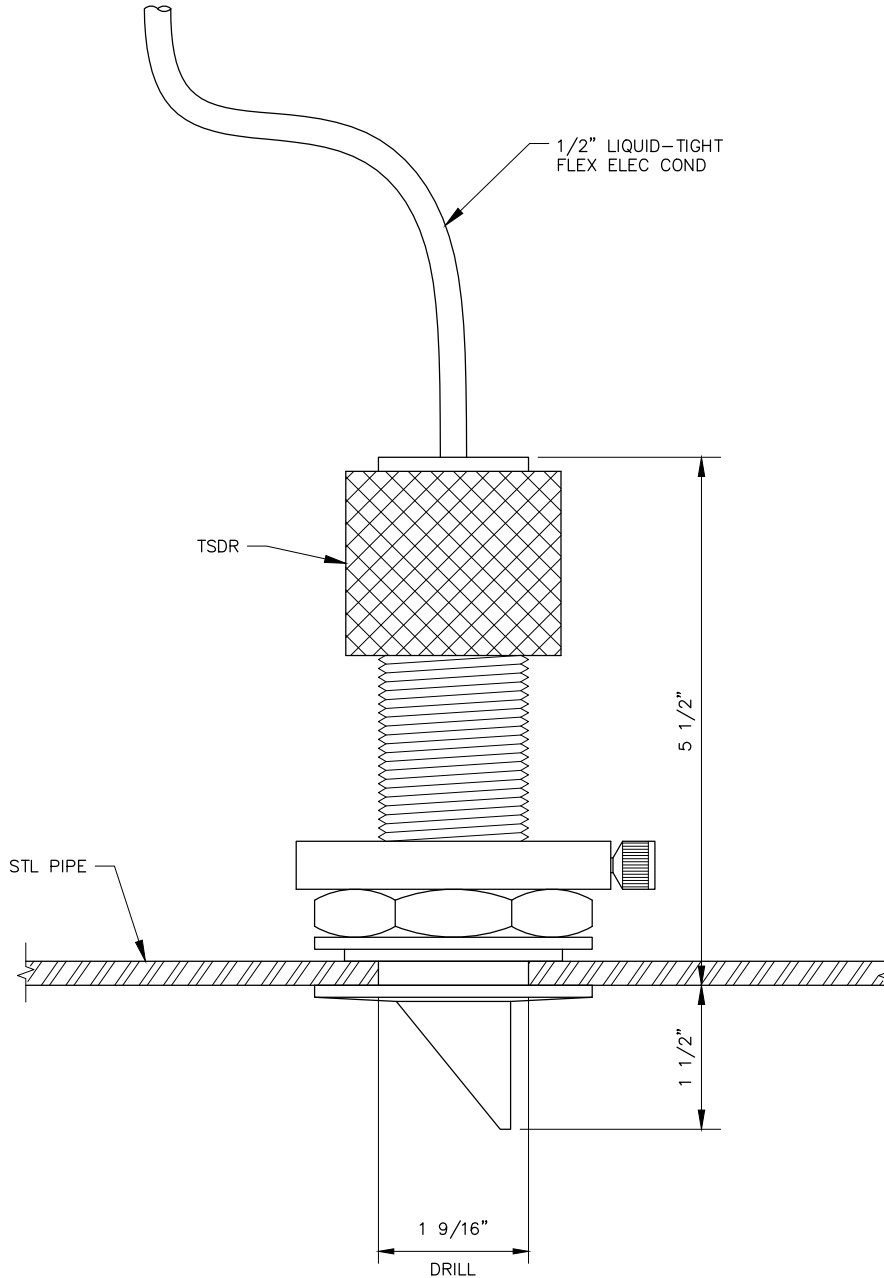
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40585
ULTRASONIC FLOWMETER
TRANSDUCER OUTSIDE
INSTALLATION**



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NOTES:

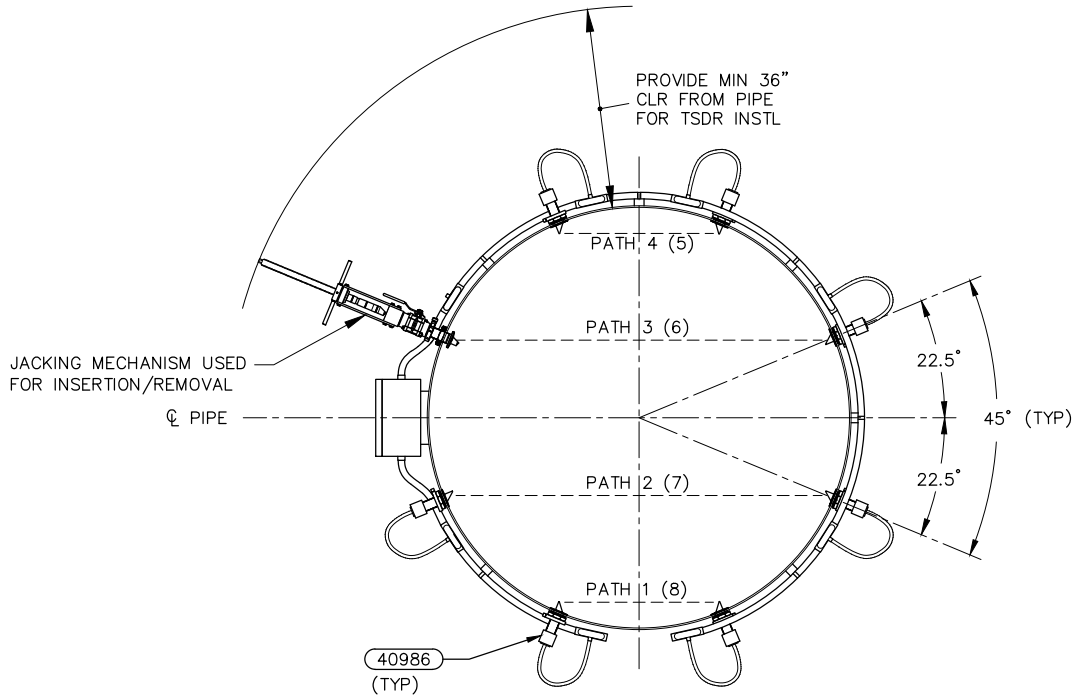
1. THE TRANSDUCER SHALL BE INSTALLED IN A DEWATERED PIPE FROM THE INSIDE OUT. THE TRANSDUCER ASSEMBLY IS SEALED ON THE PIPE USING AN O-RING INNER SEAL AND AN OUTER PACKING.
2. REPAIR LINING AND COATING AFTER DRILLING HOLE AND WELDING.

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

40586
ULTRASONIC FLOWMETER
TRANSDUCER INSIDE FEED
THROUGH INSTALLATION

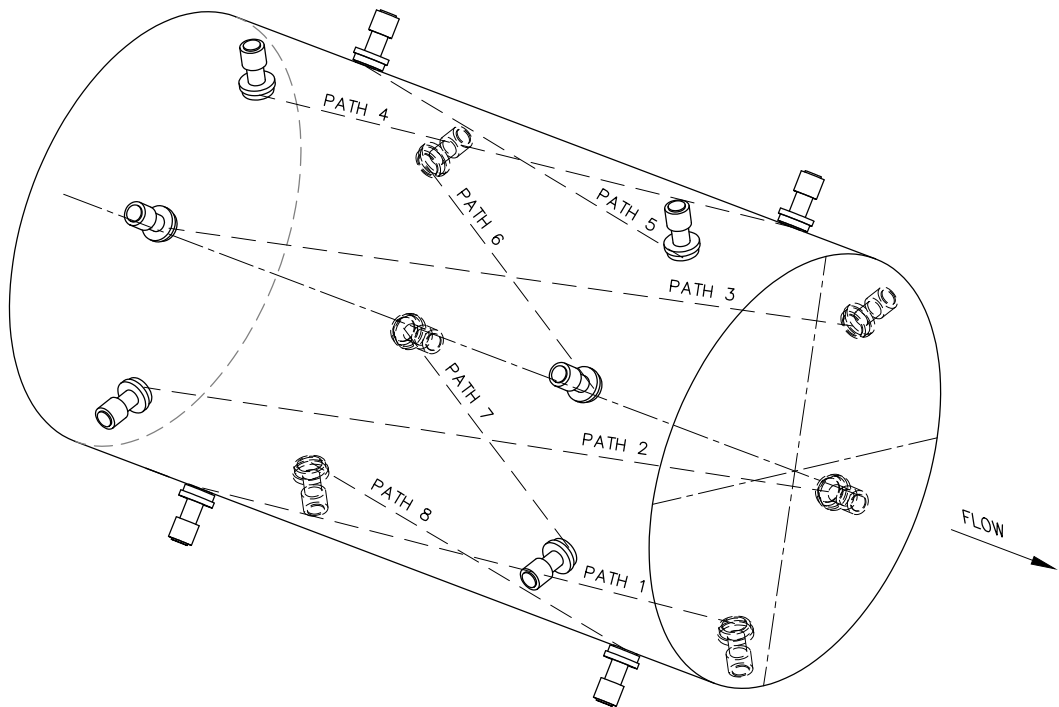
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PIPE END VIEW

ANGLES SHOWN FOR REF ONLY
-NOT DRILL ANGLES-



ISOMETRIC

DRAWN BY: ALVARADO

CHKD BY: K ROSS/KLR

APPD BY: *[Signature]*

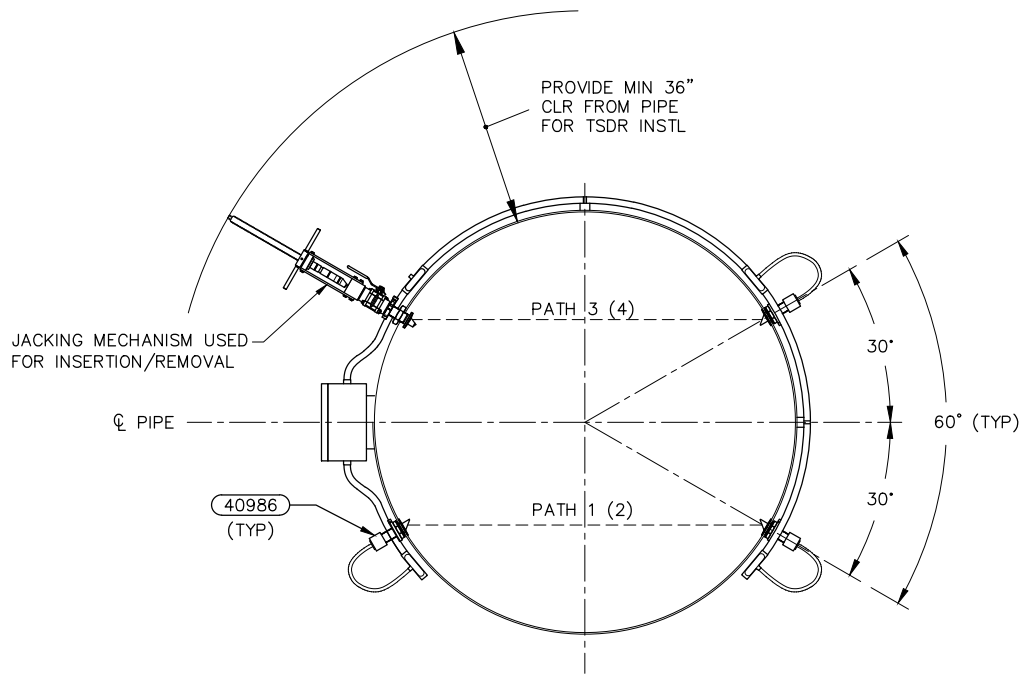
ORIGINATION DATE: JULY 2021

REVISION DATE:

**40587
ULTRASONIC FLOWMETER
(8 PATH)**

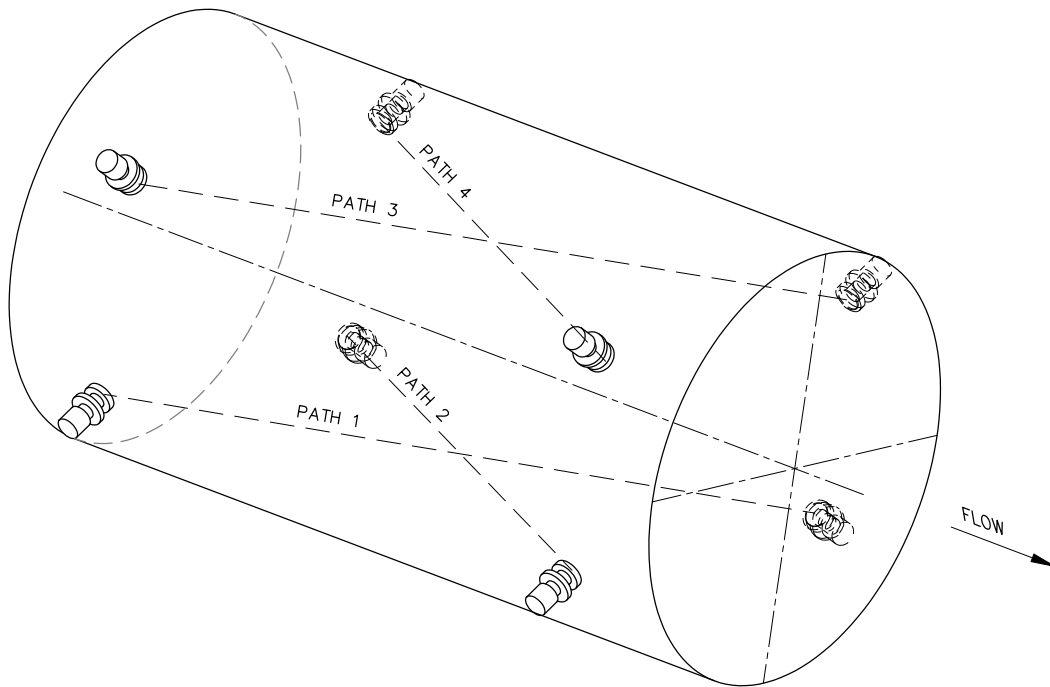


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PIPE END VIEW

ANGLES SHOWN FOR REF ONLY
 -NOT DRILL ANGLES-



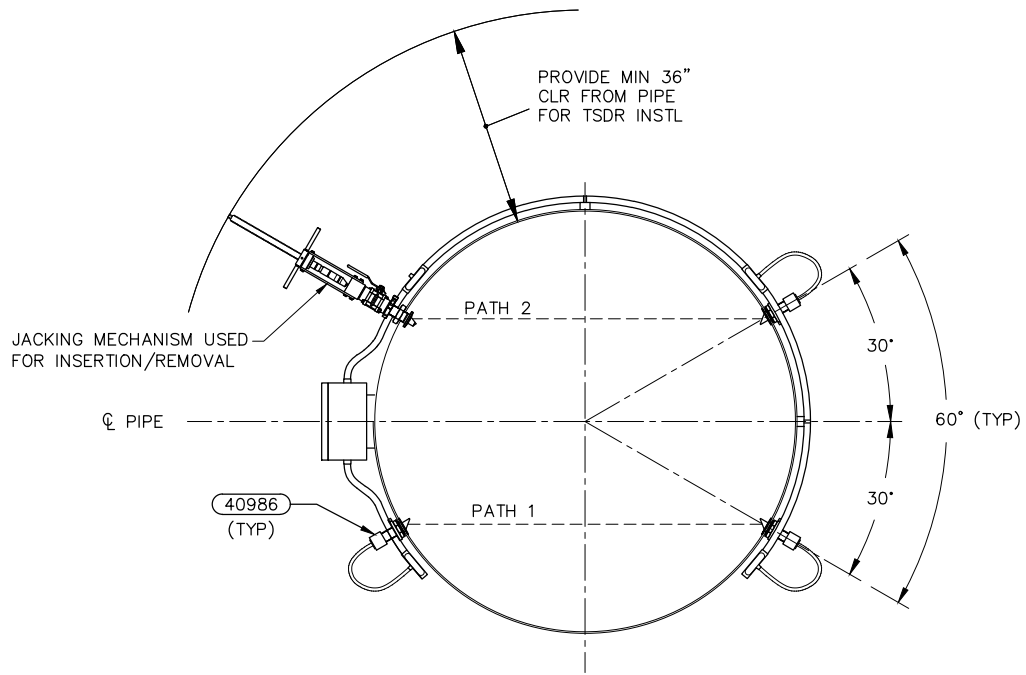
ISOMETRIC

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40588
 ULTRASONIC FLOWMETER
 (4 PATH)**

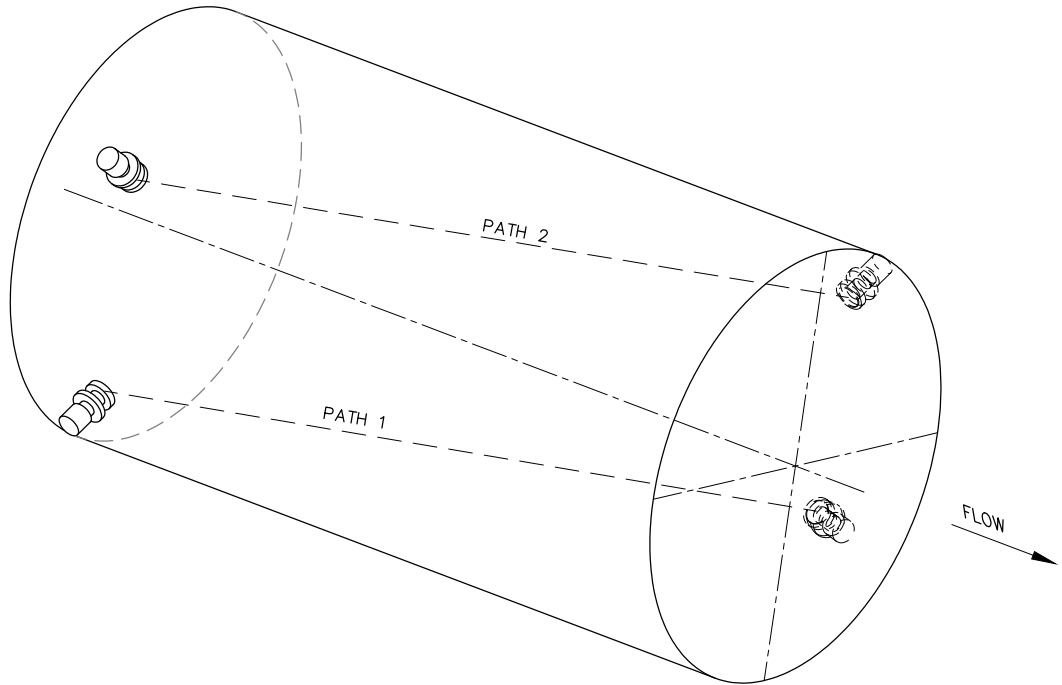


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PIPE END VIEW

ANGLES SHOWN FOR REF ONLY
 -NOT DRILL ANGLES-



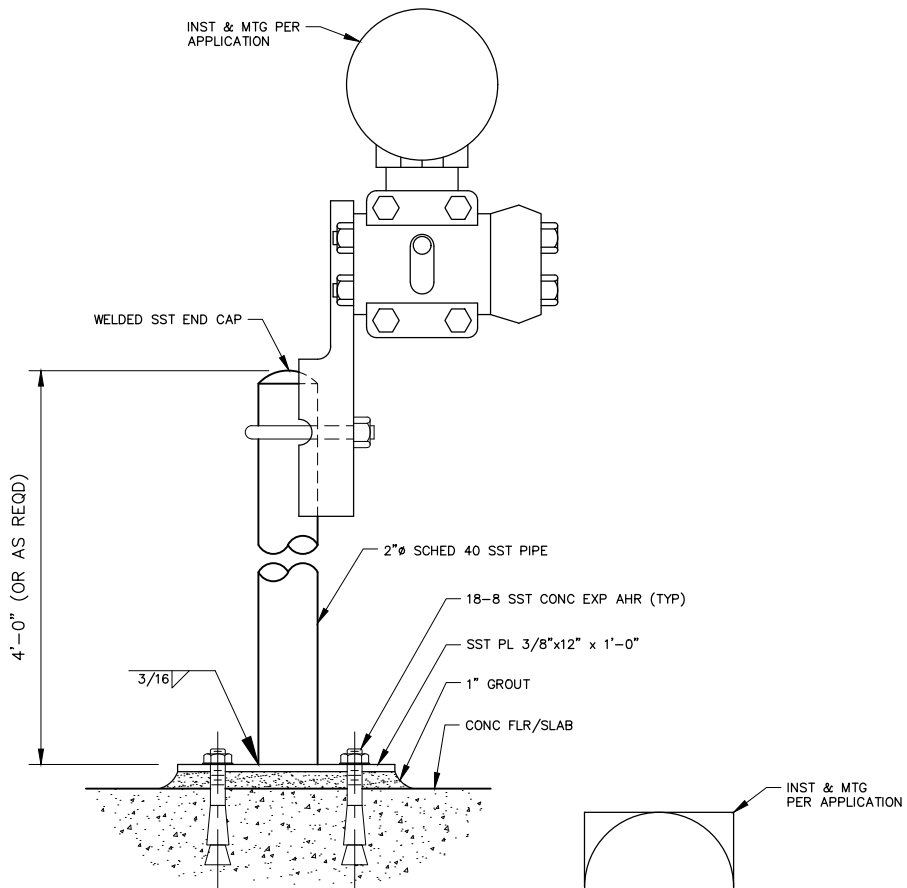
ISOMETRIC

DRAWN BY: ALVARADO
CHKD BY: K ROSS/KLR
APPD BY: <i>[Signature]</i>
ORIGINATION DATE: JULY 2021
REVISION DATE:

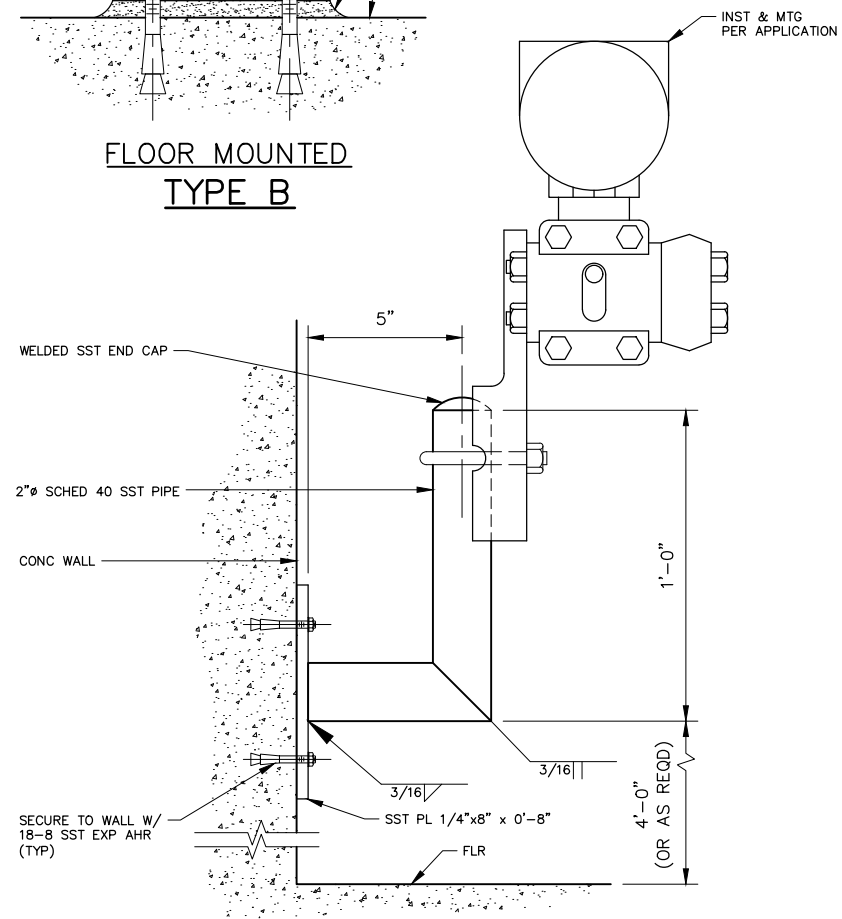
**40589
 ULTRASONIC FLOWMETER
 (2 PATH)**



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**FLOOR MOUNTED
TYPE B**



**WALL MOUNTED
TYPE A**

NOTE:
MATERIAL: ASTM A 240/320,
TYPE 304 OR 316

DRAWN BY: ROMERO
CHKD BY: K ROSS/KLR
APPD BY: [Signature]
ORIGINATION DATE: JULY 2021
REVISION DATE:

**40590
INSTRUMENT MOUNTING**

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