

NOTES:

1. THE WATER MAIN SHALL BE INSTALLED ON THE NORTH OR EAST SIDE OF THE STREET, THE CENTERLINE SHOULD BE A MINIMUM OF 6 FT FROM THE EDGE OF PAVEMENT WITH 5 FT TO 6 FT OF COVER OVER THE PIPE.
2. THE WASTEWATER MAIN SHALL BE INSTALLED IN THE CENTER OF PAVEMENT AS DEPICTED ABOVE, WITH A MAXIMUM COVER OF 20 FT OVER THE PIPE.
3. GAS AND ELECTRIC MAINS ARE USUALLY INSTALLED IN A JOINT TRENCH BEHIND THE CURB. WHEN THE GAS PRESSURE IS GREATER THAN 60 PSI THE GAS LINE IS INSTALLED, AT A DEPTH OF 4 FT, 10 FT FROM THE EDGE OF THE STORM SEWER MAIN.
4. IF THE STORM SEWER IS LOCATED 10 FT OR LESS FROM THE WASTEWATER MAIN OUTSIDE DIAMETER TO OUTSIDE DIAMETER, THE MATERIAL OF THE STORM SEWER SHALL BE EVALUATED ON A CASE BY CASE BASIS, BASED ON SOIL TYPES AND LOCATION OF GROUNDWATER, BY CITY ENGINEERING AND COLORADO SPRINGS UTILITIES.



INDUSTRIAL

A3-10

DATED 03/2014

DESIGN GUIDELINES FOR TOWNHOUSE PUD

MANDATORY DESIGN REQUIREMENTS:

1. ALL DRIVE AISLES AND UTILITY INSTALLATIONS SHALL BE IN ACCORDANCE WITH CITY SPECIFICATIONS AND THE COLORADO SPRINGS UTILITIES' LINE EXTENSION & SERVICE STANDARDS.
2. THE GAS MAIN MAY BE CENTERED IN THE DRIVE AISLE AS DIRECTED BY COLORADO SPRINGS UTILITIES FIELD ENGINEERS.
3. ELECTRIC CONDUIT IS REQUIRED FOR ALL SECONDARY SERVICE CONDUCTORS. THE DEVELOPER/CONTRACTOR SHALL PROVIDE AND INSTALL THE SECONDARY SERVICES WITH THE APPROVAL AND INSPECTION BY COLORADO SPRINGS UTILITIES FIELD ENGINEERS.
4. ADEQUATE SPACE FOR TRANSFORMERS SHALL BE PROVIDED OUTSIDE THE DRIVE AISLE AND THE LOCATION OF THE TRANSFORMER MUST BE APPROVED BY COLORADO SPRINGS UTILITIES FIELD ENGINEERS. REFERENCE THE ELECTRIC LINE EXTENSION & SERVICE STANDARDS.
5. BOLLARDS ARE REQUIRED FOR THE PROTECTION OF GAS METERS AND TRANSFORMERS. REFERENCE THE GAS LINE EXTENSION & SERVICE STANDARDS.

WASTEWATER:

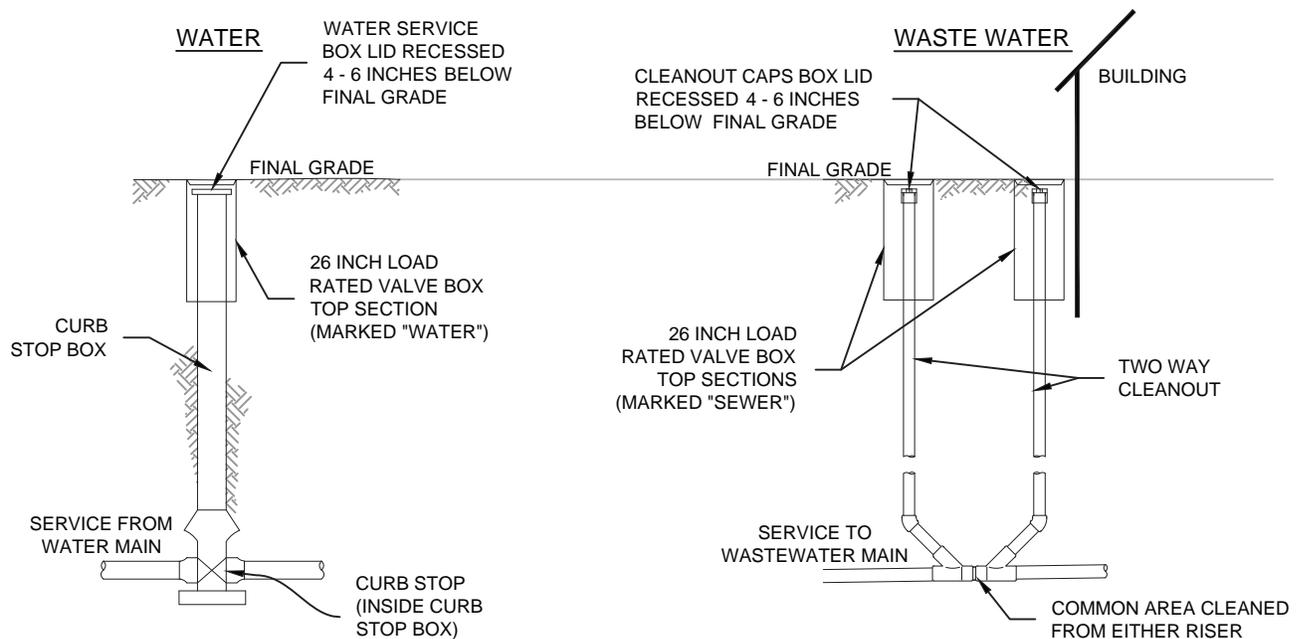
1. THE DIAMETER OF THE WASTEWATER MAIN SHALL NOT BE GREATER THAN 8 INCHES.
2. THE MAXIMUM DEPTH OF THE WASTEWATER MAIN SHALL NOT BE GREATER THAN 14 FEET MEASURED FROM FINAL GRADE (PAVEMENT) TO THE WASTEWATER PIPE INVERT.
3. COLORADO SPRINGS UTILITIES-APPROVED, LOAD-RATED, SLIP TYPE VALVE BOX TOP SECTIONS ARE REQUIRED OVER STANDARD WASTEWATER SERVICE LINE CLEANOUTS. VALVE BOX TOPS TO BE MARKED WITH "SEWER". CLEANOUT LIDS SHALL BE RECESSED 3-4" BELOW FINAL GRADE. SEE DETAIL BELOW.

WATER:

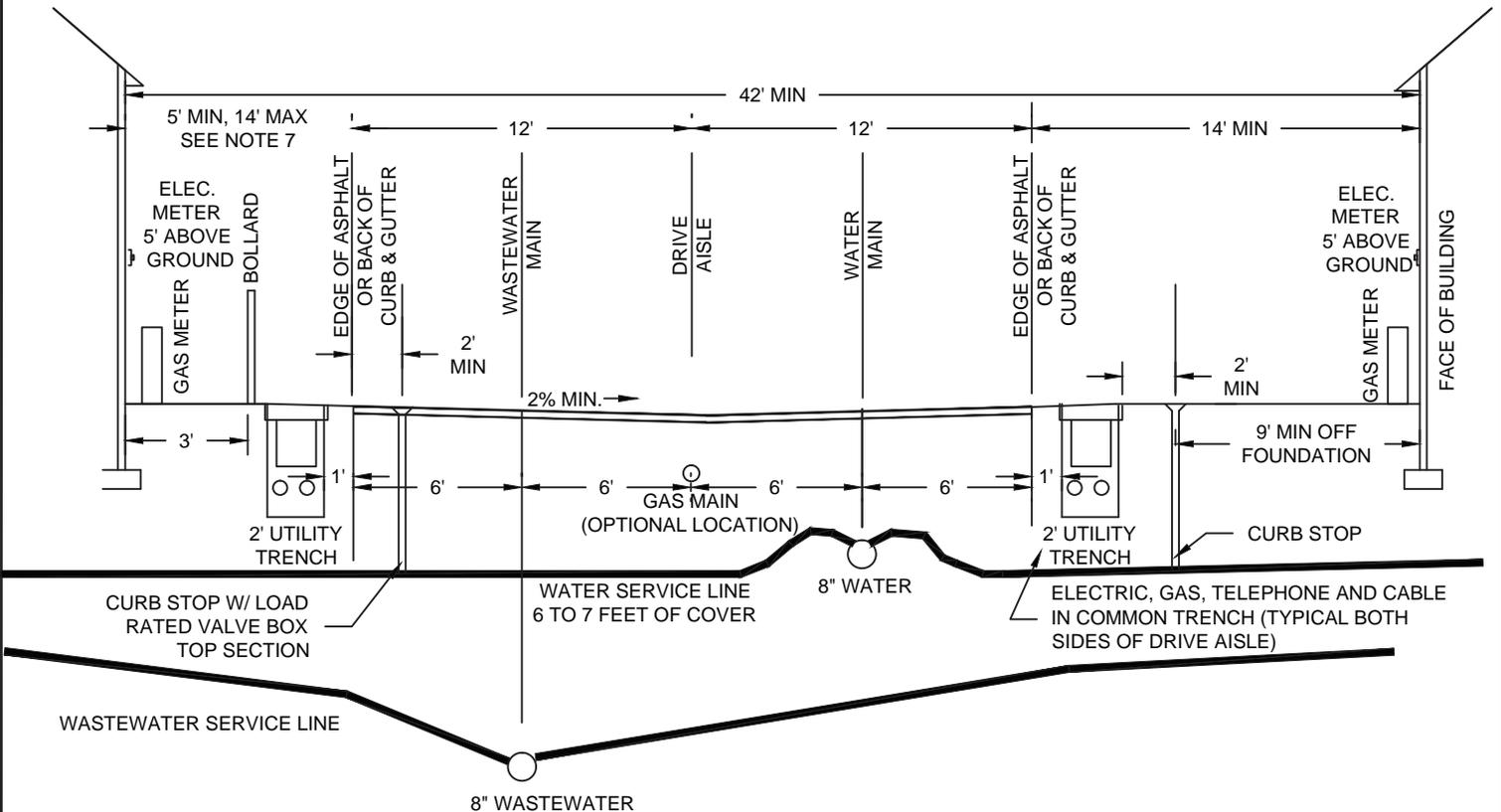
1. THE DIAMETER OF THE WATER MAIN SHALL BE NOT GREATER THAN 8 INCHES.
2. COLORADO SPRINGS UTILITIES-APPROVED, LOAD-RATED, SLIP TYPE VALVE BOX TOP SECTIONS ARE REQUIRED OVER STANDARD WATER STOP BOXES. CURB STOP LID SHALL BE RECESSED 3-4 INCHES BELOW FINAL GRADE. VALVE BOX TOPS TO BE MARKED WITH "WATER". SEE DETAIL BELOW.

NOTE:

1. THE UTILITY SERVICE PLAN FOR THE PROPOSED TOWNHOUSE DEVELOPMENT SHALL SHOW THE PROJECT-SPECIFIC LOCATION OF ALL UTILITIES AND APPURTENANCES SHOWN ON DRAWINGS **A3-13** AND **A3-14**. APPROVAL SHALL BE ON A CASE BY CASE BASIS.



DESIGN GUIDELINES FOR UTILITY CROSS SECTION FOR A TOWNHOUSE PUD



NOTES:

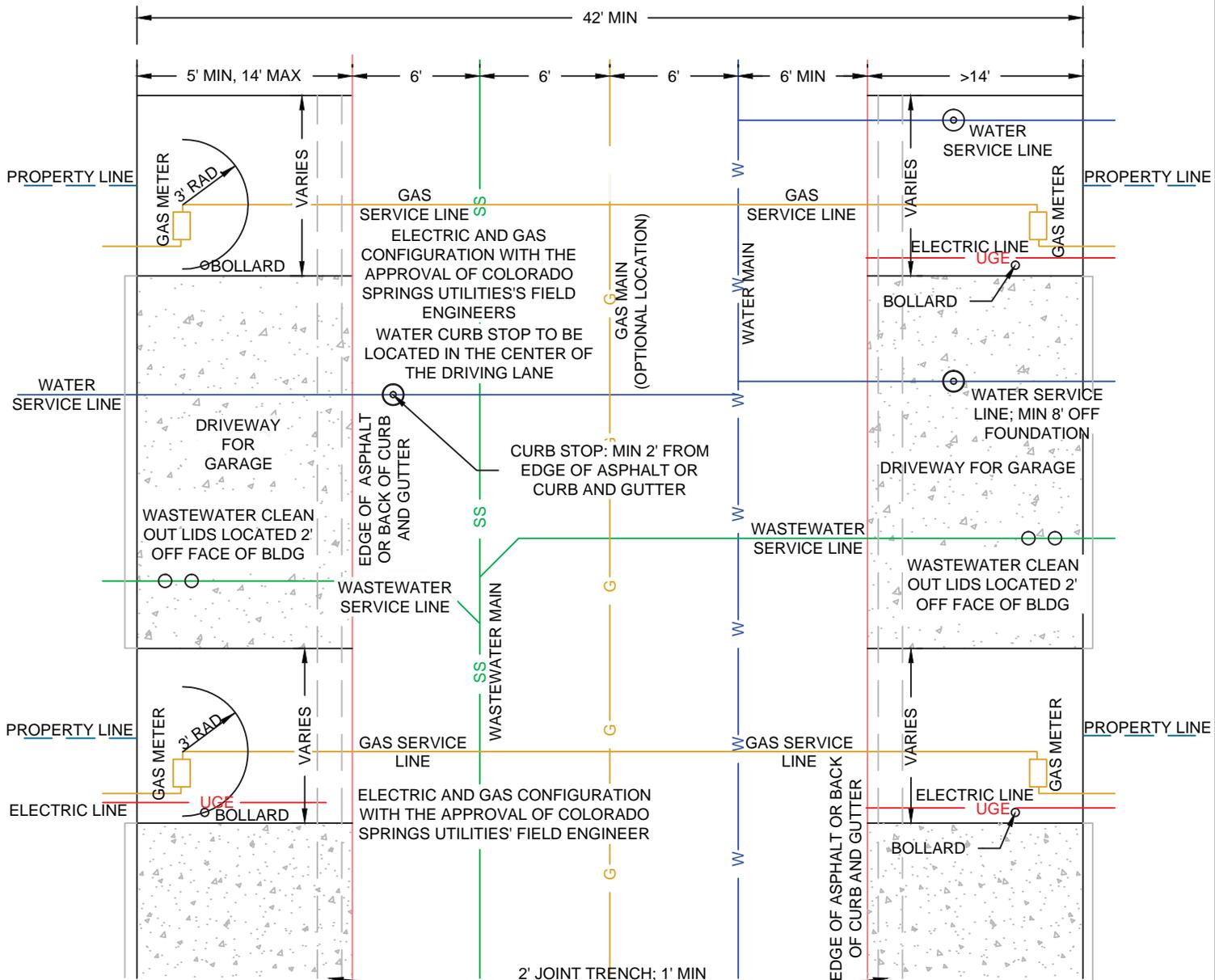
THE DRIVE AISLE RESTRICTIONS:

1. NO STORM DRAIN FACILITIES
2. NO SIDEWALKS
3. NO STREET LIGHTS
4. NO TRANSFORMERS
5. NO PARKING
6. NO EDIFICE (BUILDING) PROJECTIONS IN THE UTILITY EASEMENT, (i.e. DECKS) WITH THE EXCEPTION FOR THE ROOF SOFFITT.
7. THE CURB STOP SHALL BE LOCATED WITHIN THE ASPHALT, A MINIMUM OF 2 FEET FROM THE EDGE OF ASPHALT.
8. THE CURB STOP MAY BE LOCATED BEHIND THE CURB AND GUTTER OR EDGE OF ASPHALT WHERE THERE IS A MINIMUM OF 9 FEET FROM THE FURTHERMOST BUILDING FOUNDATION WALL AND A MINIMUM OF 2 FEET FROM THE BACK OF CURB, EDGE OF ASPHALT AND CLOSEST EDGE OF THE JOINT TRENCH.

TO BE READ IN CONJUNCTION WITH
NOTES ON SHEET **A3-12** AND **A3-14**



TYPICAL DESIGN FOR SERVICES FOR A TOWNHOUSE PUD



NOTES:

1. GAS AND ELECTRIC LOCATED IN JOINT TRENCH PER CROSS SECTIONS.
2. THE MINIMUM HORIZONTAL CLEARANCE BETWEEN THE WATER SERVICE AND GAS OR ELECTRIC SERVICE LINE MUST BE 3 FEET.
3. WHERE THE DRIVEWAY IS LESS THAN 14 FEET, THE CURB STOP SHALL BE LOCATED IN THE DRIVE AISLE, A MINIMUM OF 2 FEET FROM THE EDGE OF ASPHALT OR THE BACK OF CURB AND GUTTER.
4. THE CURB STOP SHALL BE LOCATED WITHIN THE ASPHALT A MINIMUM OF 2 FEET FROM THE EDGE OF ASPHALT.
5. THE CURB STOP MAY BE LOCATED BEHIND THE CURB AND GUTTER OR EDGE OF ASPHALT WHERE THERE IS A MINIMUM OF 9 FEET FROM THE FURTHERMOST BUILDING FOUNDATION WALL AND A MINIMUM OF 2 FEET FROM THE BACK OF CURB, EDGE OF ASPHALT AND CLOSEST EDGE OF THE JOINT TRENCH.

TO BE READ IN CONJUNCTION WITH NOTES ON SHEET A3-12 AND A3-13



PER SLIP JOINT OF DIP PIPE

PIPE DATA		MFRS. DEFL.	DESIGN DEFLECTION (80% MAX.)		APPROX. RADIUS FOR DEFLECTING CURVES WITHOUT BENDS	
PIPE SIZE	(HORZ. DEFL.)		(VERT. DEFL.)	20'L	18'L	
4"	5°00'	4°00'	6.99%	286'	258'	
6"						
8"						
10"						
12"						
14"	4°00'	3°12'	5.59%	358'	322'	
16"						
18"	3°00'	2°24'	4.19%	477'	430'	
20"						
24"						
30"						
36"						
42"	2°00'	1°36'	2.79%	716'	645'	

DATA FOR DIP PIPE

SHADED COLUMN IS MANUFACTURERS REFERENCE ONLY

PER SLIP JOINT OF PVC PIPE W/HIGH DEFLECTION COUPLINGS

PIPE DATA		MFRS. TOTAL JOINT DEFL. W/ COUPL.	DESIGN DEFLECTION (80% MAX.)		MIN. RADIUS FOR DEFLECTING CURVES WITH HIGH DEFL. COUPLINGS
PIPE SIZE	(HORZ. DEFL.)		(VERT. DEFL.)	20'L	
4"	5°00'	4°00'	6.99%	286'	
6"					
8"					
12"					
16"	NO DEFLECTION COUPLINGS FOR 16" OR GREATER				

CLASS 305 (DR-14)
CLASS 235 (DR-18)

DATA FOR PVC PIPE

SHADED COLUMN IS MANUFACTURERS REFERENCE ONLY

NOTES:

- COLORADO SPRINGS UTILITIES USES A 1.25 SAFETY FACTOR TO AVOID OVER DEFLECTION OF THE PIPE.
- SLIP JOINT PVC PIPE SHALL NOT BE DEFLECTED WITHOUT THE USE OF HIGH DEFLECTION COUPLINGS (HDC).



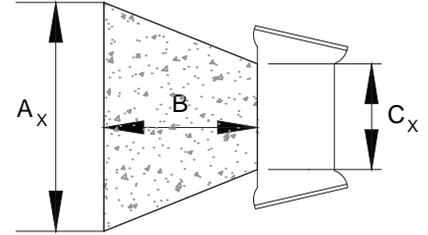
MAXIMUM PIPELINE DEFLECTION
DATA FOR DIP AND PVC PIPE

A4-1

DATED 03/2014

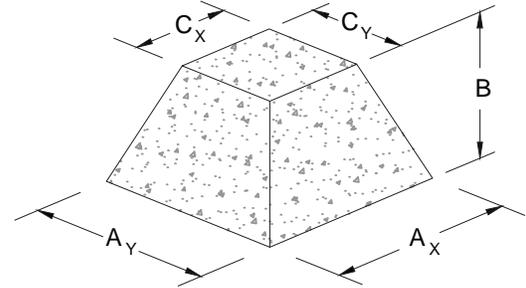
THRUST BLOCK DIMENSIONS and VOLUMES - PVC & DIP 250 psi

MAIN SIZE (in.)	TYPE OF FITTING	MINIMUM BEARING SURFACE AREA (ft ²)	MINIMUM A _x (ft)	MINIMUM A _y (ft)	MINIMUM C _x (ft)	MINIMUM C _y (ft)	MINIMUM B (ft)	APPROXIMATE VOLUME (yd ³)
4	11.25° BEND	1.00	1.00	1.00	0.25	0.33	2.00	0.25
4	22.5° BEND	2.00	1.41	1.41	0.21	0.33	2.00	0.25
4	45° BEND	3.50	1.87	1.87	0.42	0.33	2.00	0.25
4	TEE & DEAD END	4.75	2.18	2.18	0.67	0.33	2.00	0.25
6	11.25° BEND	2.00	1.41	1.41	0.25	0.50	2.00	0.25
6	22.5° BEND	3.75	1.94	1.94	0.38	0.50	2.00	0.25
6	45° BEND	7.25	2.69	2.69	0.58	0.50	2.00	0.25
6	TEE & DEAD END	9.50	3.08	3.08	0.83	0.50	2.00	0.50
8	11.25° BEND	3.25	1.80	1.80	0.34	0.67	2.00	0.25
8	22.5° BEND	6.50	2.55	2.55	0.48	0.67	2.00	0.25
8	45° BEND	12.50	3.57	3.50	0.67	0.67	2.00	0.50
8	TEE & DEAD END	16.25	4.64	3.50	1.08	0.67	2.00	0.75



THRUST BLOCK DIMENSIONS and VOLUMES - PVC (Maximum Static Pressure = 170 psi)

MAIN SIZE (in.)	TYPE OF FITTING	MINIMUM BEARING SURFACE AREA (ft ²)	MINIMUM A _x (ft)	MINIMUM A _y (ft)	MINIMUM C _x (ft)	MINIMUM C _y (ft)	MINIMUM B (ft)	APPROXIMATE VOLUME (yd ³)
12	11.25° BEND	4.75	2.18	2.18	0.43	1.00	2.00	0.25
12	22.5° BEND	9.25	3.04	3.04	0.64	1.00	2.00	0.50
12	45° BEND	18.00	4.92	3.66	1.00	1.00	2.00	0.75
12	TEE & DEAD END	23.50	6.42	3.66	1.46	1.00	2.48	1.00
16	11.25° BEND	8.00	2.83	2.83	0.44	1.33	2.00	0.50
16	22.5° BEND	16.00	4.27	3.75	0.66	1.33	2.00	0.75
16	45° BEND	31.00	8.27	3.75	1.00	1.33	3.64	1.75
16	TEE & DEAD END	40.50	10.80	3.75	1.92	1.33	4.44	3.00



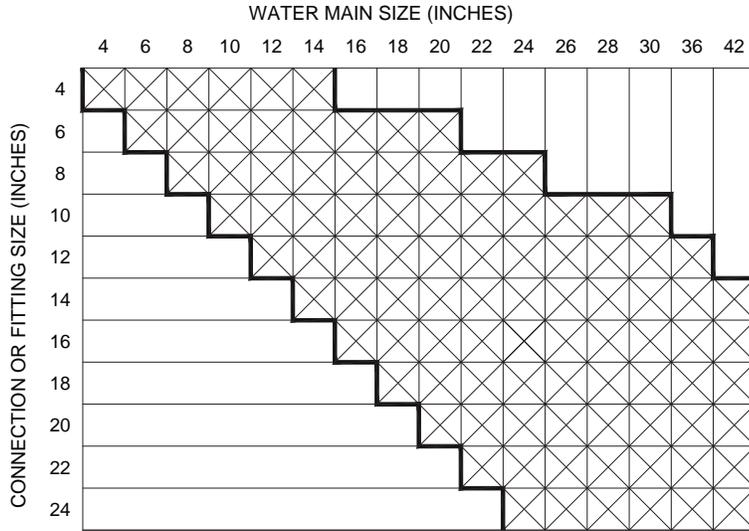
THRUST BLOCK DIMENSIONS and VOLUMES - DIP (Maximum Static Pressure = 250 psi)

MAIN SIZE (in.)	TYPE OF FITTING	MINIMUM BEARING SURFACE AREA (ft ²)	MINIMUM A _x (ft)	MINIMUM A _y (ft)	MINIMUM C _x (ft)	MINIMUM C _y (ft)	MINIMUM B (ft)	APPROXIMATE VOLUME (yd ³)
12	11.25° BEND	6.75	2.60	2.60	0.43	1.00	2.00	0.50
12	22.5° BEND	13.50	3.69	3.66	0.64	1.00	2.00	0.50
12	45° BEND	26.25	7.17	3.66	1.00	1.00	3.09	1.50
12	TEE & DEAD END	34.25	9.36	3.66	1.46	1.00	3.95	2.25
16	11.25° BEND	11.75	3.43	3.43	0.44	1.33	2.00	0.50
16	22.5° BEND	23.25	6.20	3.75	0.66	1.33	2.77	1.00
16	45° BEND	45.50	12.13	3.75	1.00	1.33	5.57	4.00
16	TEE & DEAD END	59.50	15.87	3.75	1.92	1.33	6.98	6.50

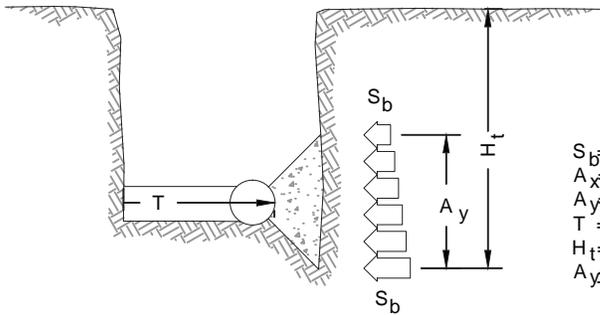
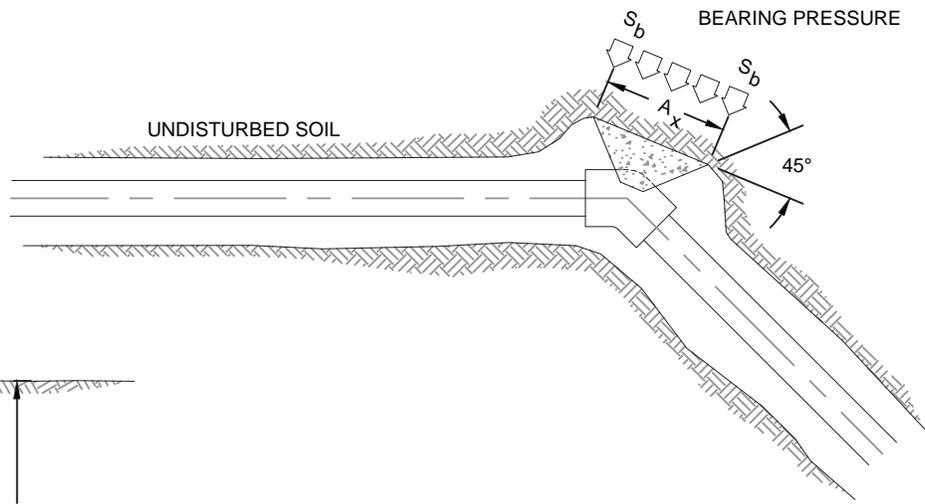
NOTES:

1. THE MINIMUM BEARING SURFACE AREAS SHOWN ARE BASED ON A MAX STATIC PIPE PRESSURE OF 170/250 POUNDS PER SQUARE INCH PLUS A SAFETY FACTOR OF 1.5 AND AN ALLOWABLE SOIL BEARING CAPACITY OF 1500 POUNDS PER SQUARE FOOT. BEARING SURFACE AREA IS ROUNDED UP TO THE NEAREST 0.25 SQUARE FEET. REFERENCE AWWA M-23 AND M-41.
2. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING ASSUMPTIONS BASED ON ACTUAL SITE CONDITIONS. IF SITE CONDITIONS VARY FROM THE ASSUMPTIONS THE DESIGN ENGINEER SHALL PROVIDE A SITE SPECIFIC DESIGN IN ACCORDANCE WITH AWWA M-23, PVC PIPE - DESIGN AND INSTALLATION AND AWWA M-41, DUCTILE-IRON PIPE AND FITTINGS. SITE SPECIFIC DESIGNS INCLUDING GEOTECHNICAL INFORMATION SHALL BE SUBMITTED TO COLORADO SPRINGS UTILITIES FOR REVIEW.
3. THE MINIMUM BEARING SURFACE AREA AND APPROXIMATE VOLUME OF CONCRETE SHALL BE SHOWN ON THE CONSTRUCTION PLANS FOR ALL CONCRETE THRUST BLOCKS. CONCRETE MIX SHALL BE PER MATERIAL CHAPTER 4.
4. THE APPROXIMATE VOLUMES SHOWN ARE BASED ON THE MINIMUM BEARING SURFACE AREA AND THE MINIMUM TRENCH DIMENSIONS. THE APPROXIMATE VOLUME IS ROUNDED UP TO THE NEAREST 0.25 CUBIC YARDS.
5. THESE CHARTS MAY ONLY BE USED IF THE BLOCK HEIGHT (A_y) IS EQUAL TO OR LESS THAN ONE HALF THE TOTAL DEPTH (H_t) FROM THE FINISHED GRADE TO THE BOTTOM OF THE BLOCK. THE MINIMUM DIMENSIONS SHOWN ARE BASED ON A PIPE DEPTH OF 5 FEET. SEE DETAIL DRAWING A4-3.
6. A SITE SPECIFIC DESIGN SHALL BE REQUIRED FOR PIPES LARGER THAN 16 INCHES OR MAX STATIC PIPE PRESSURES GREATER THAN 250 POUNDS PER SQUARE INCH. THE DESIGN ENGINEER HAS THE OPTION OF PROVIDING A SITE SPECIFIC DESIGN FOR PIPES SMALLER THAN 16 INCHES OR MAX STATIC PRESSURES LESS THAN 250 POUNDS PER SQUARE INCH.
7. ALL CALCULATIONS SHALL BE PROVIDED TO COLORADO SPRINGS UTILITIES FOR REVIEW.

CONCRETE THRUST REACTION BLOCK REQUIREMENTS FOR TEES OR TAPS



 INDICATES THAT A CONCRETE THRUST REACTION BLOCK IS REQUIRED



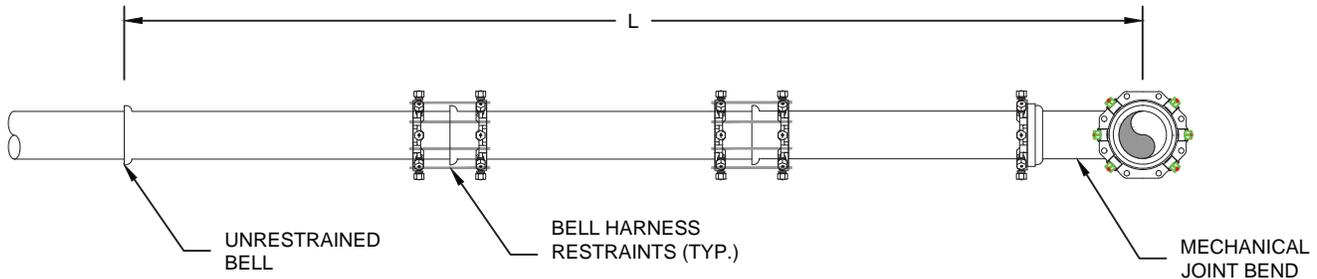
- S_b = SOIL BEARING CAPACITY
- A_x = CONCRETE THRUST REACTION BLOCK WIDTH
- A_y = CONCRETE THRUST REACTION BLOCK HEIGHT
- T = THRUST
- H_t = DEPTH TO BOTTOM OF THE CONCRETE THRUST REACTION BLOCK
- $A_y \leq 1/2 H_t$

NOTES:

1. A SITE SPECIFIC DESIGN SHALL BE REQUIRED FOR CONNECTIONS OR FITTING SIZE COMBINATIONS NOT SHOWN ABOVE.
2. THE CONCRETE THRUST REACTION BLOCK SHALL BEAR AGAINST UNDISTURBED SOIL.
3. THE CONCRETE THRUST REACTION BLOCK SHALL BE INSTALLED WITH A 45° ANGLE FROM THE FITTING TO THE UNDISTURBED SOIL AS SHOWN IN THE DRAWING ABOVE.
4. REFER TO DETAIL DRAWING **A4-2** FOR STANDARD CONCRETE THRUST REACTION BLOCK DIMENSIONS AND VOLUMES.
5. DUCTILE IRON FITTINGS AND PIPE SHALL BE WRAPPED IN POLYETHYLENE TUBING WHERE ADJACENT TO CONCRETE.

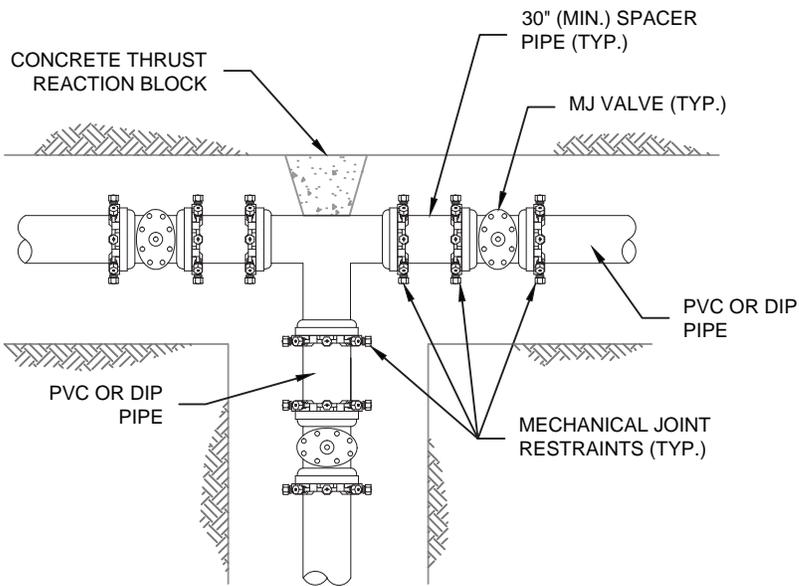
L = MINIMUM RESTRAINED PIPE LENGTH (FEET)

PIPE DIAMETER		L = MINIMUM RESTRAINED PIPE LENGTH (FEET)									DEAD END VALVE OR PLUG, TO INCLUDE IN-LINE VALVES (SEE NOTE 9)		
		45° BEND			22-1/2° BEND			11-1/4° BEND			<100	100-150	150-200
MAX. STATIC PRESSURE (PSI)		<100	100-150	150-200	<100	100-150	150-200	<100	100-150	150-200	<100	100-150	150-200
6 INCH	DUCTILE IRON AND PVC	6	9	12	3	5	6	2	3	3	49	73	97
8 INCH	DUCTILE IRON AND PVC	8	12	16	4	6	8	2	3	4	63	94	125
12 INCH	DUCTILE IRON AND PVC	12	17	23	6	8	11	3	4	6	89	133	177
16 INCH	DUCTILE IRON AND PVC	15	22	29	7	11	14	4	5	7	UUSE CONCRETE REVERSE ANCHOR	UUSE CONCRETE REVERSE ANCHOR	UUSE CONCRETE REVERSE ANCHOR
20 INCH	DUCTILE IRON AND PVC	18	26	35	9	13	17	4	6	8			
24 INCH	DUCTILE IRON AND PVC	20	30	40	10	15	20	5	7	10			
30 INCH	DUCTILE IRON AND PVC	24	36	48	12	18	24	6	9	12			
36 INCH	DUCTILE IRON AND PVC	28	42	56	14	20	27	7	10	14			

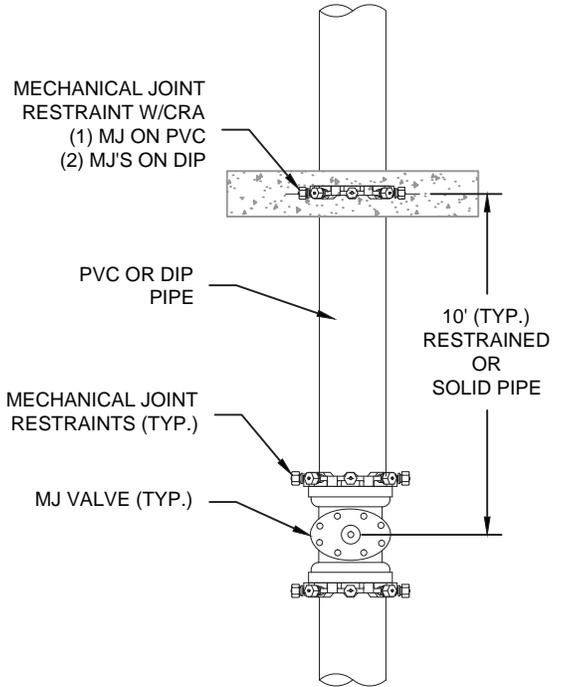


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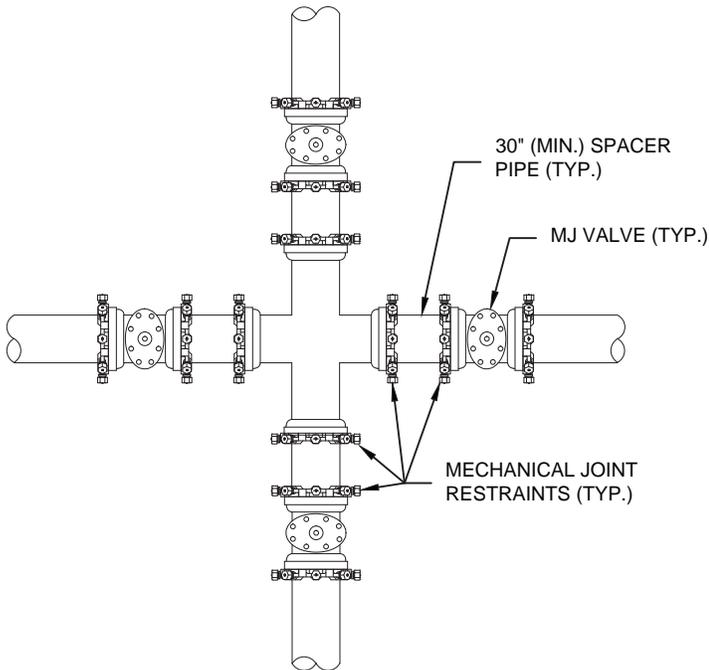
1. PRESSURE GREATER THAN 200 PSI REQUIRE SPECIAL DESIGN APPROVED BY SPRINGS UTILITIES. APPROVED BY COLORADO SPRINGS UTILITIES.
2. LENGTH IS BASED ON MINIMUM 5 FEET OF GROUND COVER AND SOIL COMPACTED ACCORDING TO CHAPTER 5 OF THESE WATER LESS. IF THE DEPTH IS LESS THAN 5 FEET RESTRAINED LENGTH MUST BE DESIGNED BY THE DESIGN ENGINEER.
3. APPROVED METHODS OF RESTRAINED PIPE BEYOND INITIAL FITTING SHALL BE IN ACCORDANCE WITH CHAPTER 4.
4. RESTRAINED PIPE LENGTH APPLIES TO CONDITIONS WHERE NO CONCRETE THRUST REACTION BLOCK IS PRESENT.
5. CALCULATIONS ARE BASED ON A POORLY GRADED SANDS, GRAVEL AND GRAVEL-SAND MIXTURE, LITTLE OR NO FINES, TYPE 4 BEDDING CONDITIONS - "PIPE BEDDED IN SAND, GRAVEL OR CRUSHED STONE TO A DEPTH OF 1/8 PIPE DIAMETER (4" MIN.)." FACTOR OF SAFETY 2:1.
6. FIGURES ARE BASED ON DIP WRAPPED IN POLYETHYLENE MATERIAL.
7. MEASUREMENTS ARE IN FEET.
8. USE CRA FOR DOWN TURNING BENDS.
9. RESTRAINED LENGTH FOR DEAD END MAY BE USED AT THE DISCRETION OF COLORADO SPRINGS UTILITIES.



TEE INSTALLATION



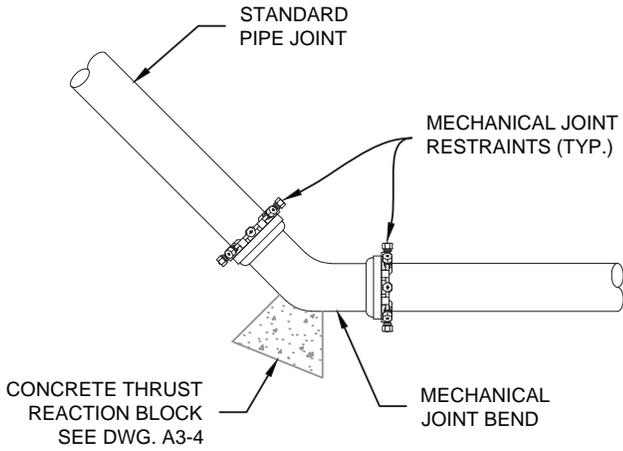
IN LINE VALVE INSTALLATION



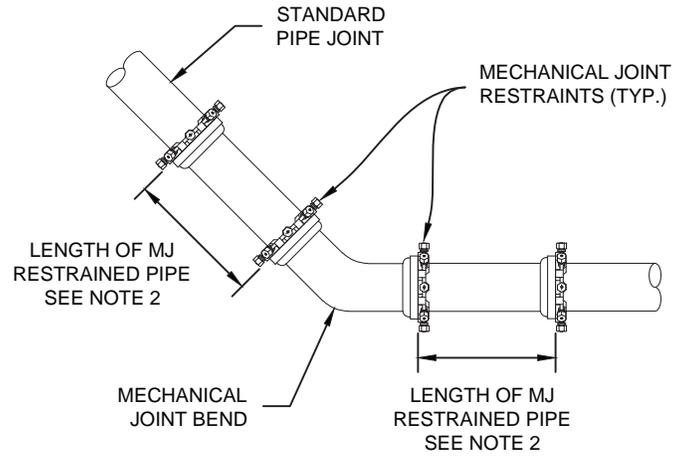
CROSS INSTALLATION

NOTES:

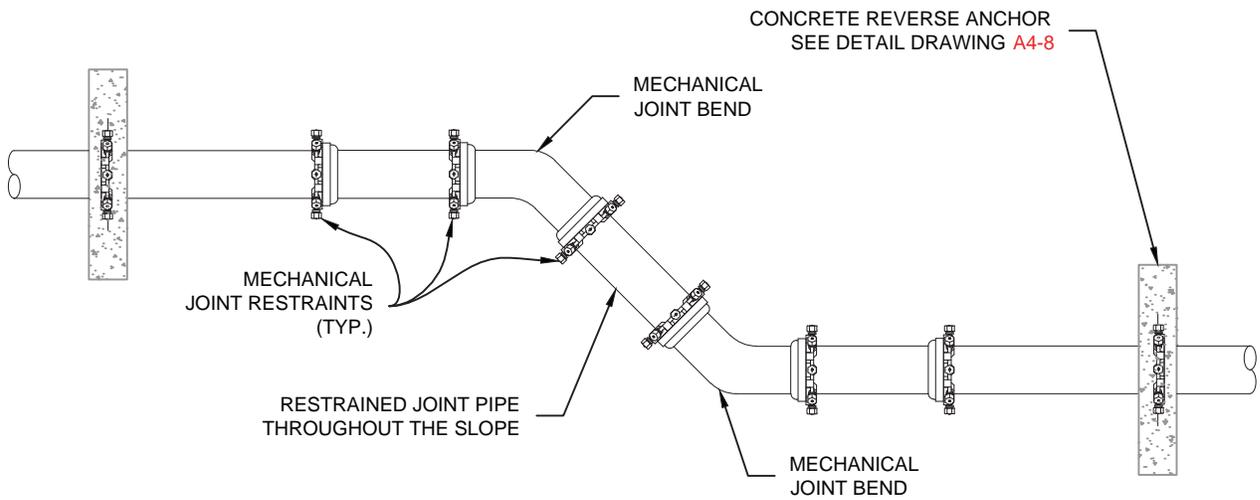
1. MECHANICAL JOINT RESTRAINTS SHALL BE APPROVED ACCORDING TO CHAPTER 4 FOR DIP AND PVC PIPE.
2. DUCTILE IRON FITTINGS AND PIPE SHALL BE WRAPPED IN POLYETHYLENE TUBING WHERE ADJACENT TO CONCRETE.



HORIZONTAL BENDS W/MJ RESTRAINTS AND CTRB



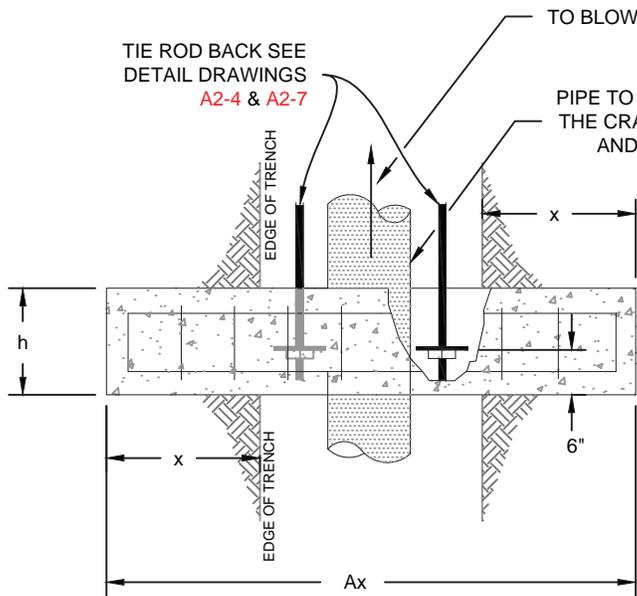
HORIZONTAL BENDS W/MJ RESTRAINTS WITHOUT CTRB



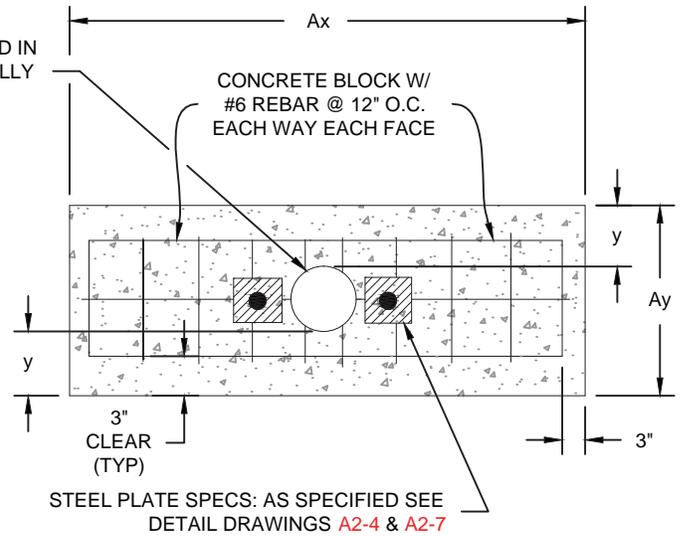
VERTICAL BENDS W/ CONCRETE REVERSE ANCHORS ON SLOPES 10% OR GREATER

NOTES:

1. MECHANICAL JOINT RESTRAINTS SHALL BE APPROVED ACCORDING TO CHAPTER 4 FOR DIP AND PVC PIPE.
2. LENGTH OF PIPE REQUIRING JOINT RESTRAINT SHALL BE DETERMINED FROM CHART ON DETAIL DRAWING A4-4.
3. DUCTILE IRON FITTINGS AND PIPE SHALL BE WRAPPED IN POLYETHYLENE TUBING WHERE ADJACENT TO CONCRETE.



PLAN
DEAD END OR
REVERSE ANCHOR

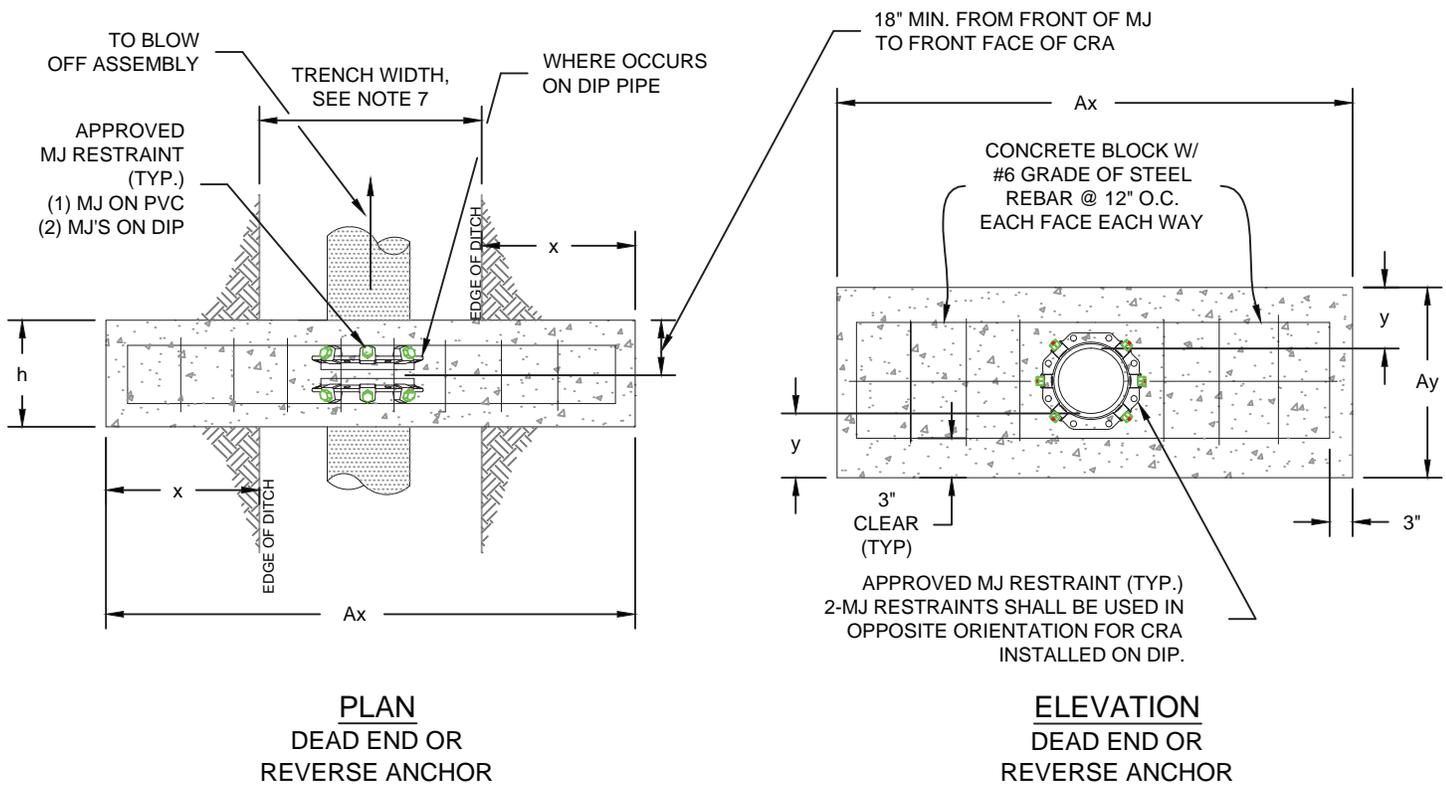


ELEVATION
DEAD END OR
REVERSE ANCHOR

DIAMETER (in)	PRESSURE (psi)	x (in)	Ax (in)	y (in)	Ay (in)	Ab (sf)	h (in)	Vol (cy)
4	250	12	72	12	28.80	6.80	18	0.5
6	250	18	84	12	30.90	9.73	18	0.75
8	250	36	120	12	33.05	18.53	18	1.0
12	170	36	120	15	43.20	24.60	18	1.5
12	250	48	144	18	49.20	36.80	24	2.0
16	170	54	156	18	53.40	44.05	24	2.5
16	250	60	168	24	65.40	60.50	36	4.0

NOTES:

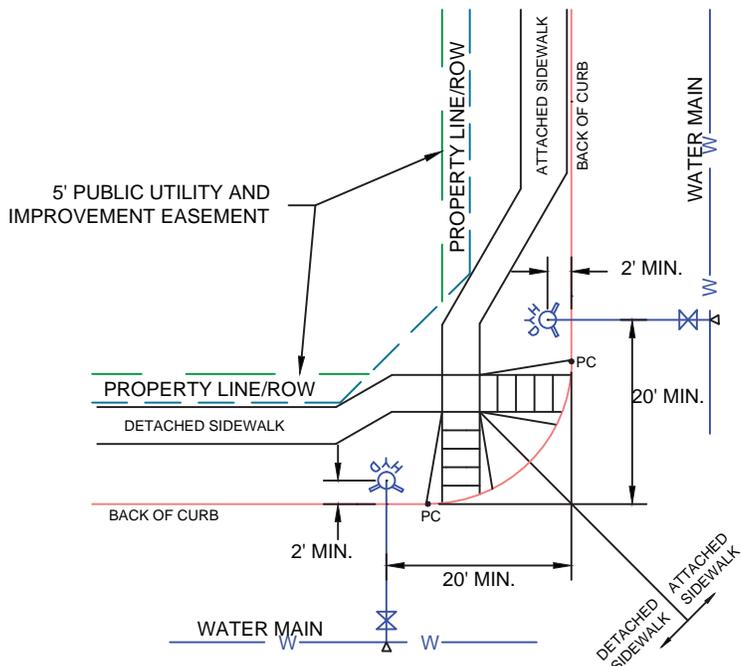
1. THE MINIMUM BEARING SURFACE AREAS SHOWN ARE BASED ON A MAX STATIC PIPE PRESSURE OF 170/250 POUNDS PER SQUARE INCH PLUS A SAFETY FACTOR OF 1.5, AND AN ALLOWABLE SOIL BEARING CAPACITY OF 1500 POUNDS PER SQUARE FOOT. REFERENCE AWWA M-23 AND M-41.
2. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING ASSUMPTION BASED ON ACTUAL SITE CONDITIONS. IF SITE CONDITIONS VARY FROM THE ASSUMPTIONS THE DESIGN ENGINEER SHALL PROVIDE A SITE SPECIFIC DESIGN IN ACCORDANCE WITH AWWA M-23, PVC PIPE - DESIGN AND INSTALLATION AND AWWA M-41, DUCTILE-IRON PIPE AND FITTINGS. SITE SPECIFIC DESIGNS INCLUDING GEOTECHNICAL INFORMATION SHALL BE SUBMITTED TO COLORADO SPRINGS UTILITIES FOR REVIEW.
3. THE MINIMUM LATERAL BEARING SURFACE AREA (Ab) AND APPROXIMATE VOLUME OF CONCRETE (Vol) SHALL BE SHOWN ON THE CONSTRUCTION PLANS FOR ALL CONCRETE REVERSE ANCHORS.
4. THE APPROXIMATE VOLUMES SHOWN ARE BASED ON THE MINIMUM DIMENSIONS IN THE TABLE. APPROXIMATE VOLUME IS ROUNDED UP TO THE NEAREST 0.25 CUBIC YARDS.
5. A SITE SPECIFIC DESIGN SHALL BE REQUIRED FOR PIPES LARGER THAN 16 INCHES OR MAX STATIC PIPE PRESSURES GREATER THAN 250 POUNDS PER SQUARE INCH. THE DESIGN ENGINEER HAS THE OPTION OF PROVIDING A SITE SPECIFIC DESIGN FOR PIPES SMALLER THAN 16 INCHES OR MAX STATIC PRESSURES LESS THAN THE PRESSURE LISTED IN THE TABLE.
6. FOR CORROSION PROTECTION OF THE RODS SEE DETAIL DRAWING A8-11.
7. A TRENCH WIDTH OF 4 FEET AND 6" BEDDING UNDER THE PIPE ARE ASSUMED FOR BEARING CALCULATIONS, (Ax, Ay, x AND y).
8. THE DESIGN ENGINEER SHALL ENSURE THE CONSTRUCTION OF THE CONCRETE REVERSE ANCHOR SHALL NOT CONFLICT WITH OTHER UTILITIES.
9. DUCTILE IRON FITTINGS AND PIPE SHALL BE WRAPPED IN POLYETHYLENE TUBING WHERE ADJACENT TO CONCRETE.



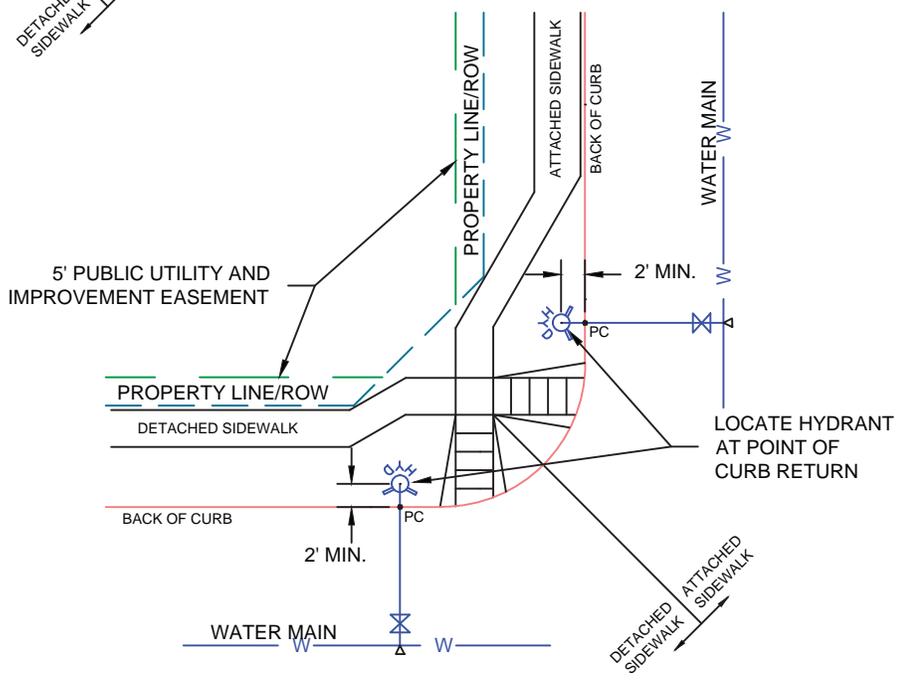
DIAMETER (in)	PRESSURE (psi)	x (in)	Ax (in)	y (in)	Ay (in)	Ab (sf)	h (in)	Vol (cy)
4	250	12	72	12	28.80	6.80	18	0.5
6	250	18	84	12	30.90	9.73	18	0.75
8	250	36	120	12	33.05	18.53	18	1.0
12	170	36	120	15	43.20	24.60	18	1.5
12	250	48	144	18	49.20	36.80	24	2.0
16	170	54	156	18	53.40	44.05	24	2.5
16	250	60	168	24	65.40	60.50	36	4.0

NOTES:

1. THE MINIMUM BEARING SURFACE AREAS SHOWN ARE BASED ON A MAX STATIC PIPE PRESSURE OF 170/250 POUNDS PER SQUARE INCH PLUS A SAFETY FACTOR OF 1.5, AND AN ALLOWABLE SOIL BEARING CAPACITY OF 1500 POUNDS PER SQUARE FOOT. FOR HDPE ADDITIONAL ASSUMPTIONS INCLUDE A MAX 50°-F TEMPERATURE CHANGE AND A POISSON RATIO OF 0.45. REFERENCE AWWA M-23, M-41 AND M-55.
2. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING ASSUMPTION BASED ON ACTUAL SITE CONDITIONS. IF SITE VARY FROM THE ASSUMPTIONS THE DESIGN ENGINEER SHALL PROVIDE A SITE SPECIFIC DESIGN THAT SHALL BE IN ACCORDANCE WITH AWWA M-23, PVC PIPE - DESIGN AND INSTALLATION AND AWWA M-41, DUCTILE-IRON PIPE AND FITTINGS. SITE SPECIFIC DESIGNS USING GEOTECHNICAL INFORMATION SHALL BE SUBMITTED TO COLORADO SPRINGS UTILITIES FOR APPROVAL.
3. THE MINIMUM LATERAL BEARING SURFACE AREA (Ab) AND APPROXIMATE VOLUME OF CONCRETE (Vol) SHALL BE SHOWN ON THE CONSTRUCTION PLANS FOR ALL CONCRETE REVERSE ANCHORS.
4. THE APPROXIMATE VOLUMES SHOWN ARE BASED ON THE MINIMUM DIMENSIONS IN THE TABLE. THE APPROXIMATE VOLUME IS ROUNDED UP TO THE NEAREST 0.25 CUBIC YARDS.
5. A SITE SPECIFIC DESIGN SHALL BE REQUIRED FOR PIPES LARGER THAN 16 INCHES OR MAX STATIC PIPE PRESSURES GREATER THAN 250 POUNDS PER SQUARE INCH. THE DESIGN ENGINEER HAS THE OPTION OF PROVIDING A SITE SPECIFIC DESIGN FOR PIPES SMALLER THAN 16 INCHES OR MAX STATIC PRESSURES LESS THAN THE PRESSURE LISTED IN THE TABLE.
6. FOR CORROSION PROTECTION OF THE RODS SEE DETAIL DRAWING **A8-11**.
7. A TRENCH WIDTH OF 4 FEET AND 6" BEDDING UNDER THE PIPE ARE ASSUMED FOR BEARING CALCULATIONS, (Ax, Ay, x AND y).
8. THE DESIGN ENGINEER SHALL ENSURE THE CONSTRUCTION OF THE CONCRETE REVERSE ANCHOR SHALL NOT CONFLICT WITH OTHER UTILITIES.
9. DUCTILE IRON FITTINGS AND PIPE SHALL BE WRAPPED IN POLYETHYLENE TUBING WHERE ADJACENT TO CONCRETE.



**STANDARD PEDESTRIAN RAMP
LAYOUT FOR CURB RETURN
RADIUS 20' OR LESS**

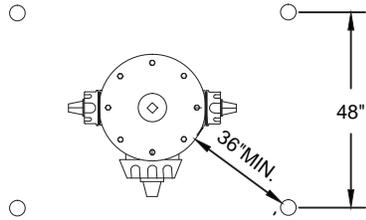


**STANDARD PEDESTRIAN RAMP
LAYOUT FOR CURB RETURN
RADIUS 25' OR GREATER**

NOTES:

1. THE FIRE HYDRANT SHALL BE LOCATED BEHIND THE POINT OF CURB RETURN FOR CURB RETURN RADIUS 25 FEET OR GREATER.
2. WHERE THE CURB RETURN RADIUS IS 20 FEET OR LESS THE CENTER OF THE HYDRANT SHALL BE LOCATED 20 FEET OFF OF THE BACK OF CURB OF THE INTERSECTING STREET.
3. IN ALL CASES THE FIRE HYDRANT SHALL BE LOCATED A MINIMUM OF 2 FEET OUTSIDE OF THE PEDESTRIAN RAMP OR SIDEWALK.
4. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER OR THE DEVELOPER'S ENGINEER TO VERIFY THAT PROPOSED HYDRANT LOCATIONS WILL NOT CONFLICT WITH ANY OTHER UTILITIES, FACILITIES, PEDESTRIAN RAMP INSTALLATIONS, DRAINAGE FACILITIES, PROPOSED PROPERTY STRUCTURES OR IMPROVEMENTS PRIOR TO BEGINNING CONSTRUCTION.

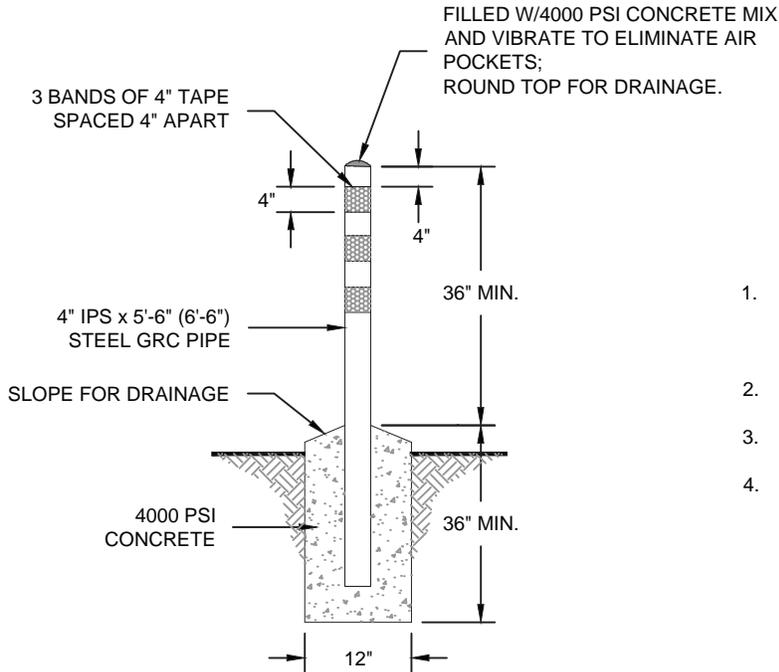




BOLLARD PLACEMENT (TOP VIEW)

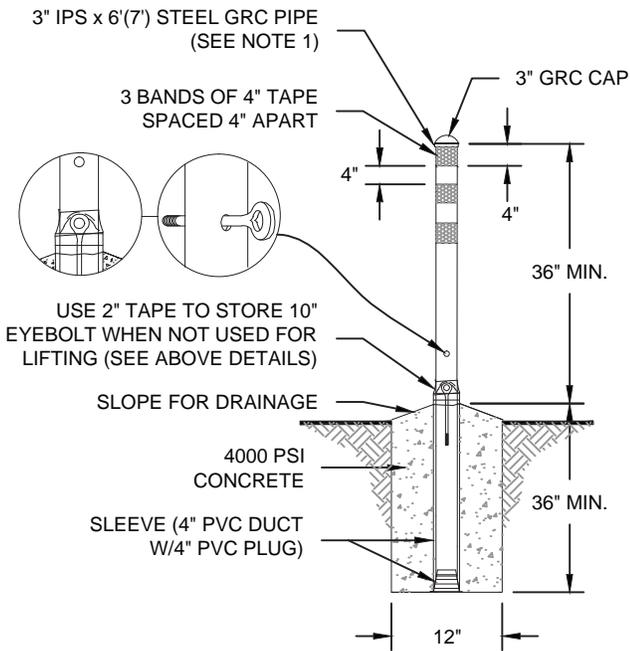
REFERENCE PROTECTION OF EQUIPMENT FROM VEHICULAR DAMAGE INFORMATION PACKET (COLORADO SPRINGS FIRE DEPARTMENT)

BOLLARDS ARE NECESSARY WHERE FIRE HYDRANTS ARE SUBJECT TO DAMAGE FROM VEHICULAR MOVEMENT.



CONCRETE FILLED POST

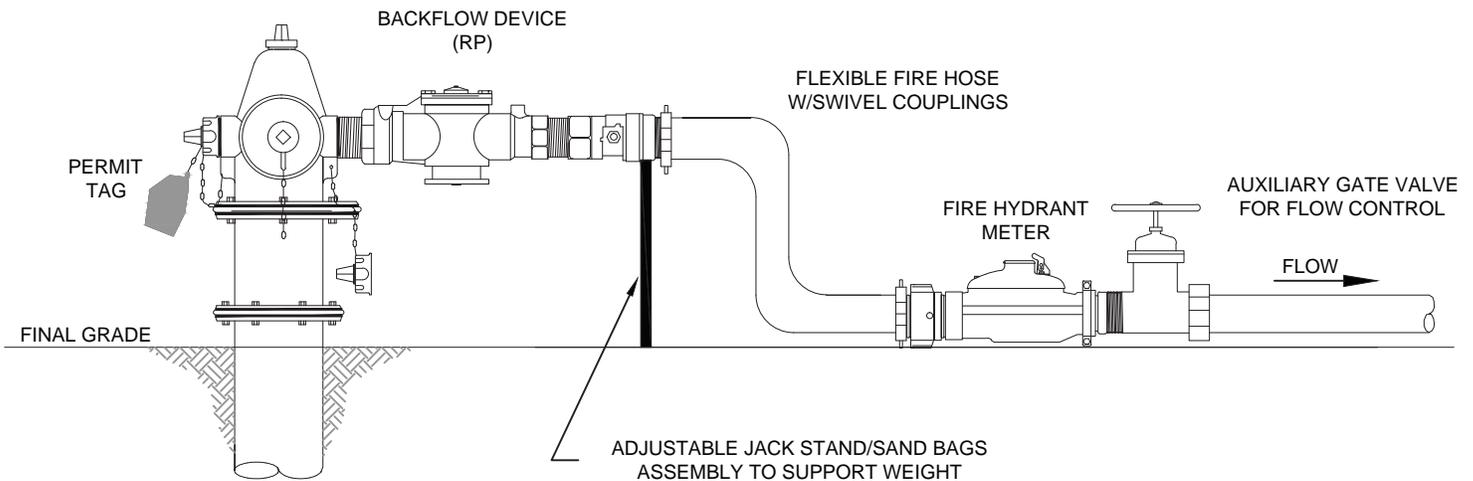
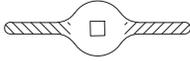
1. BARRICADE POSTS SHALL BE INSTALLED PLUMB AND LEVEL ACROSS THE TOPS FROM ONE TO ANOTHER WHEN TWO ARE USED.
2. USE 4" GRC PIPE AND PAINT WITH TWO COATS OF SILVER PAINT.
3. DIG 12" X 36" HOLE - CONDUIT TO BE CENTERED IN HOLE.
4. CONCRETE FOR ANCHORING POSTS SHALL BE 4000PSI MIX #2, APPROXIMATELY 8.3 CU.FT./POLE



REMOVABLE CAPPED - PIPE POST (WITH APPROVAL OF CSFD)

1. POST, REMOVABLE, AND ASSEMBLE WITH SCRAP 4" PVC DUCT SLEEVE, 10" X 1/2" EYEBOLT, 4" PVC PIPE PLUG, 2" BLACK TAPE AND 4" ORANGE REFLECTIVE TAPE AS SHOWN.
2. USE BANDS OF REFLECTIVE TAPE ON TOP OF POSTS TO WARN MOTORISTS, CYCLISTS, ETC. THE FIRST BAND SHOULD BE NO LOWER THAN 4" FROM THE TOP OF THE POST.
3. INTERMEDIATE POSTS ACROSS AT LEAST ONE SIDE (PREFERABLY THE FRONT) OF THE APPARATUS SHALL BE OF THE REMOVABLE TYPE; ALL OTHERS CAN BE PERMANENT.

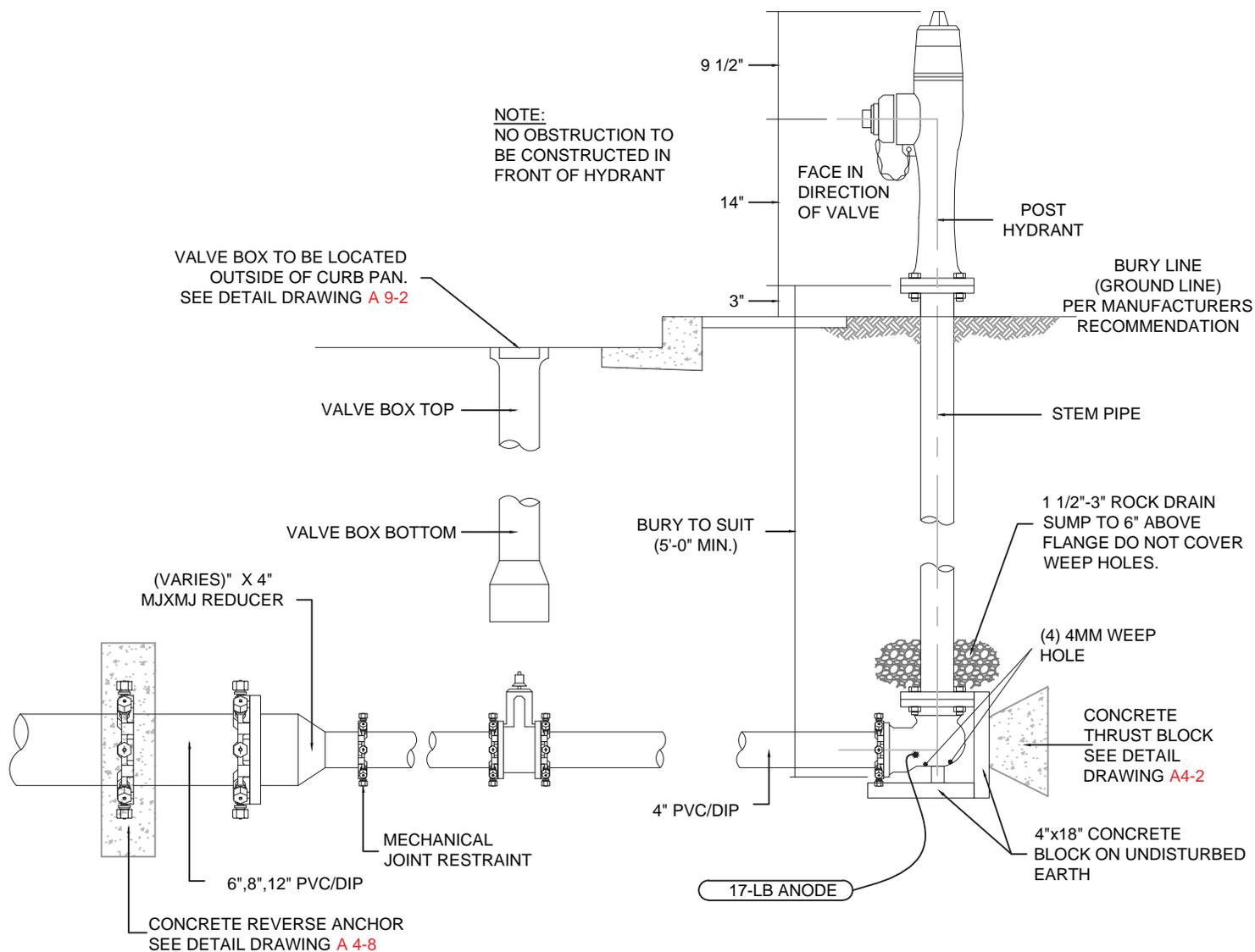
TAPERED SQUARE NUT WRENCH



ASSEMBLY SEQUENCE

NOTES:

1. FLUSH HYDRANT BEFORE CONNECTING BACKFLOW AND METER CONFIGURATION WITH STAND.
2. HYDRANTS SHALL BE FULLY OPENED WHEN IN USE; DO NOT THROTTLE HYDRANT FLOW WITH THE HYDRANT STEM VALVE. FLOW SHALL BE CONTROLLED WITH THE OUTLET GATE VALVE ONLY. WHERE BALL VALVES ARE PROVIDED FOR ISOLATION AND TESTING OF THE RP, THE HANDLE SHALL BE REMOVED FROM THE VALVES. THESE VALVES ARE ONLY TO BE USED IN SERVICING AND TESTING RP AND SHALL NOT BE USED TO CONTROL HYDRANT FLOWS AND SHALL BE IN THE FULL OPEN POSITION AT ALL TIMES DURING HYDRANT FLOWS.
3. USE OF HYDRANT REQUIRES A PERMIT, AND ADHERENCE TO ALL TERMS AND CONDITIONS OF THE PERMIT AND ASSOCIATED REQUIREMENTS. CONTACT SPRINGS UTILITIES CONTRACT ADMINISTRATION AT (719) 668-8111.
4. SEE REFERENCE HYDRANT USE PERMIT IN CONSTRUCTION SECTION 5.7.
5. USE OF A HYDRANT WITHOUT A BACKFLOW PREVENTION DEVICE IS IN VIOLATION OF THE COLORADO SPRINGS WATER CODE FOR CROSS CONNECTION CONTROL (CITY CODE 12.4.1203) ALL HYDRANT CONNECTIONS REQUIRE A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER (RP) TYPE PER COLORADO PRIMARY DRINKING WATER REGULATION. KEEP THE RP CENTER DISCHARGE OUTLET AT LEAST 12 INCHES ABOVE GRADE.
6. NO HOSE SHALL BE CONNECTED BETWEEN THE HYDRANT AND BACKFLOW DEVICE.
7. CONTRACTOR SHALL USE A HYDRANT WRENCH WITH TAPERED SQUARE BOX DESIGNED SPECIFICALLY FOR COLORADO SPRINGS UTILITIES FIRE HYDRANTS TO OPERATE THE FIRE HYDRANT. NO OTHER TYPE OF WRENCH SHALL BE USED.
8. PERMITS WILL NOT BE ISSUED FOR FIRE HYDRANTS WITH WATER PRESSURE GREATER THAN 120 PSI.



NOTE:

1. TRACER WIRE AND 17lb ANODE TO BE INSTALLED WITH EACH POST HYDRANT.
2. WHEN LATERAL IS GREATER THAN ONE PIPE LENGTH A RESTRAINING COUPLING IS REQUIRED AT EACH JOINT.
3. MAINTAIN 5' MIN. CLEARANCE AROUND POST HYDRANT FROM ABOVE GROUND STRUCTURE/VAULTS.
4. REFERENCE DETAIL DRAWING **A5-1** FOR POST HYDRANT LOCATION.

PRESSURE RELIEF MAIN LINE SHALL BE MADE UP OF 2" GALVANIZED STEEL FITTINGS WITH A 2" RELIEF VALVE.

VAULT SIZE PER DETAIL DRAWINGS
A6-4, A6-5 AND A6-6

CONCRETE REVERSE ANCHOR. SEE DETAIL DRAWING A4-8 (TYP)

4" MJ PLUG W/2" TAP EACH TEE.

8"x4" MJ TEE

FLOW →

DIP

DIP

8" DIP, STEEL OR PVC

8" DIP SPACER PIPE

8" MJ GATE VALVE

7'-0" MAX

MECHANICAL JOINT RESTRAINT

12" DIAMETER X 6" DEEP SUMP LOCATED AT LOWEST POINT IN FLOOR

36" NOMINAL DIAMETER RING AND COVER

LADDER RUNGS AT 12" O.C. CAST IN VAULT WITH FIRST RUNG 3" BELOW TOP OF PIT ROOF SLAB

PLAN

4" MANHOLE VENT (COATED STEEL) SEE DETAIL DRAWING A6-1 FOR VENT REQUIREMENTS

SERVICE SADDLE WITH 3/4" BALL VALVE BOTH SIDES

36" NOMINAL DIAMETER RING AND COVER. SET TOP LEVEL WITH PAVEMENT, (1" ABOVE GROUND WHEN OUT OF PAVEMENT).

ADD RISERS WHERE NECESSARY TO MEET FINAL GRADE. A CONCRETE RISER SHALL BE FORMED ON THE ROOF OF THE PIT TO MATCH THE SLOPE OF THE STREET SURFACE, SEE DETAIL "A", DRAWING A6-4. INSTALL SAFETY POST.

FINAL GRADE

17-LB ANODE

COAT EXTERIOR WITH ASPHALT DAMP PROOFING

INSTALL "CONSEAL" WATERTIGHT SEALANT

FELT PAD

SUMP

17-LB ANODE

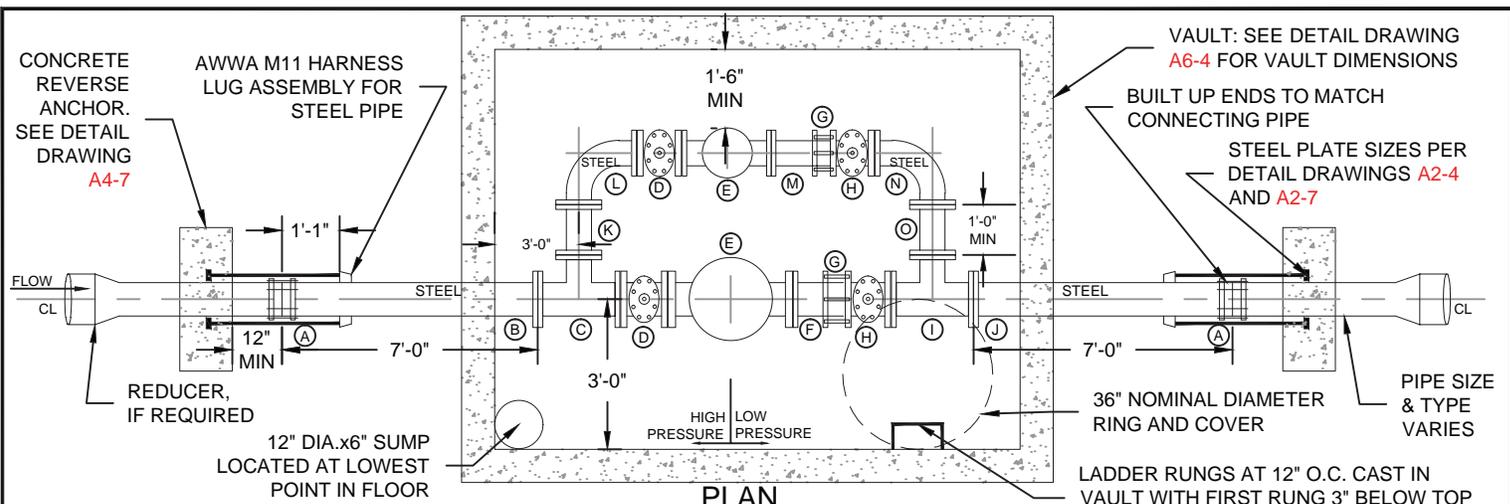
DESIGN ARCH TO MEET INDIVIDUAL CONDITIONS WITH POLYETHYLENE BOND BREAKER BOTH ENDS. GROUT FULL W/PROTLAND CEMENT AND NON SHRINK GROUT. SEAL AS NECESSARY FOR WATER TIGHT CONNECTION.

ELEVATION

4"x18"x18" (MIN) CONCRETE BLOCKS OR ADJUSTABLE JACK STANDS

NOTES:

1. MECHANICAL JOINT RESTRAINTS OR FLANGES SHALL BE USED BETWEEN TEES AND VALVES.
2. CONTRACTOR SHALL DETERMINE DIMENSIONS OF ALL 2" MATERIALS FOR PROPER INSTALLATION.
3. CONCRETE VAULTS SHALL MEET ALL CRITERIA AS OUTLINED ON DETAIL DRAWINGS A6-4, A6-5 AND A6-6.
4. ALL MATERIAL INSIDE VAULT SUPPLIED BY CONTRACTOR AND REIMBURSED BY COLORADO SPRINGS UTILITIES. SEE CHAPTER 2.
5. PIPE SIZES AND MATERIALS TO BE BASED ON HYDRAULIC MODELING FOR PIPES LARGER THAN 8 INCH.
6. MAIN LINE VALVE IS NORMALLY CLOSED IN ALL APPLICATIONS.
7. PIPE SHALL BE RESTRAINED BETWEEN THE CRA AND THE VAULT.
8. ALL CONCRETE VAULTS SHALL BE DESIGNED FOR HS-20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD.

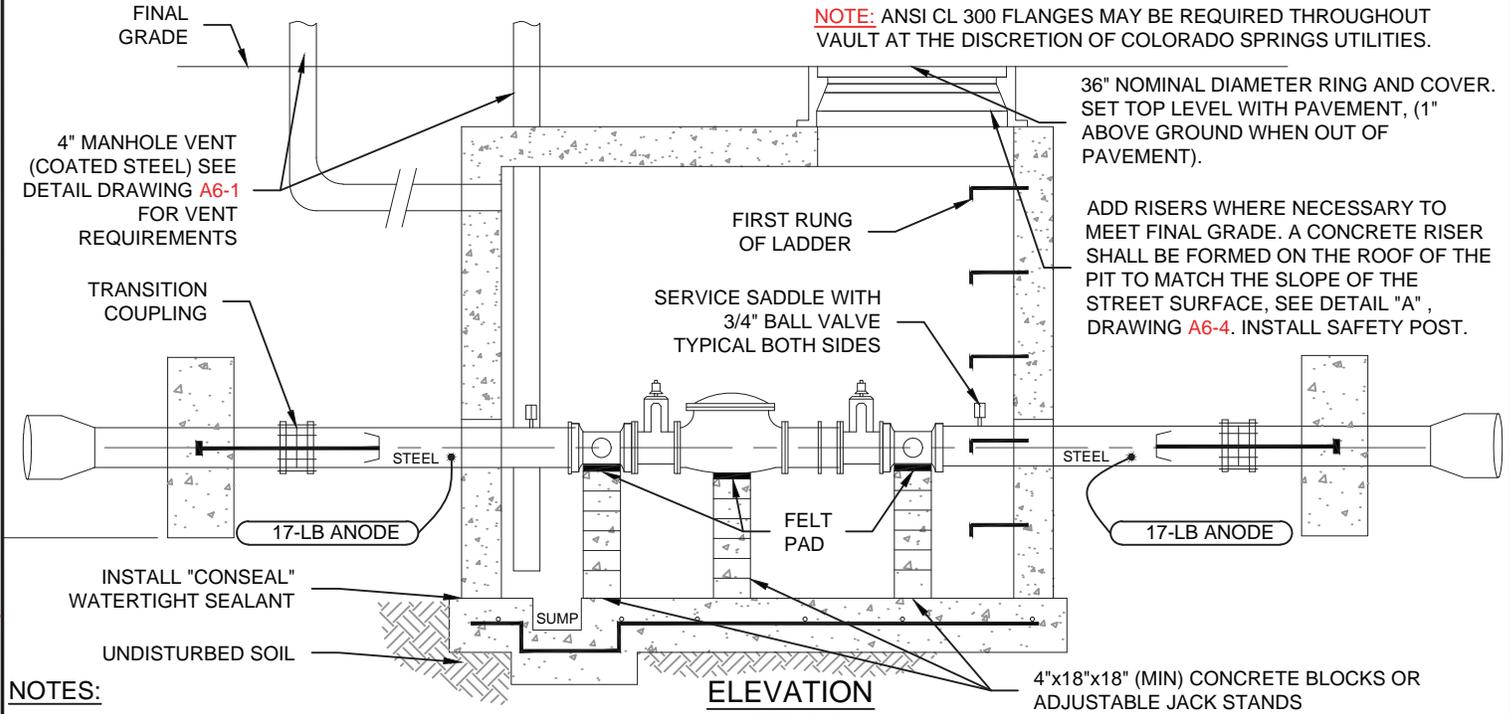


PRV MATERIALS:

- A - DRESSER COUPLINGS
- B - FLANGE (ANSI CL 300) x SPIGOT STEEL FITTING (7'-0" STEEL TAILPIECE)
- C - FLANGE x FLANGE (ANSI CL 300) STEEL TEE
- D - 250 VALVE BODY GATE VALVE W / ANSI CL 300 FLANGES
- E - CLASS 300 VALVE BODY, DI, CLA-VAL REGULATORS
- F - FLANGE (ANSI CL 300) x SPIGOT STEEL FITTING
- G - RESTRAINED FLANGE ADAPTOR
- H - 250 VALVE BODY GATE VALVE W / ANSI CL 150 FLANGES

PRV MATERIALS:

- I- FLANGE x FLANGE (ANSI CL 150) STEEL TEE
- J- FLANGE (ANSI CL 150) x SPIGOT STEEL FITTING (7'-0" TAILPIECE)
- K- FLANGE x FLANGE (ANSI CL 300) STEEL SPOOL PIECE
- L- FLANGE x FLANGE (ANSI CL 300) STEEL 90° ELBOW
- M- FLANGE (ANSI CL 300) x SPIGOT STEEL FITTING
- N- FLANGE x FLANGE (ANSI CL 150) STEEL 90° ELBOW
- O- FLANGE x FLANGE (ANSI CL 150) STEEL SPOOL PIECE



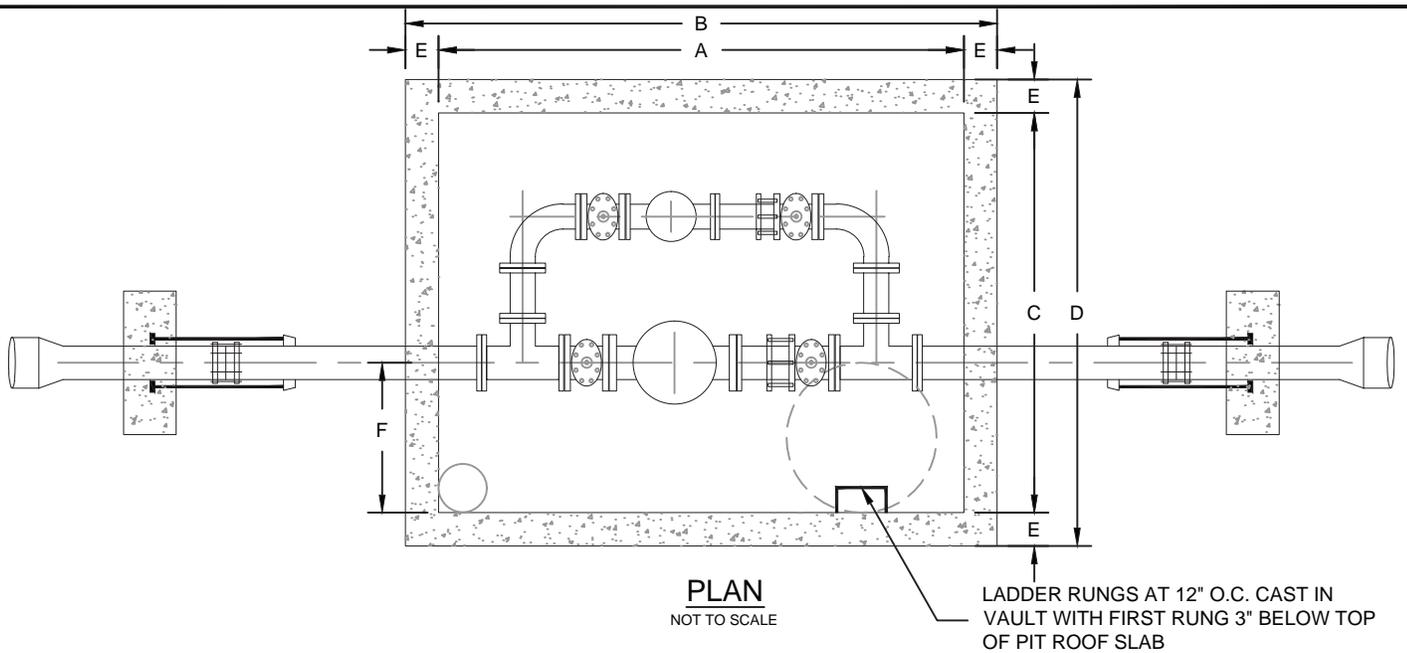
NOTES:

1. ALL GATE VALVES SHALL BE 250 PSI, TESTED TO AWWA C509/C515 WITH FLANGED ENDS TO ASME/ANSI B16.1.
2. ALL PRESSURE REGULATORS SHALL BE CLA-VAL (ASTM A536) WITH ASME/ANSI B16.42/B16.5, CL 300 FLANGES.
3. ALL STEEL PIPE DIMENSIONS SHALL COMPLY WITH ANSI/AWWA C208-07.
4. ALL STEEL PIPE FLANGE DIMENSIONS FOR OUTSIDE AND INSIDE DIAMETER OF FLANGE, BOLT CIRCLE PATTERN, NUMBER OF BOLTS AND DIAMETER OF BOLT HOLES SHALL COMPLY WITH ANSI B16.42 / B16.5, CL 150 OR CL 300. ALL STEEL PIPE FLANGE THICKNESS SHALL COMPLY WITH ANSI/AWWA C207-07, CLASS E.
5. JOINT HARNESS TIE BOLTS AND LUGS SHALL CONFORM TO AWWA M11 FOR STEEL PIPE.
6. REFER TO DETAIL DRAWINGS A6-4, A6-5 AND A6-6 FOR VAULT DIMENSIONS AND DETAILS.
6. A SITE SPECIFIC DESIGN SHALL BE REQUIRED FOR ALL PRESSURE REGULATOR STATIONS WITH PRESSURE REGULATORS LARGER THAN 12 INCH.
7. ALL MATERIALS SHALL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR. INTERNAL COMPONENTS MAY BE REIMBURSED BY COLORADO SPRINGS UTILITIES. SEE CHAPTER 2.
8. ALL CONCRETE VAULTS SHALL BE DESIGNED FOR HS-20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD.

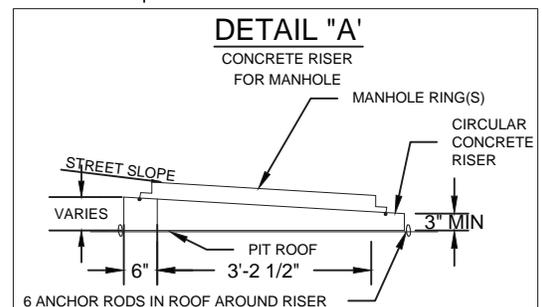
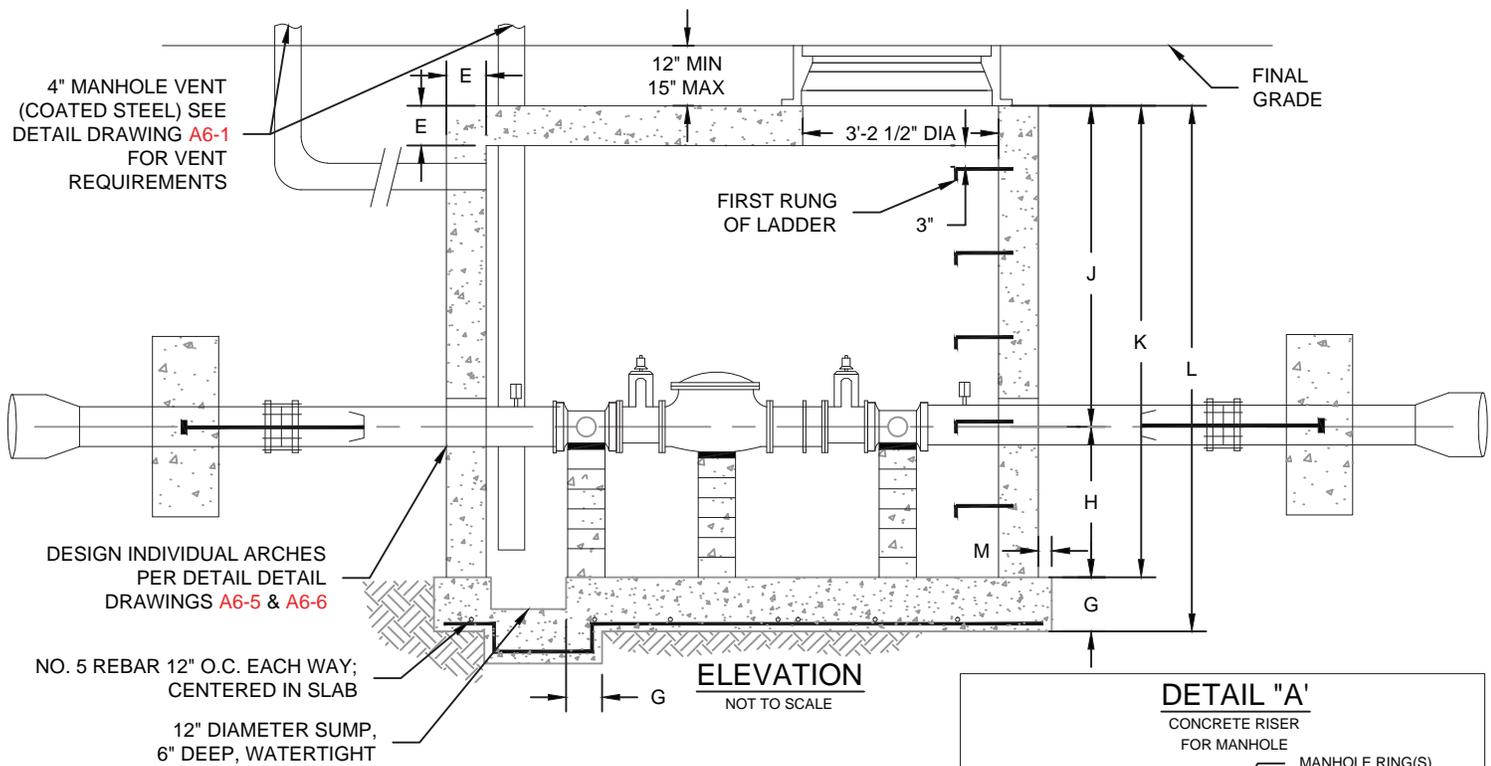


PRESSURE REGULATOR STATIONS
6", 8" & 12"
COMPONENT CONFIGURATION & MATERIALS

A6-3
DATED 03/2014



	PRV VAULT SIZE	A	B	C	D	E	F	G	H	J	K	L	M
MAIN SIZE	6" & 8"	12'-6"	13'-10"	8'-0"	9'-4"	0'-8"	3'-0"	0'-10"	2'-8"	4'-2"	6'-10"	7'-8"	0'-4"
MAIN SIZE	12"	14'-8"	16'-0"	9'-0"	10'-4"	0'-8"	3'-0"	0'-10"	2'-8"	4'-2"	6'-10"	7'-8"	0'-4"



NOTES:

1. ALL CONCRETE VAULTS SHALL BE DESIGNED FOR HS-20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD WITH A CAST IN PLACE FOUNDATION AS SHOWN.



PRESSURE REGULATOR STATIONS
6", 8" & 12"
VAULT DIMENSIONS

A6-4

DATED 03/2014

LIFT ANCHORS:
MEADOWBURKE CX-41x1-1/4"
DIAMETER COIL LIFTING
INSERT W/PR22 LOCATOR
PLUG, (4) REQUIRED, (1) EACH
SIDE CENTERED W/15" MIN.
EDGE DISTANCE (TYP)

36" NOMINAL DIAMETER RING AND COVER.
SET TOP LEVEL WITH PAVEMENT, (1"
ABOVE GROUND WHEN OUT OF
PAVEMENT).

ADD RISERS AS NECESSARY TO MEET
FINAL GRADE, SEE DETAIL DRAWING
A6-4. WHERE DETERMINED NECESSARY, A
CONCRETE RISER SHALL BE FORMED ON
THE ROOF OF THE PIT TO MATCH THE
SLOPE OF THE STREET SURFACE. THE
RISER SHALL BE A CIRCULAR RING OF 6
INCHES THICK AND A MINIMUM OF 3 INCHES
HIGH. INSTALL SAFETY POST.

VAULT FOUNDATION
PER DETAIL
DRAWING A6-4.

GROUT FULL W/PORTLAND
CEMENT, NON-SHRINK GROUT,
SEAL AS NECESSARY FOR
WATERTIGHT CONNECTION.

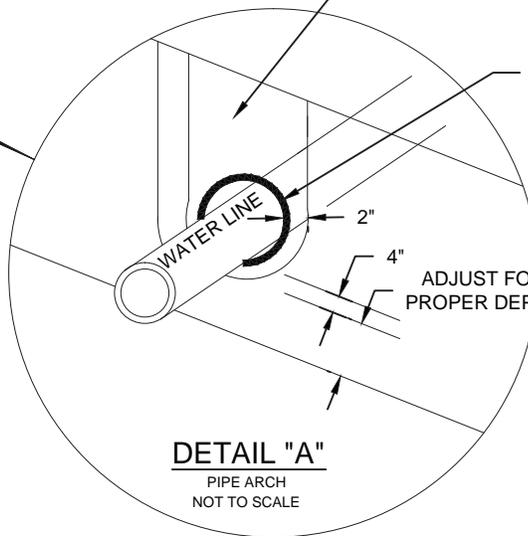
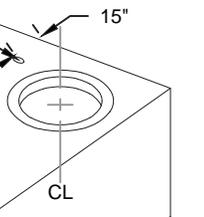
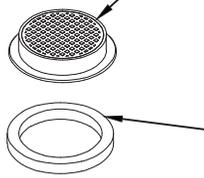
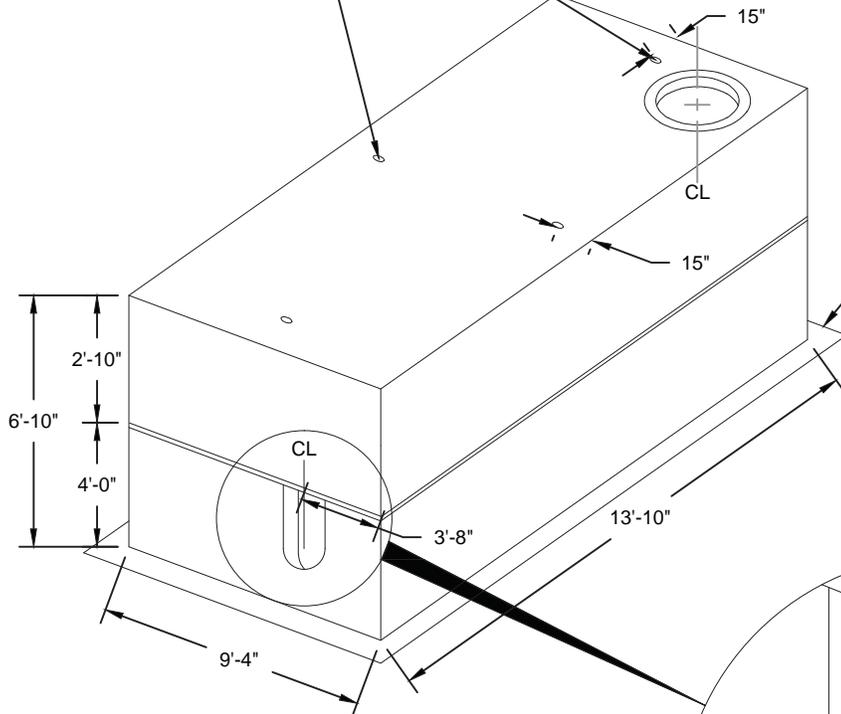
POLYETHYLENE
BOND BREAKER

ADJUST FOR
PROPER DEPTH

DETAIL "A"

PIPE ARCH
NOT TO SCALE

ISOMETRIC VIEW OF 6"/8" REGULATOR VAULT



NOTES:

1. ALL CONCRETE WORK SHALL COMPLY WITH COLORADO SPRINGS UTILITIES STANDARD SPECIFICATIONS AND THE LATEST ACI-318 CODE.
2. ALL CONCRETE VAULTS SHALL BE DESIGNED FOR HS 20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD.
3. VAULTS FOR PRESSURE REGULATOR STATIONS LARGER THAN 12 INCH WILL BE SPECIFICALLY DESIGNED BY THE ENGINEER AND APPROVED BY COLORADO SPRINGS UTILITIES.
4. SHOP DETAIL DRAWINGS FOR ALL VAULTS ARE REQUIRED AND WILL BE APPROVED BY COLORADO SPRINGS UTILITIES.
5. SEE DETAIL DRAWING A6-4 FOR VAULT DETAILS.

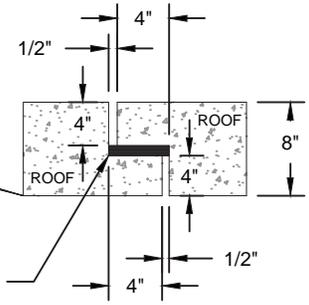
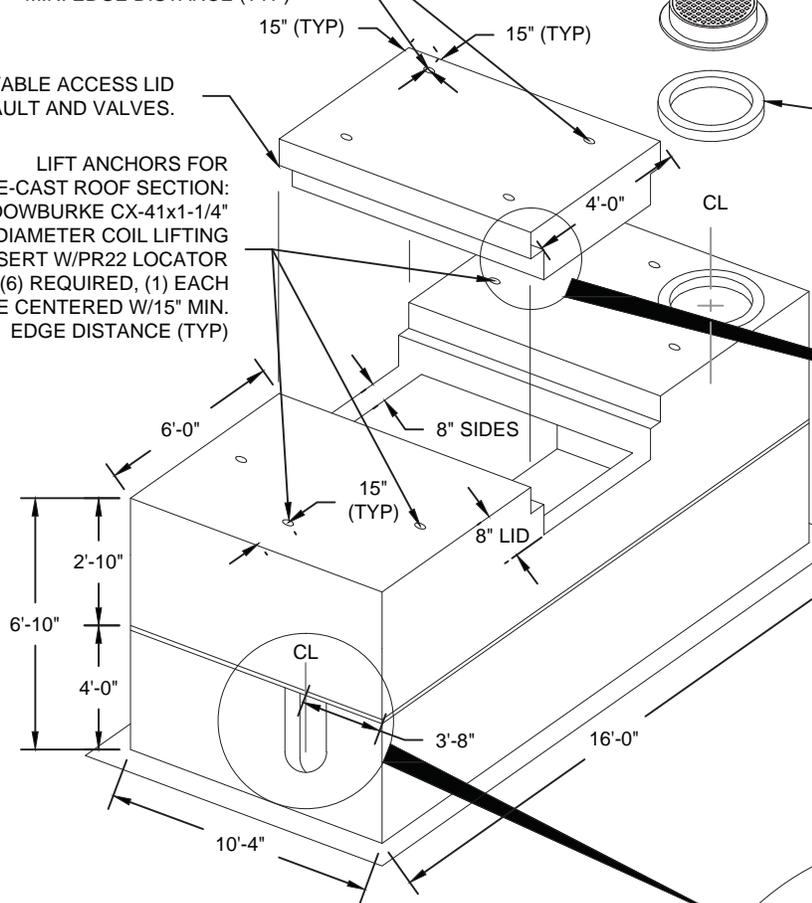
LIFT ANCHORS FOR REMOVABLE SLAB: MEADOWBURKE CX-41x1-1/4" DIAMETER COIL LIFTING INSERT W/PR22 LOCATOR PLUG, (4) REQUIRED, (1) EACH CORNER W/15" MIN. EDGE DISTANCE (TYP)

36" NOMINAL DIAMETER RING AND COVER. SET TOP LEVEL WITH PAVEMENT, (1" ABOVE GROUND WHEN OUT OF PAVEMENT).

REMOVABLE ACCESS LID TO VAULT AND VALVES.

ADD RISERS AS NECESSARY TO MEET FINAL GRADE, SEE DETAIL DRAWING A6-4. WHERE DETERMINED NECESSARY, A CONCRETE RISER SHALL BE FORMED ON THE ROOF OF THE PIT TO MATCH THE SLOPE OF THE STREET SURFACE. THE RISER SHALL BE A CIRCULAR RING OF 6 INCHES THICK AND A MINIMUM OF 3 INCHES HIGH. INSTALL SAFETY POST.

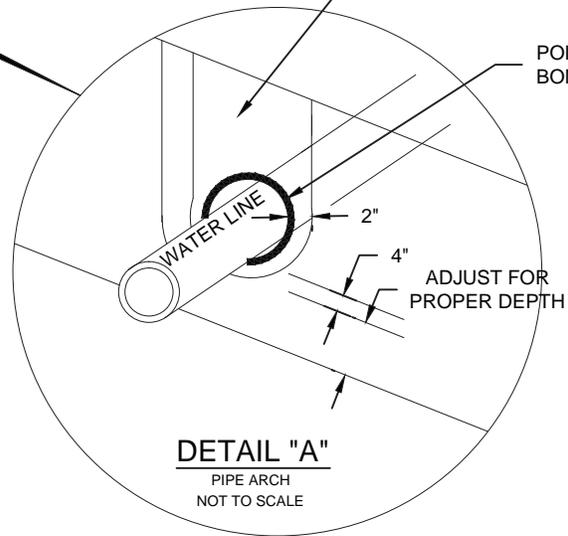
LIFT ANCHORS FOR PRE-CAST ROOF SECTION: MEADOWBURKE CX-41x1-1/4" DIAMETER COIL LIFTING INSERT W/PR22 LOCATOR PLUG, (6) REQUIRED, (1) EACH SIDE CENTERED W/15" MIN. EDGE DISTANCE (TYP)



3/16" NEOPRENE
VAULT FOUNDATION PER DETAIL DRAWING A6-4.

DETAIL 'B'

GROUT FULL W/PORTLAND CEMENT, NON-SHRINK GROUT, SEAL AS NECESSARY FOR WATERTIGHT CONNECTION.



DETAIL "A"
PIPE ARCH
NOT TO SCALE

ISOMETRIC VIEW OF 12" REGULATOR VAULT

NOTES:

1. ALL CONCRETE WORK SHALL COMPLY WITH COLORADO SPRINGS UTILITIES STANDARD SPECIFICATIONS AND THE LATEST ACI-318 CODE.
2. ALL CONCRETE VAULTS SHALL BE DESIGNED FOR HS 20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD.
3. VAULTS FOR PRESSURE REGULATOR STATIONS LARGER THAN 12 INCH WILL BE SPECIFICALLY DESIGNED BY THE ENGINEER AND APPROVED BY COLORADO SPRINGS UTILITIES.
4. SHOP DETAIL DRAWINGS FOR ALL VAULTS ARE REQUIRED AND WILL BE APPROVED BY COLORADO SPRINGS UTILITIES.
5. SEE DETAIL DRAWING A6-4 FOR VAULT DETAILS.



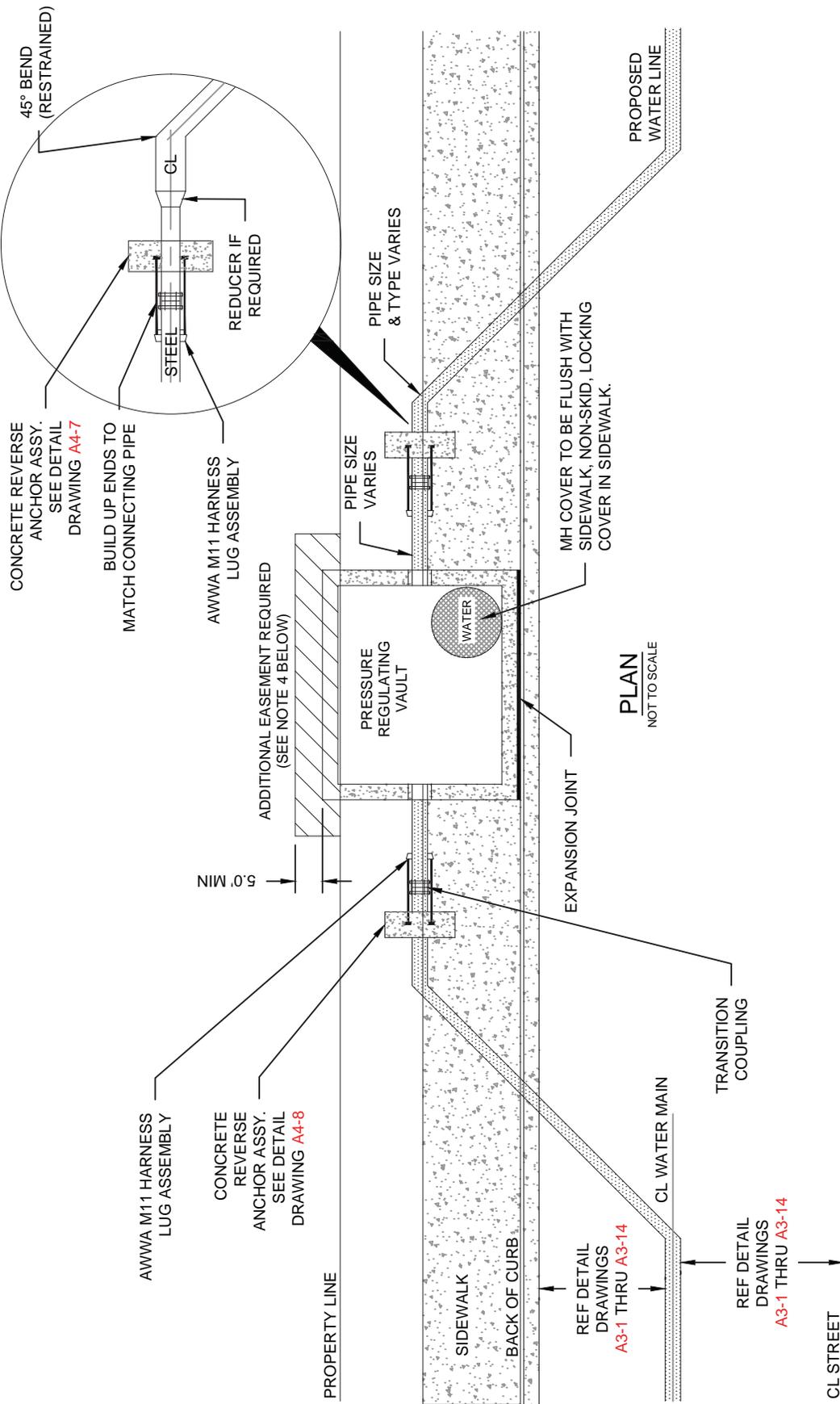
**12" PRESSURE REGULATOR STATION
PRE-CAST VAULT DETAIL**

A6-6

DATED 03/2014

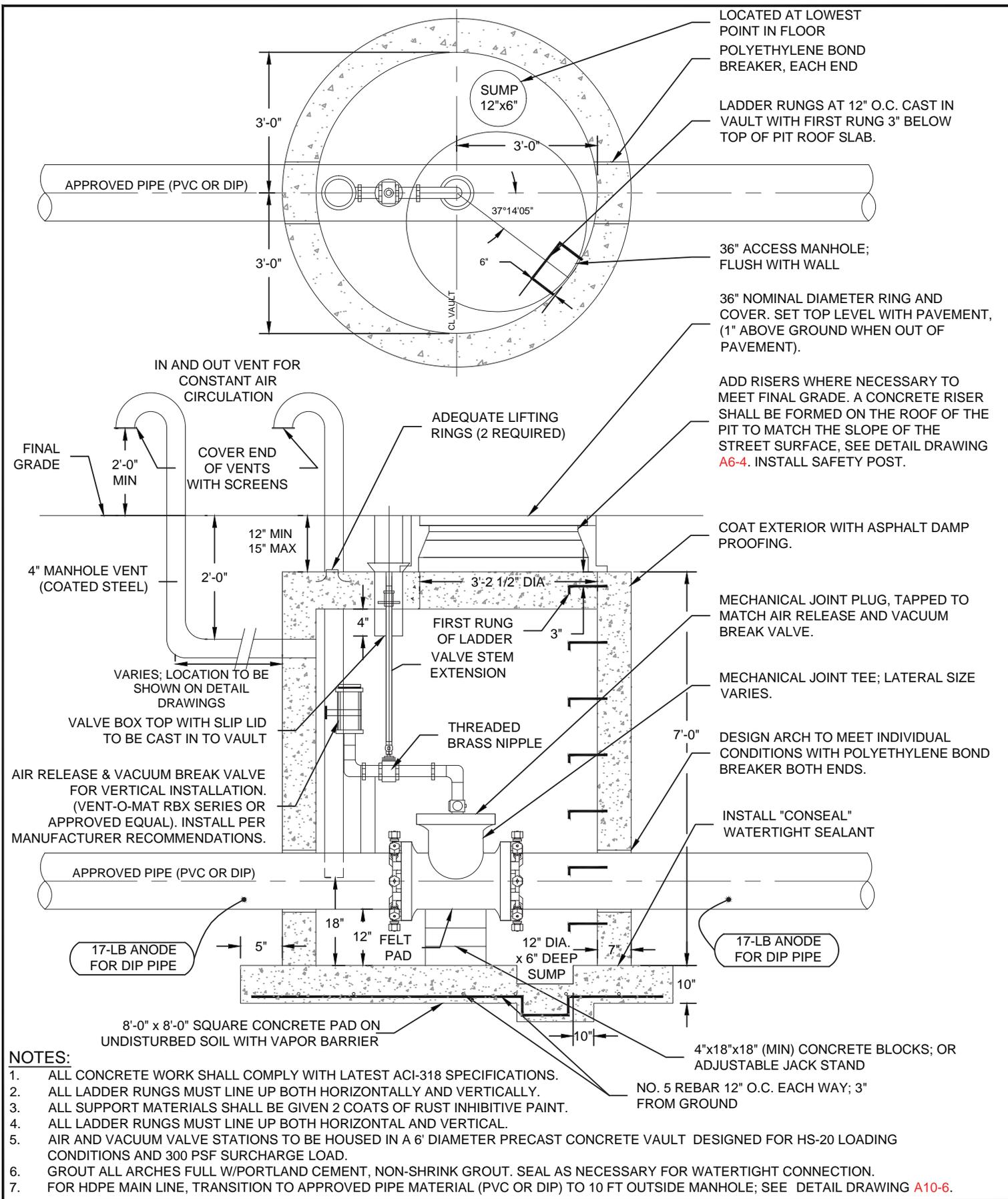
DETAIL UNDER DESIGN

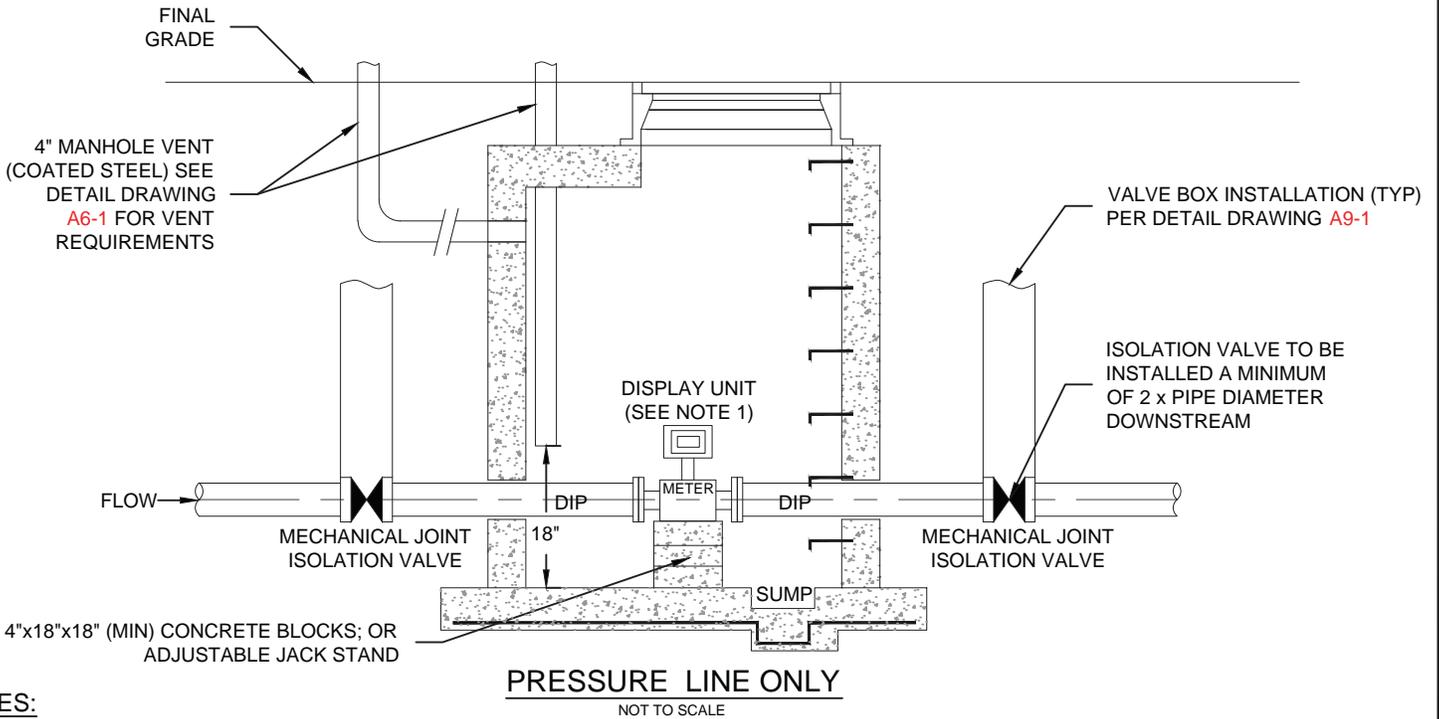
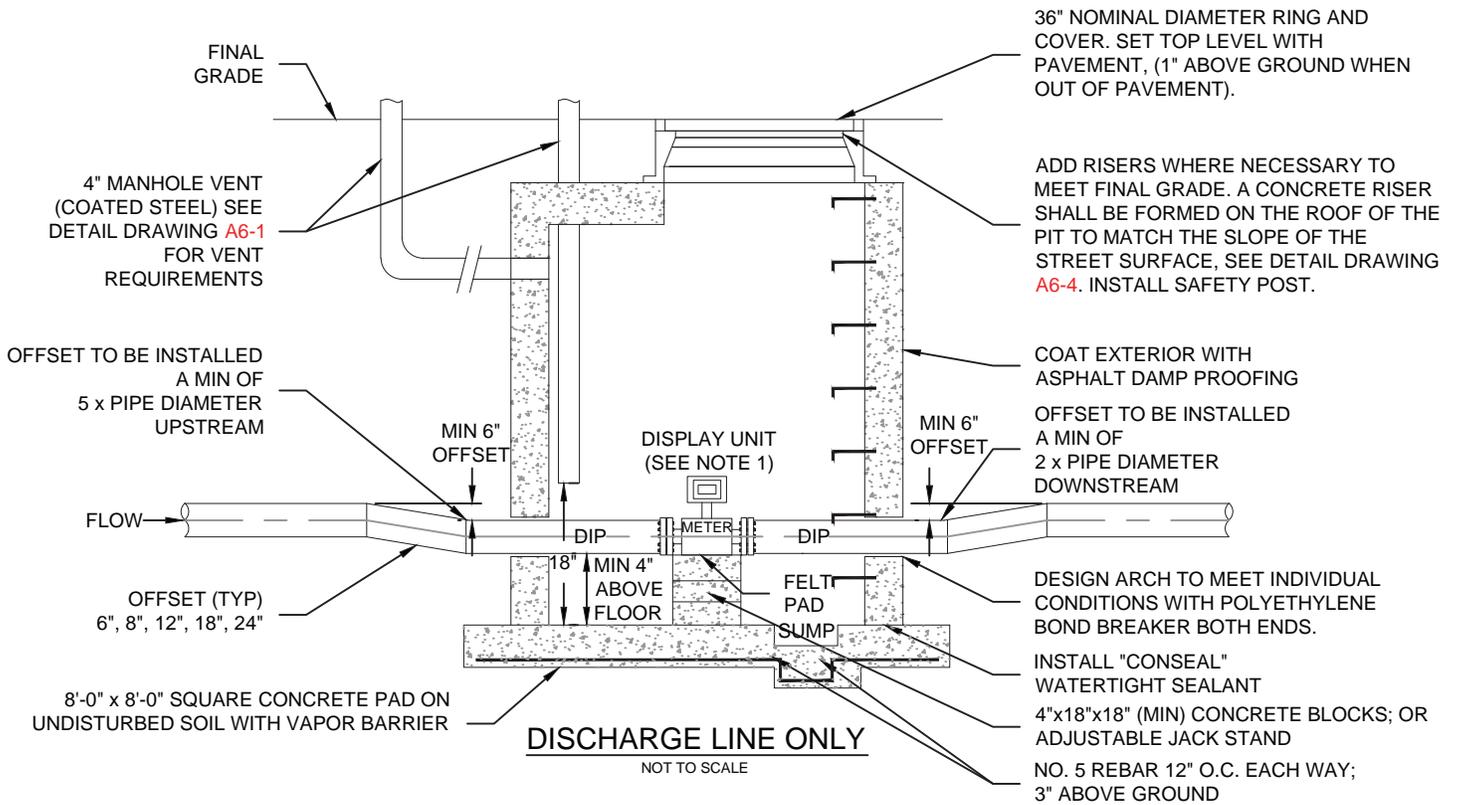
DETAIL UNDER DESIGN



NOTES:

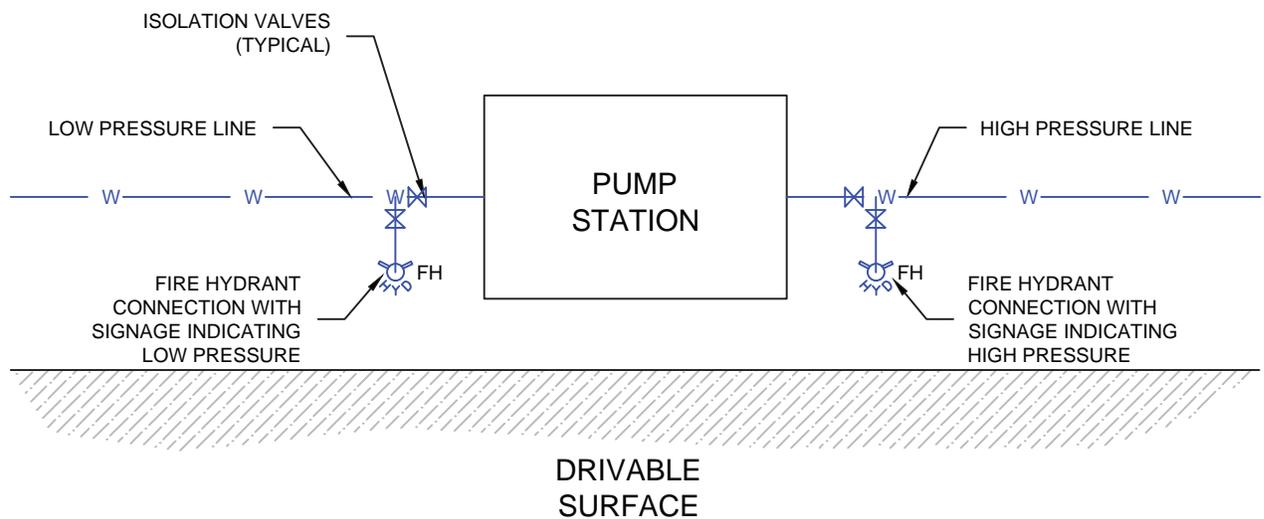
1. ALL CONCRETE VAULTS SHALL BE DESIGNED FOR HS-20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD.
2. ALL PRESSURE REGULATOR INSTALLATIONS LARGER THAN 12" SHALL BE DESIGNED BY DESIGN ENGINEER AND APPROVED BY COLORADO SPRINGS UTILITIES.
3. ALL MATERIAL INSIDE VAULT SUPPLIED BY CONTRACTOR AND REIMBURSED BY COLORADO SPRINGS UTILITIES. SEE CHAPTER 2.
4. LOCATION OF PRV VAULT MAY VARY DUE TO WIDTH OF ROW AND SIDEWALKS. COORDINATE WITH GAS AND ELECTRIC DEPARTMENT PRIOR TO INSTALLATION. ADDITIONAL EASEMENT MAY BE NECESSARY TO PROVIDE A MINIMUM OF 5.0' FROM THE OUTSIDE EDGE OF EXTERIOR VAULT WALLS.
5. PRV DETAILS SHOWN IN DETAIL DRAWINGS, A6-3, A6-4, A6-5 AND A6-6.
6. ALL FITTINGS TO BE MECHANICALLY JOINT (MJ) RESTRAINED.
7. IF REDUCER IS REQUIRED, IT SHALL BE PLACED BETWEEN THE CRA AND 45° BEND. SEE DETAIL ABOVE.
8. JOINT HARNES TIE BOLTS AND LUGS SHALL CONFORM TO AWWA M11 FOR STEEL PIPE.





NOTES:

1. METER VAULTS TO HAVE TWO (2) EACH 2" KNOCKOUTS FOR INSTALLATION OF 115 VAC ELECTRICAL AND REMOTE SIGNAL WIRE. LOCATION TO BE DETERMINED PER INDIVIDUAL APPLICATION BY COLORADO SPRINGS UTILITIES.
2. ELECTRICAL EQUIPMENT AND DISPLAY UNIT TO BE MOUNTED IN A DRY LOCATION.
3. METER TO BE COMPATIBLE WITH COLORADO SPRINGS UTILITIES CURRENT DATA COLLECTION PROGRAM.
4. CONCRETE VAULTS SHALL BE DESIGNED FOR HS-20 TRAFFIC LOADING CONDITIONS AND 300 PSF SURCHARGE LOAD WITH A CAST IN PLACE FOUNDATION AS SHOWN.



PLAN VIEW
NOT TO SCALE

NOTES:

1. HYDRANTS TO BE LOCATED NOT MORE THAN 40 FT FROM EACH OTHER AND NO MORE THAN 20 FT FROM VEHICULAR ACCESS.
2. HYDRANT LOCATIONS TO BE DETERMINED BY SITE LAYOUT CONDITIONS.
3. DETAIL DRAWING **A6-12** TO BE USED WHEN PRESSURES EXCEED THE PRESSURE RATING OF THE FIRE HYDRANTS.

CENTER END OF PIPE IN CRUSHED ROCK AND COVER END OF PIPE WITH 1/4" MESH SCREEN. SECURE TO END OF PIPE WITH BAND CLAMP

1 CY 3/4" CLEAN CRUSHED ROCK WRAPPED IN MESH GEO-TEXTILE FABRIC

3" DRAIN

3" GATE VALVE, NORMALLY CLOSED

5'-6" LONG x 4'-0" WIDE, 4000 PSI CONCRETE SLAB, 12" DEEP

4-1/2" PUMPER NOZZLE WITH 6 RIGHT HAND THREADS PER INCH

(EXISTING MAIN)x4" MJ TEE

4" STEEL PIPE

EXISTING WATER MAIN

4"x3" TEE

4" GATE VALVE, NORMALLY CLOSED

PUMP BYPASS CONNECTION PLAN VIEW

NOT TO SCALE

4-1/2" PUMPER NOZZLE WITH 6 RIGHT HAND THREADS PER INCH

4"x90° BEND

4" STEEL PIPE

INSULATING FLANGE

ADJUSTABLE STANCHION SADDLE SUPPORT WITH STAINLESS STEEL U-BOLT.

FINAL GRADE

#4 @ 6" EACH WAY TOP AND BOTTOM

PROVIDE BOND BREAKER ALL AROUND PIPE, FULL DEPTH OF SLAB

VALVE BOX AND STEM EXTENSION

4" DUCTILE IRON PIPE

(EXISTING MAIN)x4" MJ TEE

4" GATE VALVE, NORMALLY CLOSED

PUMP BYPASS CONNECTION SECTION "A"

NOT TO SCALE

4"x90° BEND
4" x 3" MJ TEE WITH 3" DRAIN VALVE

NOTES:

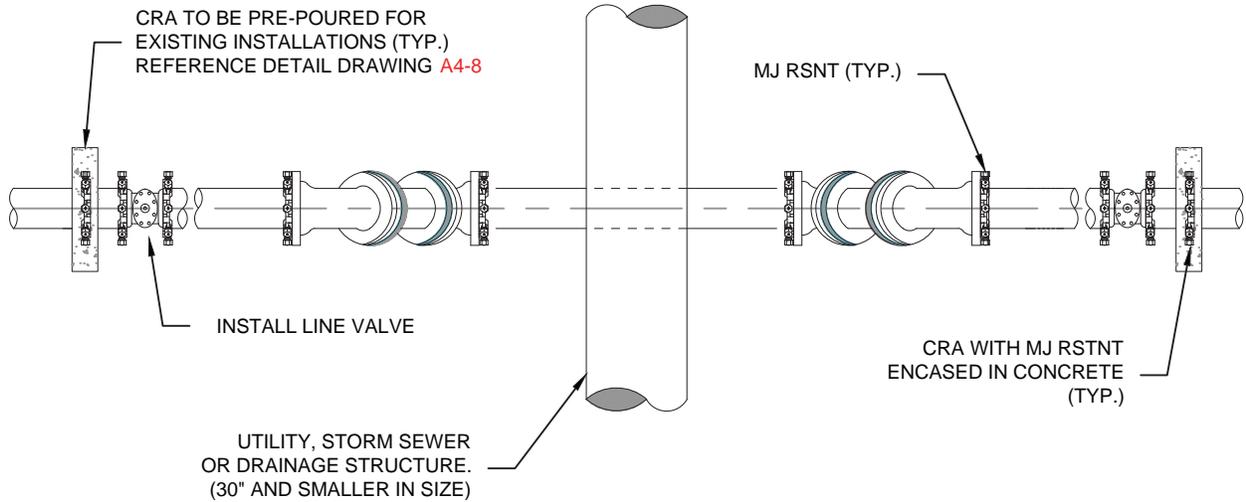
1. THIS DETAIL TO BE USED WHEN THE PRESSURES EXCEED THE PRESSURE RATING OF THE FIRE HYDRANTS.
2. TEE SHALL BE 4" LATERAL FROM EXISTING WATER MAIN SIZE, I.E., 8" x 4", 12" x 4", ETC.
3. PROVIDE CLEAN CRUSHED ROCK WRAPPED IN GEO-TEXTILE FABRIC FOR STAND PIPE DRAINAGE WHEN NOT IN USE.
4. ALL MECHANICAL JOINT (MJ) CONNECTIONS SHALL BE RESTRAINED.
5. PUMPER NOZZLES SHALL BE LOCATED EACH NOT MORE THAN 40 FT FROM EACH OTHER AND NO MORE THAN 20 FT FROM VEHICULAR ACCESS. LOCATIONS TO BE DETERMINED BY SITE LAYOUT.



PUMP STATION BYPASS SCHEMATIC LAYOUT (ALTERNATIVE)

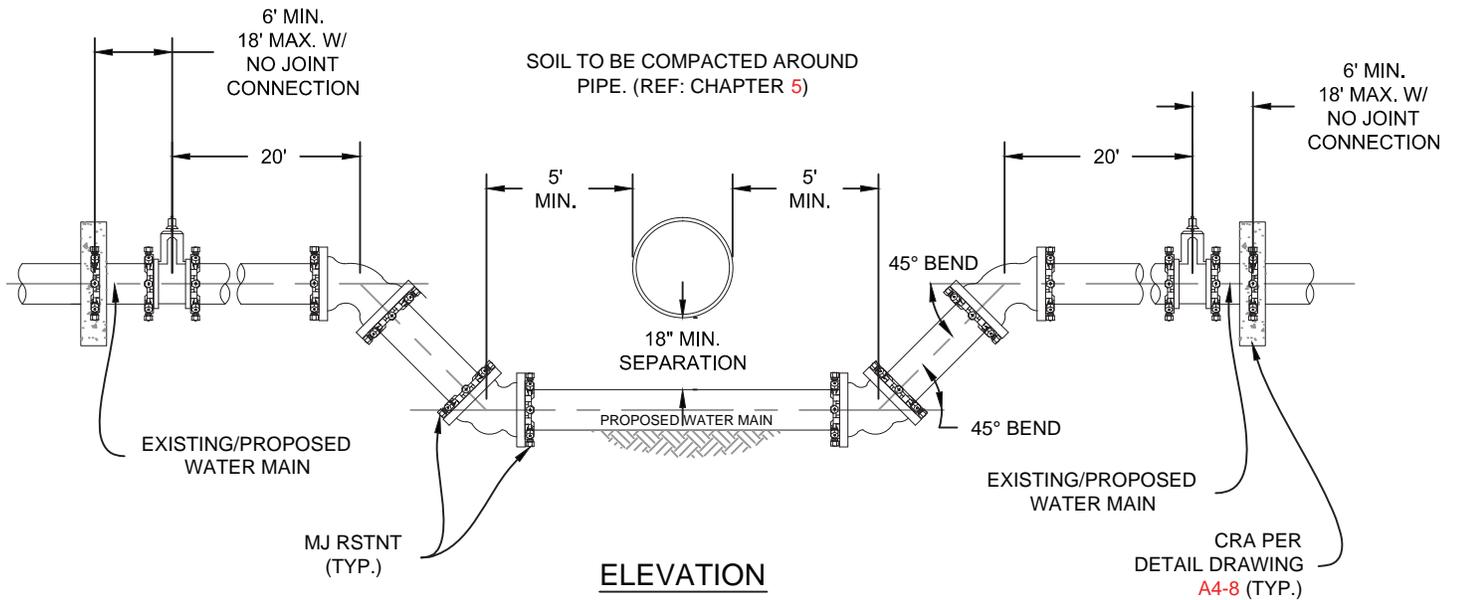
A6-13

DATED 03/2014



PLAN

FINAL/EXISTING GRADE



ELEVATION

NOTES:

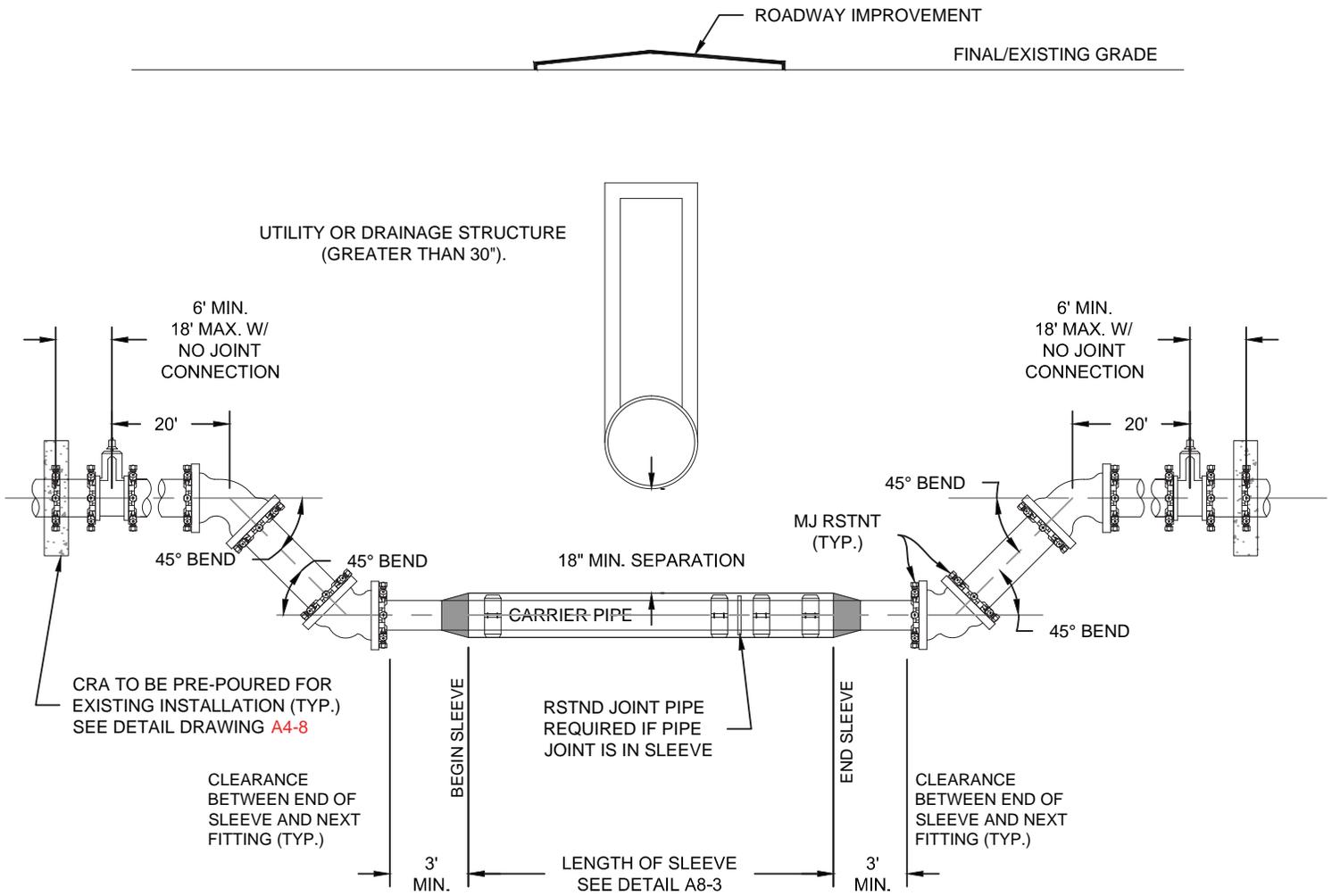
1. ALL DUCTILE IRON FITTINGS AND PIPE SHALL BE CATHODICALLY PROTECTED PER SECTION 2.6.1.
2. ALL FITTINGS SHALL HAVE MJ RESTRAINTS IN ACCORDANCE WITH CHAPTER 5.
3. EXAMPLE CAN VARY DUE TO SITE CONDITIONS AND COLORADO SPRINGS UTILITIES INSPECTOR'S DIRECTION.
4. RESTRAINED JOINTS ARE REQUIRED WITHIN LOWERING.
5. NO TAPS OR TEES ARE ALLOWED WITHIN THE LOWERING.
6. WHERE WATER MAIN CROSSES UNDER STORM SEWER, WASTEWATER OR NON-POTABLE WATER INFRASTRUCTURE, REFERENCE SECTION 2.6-H.2.



**LOWERING DETAIL
UTILITY CROSSING 30" & SMALLER**

A7-1

DATED 03/2014



NOTES:

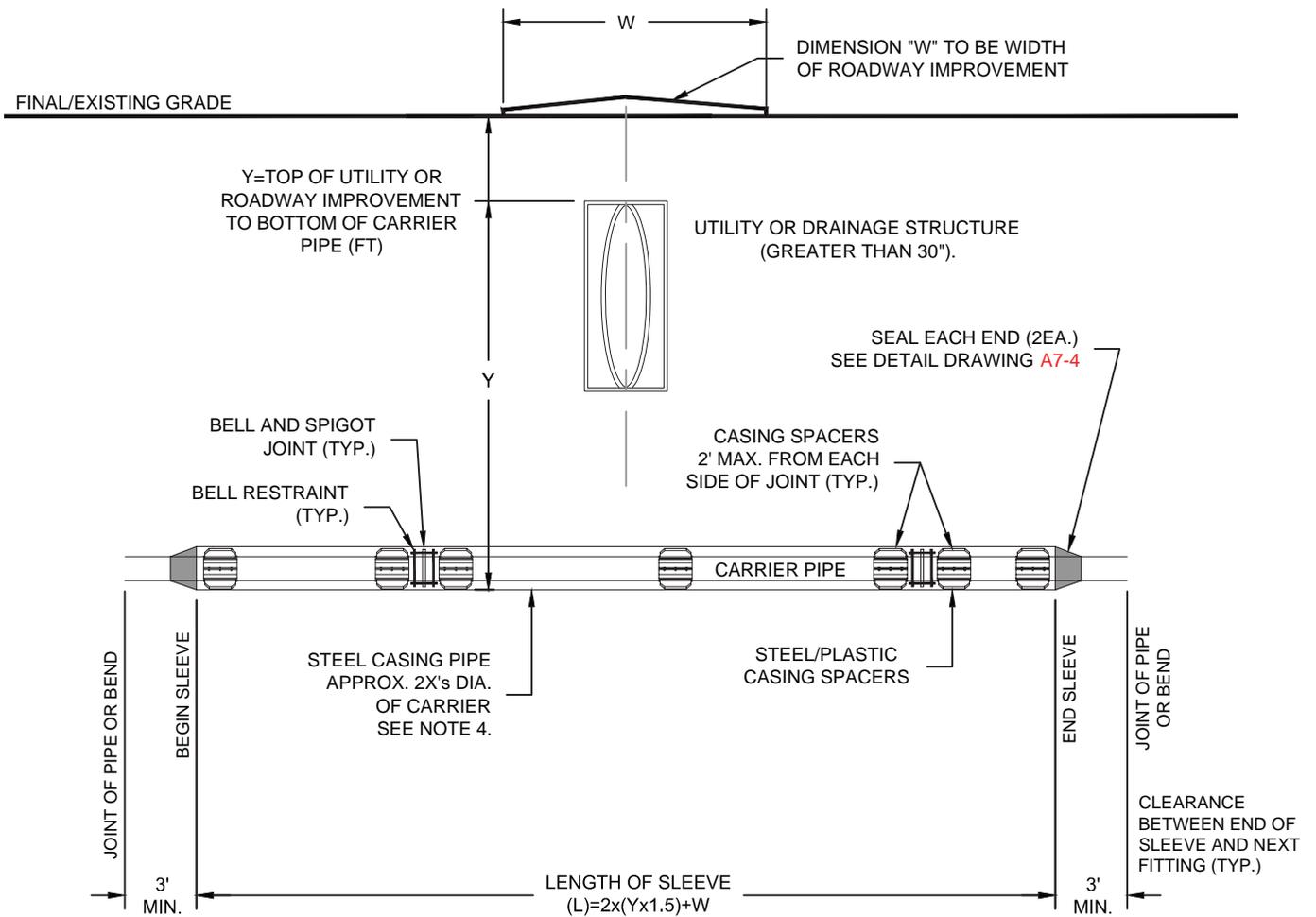
1. ALL DUCTILE IRON FITTINGS AND PIPE SHALL BE CATHODICALLY PROTECTED PER SECTION 2.6.I.
2. ALL FITTINGS SHALL HAVE MJ RESTRAINTS IN ACCORDANCE WITH CHAPTER 5.
3. EXAMPLE CAN VARY DUE TO SITE CONDITIONS AND COLORADO SPRINGS UTILITIES INSPECTOR'S DIRECTION.
4. RESTRAINED JOINTS ARE REQUIRED WITHIN LOWERING.
5. NO TAPS OR TEES ARE ALLOWED WITHIN THE LOWERING.
6. WHERE WATER MAIN CROSSES UNDER STORM SEWER, WASTEWATER OR NON-POTABLE WATER INFRASTRUCTURE, REFERENCE SECTION 2.6-H.2.



**LOWERING DETAIL W/CASING
UTILITY CROSSING GREATER THAN 30"**

A7-2

DATED 03/2014



NOTE:
AN ADDITIONAL CASING SPACER SHALL BE CENTERED ON THE PIPE WHEN 18' TO 20' LONG PIPE JOINTS ARE USED. (TYP.)

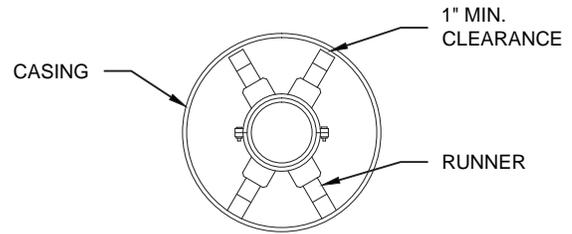
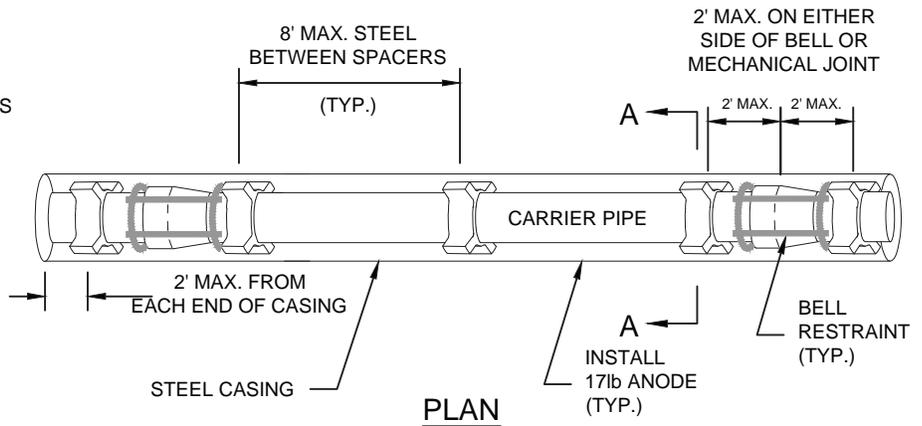
NOTES:

1. ALL FITTINGS AND BELLS SHALL BE RESTRAINED IN THE CASING PIPE.
2. LOCATE CASING SPACERS AT "HOMING" LOCATION FOR SLEEVES GREATER THAN 50 FEET IN LENGTH TO PREVENT DAMAGE TO BELL DURING INSTALLATION AND EXTRACTION OF PIPE, IF REMOVED.
3. CASING SHALL BE STEEL PIPE WITH A MINIMUM YIELD STRENGTH OF 35,000 PSI. CASING THICKNESS SHALL BE SPECIFIED BY THE DESIGN ENGINEER ON THE PLANS BASED ON THE ANTICIPATED LOADS. SEE DETAIL DRAWING A7-4.
4. THE DIAMETER OF THE CASING SHALL BE SPECIFIED BY THE DESIGN ENGINEER. THE DIAMETER SHALL TAKE INTO ACCOUNT THE MAXIMUM O.D. WITH THE USE OF RESTRAINED JOINT PIPE.
5. SEE DETAIL DRAWING A7-4 FOR CASING SPACER DETAILS.
6. LOCATE SPACERS ON BOTH SIDES OF JOINTS TO ELIMINATE DEFLECTION OF THE JOINT IN THE SLEEVE.
7. WHERE WATER MAIN CROSSES UNDER STORM SEWER, WASTEWATER OR NON-POTABLE WATER INFRASTRUCTURE, REFERENCE SECTION 2.6-H.2.
8. WHEN CROSSING A ROADWAY IMPROVEMENT, THE WIDTH OF THE IMPROVEMENT SHALL BE ADDED TO THE LENGTH OF THE SLEEVE.

CASING PIPE MINIMUM SIZES AND THICKNESSES
(TO BE VERIFIED BY THE DESIGN ENGINEER)
BASED ON ACTUAL LOADING AND SITE CONDITIONS

CASING PIPE NOMINAL SIZE (IN)	MIN. THICKNESS (IN)
12	0.250
14	0.312
16	0.312
18	0.312
20	0.375
24	0.375
32	0.500
36	0.625

CASING PIPE MINIMUM SIZES AND THICKNESSES ARE
BASED ON E80 LOADING. VARIANCES TO THESE
MINIMUMS MAY BE ALLOWED WITH SUPPORTING
CALCULATIONS FROM THE DESIGN ENGINEER



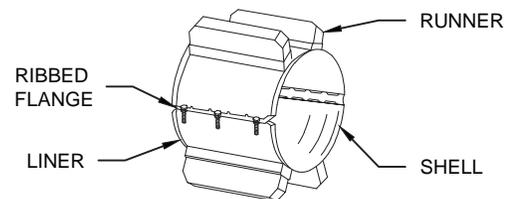
SECTION A-A
TYPICAL PIPE SUPPORT CASING ARRANGEMENT (CENTERED/RESTRAINED)

CARRIER PIPE:

- CARRIER PIPE SHALL BE CENTERED WITHIN CASING BY USE OF APPROVED STAINLESS STEEL CASING SPACERS AS MANUFACTURED BY APPROVED MANUFACTURER BY COLORADO SPRINGS UTILITIES. (REFERENCE CHAPTER 2)

PLACEMENT OF SPACERS ON CARRIER PIPE:

- GENERAL - ONE SPACER SHALL BE PLACED MAX. 2' FROM EACH END OF CASING AND ON EITHER SIDE OF EACH BELL OR MECHANICAL JOINT. SUBSEQUENT SPACERS SHALL BE PLACED AT 8' INTERVALS WITHIN THE CASING, OR IN ACCORDANCE WITH PIPE MANUFACTURERS RECOMMENDATIONS.



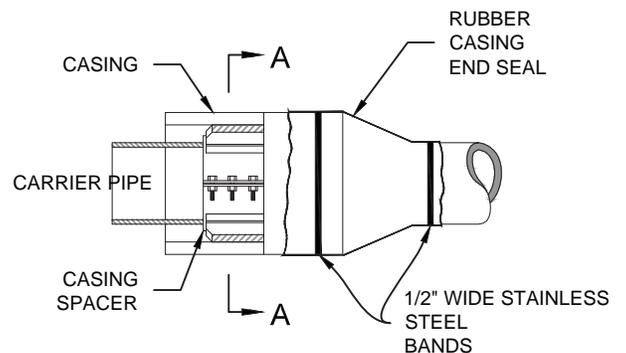
SPACER

END SEALS:

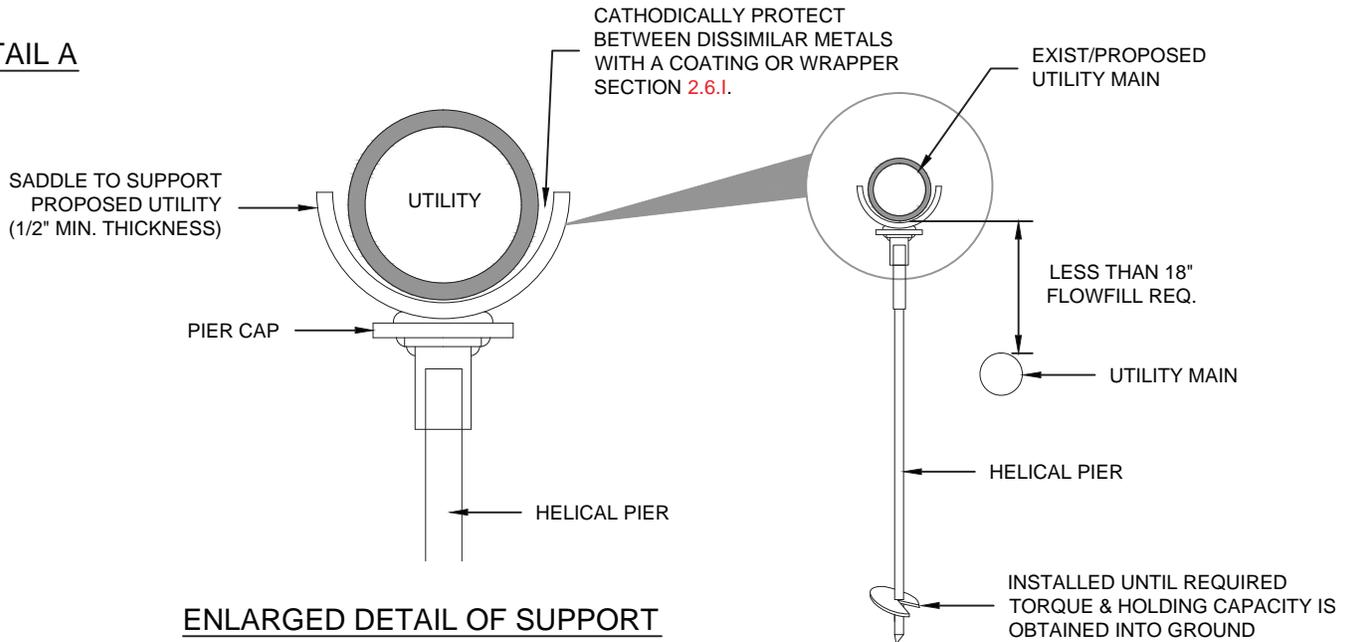
- END SEALS SHALL BE USED TO ENSURE A WATER TIGHT SEAL ON EITHER END OF THE CASING.

CATHODIC PROTECTION:

- CASING SHALL BE CATHODICALLY PROTECTED PER SECTION 2.6.I.



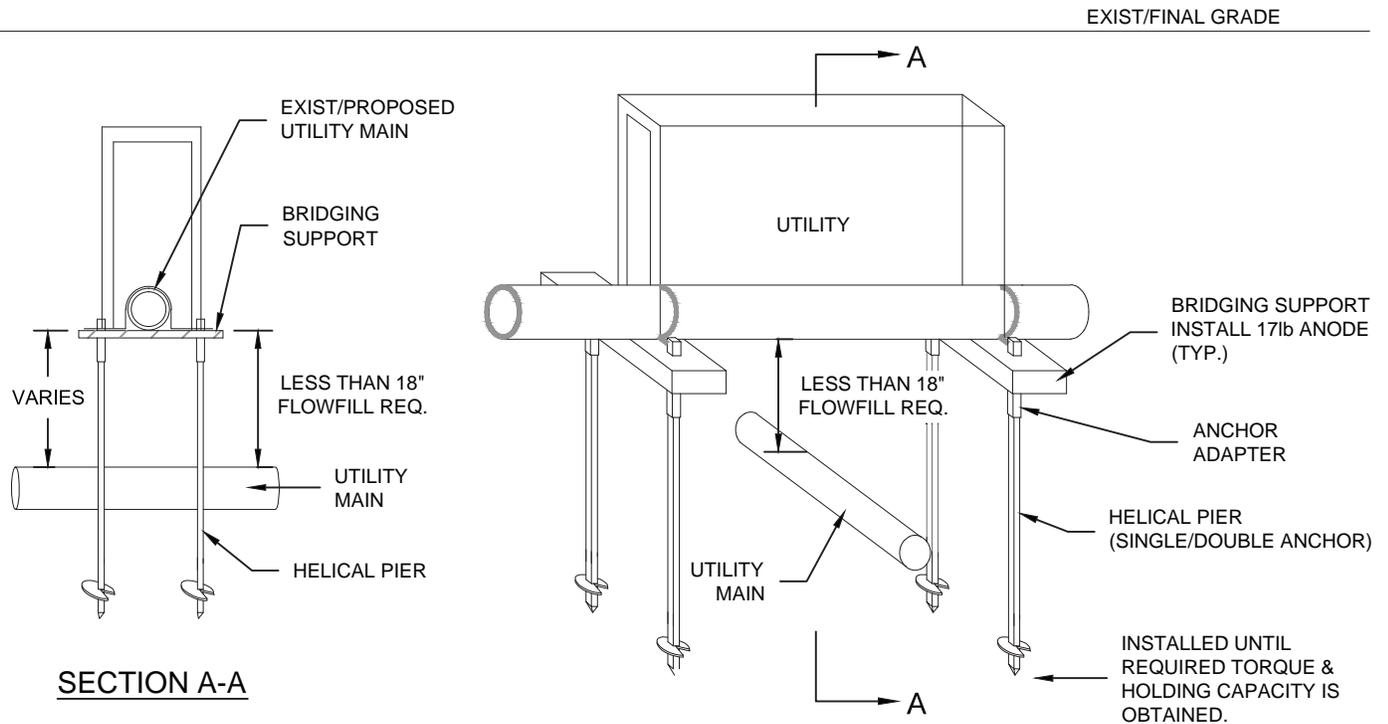
DETAIL A



ENLARGED DETAIL OF SUPPORT

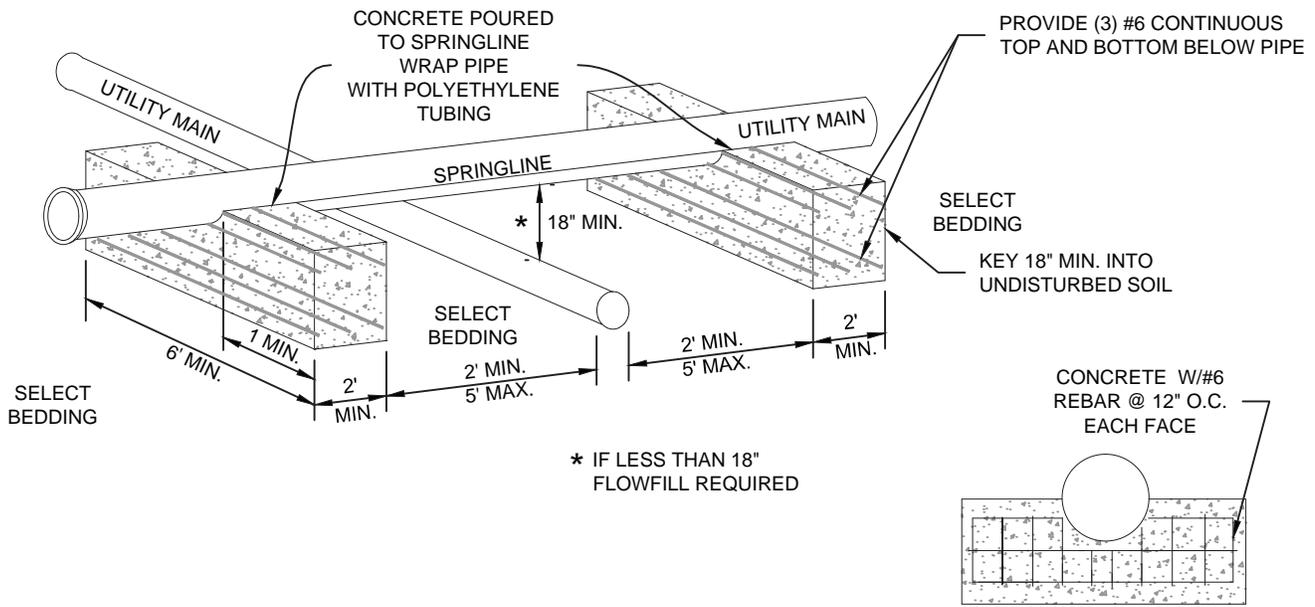
NOTE: HELICAL PIERS AND PIER CAPS SHALL BE DESIGNED BY THE DESIGN ENGINEER.

DETAIL B



NOTES:

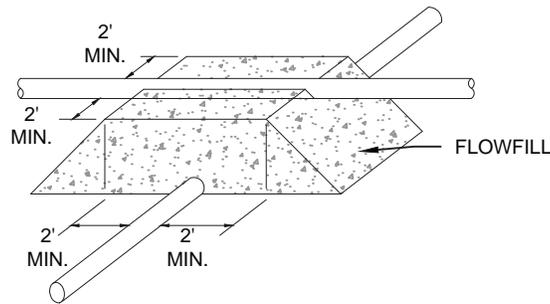
1. IF UPPER UTILITY IS GREATER THAN 30" IN SIZE LOWER UTILITY MUST BE IN A CASING PIPE. REFERENCE DETAIL DRAWING A7-2 & A7-3.
2. ALL METALLIC STRUCTURE AND PIPE SHALL BE CATHODICALLY PROTECTED PER SECTION 2.6.1.
3. THE BRIDGING SUPPORT SHALL BE DESIGNED BY THE DESIGN ENGINEER.



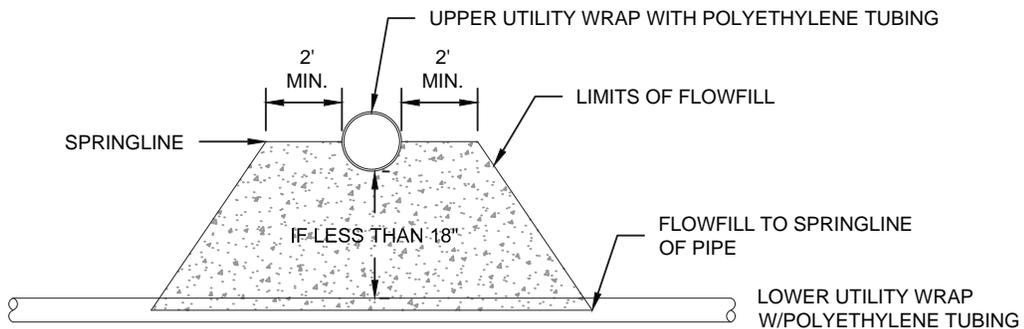
NOTES:

1. CONCRETE SHALL BE REINFORCED WITH NO. 6 REBAR, SET ON 12" CENTERS
2. NO JOINTS OF UTILITY MAIN SHALL BE ALLOWED BETWEEN CONCRETE BRIDGING BLOCKS.
3. CONCRETE AND REINFORCEMENT SHALL BE IN ACCORDANCE WITH CHAPTER 4.

FLOWFILL DETAIL



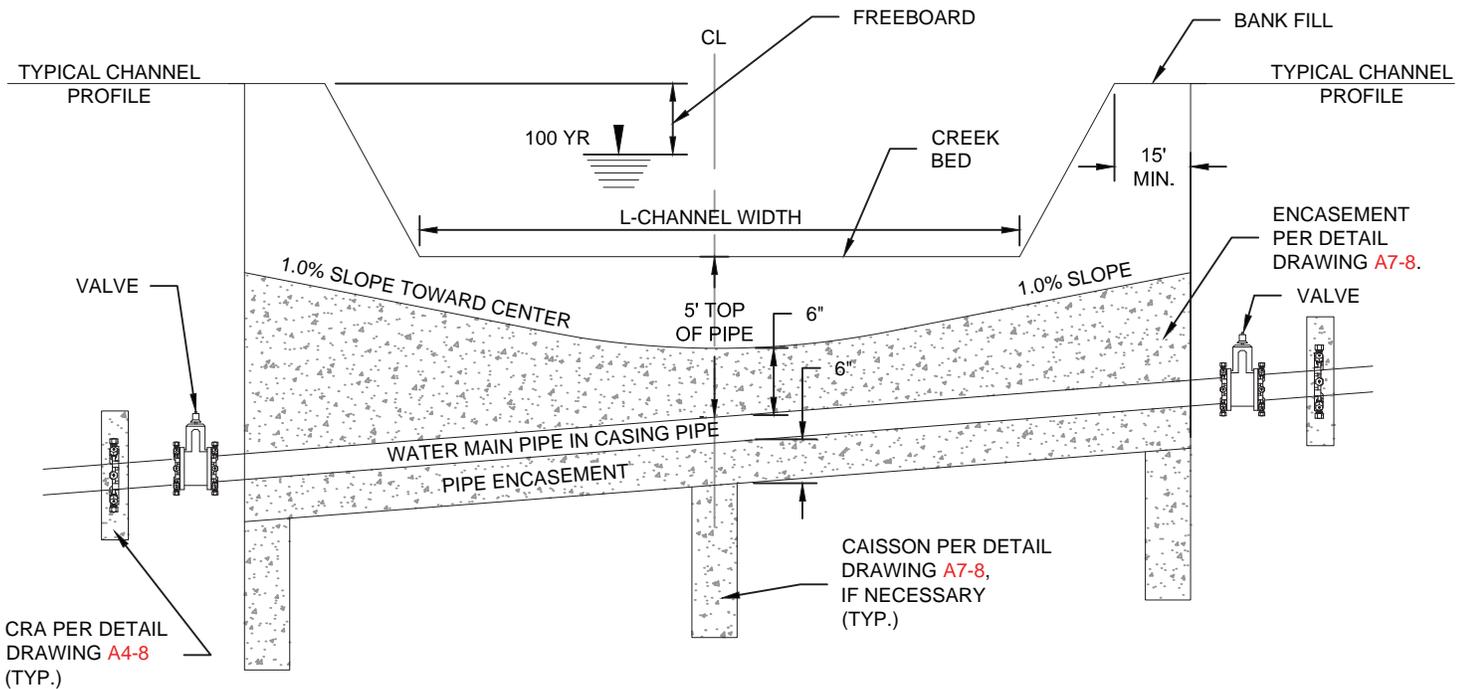
FINAL GRADE



NOTES:

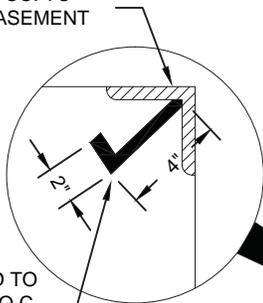
1. ALL FLOWABLE-FILL SHALL BE IN CONFORMANCE WITH CHAPTER 4.
2. SEE SECTION 2.6.H FOR UTILITY CROSSING STANDARDS.





TYPICAL STREAM CROSSING CROSS SECTION

4"x4"x1/4" L TIED BACK W#6 REBAR @ 12" CC. TO PROTECT ENCASEMENT (TYP.)



L BRACKET DETAIL

#6 BAR WELDED TO L @ 12" O.C. (1/2" ANCHOR BOLT MAY BE USED)

ENCASEMENT AT CREEK BANKS SET TO IDENTICAL ELEVATION

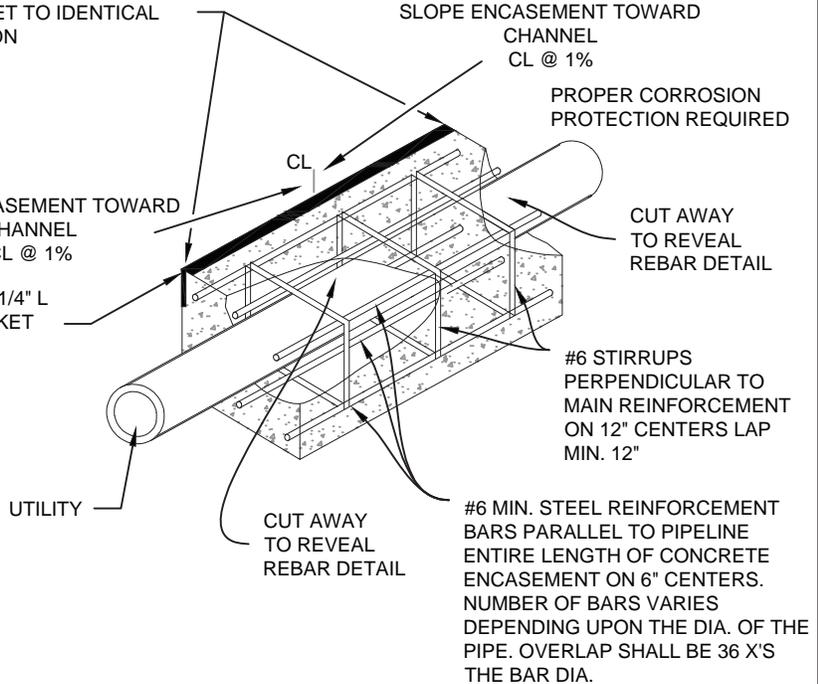
SLOPE ENCASEMENT TOWARD CHANNEL CL @ 1%

PROPER CORROSION PROTECTION REQUIRED

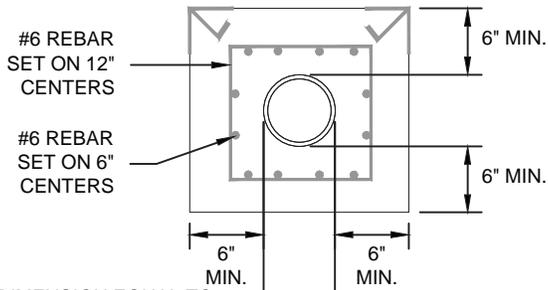
SLOPE ENCASEMENT TOWARD CHANNEL CL @ 1%

4"x4"x1/4" L BRACKET (TYP.)

CUT AWAY TO REVEAL REBAR DETAIL



LINED STEEL OR DUCTILE IRON PIPE POLYWRAPPED AND BONDED PRIOR TO PLACEMENT OF CONCRETE.

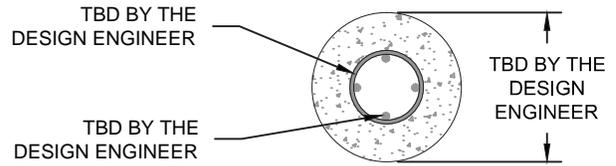
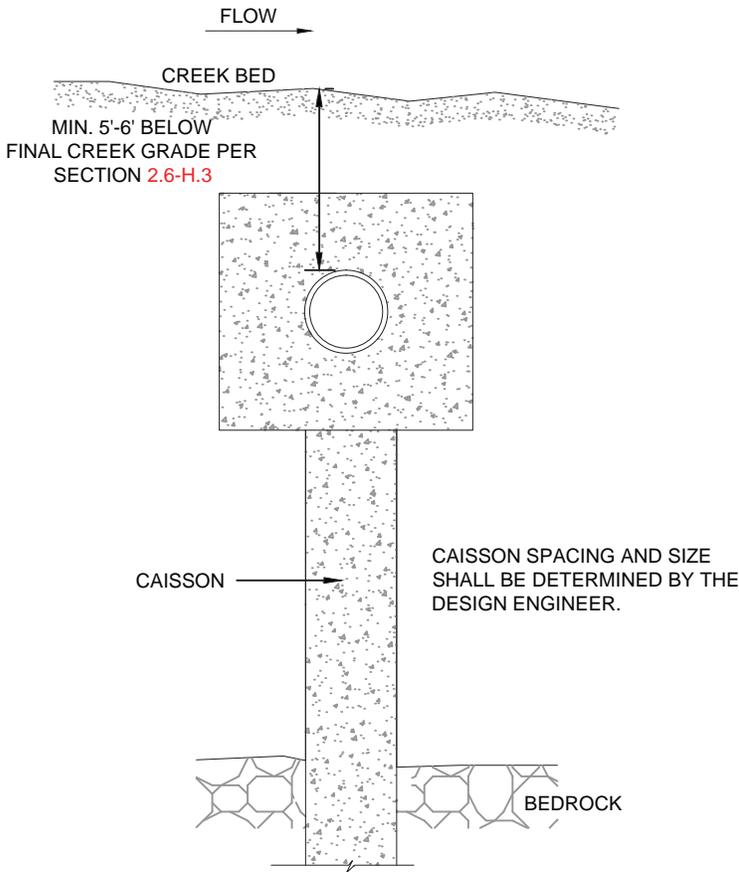


CONCRETE ENCASEMENT DETAIL WITHOUT CAISSON

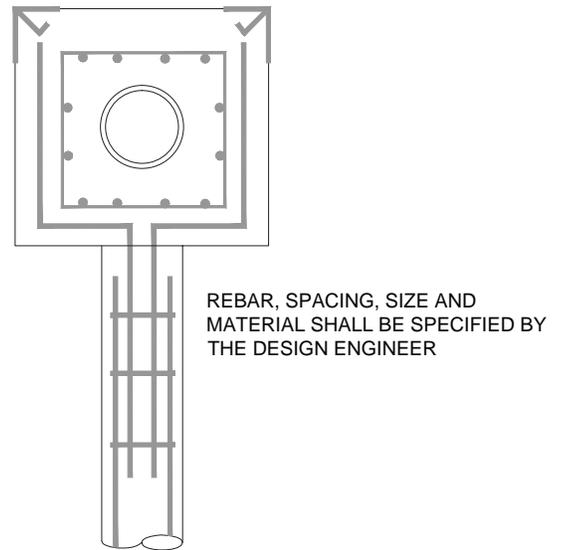
STREAM CROSSING NOTES:

1. EXAMPLE CAN VARY DUE TO SITE CONDITIONS AND COLORADO SPRINGS UTILITIES INSPECTOR'S DIRECTIONS.
2. ALL STREAM CROSSINGS SHALL BE REVIEWED AND APPROVED BY THE CITY ENGINEER.

TYPICAL STREAM CROSSING CROSS SECTION



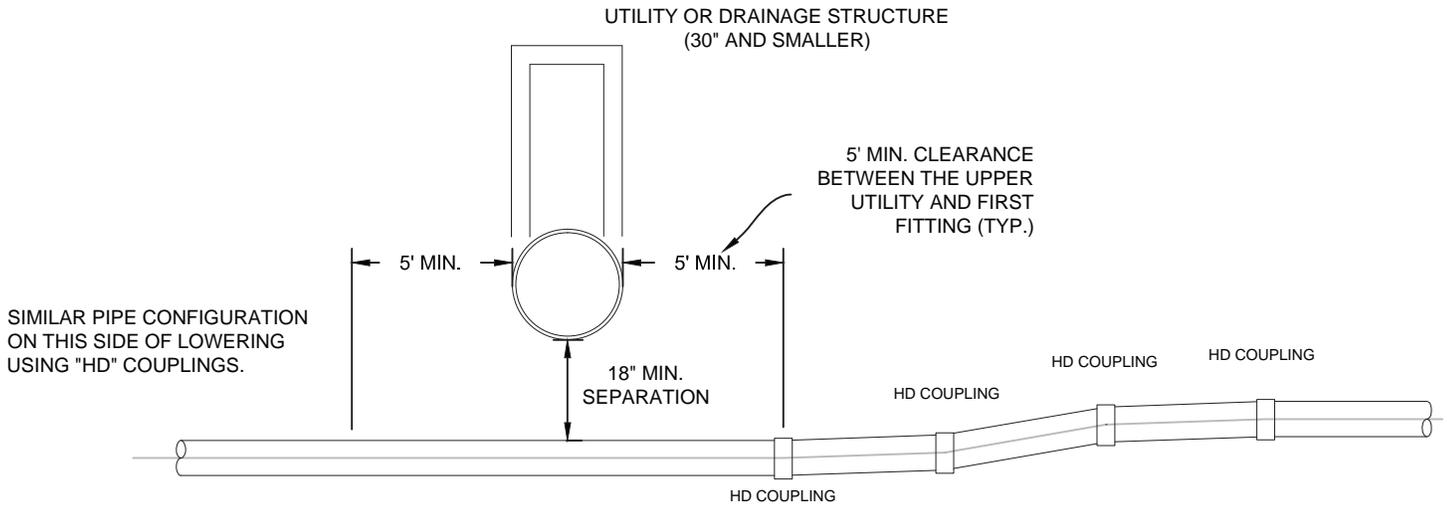
CAISSON CROSS SECTION



CONCRETE ENCASEMENT DETAIL WITH CAISSON

EXAMPLE OF A SLIP JOINT OF PVC PIPE WITH HIGH DEFL COUPLINGS

FINAL GRADE



HIGH DEFLECTION COUPLING (4"-12") 4° DEFL.
(i.e. MAX. 2° IN AND OUT OF COUPLING)
(REFERENCE DETAIL DRAWING A4-1)

NOTE:

1. MINIMUM PIPE LENGTH 5' BETWEEN EACH HD COUPLING.

ELEVATION

PER SLIP JOINT OF PVC PIPE W/HIGH DEFLECTION COUPLINGS

PIPE DATA	MFRS. TOTAL JOINT DEFL. W/ COUPL.	DESIGN DEFLECTION (80% MAX.)		MIN. RADIUS FOR DEFLECTING CURVES WITH HIGH DEFL. COUPLINGS
		(HORZ. DEFL.)	(VERT. DEFL.)	
4"	5°00'	4°00'	6.99%	20'L
6"	5°00'	4°00'	6.99%	286'
8"	5°00'	4°00'	6.99%	286'
12"	5°00'	4°00'	6.99%	286'
NO DEFLECTION COUPLINGS FOR 16" OR GREATER				

CLASS 305 (DR-14)
CLASS 235 (DR-18)

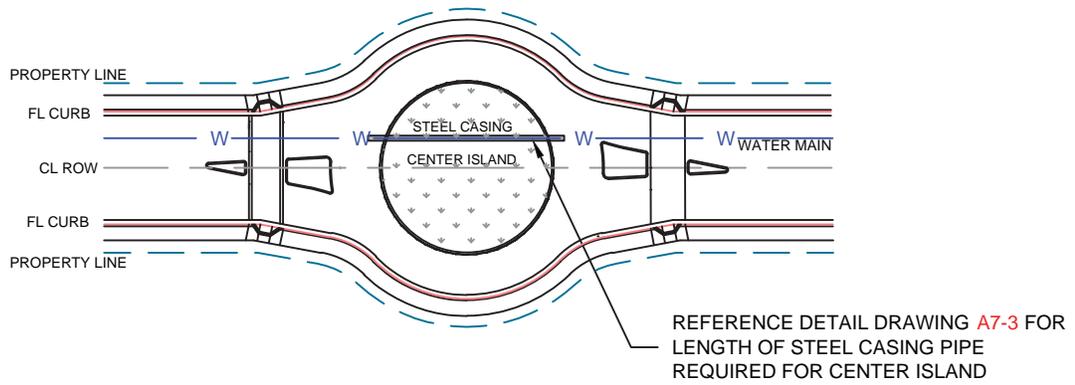
DATA FOR PVC PIPES

NOTES:

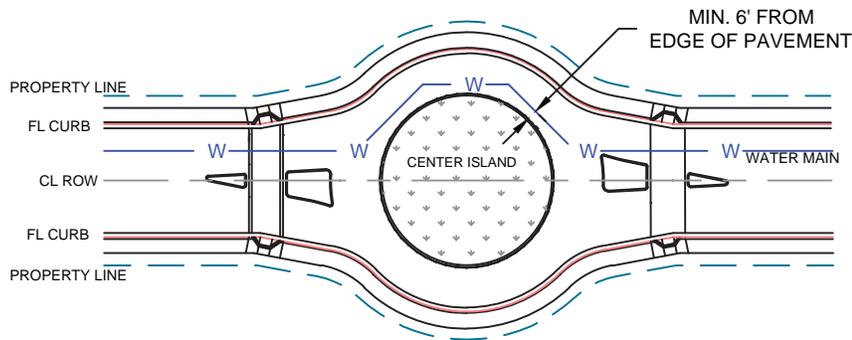
1. SEE DETAIL DRAWING A4-1 DETAIL FOR HORIZONTAL RADIUS.



EXAMPLE A



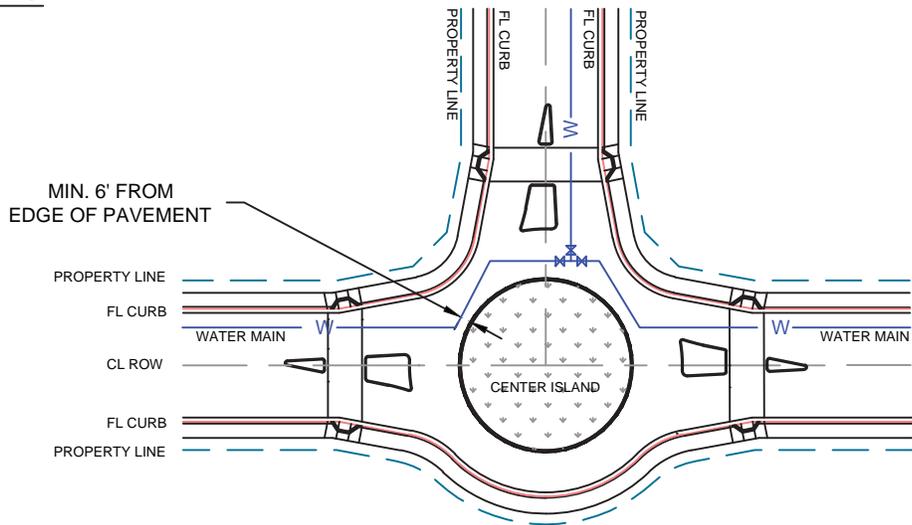
EXAMPLE B



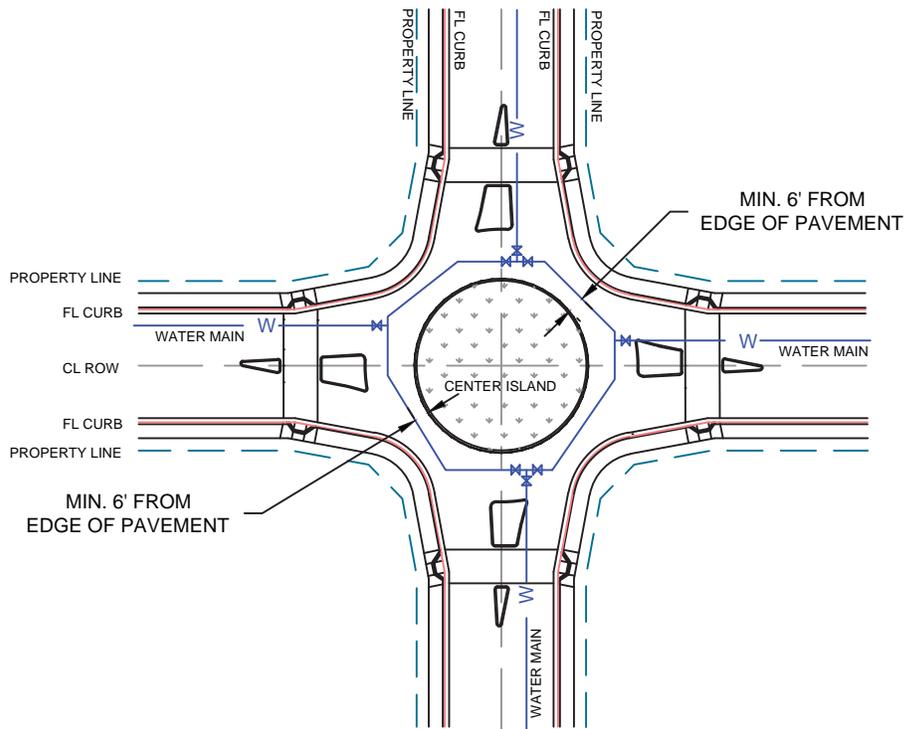
NOTES:

1. REFERENCE SECTION 2.6.H, FOR DESIGN REQUIREMENTS.
2. ROUNDABOUTS SHALL BE DESIGNED PER THE CITY OF COLORADO SPRINGS TRAFFIC CRITERIA MANUAL.
3. MAINTAIN A MINIMUM OF 6' FROM THE EDGE OF PAVEMENT TO CENTERLINE OF WATER MAIN.
4. SEE DETAIL DRAWINGS A3-1 THRU A3-10 FOR LOCATION OF UTILITIES IN THE RIGHT OF WAY.
5. SERVICE TAPS SHALL BE LOCATED A MINIMUM OF 15 FT OUTSIDE THE ROUNDABOUT.

EXAMPLE C



EXAMPLE D



NOTES:

1. REFERENCE SECTION 2.6.H, FOR DESIGN REQUIREMENTS.
2. ROUNDABOUTS SHALL BE DESIGNED PER THE CITY OF COLORADO SPRINGS TRAFFIC CRITERIA MANUAL.
3. MAINTAIN A MINIMUM OF 6' FROM THE EDGE OF PAVEMENT TO CENTERLINE OF WATER MAIN.
4. SEE DETAIL DRAWINGS A3-1 THRU A3-10 FOR LOCATION OF UTILITIES IN THE RIGHT OF WAY.
5. SERVICE TAPS SHALL BE LOCATED A MINIMUM OF 15 FT OUTSIDE THE ROUNDABOUT.

FIELD INSTALLATION OF POLYETHYLENE WRAP FOR DIP PIPE AND FITTINGS

STEP 1:

PLACE TUBE OF POLYETHYLENE MATERIAL ON PIPE PRIOR TO LOWERING IT INTO TRENCH.

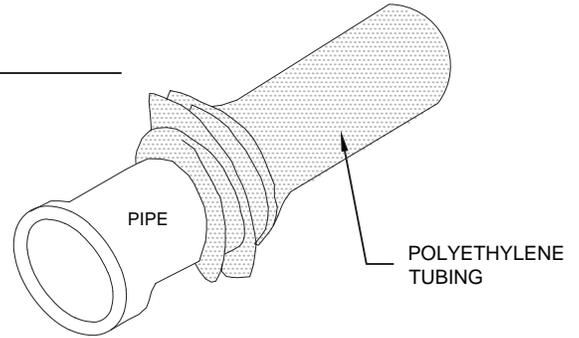
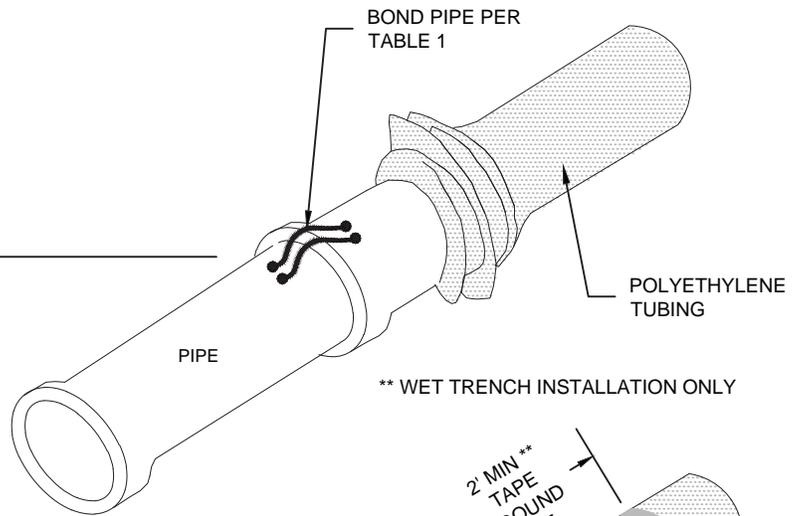


TABLE 1 SUITABLE CONDUCTOR SIZES FOR JOINT BONDING OF DUCTILE IRON PIPE		
PIPE SIZE (IN)	QUANTITY - SIZE OF BOND	SIZE OF CHARGE (G)
3 TO 14	2 - #8 STRANDED OR SOLID	25
16 TO 36	2 - #4 STRANDED OR SOLID	32
	4 - #8 STRANDED OR SOLID	25
	1 - BONDING STRAP	15
42 TO 64	2 - #2 STRANDED OR SOLID	32
	4 - #4 STRANDED OR SOLID	32

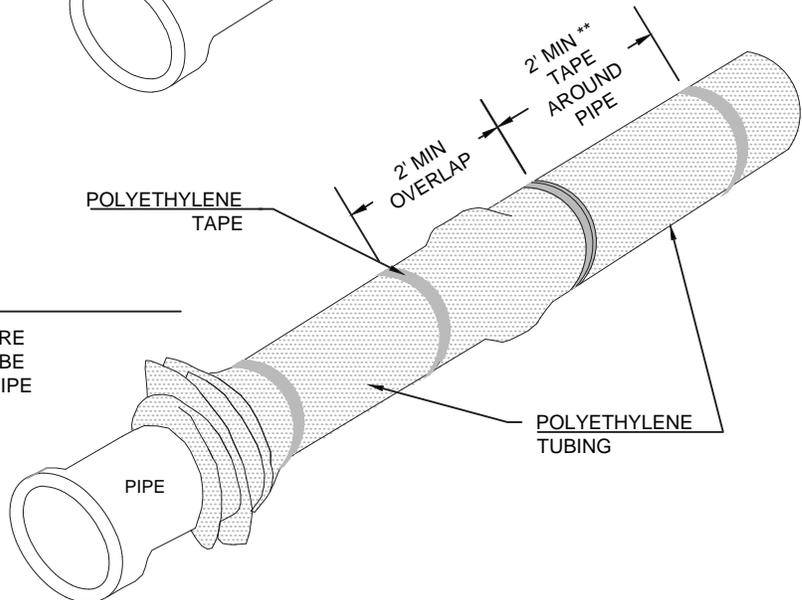
STEP 2:

PULL TUBE OVER THE LENGTH OF THE PIPE. TAPE TUBE TO END AT JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH TAPE TO HOLD THE PLASTIC TUBE IN PLACE. INSTALL BONDING STRAP OR WIRE AT EVERY JOINT OF PIPE PRIOR TO WRAPPING.



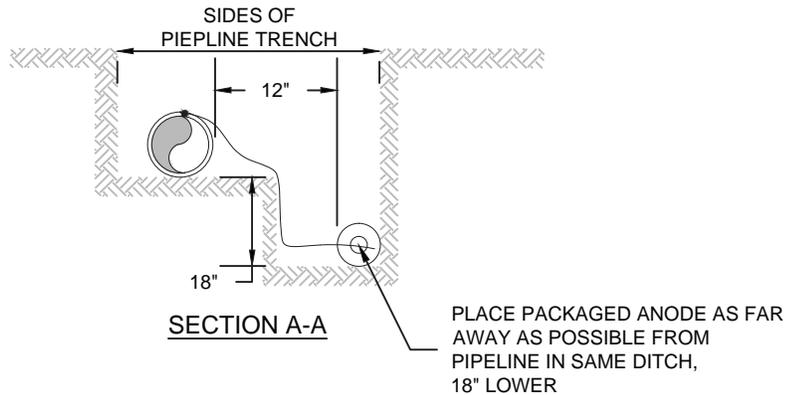
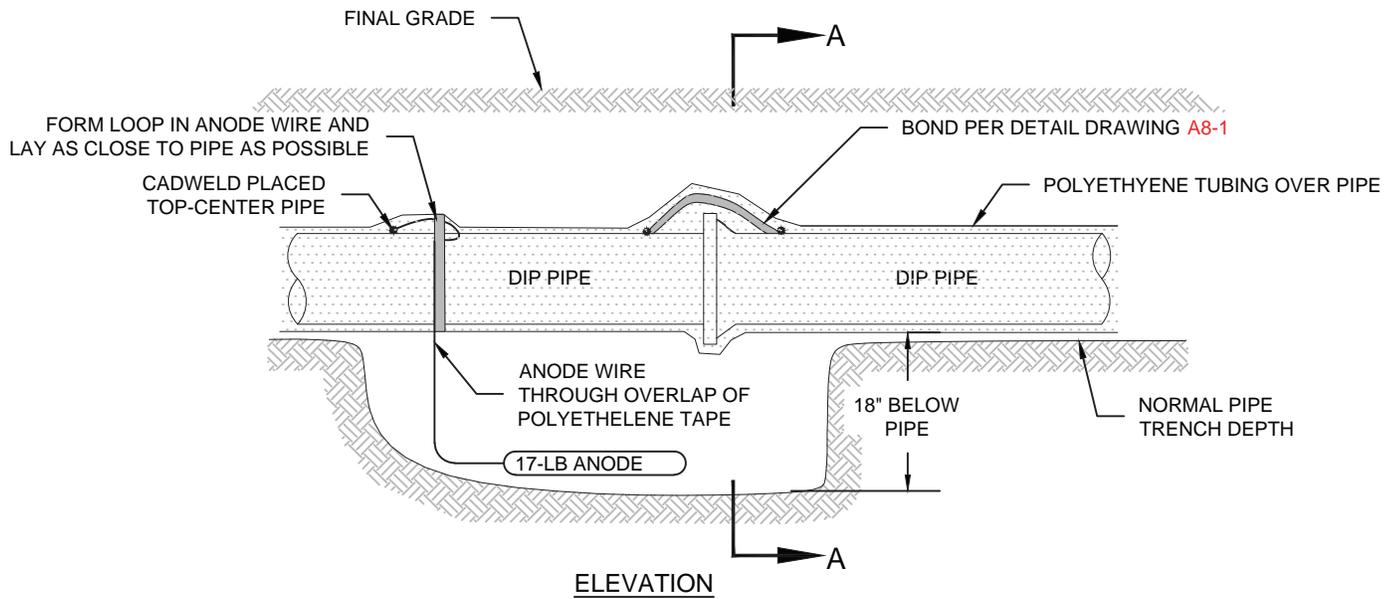
STEP 3:

OVERLAP FIRST TUBE WITH ADJACENT TUBE AND SECURE WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL FOLDED ON TOP OF PIPE AND TAPED IN PLACE



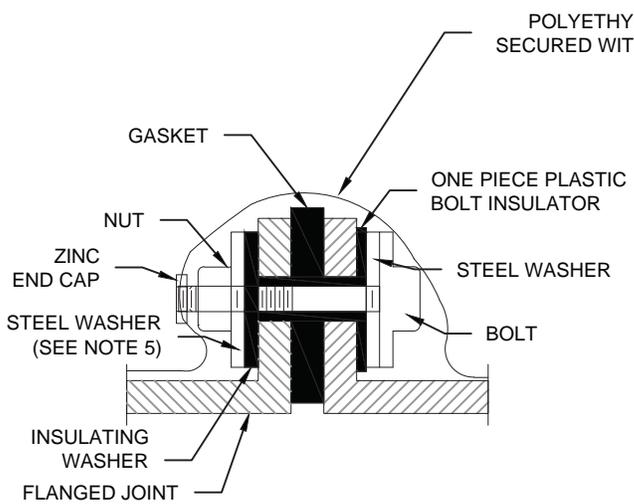
NOTES:

1. ANY TEARS OR HOLES SHALL BE REPAIRED WITH POLYETHYLENE TUBING AND TAPE.
2. WHEN WORKING AROUND EXISTING POLY WRAPPED PIPE, ANY TEARS AS A RESULT OF CONSTRUCTION SHALL BE REPAIRED.
3. WHEN WORKING AROUND EXISTING BONDED PIPE, ANY BROKEN BONDS AS A RESULT OF CONSTRUCTION, SHALL BE REPAIRED.

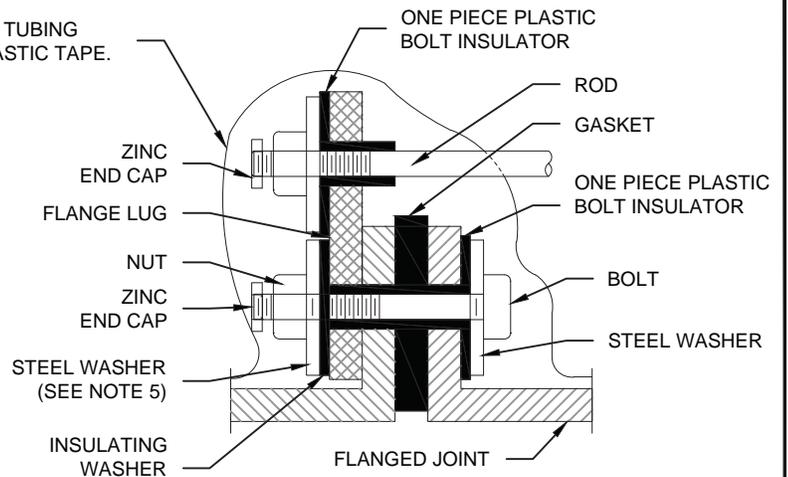


NOTES:

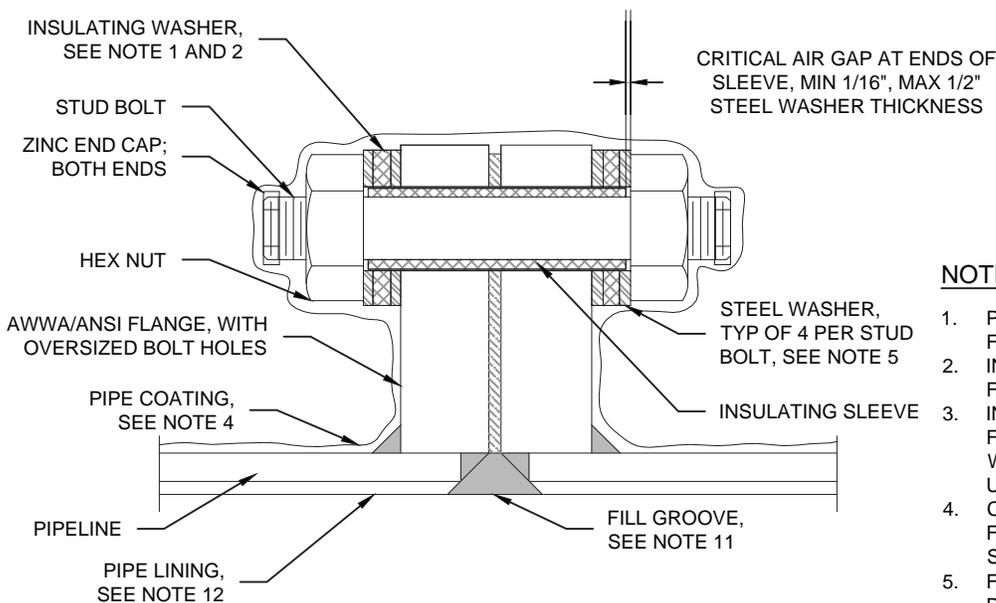
1. THERMITE WELD ANODE TO PIPE WITH A 15 GRAM CHARGE. INSTALL A COPPER SLEEVE WHEN WIRE IS #10 AWG OR SMALLER.
2. THERMITE WELD CONNECTIONS AND ANY BARE METAL SHALL BE COVERED WITH PRIMERLESS HANDICAP OR CORROSION TAPE.
3. PACKED ANODE SHOULD BE COVERED WITH FINE SOIL CONTAINING NO ROCKS OR DIRT CLUMPS AND SHALL BE HAND TAMPED FOR COMPACTION.
4. ANODE WITH BROKEN BAGS SHALL NOT BE USED.
5. ANODES SHALL BE REMOVED FROM PLASTIC PACKAGING.
6. IT IS NOT NECESSARY TO WET THE ANODES.
7. DIP PIPE SHALL BE ENCASED IN POLYETHYLENE TUBING PER DETAIL DRAWING A8-1.



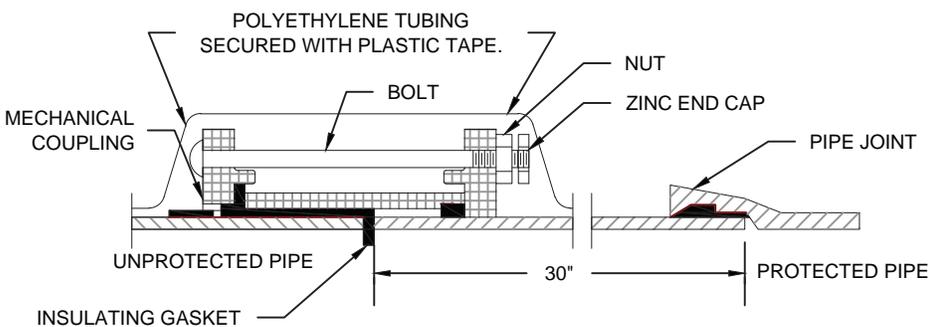
INSULATED FLANGE JOINT



INSULATED TIE BACK ROD
(WITH APPROVAL OF COLORADO SPRINGS UTILITIES)



INSULATED STEEL COUPLING

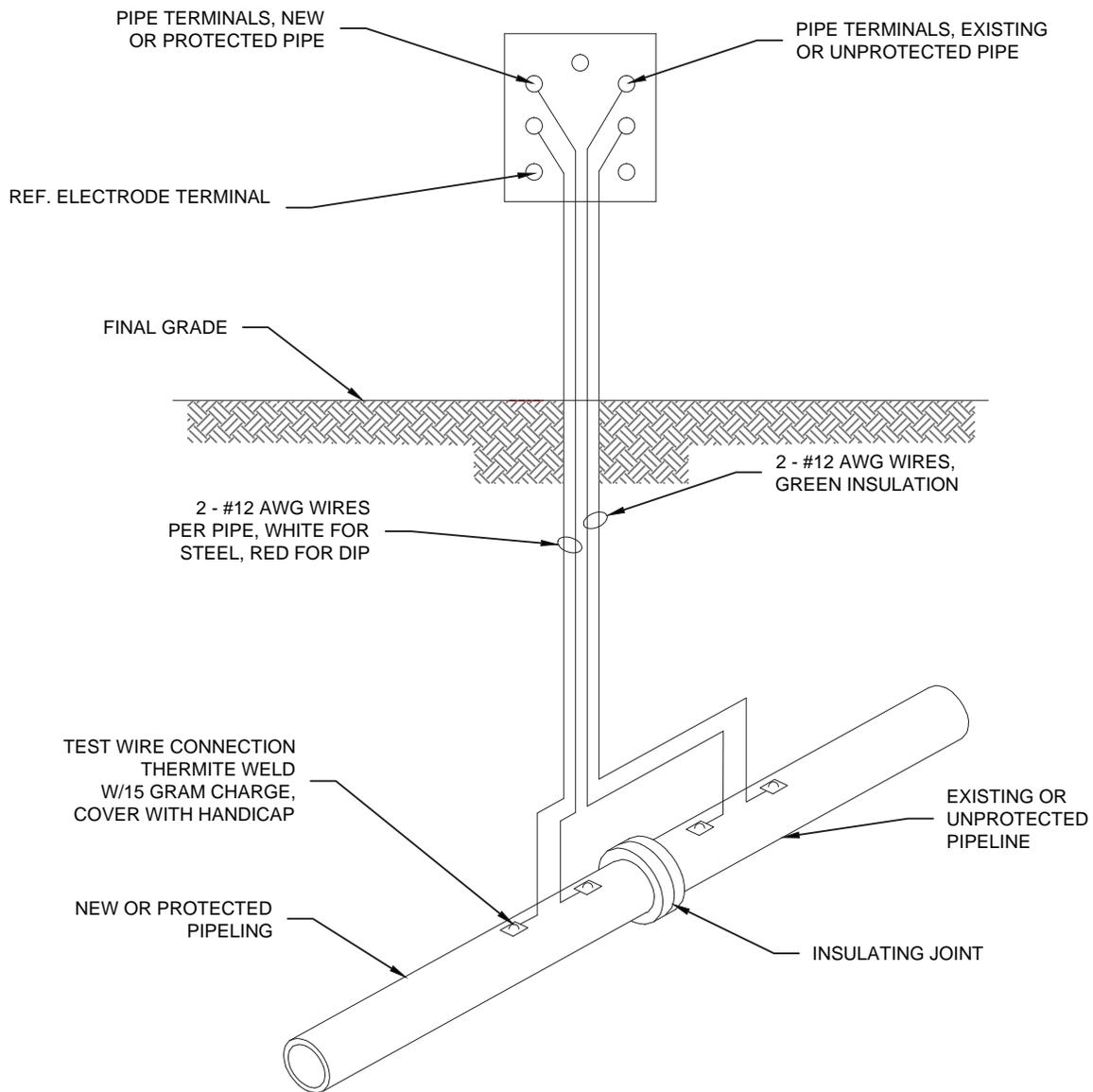


INSULATED MECHANICAL COUPLING

NOTES:

1. PROVIDE INSULATING KIT FOR APPLICABLE FLANGE TYPE AND PRESSURE RATING.
2. INSTALL DOUBLE INSULATING WASHER SET FOR VAULT OR EXPOSED FLANGES.
3. INSTALL SINGLE INSULATING WASHER SET FOR BURIED OR SUBMERGED FLANGES WITH INSULATORS OR WRAP ON UNPROTECTED SIDE OF FLANGE.
4. COAT BURIED OR IMMERSED INSULATING FLANGES FOR 12-INCHES MINIMUM ON EACH SIDE OF FLANGE.
5. FOR PIPE LESS THAN 36-INCHES DIAMETER, DO NOT INSTALL INNER STEEL WASHERS.
6. TEST COMPLETED JOINT FOR ELECTRICAL ISOLATION AND REPAIR AS REQUIRED.
7. CARE SHOULD BE TAKEN TO INSURE THAT THE TIE-BACK BOLTS DO NOT, ALONG THEIR LENGTH, CONTACT ANY PART OF THE PIPE APPURTENANCES.
8. INSULATION KITS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATIONS.
9. CONTINUITY TESTING SHALL BE ACCOMPLISHED PRIOR TO FINAL ACCEPTANCE.
10. TEST STATIONS SHALL BE INSTALLED AT INSULATING COUPLINGS PER DETAIL DRAWING A8-4.
11. FILL INTERIOR GAP BETWEEN FLANGES WITH DIELECTRIC FILLER OF SEALANT COMPATIBLE WITH SPECIFIED PIPE LINING.
12. EXTEND SPECIFIED PIPE LINING TO FACE OF FLANGE AND COAT INTERIOR OF MORTAR LINED PIPE FOR TWO PIPE DIAMETERS WITH NSF APPROVED EPOXY AT 20 MILS DFT.

TERMINAL BOARD
WIRING DIAGRAM

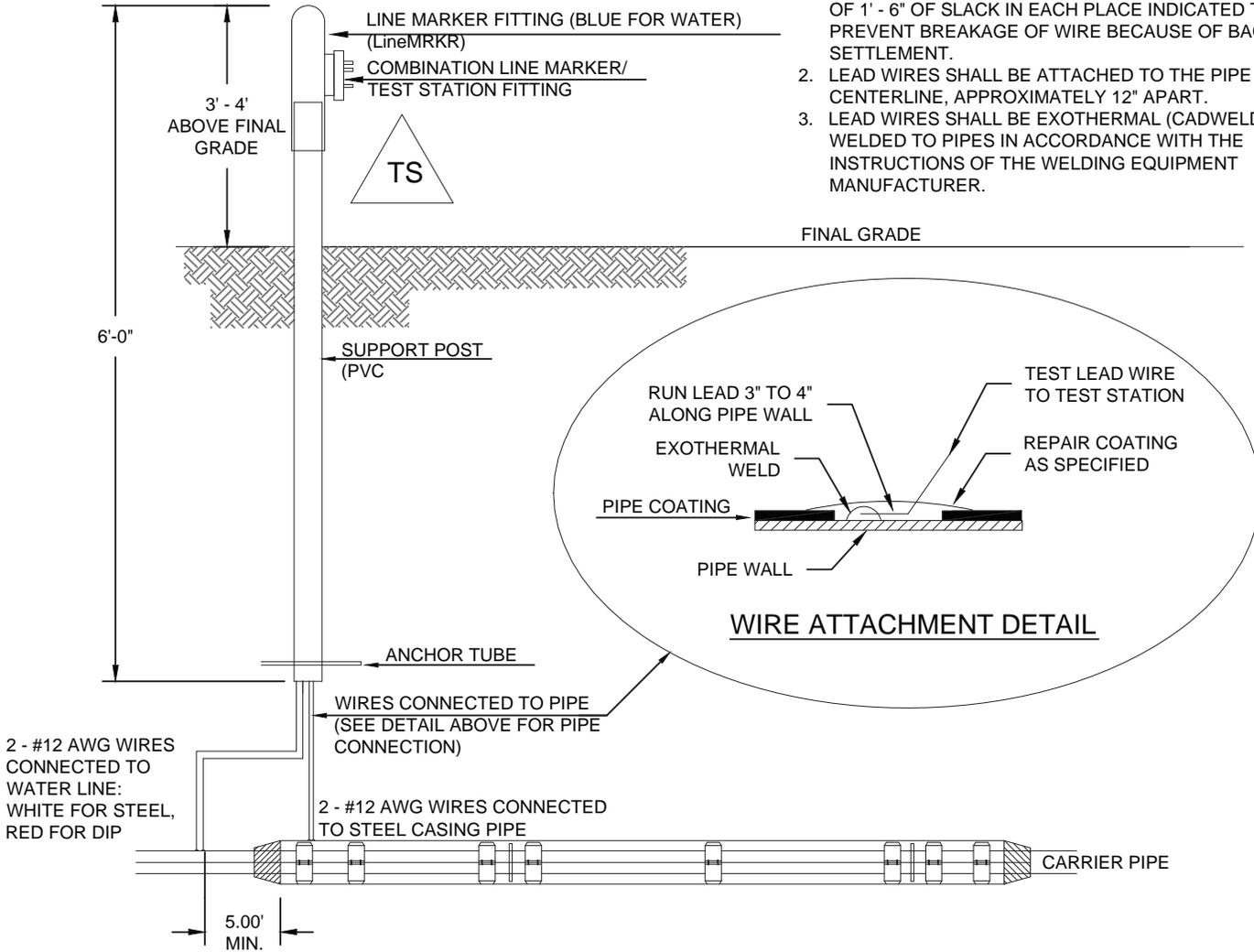


NOTES:

1. THE CONTRACTOR SHALL COORDINATE WITH COLORADO SPRINGS UTILITIES TO WIRE THE TERMINAL BOARD.
2. THERMITE WELD WIRES TO PIPE WITH A 15 GRAM CHARGE. INSTALL A COPPER SLEEVE WHEN WIRE IS #10 AWG OR SMALLER.
3. THERMITE WELD CONNECTIONS AND ANY BARE METAL SHALL BE COVERED WITH PRIMERLESS HANDICAP OR CORROSION TAPE.
4. THE CONTRACTOR SHALL VERIFY CONTINUITY OF ALL WIRES TO TERMINAL BOARD PRIOR TO FINAL ACCEPTANCE.

NOTES:

1. ALL LEAD WIRES SHALL BE INSTALLED WITH A MINIMUM OF 1' - 6" OF SLACK IN EACH PLACE INDICATED TO PREVENT BREAKAGE OF WIRE BECAUSE OF BACKFILL SETTLEMENT.
2. LEAD WIRES SHALL BE ATTACHED TO THE PIPE ON THE CENTERLINE, APPROXIMATELY 12" APART.
3. LEAD WIRES SHALL BE EXOTHERMAL (CADWELD) WELDED TO PIPES IN ACCORDANCE WITH THE INSTRUCTIONS OF THE WELDING EQUIPMENT MANUFACTURER.

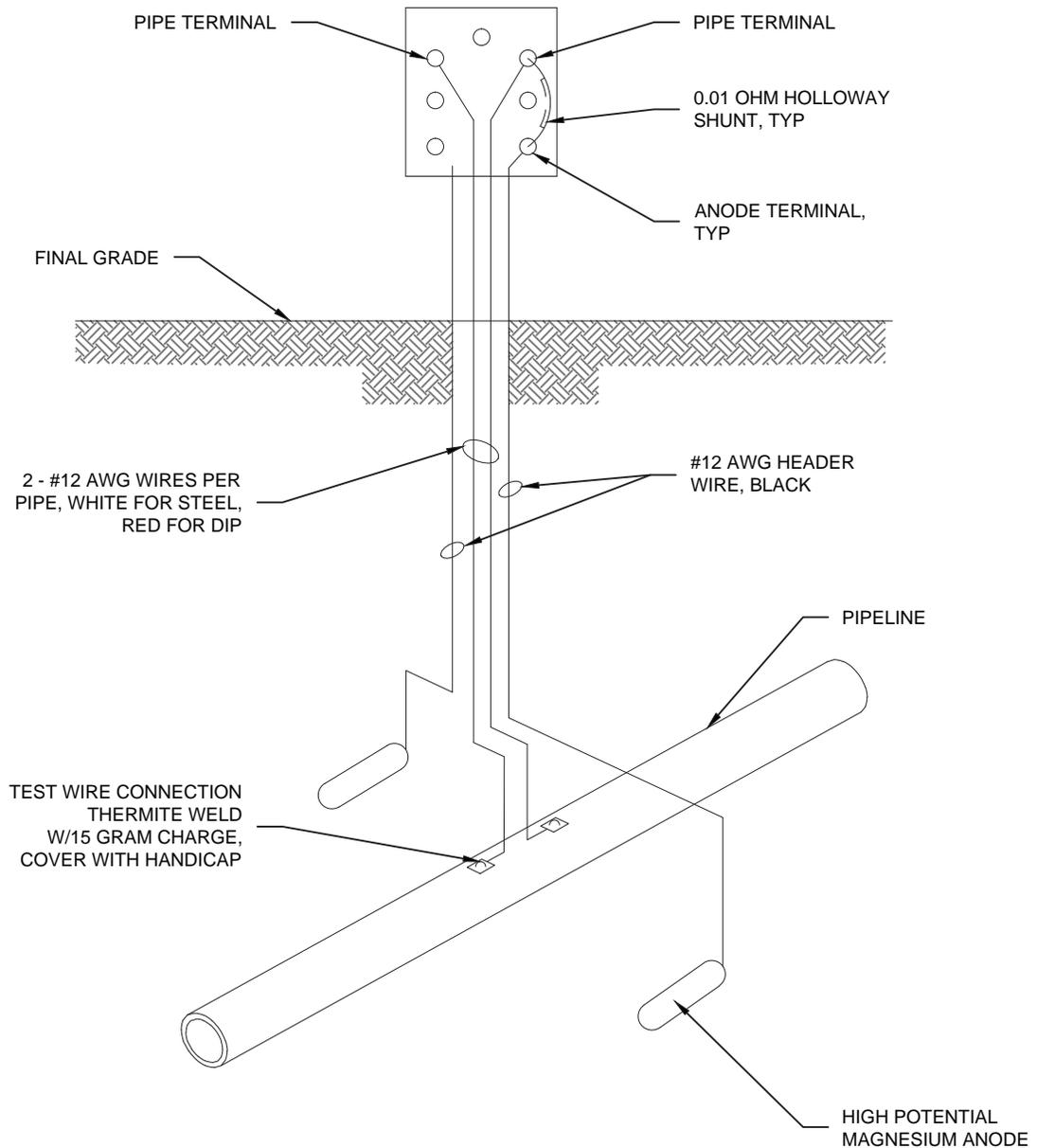


TYPICAL DETAIL FOR TEST STATION WITH STEEL SLEEVE INSTALLATION

NOTES:

1. THE CASING SHALL BE CATHODICALLY PROTECTED UNDER THE DIRECTION OF THE COLORADO SPRINGS UTILITIES INSPECTOR. SEE SECTION 2.6.1.
2. EXAMPLE CAN VARY DUE TO SITE CONDITIONS AND COLORADO SPRINGS UTILITIES INSPECTORS' DIRECTION.
3. REFERENCE STANDARD DETAIL DRAWING A7-3 - STEEL CASING INSTALLATION.
4. CONTRACTOR TO COORDINATE W/ COLORADO SPRINGS UTILITIES TO WIRE TERMINAL BOARD.
5. THERMITE WELD WIRES TO PIPE W/ 15 GRAM CHARGE. INSTALL COPPER SLEEVE WHEN WIRE IS #10 AWG OR SMALLER.
6. THERMITE WELD CONNECTIONS AND ANY BARE METAL SHALL BE COVERED WITH PRIMERLESS HANDICAP OR CORROSION TAPE.
7. CONTRACTOR TO VERIFY CONTINUITY OF ALL WIRES TO TERMINAL BOARD PRIOR TO FINAL ACCEPTANCE.

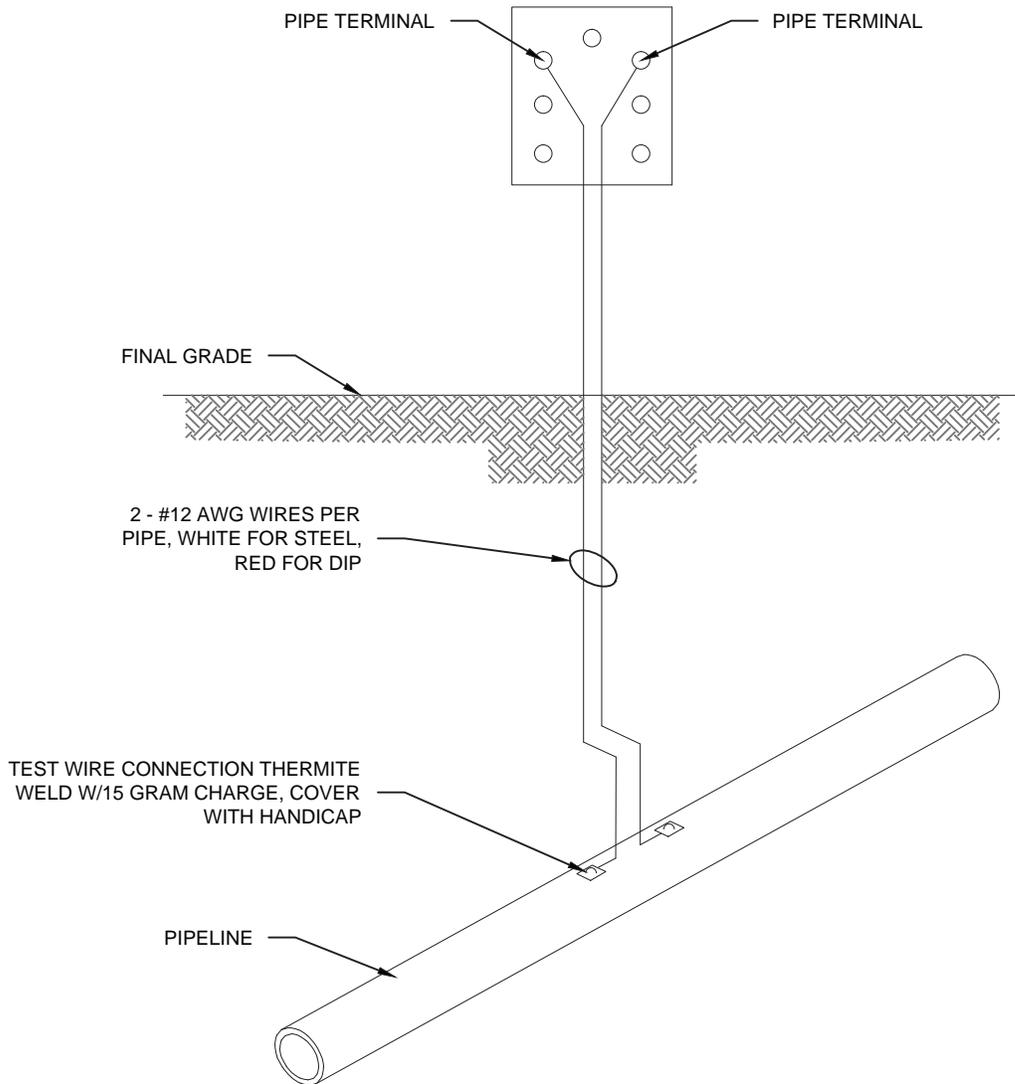
TERMINAL BOARD WIRING DIAGRAM



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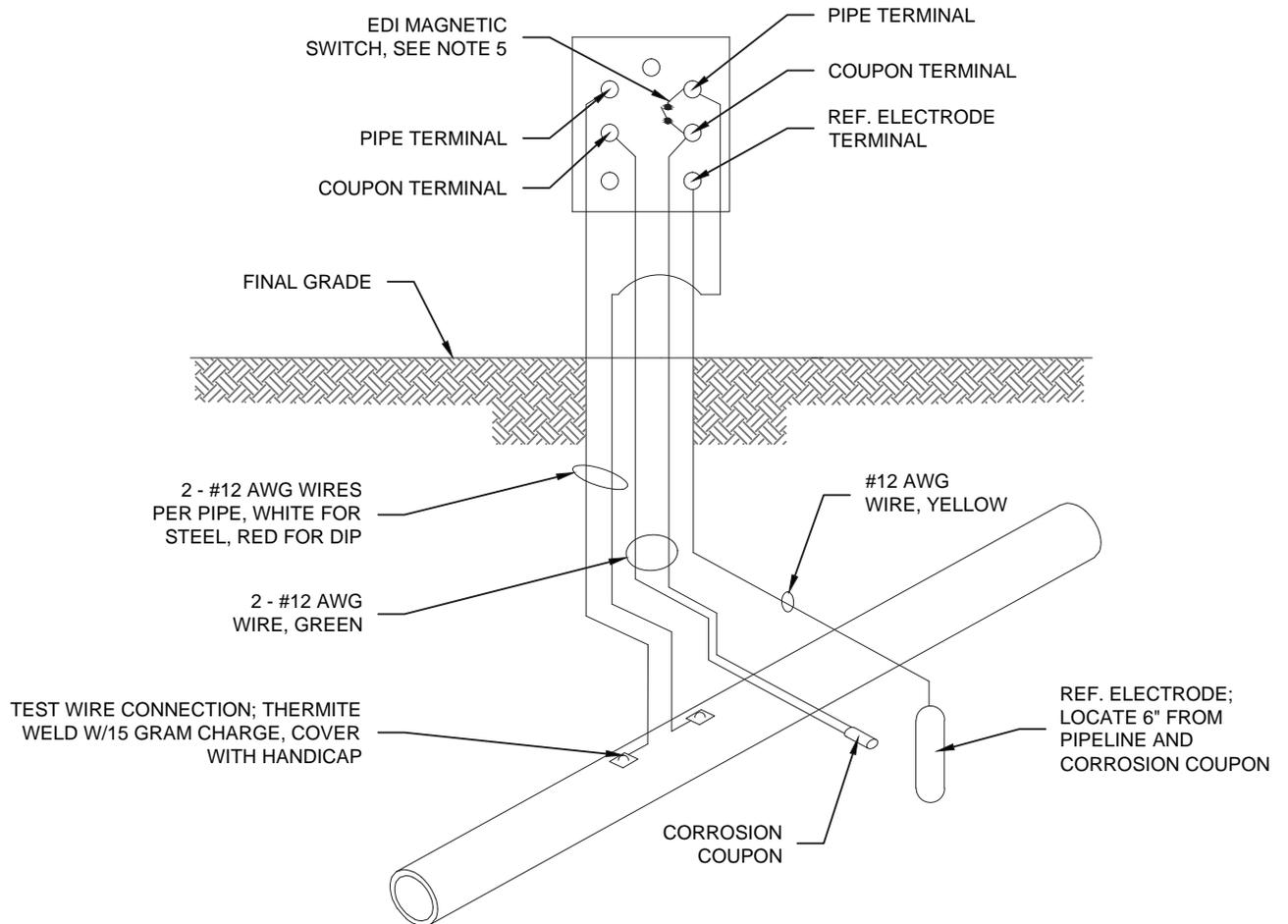
TERMINAL BOARD WIRING DIAGRAM



NOTES:

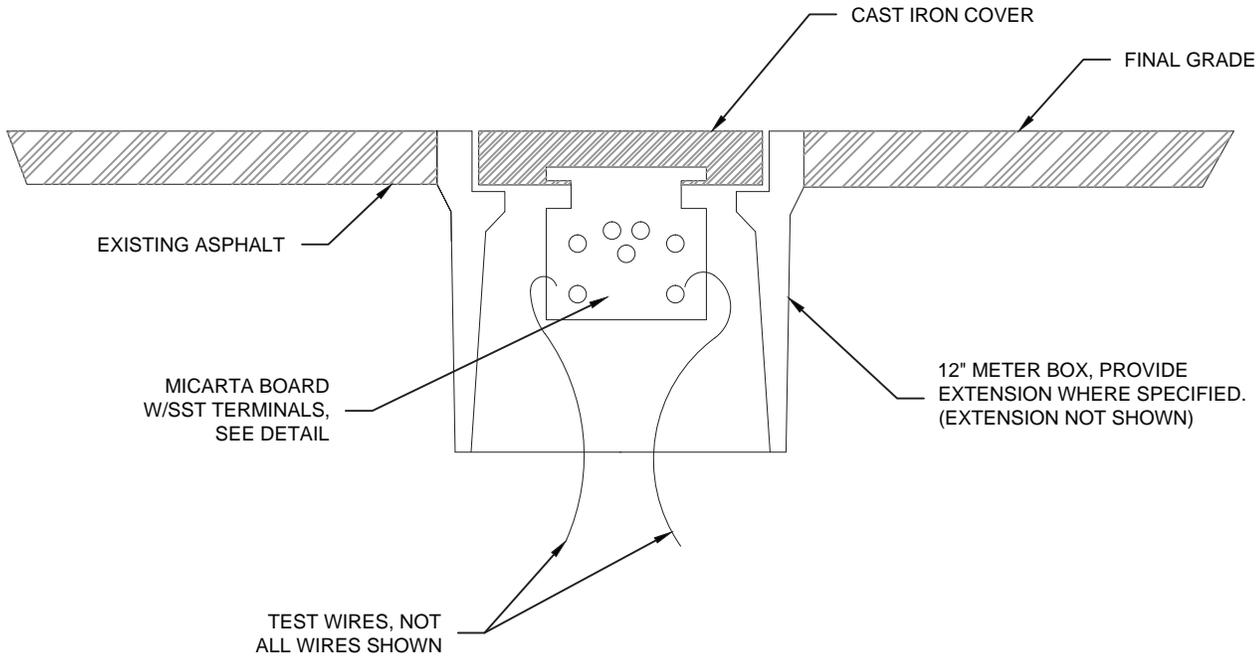
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TERMINAL BOARD WIRING DIAGRAM



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4. THE CONTRACTOR SHALL VERIFY CONTINUITY OF ALL WIRES TO TERMINAL BOARD PRIOR TO FINAL ACCEPTANCE.
5. REMOVE MAGNETIC SWITCH FOR A REMOTE TERMINAL UNIT (RTU).

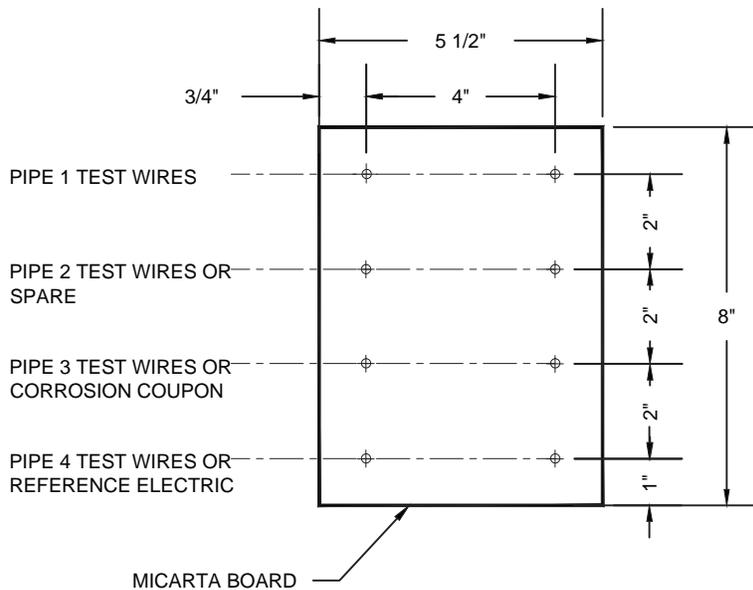


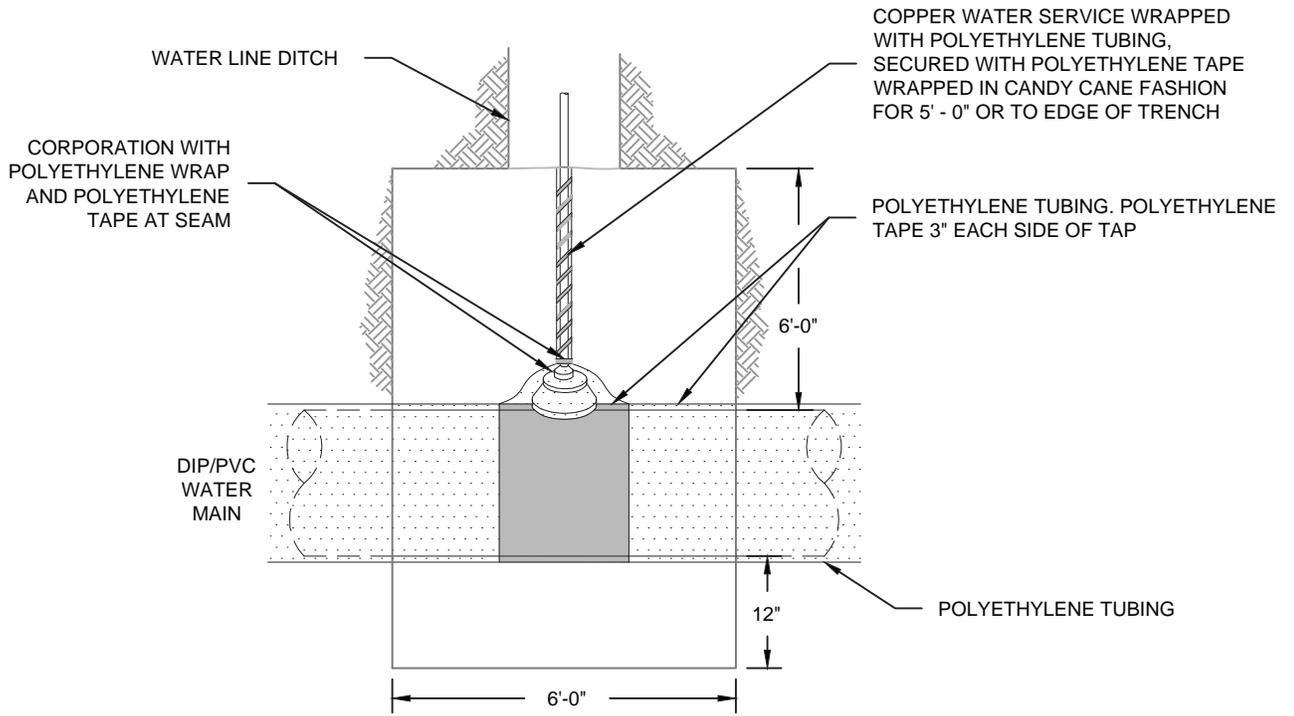
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4. THE CONTRACTOR SHALL VERIFY CONTINUITY OF ALL WIRES TO TERMINAL BOARD PRIOR TO FINAL ACCEPTANCE.
5. COLOR CODE WIRE INSULATION AS SHOWN IN APPLICABLE TEST STATION DETAILS. CONNECT EACH TEST WIRE TO SEPARATE TERMINAL.
6. WIRE CONFIGURATION FOR FLUSH MOUNT STYLE TEST STATIONS SIMILAR TO POST MOUNT STYLE TEST STATIONS.
7. PROVIDE 18 INCHES SLACK IN TEST WIRES, MINIMUM.

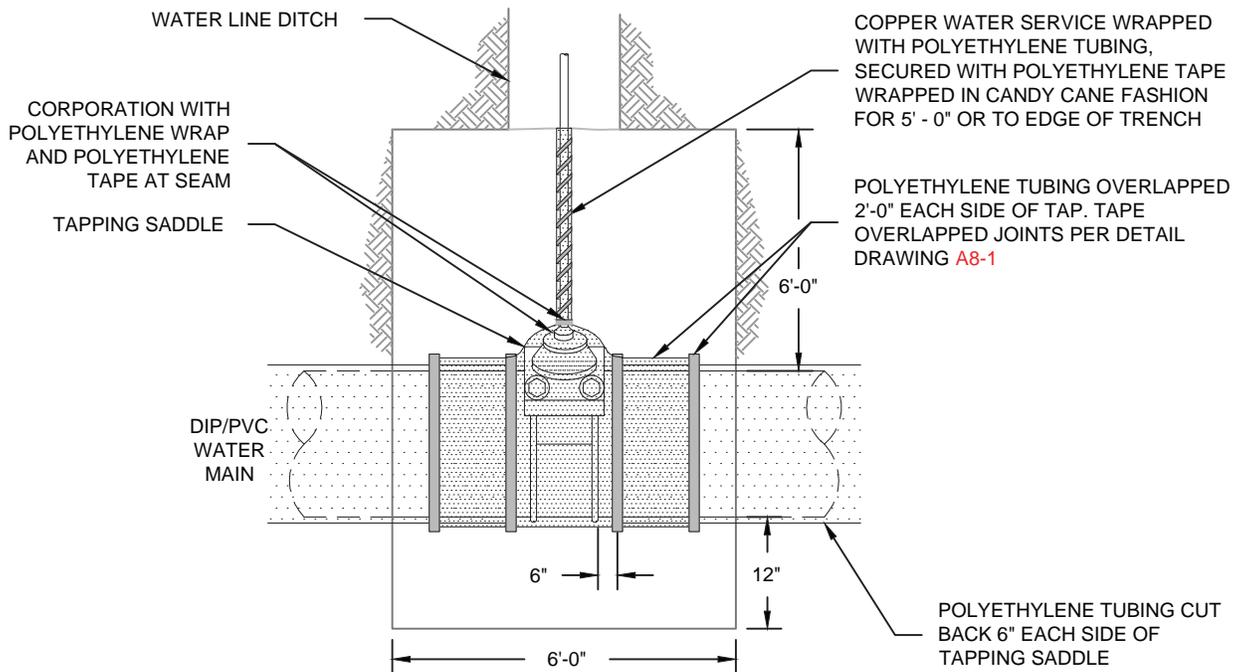
NOTES:

1. TERMINALS SHALL BE 1/4" STAINLESS STEEL W/LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. ALL WIRE CONNECTIONS TO BE W/RING TONGUE COMPRESSION TERMINALS.
3. WIRES ON TEST STATIONS TO BE PERMANENTLY LABELED WITH PIPE IDENTIFICATION (i.e. 12" DIP) USING NYLON WIRE MARKER TAGS.





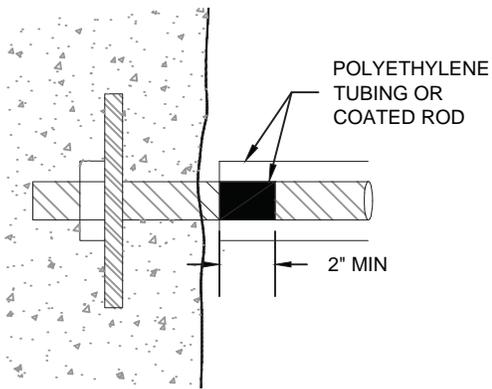
TAPPING DETAIL FOR 1/2" THROUGH 1" CONNECTION



TAPPING DETAIL FOR 1 1/2" AND 2" CONNECTION

NOTES:

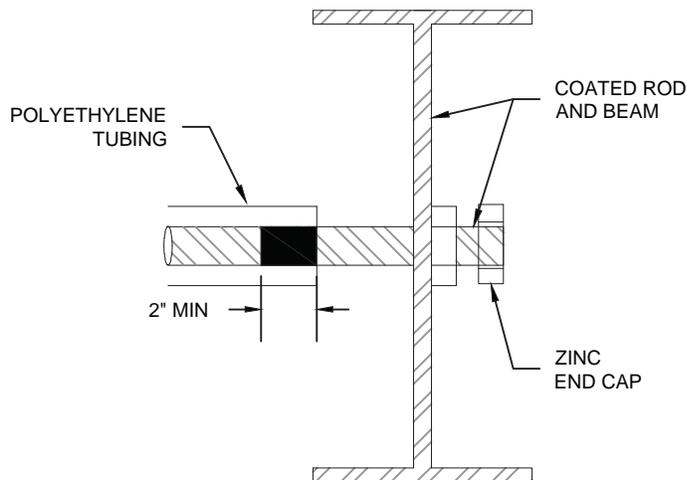
1. DO NOT WRAP OR WAX TAPE DIRECT TAP OR FITTINGS ON COPPER WATER SERVICE LINES.
2. PVC AND HDPE WATER SERVICE METAL FITTINGS SHALL BE WRAPPED OR WAX TAPED PER SECTION 2.6.I.



METAL IN CONCRETE

NOTES:

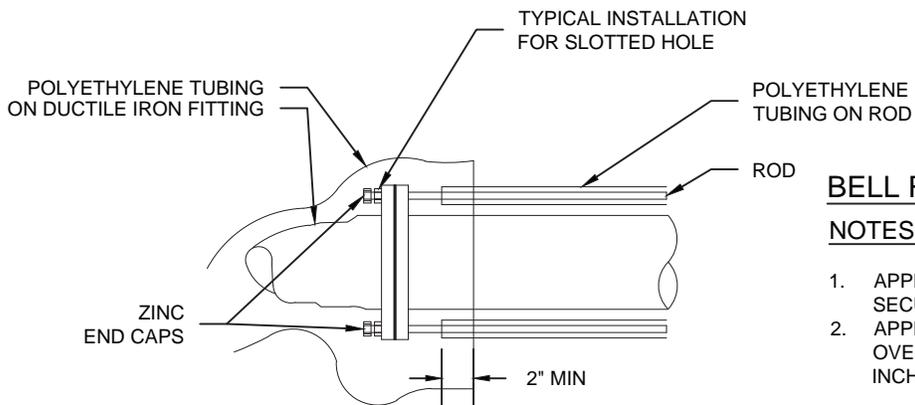
1. COAT METAL PARTS WHERE IN CONTACT WITH CONCRETE, EXTENDING COATING SEVERAL INCHES BEYOND THE CONCRETE, SEE SECTION 2.6.1.
2. APPLY POLYETHYLENE WRAP TO THE ROD, OVERLAPPING THE POLYETHYLENE WRAP AND COATING A MINIMUM OF 2 INCHES.
3. SECURE POLYETHYLENE WRAP TO THE ROD USING 2 INCH WIDE POLYETHYLENE PRESSURE-SENSITIVE TAPE.



ROD THROUGH I-BEAM

NOTES:

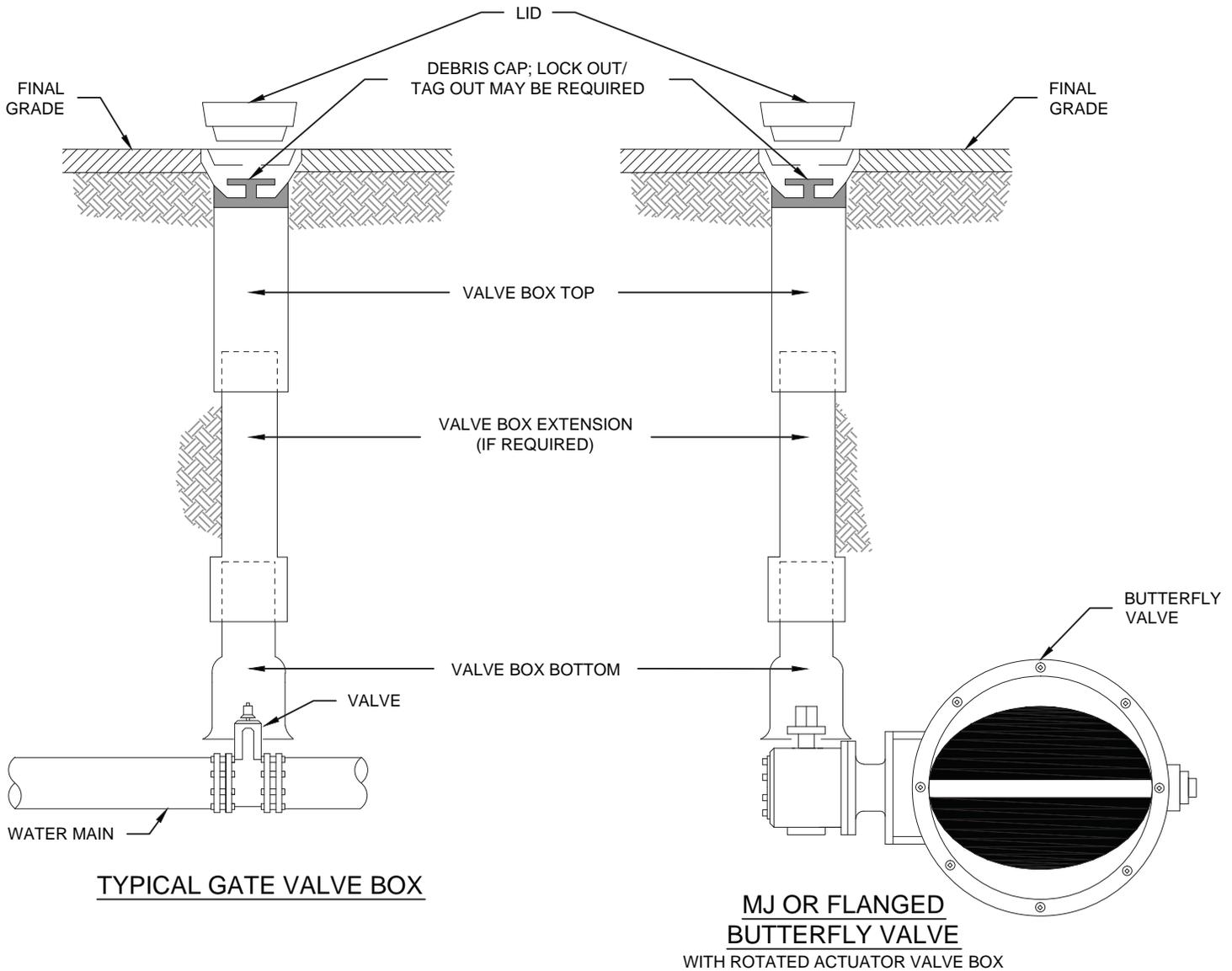
1. COAT ENTIRE I-BEAM, SEE SECTION 2.6.1.
2. COAT NUT AND ROD, EXTENDING COATING SEVERAL INCHES BEYOND THE BEAM.
3. APPLY POLYETHYLENE WRAP TO THE ROD, OVERLAPPING THE COATING A MINIMUM OF 2 INCHES AND SECURE WITH TAPE.



BELL RESTRAINT

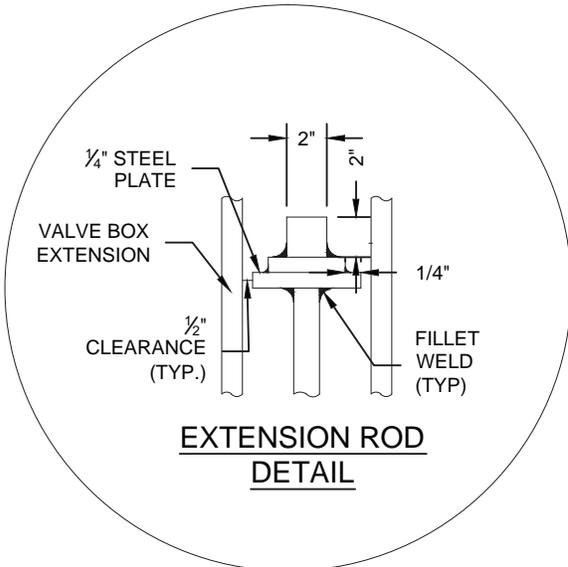
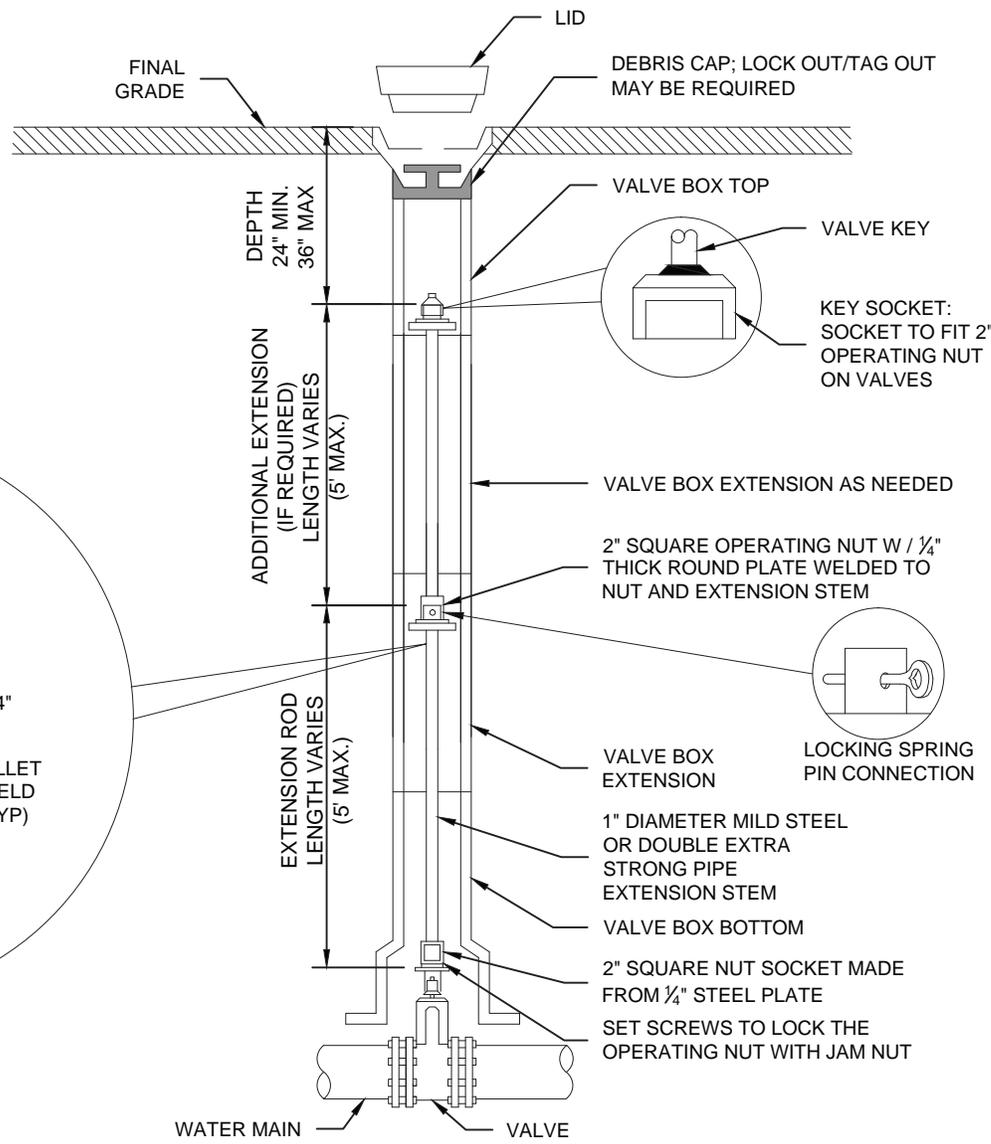
NOTES:

1. APPLY POLYETHYLENE WRAP TO THE ROD AND SECURE WITH TAPE, SEE SECTION 2.6.1.
2. APPLY POLYETHYLENE WRAP ON THE FITTING, OVERLAPPING THE COATING A MINIMUM OF 2 INCHES AND SECURE WITH TAPE.



NOTES:

1. MAIN AND FIRE HYDRANT VALVES AND VALVE BOXES SHALL NOT BE IN THE CURB PAN, CURB OR SIDEWALK.
2. VALVE BOXES SHALL BE SLIP TYPE, PER CHAPTER 4.
3. DEBRIS CAPS SHALL BE INSTALLED AS CLOSE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATIONS.
4. DEBRIS CAPS WITH FLEXIBLE SKIRTS SHALL BE TRIMMED TO PROVIDE A SMOOTH CONTACT WITH THE INTERIOR OF THE VALVE BOX.
5. FOR SERVICE LINES 4" AND GREATER, TRACER WIRE WILL BE BROUGHT UP IN THE SECONDARY VALVE BOX.



NOTES:

1. THIS DRAWING DEPICTS DEEP VALVE BOX INSTALLATIONS WITH EXTENSION RODS.
2. FOR BUTTERFLY VALVES, SUPPORT GEAR CASING WITH 4"x18"x18" (MIN) CONCRETE BLOCKS.
3. REFER TO DETAIL DRAWING A9-1 FOR TYPICAL VALVE BOX INSTALLATION REQUIREMENTS.

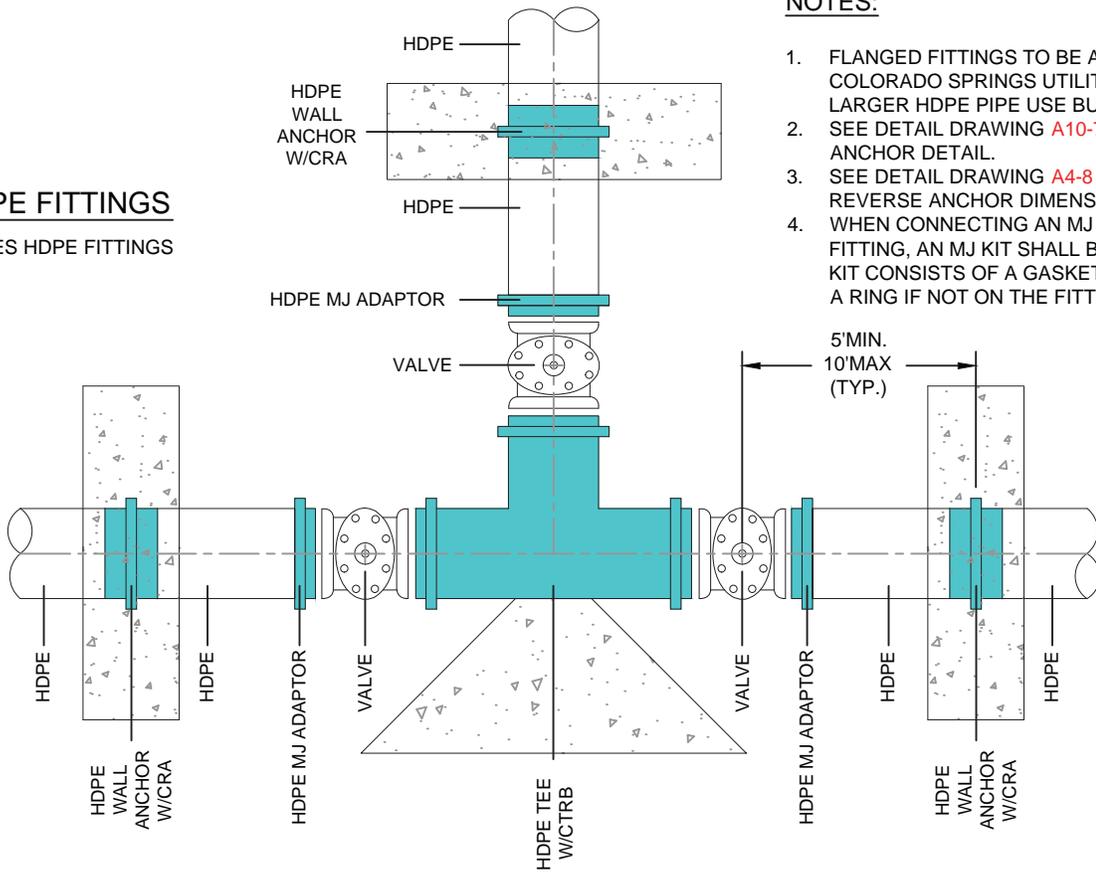


**DEEP VALVE BOX INSTALLATION
WITH EXTENSION RODS FOR
DEPTHS OVER 10'**

A9-2
DATED 03/2014

TIE-IN HDPE FITTINGS

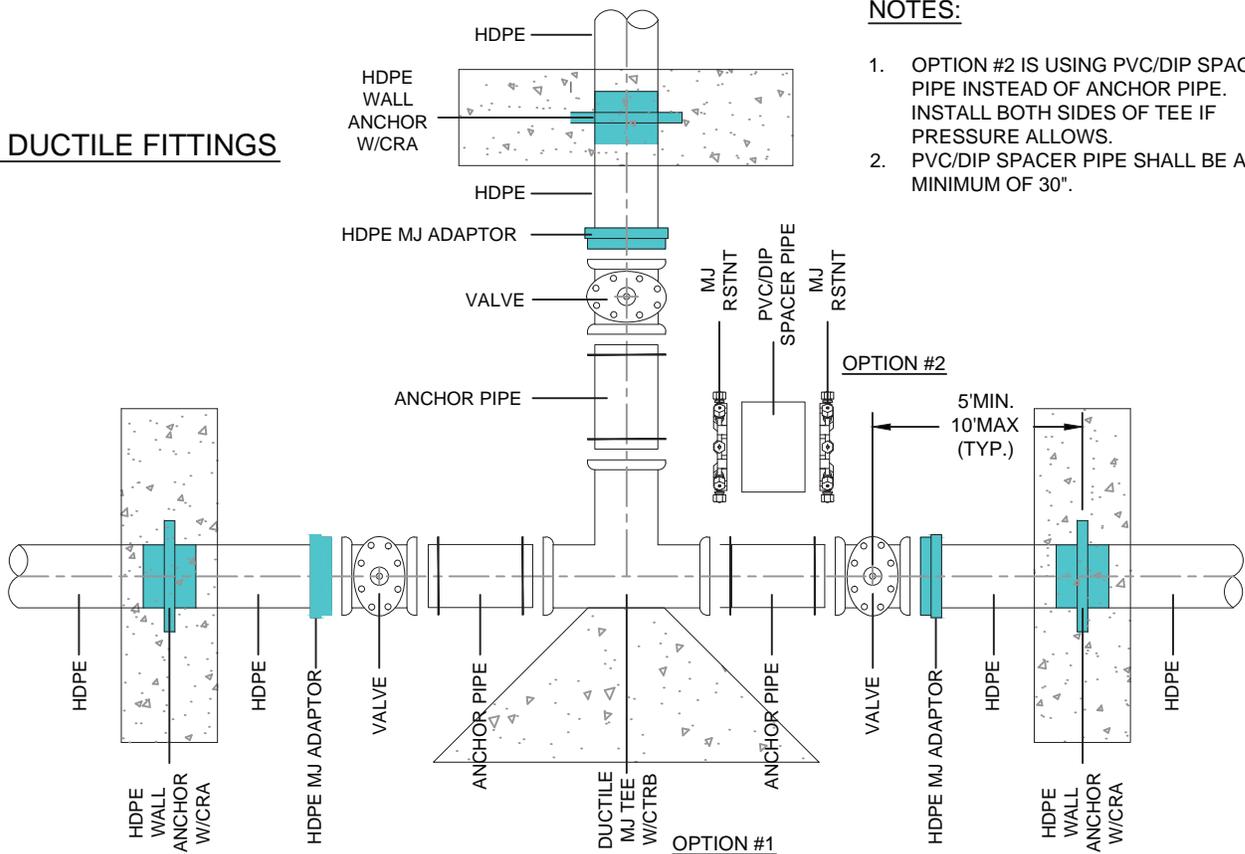
■ DENOTES HDPE FITTINGS



NOTES:

1. FLANGED FITTINGS TO BE APPROVED BY COLORADO SPRINGS UTILITIES. FOR 16" OR LARGER HDPE PIPE USE BUTTERFLY VALVES.
2. SEE DETAIL DRAWING A10-7 FOR WALL ANCHOR DETAIL.
3. SEE DETAIL DRAWING A4-8 FOR CONCRETE REVERSE ANCHOR DIMENSIONS AND SIZING.
4. WHEN CONNECTING AN MJ FITTING TO AN MJ FITTING, AN MJ KIT SHALL BE USED. THE MJ KIT CONSISTS OF A GASKET AND BOLTS (AND A RING IF NOT ON THE FITTING)

TIE-IN DUCTILE FITTINGS



NOTES:

1. OPTION #2 IS USING PVC/DIP SPACER PIPE INSTEAD OF ANCHOR PIPE. INSTALL BOTH SIDES OF TEE IF PRESSURE ALLOWS.
2. PVC/DIP SPACER PIPE SHALL BE A MINIMUM OF 30".