

# WEST HARRIS COUNTY REGIONAL WATER AUTHORITY SURFACE WATER SUPPLY PROJECT

## KINDER MORGAN KM"X"

### PROJECT LIMITS DESCRIPTION

**48 HOUR NOTICE**

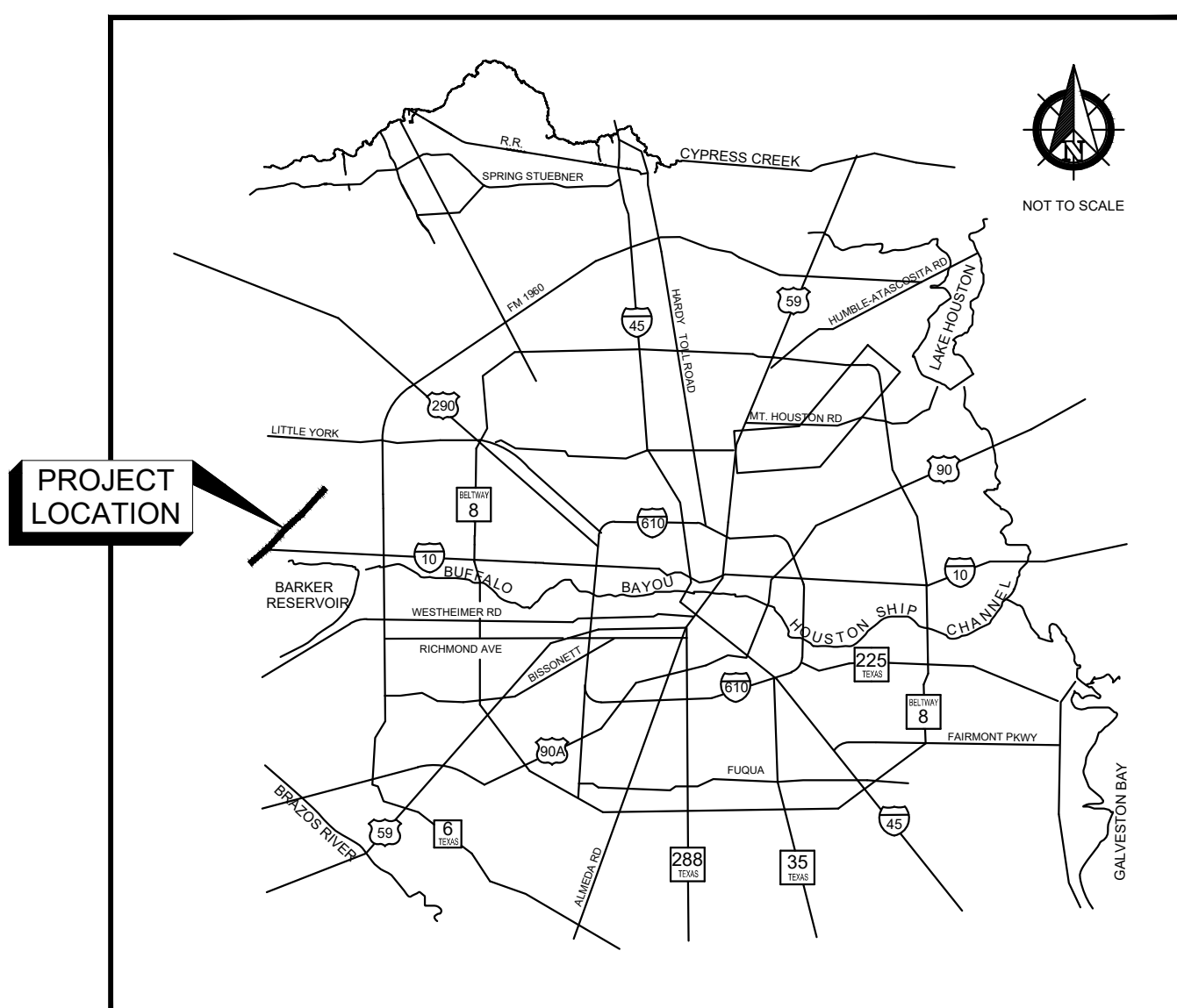
CONTRACTOR SHALL NOTIFY HARRIS COUNTY PRIOR TO COMMENCING CONSTRUCTION AND/OR BACKFILLING ANY UTILITIES. CONTRACTOR(S) TO CONTACT MARC BARBE WITH PUBLIC REVIEW DEPARTMENT @ (713-274-3937) OR (marc.barbe@hcpid.org)

**\*CONSTRUCTION IN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY REQUIRES:**

SITE PLANS MUST BE APPROVED PRIOR TO OBTAINING THE REQUIRED HCFCD RIGHT-OF-WAY NOTIFICATION. BE ADVISED THAT THE HCFCD RIGHT-OF-WAY NOTIFICATION IS SEPARATE FROM THE SITE DEVELOPMENT PERMIT PACKAGE

- 1.) HCFCD RIGHT-OF-WAY NOTIFICATION (PERMIT)
- 2.) HCFCD 48-HR PRE-CONSTRUCTION NOTICE

BOTH ARE REQUIRED PRIOR TO ENTERING OR WORKING WITHIN HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY. THE HCFCD RIGHT-OF-WAY NOTIFICATION AND 48-HOUR NOTICE MUST BE PROVIDED TO HCFCD AT [dcid@hcfcd.org](mailto:dcid@hcfcd.org)  
TO APPLY FOR THE HCFCD RIGHT-OF-WAY NOTIFICATION PLEASE GO TO <http://apps.harriscountytx.gov/EPermits> AND APPLY FOR THE HCFCD ROW UNDER ROW NOTIFICATION. FAILURE TO PROVIDE BOTH ITEMS COULD RESULT IN PROJECT DELAYS.



LOCATION MAP



WEST HARRIS COUNTY REGIONAL WATER AUTHORITY  
BOARD OF DIRECTORS

- LARRY A. WEPPLER DIRECTOR PRECINCT #1
- JOHN WHEELER DIRECTOR PRECINCT #2
- ERIC HANSEN DIRECTOR PRECINCT #3
- MICHAEL THORNHILL DIRECTOR PRECINCT #4
- MIKE OWENS DIRECTOR PRECINCT #5
- DOUGLAS C. POSTLE DIRECTOR PRECINCT #6
- GARY STRUZICK DIRECTOR PRECINCT #7
- MARK G. JANNECK DIRECTOR PRECINCT #8
- DENNIS GORDEN DIRECTOR PRECINCT #9

NORTH FORT BEND WATER AUTHORITY  
BOARD OF DIRECTORS

- \_\_\_\_\_ DIRECTOR PRECINCT #1
- ROBERT DARDEN DIRECTOR PRECINCT #2
- BRUCE FAY DIRECTOR PRECINCT #3
- MELONY F. GAY DIRECTOR PRECINCT #4
- ROBERT L. PATTON DIRECTOR PRECINCT #5
- PETER HOUGHTON DIRECTOR PRECINCT #6
- \_\_\_\_\_ DIRECTOR PRECINCT #7

DESIGN VARIANCE GIVEN BY CITY ENGINEER BY EMAIL DATED 1/22/2019. CITY SIGNATURES DO NOT REPRESENT COMPLIANCE WITH THE CITY'S DESIGN STANDARDS, ONLY ACKNOWLEDGEMENT OF THE PROJECT FOR THE PURPOSES OF CONSTRUCTION AND PERMITTING.

CONSTRUCTION ACTIVITIES ALLOWED ONLY IN AREAS WHERE THE AUTHORITY HAS EASEMENTS OR THE LEGAL RIGHT TO BE PRESENT

ONE-CALL NOTIFICATION SYSTEM  
CALL BEFORE YOU DIG!!  
(713) 223-4567  
(New Statewide Number Outside Houston)  
1-800-545-6005

ILMS NO.  
C.O.H. LOG. NO.

**XX% SUBMITTAL**

WHCRWA NFBWA  
**SURFACE WATER SUPPLY PROJECT**  
Program Manager  
**DANNENBAUM ENGINEERING CORPORATION**

3	MM/DD/YY	BRIEF DESCRIPTION	XXX
2	MM/DD/YY	BRIEF DESCRIPTION	XXX
1	MM/DD/YY	BRIEF DESCRIPTION	XXX
NO.	DATE	REVISION	APP.

**Company Name**  
**Address**  
**Telephone No.**  
**Texas Firm No.**

INTERIM REVIEW ONLY  
Not to be used for construction, bidding, permit or regulatory approval purposes. This document is released for the purpose of interim review under the authority of:  
John D. Doe  
XXXXX  
08/31/2019  
Engineer of Record  
Texas Registered Engineering Firm F-#XXX

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE
TRAFFIC SIGNAL	

CITY ENGINEER DATE DIRECTOR OF HOUSTON PUBLIC WORKS DATE

SHEET NO XX OF XX SHEETS  
FOR CITY OF HOUSTON USE ONLY

VICINITY MAP

- KEY MAP NO. 0000
- GIMS MAP NO. 00000
- ZIP CODE NO. 00000

ISSUE DATE: MONTH/DAY/YEAR

**DRAWING LIST**

DWG No	SHEET	DESCRIPTION
	1	COVER SHEET
	2	HARRIS COUNTY EXPRESS REVIEW SHEET
	3	INDEX OF DRAWINGS AND LEGEND
	4	GENERAL CONSTRUCTION NOTES
	5	SHEET LAYOUT MAP AND CORE BORING PLAN
	6	SURVEY CONTROL MAP (SHEET 1 OF 3)
	7	SURVEY CONTROL MAP (SHEET 2 OF 3)
	8	SURVEY CONTROL MAP (SHEET 3 OF 3)
	9	PLAN AND PROFILE STATION 0+00 TO 5+00
	10	PLAN AND PROFILE STATION 5+00 TO 10+00
	11	PLAN AND PROFILE STATION 10+00 TO 15+00
	12	PLAN AND PROFILE STATION 15+00 TO 20+00
	13	PLAN AND PROFILE STATION 20+00 TO 25+00
	14	PLAN AND PROFILE STATION 25+00 TO 30+00
	15	PLAN AND PROFILE STATION 30+00 TO 35+00
D01	16	PROJECT SIGN DETAIL
D02	17	STEEL PIPE DETAILS
D03	18	PRESTRESSED CONCRETE CYLINDER PIPE DETAILS
D04	19	TUNNEL AND CASING DETAILS
D05	20	AIR VALVE IN SERVICE MANHOLE DETAILS
D06	21	VENT PIPING DETAILS
D07	22	VALVE AND SERVICE MANHOLE DETAILS
D08	23	MANHOLE COVER DETAILS
D09	24	STANDARD WATER MAIN DETAILS
D10	25	EXCAVATION, BEDDING, BACKFILL AND PAVEMENT REPAIR DETAILS
D11	26	BEDDING & BACKFILL AUGER PIT & SANITARY SEWER CROSSING DETAIL
D12	27	TREE PROTECTION DETAILS
M01	28	COMBINED METER/FLOW CONTROL FLOW MECHANICAL
M02	29	COMBINED METER/FLOW CONTROL FLOW MECHANICAL
M03	30	HOTBOX DETAILS
M04	31	COMBINED METER/FLOW CONTROL FLOW STRUCTURAL
M05	32	COMBINED METER/FLOW CONTROL FLOW STRUCTURAL

**DRAWING LIST**

DWG No	SHEET	DESCRIPTION
E01	33	ELECTRICAL METERING/FLOW CONTROL STATION POWER PLAN
E02	34	ELECTRICAL METERING/FLOW CONTROL STATION PLANS AND DETAILS
E03	35	ELECTRICAL CONDUIT AND CABLE SCHEDULE YARD LIGHT DETAIL
E04	36	ELECTRICAL CONTROL PANEL LAYOUT SHEET 1 OF 2
E05	37	ELECTRICAL CONTROL PANEL LAYOUT SHEET 2 OF 2
E06	38	ELECTRICAL POWER WIRING DIAGRAM SHEET 1 OF 2
E07	39	ELECTRICAL POWER WIRING DIAGRAM SHEET 2 OF 2
E08	40	ELECTRICAL CONTROL WIRING DIAGRAM SHEET 1 OF 5
E09	41	ELECTRICAL CONTROL WIRING DIAGRAM SHEET 2 OF 5
E10	42	ELECTRICAL CONTROL WIRING DIAGRAM SHEET 3 OF 5
E11	43	ELECTRICAL CONTROL WIRING DIAGRAM SHEET 4 OF 5
E12	44	ELECTRICAL CONTROL WIRING DIAGRAM SHEET 5 OF 5
E13	45	ELECTRICAL CONTROL PANEL AND SUN SHIELD DETAILS
E14	46	ELECTRICAL MISCELLANEOUS DETAILS SHEET 1 OF 2
E15	47	ELECTRICAL MISCELLANEOUS DETAILS SHEET 2 OF 2
CP1	48	CATHODIC PROTECTION SCHEDULES
CP2	49	CATHODIC PROTECTION TEST STATION DETAILS 1 OF 4
CP3	50	CATHODIC PROTECTION TEST STATION DETAILS 2 OF 4
CP4	51	CATHODIC PROTECTION TEST STATION DETAILS 3 OF 4
CP5	52	CATHODIC PROTECTION TEST STATION DETAILS 4 OF 4
CP6	53	CATHODIC PROTECTION RECTIFIER DETAILS 1 OF 2
CP7	54	CATHODIC PROTECTION RECTIFIER DETAILS 2 OF 2
CP8	55	CATHODIC PROTECTION INSULATING JOINT DETAILS
CP9	56	CATHODIC PROTECTION JOINT BONDING
CP10	57	CATHODIC PROTECTION MISCELLANEOUS DETAILS 1 OF 2
CP11	58	CATHODIC PROTECTION MISCELLANEOUS DETAILS 2 OF 2
SW1	59	STORM WATER POLLUTION PREVENTION PLANS (SHEET 1 OF 4)
SW2	60	STORM WATER POLLUTION PREVENTION PLANS (SHEET 2 OF 4)
SW3	61	STORM WATER POLLUTION PREVENTION PLANS (SHEET 3 OF 4)
SW4	62	STORM WATER POLLUTION PREVENTION PLANS (SHEET 4 OF 4)
SW5	63	STORM WATER POLLUTION PREVENTION DETAILS
TC1	64	TRAFFIC CONTROL PLAN
TC2	65	TRAFFIC CONTROL DETAILS

**STANDARD ABBREVIATIONS**

@	AT	N.	NORTH
AI/VR	AIR RELEASE/VACUUM RELEASE	N.G.	NATURAL GROUND
B.L.	BUILDING LINE	N.F.V.	NOT FIELD VERIFIED
B/F	BLIND FLANGE	P.C.	POINT OF CURVATURE
B.F.V.	BUTTERFLY VALVE	P.O.C.	POINT ON CURVE
BL	BASELINE	PI	POINT OF INTERSECTION
B/S	BACKSLOPE	PL	PROPERTY LINE
C.L.	CENTER LINE	P.R.C.	POINT OF REVERSE CURVE
CLR.	CLEARANCE	PRV	PRESSURE REDUCING VALVE
C-C	CENTER TO CENTER	P.T.	POINT OF TANGENCY
C.O.	CLEAN OUT	PT.	POINT
CONC.	CONCRETE	PROP.	PROPOSED
CP	CATHODIC PROTECTION	PVI	POINT OF VERTICAL INTERSECTION
C.G.M.P.	CORRUGATED GALVANIZED METAL PIPE	PVMT.	PAVEMENT
		R.	RADIUS
C.M.P.	CORRUGATED METAL PIPE	R.C.P.	REINFORCED CONCRETE PIPE
D.E.	DRAINAGE EASEMENT	R.O.W.	RIGHT-OF-WAY
DESC.	DESCRIPTION	R.P.	RADIUS POINT
D.I.C.L.	DUCTILE IRON CEMENT LINED	RED.	REDUCER
D.I.P.	DUCTILE IRON PIPE	(R)	RECORD DRAWING NOT FIELD VERIFIED
DIA.	DIAMETER	RT.	RIGHT
D/W	DRIVEWAY	S.	SOUTH
E.	EAST	SJRA	SAN JACINTO RIVER AUTHORITY
E.P.	EDGE OF PAVEMENT	S.S.	SIDE SLOPE
EL.	ELEVATION	S.S.E.	SANITARY SEWER EASEMENT
ENT.	ENTERGY	SAN.	SANITARY
ESMT	EASEMENT	SB/BH	SOIL BORING/ BORE HOLE
EXIST.	EXISTING	SWBT	AT&T TEXAS/SWBT
F.H.	FIRE HYDRANT	STA.	STATION
F.L.	FLOOD LIGHT	STL	STEEL
F.M.	FORCE MAIN OR FLOW METER	STM.	STORM
F.V.	FLUSHING VALVE	SWR.	SEWER
FL.	FLOW LINE	T.C.	TOP OF CURB
G.V.	GATE VALVE	T.C.E.	TEMPORARY CONSTRUCTION EASEMENT
GRP	GROUNDWATER REDUCTION PROGRAM	TP	TOP OF PAVEMENT
		TYP.	TYPICAL
H.M.A.C.	HOT MIX ASPHALTIC CONCRETE	U.E.	UTILITY EASEMENT
H.P.	HIGH PRESSURE	VPI.	VERTICAL POINT INTERSECTION
I.P.	INTERMEDIATE PRESSURE	W.	WEST
I.R.	IRON ROD	W.L.	WATERLINE
INFL.	INFLUENT	W.L.E.	WATER LINE EASEMENT
INV. EL.	INVERT ELEVATION	w/	WITH
L.F.	LINEAR FEET		
L.U.S.T.	LEAKING UNDERGROUND STORAGE TANK		
L.T.	LEFT		
M.A.	MAINTENANCE ACCESS		
M.C.D.	MULTI CONDUIT DUCT		
M.H.	MANHOLE		
MAX.	MAXIMUM		
MIN.	MINIMUM		

**WHCROWA NFBWA**  
**SURFACE WATER SUPPLY PROJECT**  
 Program Manager  
**DANNENBAUM**  
 ENGINEERING CORPORATION

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**EXISTING PLAN LEGEND**

	SHRUB OR BUSH		LIGHT STANDARD
	TREE		ELECTRICAL BOX
	SAN MANHOLE, STORM MANHOLE		HEDGE
	AT&T TEXAS/SWBT MANHOLE		CURB LINE
	CLEANOUT		LOT LINES
	GAS METER		EASEMENT LINE
	GAS VALVE		EDGE OF ASPHALT
	FIRE HYDRANT		CULVERT PIPE
	WATER METER		BASELINE
	WATER VALVE		CHAIN LINK, WOOD FENCE
	POWER POLE, TELEPHONE & ELEC. POLE		GAS LINE OR PIPELINE
	DOWN GUY		AT&T TEXAS/SWBT LINE
	STORM "B" INLET		CENTERPOINT ENERGY CONDUIT
	STORM "B-B" INLET		CENTERPOINT ENERGY OVERHEAD LINES
	STORM INLET, GRATE		PROPERTY LINE (R.O.W.)
	TRAFFIC SIGNAL, SIGNAL POLE		SAN SEWER LINE 24" DIA. & SMALLER
	IRON ROD/POLE		SAN SEWER LINE 30" DIA. & LARGER
	WOOD POST, BRICK COLUMN, BRICK PILLAR		STM SEWER LINE 24" DIA. & SMALLER
	TRAFFIC, METRO, BUSINESS, STOP SIGNS		STM SEWER LINE 30" DIA & LARGER
	AT&T TEXAS/SWBT PEDESTAL, HISTORICAL MARKER		WATER LINE 24" DIA. & SMALLER
	W.H.C.R.W.A. SURVEY MARKER, MONUMENT MARKER		WATER LINE 30" DIA & LARGER
	SOIL BORING LOCATION		PIPELINE MARKER
	SOIL BORING & PIEZOMETER LOCATION		INFORMATION OBTAINED FROM RECORD DRAWINGS, NOT FIELD VERIFIED.
	MAILBOX		
	METAL POST		
	UTILITY MARKER		

**EXISTING PROFILE LEGEND**

	BASELINE, CENTER LINE OF RIGHT-OF-WAY
	R.O.W. LINE N & E
	R.O.W. LINE S & W
	DITCH OR CURB LINE N & E
	DITCH OR CURB LINE S & W
	GAS LINE
	AT&T TEXAS/SWBT CONDUIT
	SAN SEWER LINE 24" DIA. & SMALLER
	SAN SEWER LINE 30" DIA. & LARGER
	STM SEWER LINE 24" DIA. & SMALLER
	STM SEWER LINE 30" DIA & LARGER
	WATER LINE 24" DIA. & SMALLER
	WATER LINE 30" DIA & LARGER
	PIPELINE MARKER
	INFORMATION OBTAINED FROM RECORD DRAWINGS, NOT FIELD VERIFIED.

**PROPOSED LEGEND**

	T.S.V. & BOX
	BUTTERFLY VALVE
	STORM "BB" INLET
	ACCESS MANHOLE
	CATHODIC PROTECTION RECTIFIER AND DEEP ANODE
	AIR VENT w/3 BOLLARDS
	AIR VENT w/1 BOLLARD
	CATHODIC PROTECTION TEST STATION
	WHCROWA EASEMENT LINE
	WATER LINE 24" AND SMALLER
	WATER LINE 30" DIA & LARGER
	WATER LINE 24" DIA & SMALLER IN TUNNEL
	WATER LINE 30" DIA & LARGER IN TUNNEL

**PROPOSED LEGEND**

	WATER LINE 24" DIA & SMALLER
	WATER LINE 30" DIA & LARGER
	WATER LINE 30" DIA & LARGER TRENCHLESS
	GATE VALVE w/BOX
	BUTTERFLY VALVE w/OPERATOR M.H.
	INTERNAL ELLIPTICAL DISH HEAD PLUG
	MANHOLE, AI/VR

CONTRACT KM "X"

**INDEX SHEET LEGEND & ABBREVIATIONS**

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

**CITY OF HOUSTON**  
 HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO.	HORIZ: HORIZ
G-02	VERT: VERT
SHEET NO. XX OF XXX	DRAWING SCALE
FOR CITY OF HOUSTON USE ONLY	



GENERAL CONSTRUCTION NOTES

- 1. THERE WILL BE NO SEPARATE PAYMENT FOR WORK SHOWN ON THESE PLANS UNLESS OTHERWISE SPECIFICALLY ESTABLISHED IN BID SECTION OF CONTRACT DOCUMENTS. INCLUDE COST OF THIS WORK IN CONTRACT UNIT PRICE FOR ITEMS OF WHICH THIS WORK IS A COMPONENT OR INCIDENTAL TO.
2. CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF EXISTING FACILITIES PRIOR TO CONSTRUCTION OF PROPOSED FACILITIES. ANY DAMAGE TO EXISTING FACILITIES INCURRED AS A RESULT OF CONSTRUCTION OPERATIONS WILL BE REPAIRED AT CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL REMAIN FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING PUBLIC OR PRIVATE UTILITY LINES, INCLUDING BUT NOT LIMITED TO WATER MAINS, WASTEWATER COLLECTION SYSTEMS, AND STORM SEWERS, DURING CONSTRUCTION.
4. REMOVE EXISTING PLUGS AND CONNECT PROPOSED UTILITY LINES AS INDICATED ON PLANS.
5. VERIFY LOCATION OF UNDERGROUND UTILITIES AND NOTIFY THE FOLLOWING AGENCIES 48-HRS PRIOR TO EXCAVATING NEAR EXISTING FACILITIES:
A) TEXAS 811 AT (800) 245-4545
B) LONE STAR NOTIFICATION CENTER AT (800) 669-8344
C) TEXAS EXCAVATION SAFETY SYSTEM INC. AT (800) 344-8377.
6. COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS AND ALL REGULATIONS OF UTILITY COMPANIES CONCERNING SAFETY AND HEALTH PRACTICES.
7. INCLUDE PRICE OF ALL BEDDING AND BACKFILL OF TYPE REQUIRED IN PRICE BID PER LINEAR FOOT OF PIPE.
8. ALL SEWER TRENCHES UNDER OR WITHIN 1-FT OF PROPOSED AND/OR FUTURE PAVEMENT OR CURB SHALL BE BACKFILLED WITH 1-1/2 SACKS OF CEMENT PER CUBIC YARD CEMENT-STABILIZED SAND TO A POINT 1-FT BELOW PAVEMENT SUBGRADE. REMAINING BACKFILL SHALL BE MADE WITH COMPACTED SUITABLE MATERIAL PER SPECIFICATIONS.
9. OWNER WILL FURNISH INITIAL LABORATORY TESTS. SUBSEQUENT TESTING DUE TO FAILED TESTS SHALL BE AT CONTRACTOR'S EXPENSE. COPY OF ALL TEST RESULTS SHALL BE SUBMITTED TO ENGINEER.
10. DAILY REMOVE ALL MUD, DIRT, AND DEBRIS DEPOSITED OR DROPPED ON EXISTING PAVEMENT DUE TO CONSTRUCTION ACTIVITY. MATERIAL THAT IS HAZARDOUS TO TRAFFIC SHALL BE REMOVED IMMEDIATELY.
11. ALL TRAFFIC CONTROL AND WARNING SIGNS SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
12. WHEN TRENCH CONDITION WARRANTS USE OF DEWATERING SYSTEMS, THEIR USE SHALL BE REQUESTED BY CONTRACTOR AND APPROVED BY OWNER.
13. THESE PLANS DO NOT EXTEND OR INCLUDE DESIGNS OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. SEAL OF THE REGISTERED PROFESSIONAL ENGINEER(S) HEREON DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED IN THESE PLANS. CONTRACTOR SHALL INDEPENDENTLY PREPARE AND/OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS.
14. PROTECT ALL TREES DURING CONSTRUCTION. NO TREES SHALL BE REMOVED WITHOUT OWNER'S PERMISSION, UNLESS OTHERWISE SPECIFIED IN PLANS.
15. GIVE NOTICE TO ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS, OR PERSONS IN CHARGE OF PRIVATE AND PUBLIC UTILITIES OR RAILROADS AFFECTED BY OPERATIONS PRIOR TO COMMENCEMENT OF WORK. OBTAIN ALL NECESSARY CONSTRUCTION PERMITS PRIOR TO STARTING CONSTRUCTION.
16. OBTAIN ALL PERMITS REQUIRED BY REGULATION OF HARRIS COUNTY, TEXAS FOR FLOOD PLAIN MANAGEMENT PRIOR TO STARTING CONSTRUCTION.
17. OBTAIN ALL PERMITS REQUIRED BY HARRIS COUNTY, TEXAS PRIOR TO STARTING CONSTRUCTION OF UTILITIES AND/OR CULVERTS WITHIN HARRIS COUNTY ROAD RIGHTS-OF-WAY, IF APPLICABLE.
18. NOTIFY HARRIS COUNTY ENGINEERING DEPARTMENT BY WRITTEN NOTIFICATION 48-HRS IN ADVANCE OF STARTING CONSTRUCTION, FOLLOWED BY TELEPHONE NOTIFICATION AT (713) 316-3561 24-HRS IN ADVANCE OF STARTING CONSTRUCTION. A COPY OF WRITTEN NOTIFICATION SHALL BE SENT TO ENGINEER.
19. ALL DISTURBED AREAS OR AREAS AFFECTED BY CONSTRUCTION IN BOTH PRIVATE AND PUBLIC PROPERTIES SHALL BE CLEANED AND RETURNED TO EXISTING OR BETTER CONDITIONS. DISTURBED VEGETATED AREAS SHALL BE HYDRO-MULCHED UNLESS OTHERWISE NOTED ON THE PLANS. DISTURBED SWALES AND OTHER DRAINAGE FACILITIES SHALL BE RESTORED AND REMAIN FUNCTIONAL AFTER CONSTRUCTION. DISTURBED AREAS WITHIN HCFCO RIGHTS-OF-WAY AND/OR EASEMENTS SHALL BE FULLY RESTORED IN ACCORDANCE WITH APPLICABLE HCFCO STANDARD CONSTRUCTION SPECIFICATIONS.
20. ALL OPEN TRENCHES, TUNNEL SHAFTS, OR OTHER EXCAVATIONS SHALL BE SECURED IN ACCORDANCE WITH OSHA REQUIREMENTS.
21. ALL OPEN CUTS ON PAVEMENTS SHALL BE REPLACED AND REPAIRED PER DETAILS. STEEL PLATES SHALL BE USED AS WARRANTED TO PROVIDE A CONTINUOUS TRAFFIC FLOW AFTER WORKING HOURS.
22. ALL HIKE AND BIKE TRAILS SHALL BE REPLACED IF DAMAGED OR REMOVED DURING CONSTRUCTION.
23. RESTORE ALL SPRINKLER AND/OR IRRIGATION SYSTEMS DISTURBED DURING CONSTRUCTION TO ORIGINAL CONDITION OR BETTER, NO SEPARATE PAY.

WATER MAIN CONSTRUCTION NOTES

- 1. ALL NEWLY INSTALLED PIPES, COATINGS, AND RELATED PRODUCTS SHALL CONFORM TO ANSIS/NSF STANDARDS AND MUST BE CERTIFIED BY AN ORGANIZATION ACCREDITED BY ANSI.
2. UNLESS OTHERWISE INDICATED ON THE PLANS, ALL WATER MAIN TRENCHES SHALL BE BACKFILLED WITH BANK-RUN SAND TO A POINT 1-FT OVER TOP OF PIPE. REMAINING BACKFILL SHALL BE MADE WITH COMPACTED SUITABLE MATERIAL PER SPECIFICATIONS. ALL TRENCHES WITHIN HCFCO RIGHTS-OF-WAY AND/OR EASEMENTS SHALL BE BACKFILLED AND RESTORED IN ACCORDANCE WITH APPLICABLE HCFCO STANDARD CONSTRUCTION SPECIFICATIONS.
3. CONTACT DISTRICT OPERATOR PRIOR TO MAKING ANY CONNECTION(S) TO EXISTING WATER MAINS AND/OR ANYTIME A VALVE ON AN EXISTING WATER MAIN IS TO BE OPENED OR CLOSED.
DISTRICT NAME:
OPERATOR COMPANY:
OPERATOR CONTACT:
CONTACT PHONE #:
4. ALLOW A MINIMUM OF 1-FT VERTICAL AND 4-FT HORIZONTAL CLEARANCE BETWEEN PROPOSED WATER MAINS AND OTHER EXISTING OR PROPOSED UTILITIES. WATER MAINS CROSSING STORM SEWERS SHALL HAVE A MINIMUM OF 2-FT VERTICAL CLEARANCE.
5. WHEN A WATER MAIN IS PLACED NEAR A SANITARY SEWER MANHOLE, IT SHALL HAVE A MINIMUM OF 9-FT WALL TO WALL SEPARATION. WHERE A WATER MAIN PARALLELS A SANITARY SEWER, 9-FT SEPARATION SHALL BE MAINTAINED IN ALL DIRECTIONS. IF THE 9-FT SEPARATION CANNOT BE ACHIEVED, BOTH SEWER PIPE AND JOINTS SHALL HAVE A MINIMUM PRESSURE RATING OF 150-PSI AND MANHOLES SHALL BE WATER TIGHT. VERTICAL SEPARATION SHALL BE A MINIMUM OF 2-FT BETWEEN OUTSIDE DIAMETERS AND HORIZONTAL SEPARATION SHALL BE A MINIMUM OF 4-FT BETWEEN OUTSIDE DIAMETERS.
6. ALL WATER MAINS WITHIN DEDICATED EASEMENTS SHALL HAVE A MINIMUM 6-FT OF COVER FROM NATURAL GROUND. ALL WATER MAINS WITHIN RIGHTS-OF-WAY WITH IMPROVED ROADWAY SHALL HAVE A MINIMUM 6-FT OF COVER FROM EXISTING OR PROPOSED TOP OF CURB (TOC). ALL WATER MAINS WITHIN RIGHTS-OF-WAY WITH UNIMPROVED ROADWAY SHALL HAVE A MINIMUM 8-FT OF COVER FROM NATURAL GROUND.
7. UNLESS OTHERWISE SHOWN ON PLANS, CONSTRUCT WATER MAINS WITH ONE JOINT OF PIPE BEYOND PROPOSED VALVES AND PLUGS FOR FUTURE LINES.
8. VALVES SHALL BE EQUIPPED WITH OPERATING NUT EXTENSIONS TO WITHIN 4-FT OF NATURAL GROUND IN ACCORDANCE WITH SPECIFICATIONS.
9. INSTALL RESTRAINED JOINTS AS NECESSARY AND AS SHOWN TO ENSURE INTEGRITY OF THE WATER MAIN AT TEST PRESSURE. THIS WORK IS INCIDENTAL TO WATER MAIN INSTALLATION, NO SEPARATE PAY.
10. ALL WATER MAINS SHALL BE INSTALLED BY OPEN CUT METHODS UNLESS OTHERWISE INDICATED ON PLANS OR DIRECTED BY ENGINEER.
11. PROVIDE DETECTABLE WARNING TAPE FOR NON-METALLIC PIPING, PER SPECIFICATIONS.
12. WHEN CROSSING AN EXISTING STORM SEWER USING OPEN CUT METHODS, WATER MAIN TRENCH ZONE, AS DEFINED IN THE SPECIFICATIONS AND DETAILS, SHALL BE BACKFILLED FOR 3-FT TO 5-FT EITHER SIDE OF STORM SEWER WITH CEMENT STABILIZED SAND TO SPRING LINE OF STORM SEWER.
13. ALL WATER MAINS 24-IN AND LARGER IN DIAMETER SHALL BE PRE-STRESSED CONCRETE CYLINDER PIPE (AWWA C301), BAR-WRAPPED CONCRETE CYLINDER PIPE (AWWA C303), STEEL PIPE, OR DUCTILE IRON PIPE, UNLESS OTHERWISE INDICATED ON PLANS.
14. MECHANICAL RESTRAINED JOINTS TO BE USED IN PLACE OF WELDED RESTRAINED JOINTS IF DUCTILE IRON PIPE (DIP) IS USED.

CONTRACTOR WORK ZONE NOTES

- 1. MAINTAIN TWO LANES OPEN WHEN WORKING IN BOULEVARD SECTIONS. RESIDENTIAL SECTIONS WILL MAINTAIN ONE LANE OPEN WITH ADEQUATE SIGNAGE AND/OR FLAGMEN TO FACILITATE USE OF LANE.
2. DRIVEWAY ACCESS SHALL BE MAINTAINED OPEN AFTER WORKING HOURS. A MINIMUM OF ONE DRIVEWAY ACCESS SHALL BE MAINTAINED OPEN AT ALL TIMES TO COMMERCIAL, APARTMENT, AND/OR NON-RESIDENTIAL DEVELOPMENTS. SCHOOL DRIVEWAYS SHALL BE MAINTAINED OPEN WHERE PRACTICAL WHEN SCHOOL IS SESSION. IN THE EVENT THAT SCHOOL DRIVEWAYS WILL BE IMPACTED IN ANY WAY, COORDINATE ALL WORK WITH SCHOOL.
3. THE LENGTH OF WORK ZONE SHALL BE MINIMIZED WITHIN HARRIS COUNTY RIGHTS-OF-WAY AND/OR EASEMENTS. THERE SHALL NOT BE MORE THAN 200-FT OF TRENCH OPEN AT ANY ONE TIME. CONSTRUCTION ZONE SHALL BE A ROLLING CONSTRUCTION ZONE WITH APPROPRIATE TRANSITIONS ON EACH END.
4. LANES SHALL NOT BE CLOSED AT A SIGNALIZED INTERSECTION UNLESS APPROVED BY HARRIS COUNTY ENGINEER. AN APPROPRIATE TRANSITION AS DEFINED IN TRAFFIC CONTROL PLAN SHALL BE PROVIDED AT SIGNALIZED INTERSECTIONS.
5. SEPARATION DISTANCES FOR INSTALLATION OF POTABLE WATER DISTRIBUTION LINES AND WASTEWATER COLLECTION LINES, WASTEWATER FORCE MAINS AND OTHER CONVEYANCES/APPURTENANCES IDENTIFIED AS POTENTIAL SOURCES OF CONTAMINATION MUST CONFORM TO TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES AND REGULATIONS.
6. TEMPORARY EPOXY-GLUED PAVEMENT BUTTONS OR "CONSTRUCTION GRADE" TAPE PAVEMENT MARKERS SHALL BE USED ON PERMANENT PAVEMENT TO REMAIN IN-PLACE TO ELIMINATE GRINDING AND SCARRING OF SURFACE.
7. CARE SHALL BE TAKEN TO PROVIDE FOR TEMPORARY PEDESTRIAN TRAFFIC AND CROSSING AT AREAS SUCH AS SCHOOLS, PARKS, AND SHOPPING AREAS.
8. WORK SHALL BE CONFINED TO WEST HARRIS COUNTY REGIONAL WATER AUTHORITY WATER MAIN OR CONSTRUCTION EASEMENTS OR TO AREAS IDENTIFIED ON PLANS.

SANITARY SEWER CONSTRUCTION NOTES

- 1. GRAVITY SANITARY SEWERS AND FORCE MAINS SHALL BE INSTALLED IN ACCORDANCE WITH CITY OF HOUSTON STANDARD SPECIFICATIONS. ONLY PRE-CAST CONCRETE MANHOLES WILL BE ALLOWED.
2. SANITARY SEWERS CROSSING WATER MAINS SHALL BE DUCTILE IRON PIPE WITH A MINIMUM 150-PSI RATED WATER PRESSURE (AWWA C151), DOUBLE WRAPPED IN 8-MIL POLYETHYLENE OR POLYVINYL CHLORIDE PIPE DR 18 (AWWA C900 OR C905).
3. INTERIOR LINING FOR DUCTILE IRON PIPE SANITARY SEWER SHALL BE PROVIDED IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS AND CONFORM TO REQUIREMENTS OF EITHER ASTM D1248, ASTM D1653, OR ASTM D16 TYPE V. MINIMUM LINING THICKNESS TO BE 40-MILS, REGARDLESS OF COATING RECOMMENDED BY MANUFACTURER. NO CEMENT MORTAR LINING OR BITUMINOUS LINING WILL BE ALLOWED.
4. UNLESS OTHERWISE NOTED ON PLANS, WHERE SANITARY SEWER MANHOLES ARE LOCATED WITHIN EASEMENTS, RIM ELEVATION SHALL BE SET 3-IN ABOVE NATURAL GROUND AND/OR FINISHED GRADE. WHERE SANITARY SEWER MANHOLES ARE LOCATED WITHIN 100-YEAR FLOOD PLAIN, RIM ELEVATION SHALL BE SET 12-IN ABOVE 100 YEAR FLOOD ELEVATION OR SHALL BE SEALED.
5. PROVIDE ADEQUATE THRUST BLOCKING AT ALL FORCE MAIN BENDS TO WITHSTAND PRESSURE TEST.
6. INSTALL OVER FORCE MAIN LINES "TERRA TAPE" OR APPROVED EQUAL. TAPE TO BE CONTINUOUSLY LABELED "NON POTABLE WATER". SUCH WORK IS INCIDENTAL TO FORCE MAIN INSTALLATION, REPAIR, OR REPLACEMENT, NO SEPARATE PAY.
7. ALL SEMI-RIGID SEWER PIPE SHALL BE TESTED FOR DEFLECTION. TESTING SHALL BE PERFORMED 30-DAYS AFTER BACKFILL OPERATIONS ARE COMPLETED AND PRIOR TO OTHER TESTING OF SEWER SYSTEMS. TEST FOR DEFLECTION BY PULLING A HAND LINE WITH AN ATTACHED MANDREL DEVICE THROUGH PIPE (NO MECHANICAL PULLING DEVICE ALLOWED). MANDREL TO HAVE AN OUTSIDE DIAMETER EQUAL TO 95% OF THE NOMINAL DIAMETER OF PIPE BEING TESTED. MANDREL TO BE MANUFACTURED WITH A MINIMUM OF SEVEN (7) RUNNERS, WITH EACH RUNNER BEING A MINIMUM OF 5-IN LONG. ANY PIPE NOT MEETING TEST REQUIREMENTS SHALL BE REMOVED AND REPLACED AT CONTRACTOR'S EXPENSE. PAYMENT FOR THIS WORK TO BE INCLUDED IN UNIT PRICE BID PER LINEAR FOOT OF SEWER IN APPROPRIATE SIZE.

STORM SEWER CONSTRUCTION NOTES

- 1. ALL STORM SEWERS AND LEADS SHALL BE REINFORCED CONCRETE PIPE (RCP), CLASS III (ASTM C76), WITH RUBBER GASKET JOINTS (ASTM C443), 24-IN DIAMETER MINIMUM, UNLESS OTHERWISE NOTED ON PLANS.
2. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION. ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY. ALL CONSTRUCTION STORM RUNOFF SHALL COMPLY WITH THE STORM WATER MANAGEMENT HANDBOOK FOR CONSTRUCTION ACTIVITIES AS PREPARED BY HARRIS COUNTY, HCFCO, AND THE CITY OF HOUSTON AND SHALL BE IN COMPLIANCE WITH THE NPDES REQUIREMENTS.

STORM SEWER QUALITY PRE-CONSTRUCTION INSPECTION REQUIREMENTS

- 1. CONTACT THE HARRIS COUNTY STORM WATER QUALITY PERMITTING SECTION AT (713) 956-3000 FOR A PRE-CONSTRUCTION INSPECTION PRIOR TO COMMENCING ANY CLEARING OR CONSTRUCTION ACTIVITIES AT THE PROJECT SITE.

STANDARD HARRIS COUNTY NOTES FOR PLANS

- 1. AUTHORIZATION NOTICE ISSUED BY HARRIS COUNTY PUBLIC INFRASTRUCTURE ENGINEERING DEPARTMENT PERMIT OFFICE REQUIRED PRIOR TO CONSTRUCTION OF UTILITIES OR LEFT TURN LINES WITHIN HARRIS COUNTY RIGHTS-OF-WAY. CONTACT HARRIS COUNTY PERMIT OFFICE (713) 956-3000.
2. AUTHORIZATION NOTICE ISSUED BY HARRIS COUNTY PUBLIC INFRASTRUCTURE ENGINEERING DEPARTMENT PERMIT OFFICE REQUIRED PRIOR TO CONSTRUCTION WITHIN HARRIS COUNTY FLOOD CONTROL RIGHT-OF-WAY. CONTACT HARRIS COUNTY PERMIT OFFICE (713) 956-3000.
3. VENT PIPES WITHIN HARRIS COUNTY RIGHTS-OF-WAY SHALL BE BREAKAWAY, PER DETAILS, UNLESS OTHERWISE INDICATED ON DRAWINGS AND APPROVED BY HARRIS COUNTY PUBLIC INFRASTRUCTURE ENGINEERING DEPARTMENT.
4. CONTRACTOR IS FULLY RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED BY THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR FLOOD PLAIN MANAGEMENT" PRIOR TO START OF CONSTRUCTION.

STANDARD HCFCO NOTES FOR PLANS

- 1. NOTIFY HARRIS COUNTY FLOOD CONTROL DISTRICT (HCFCO), PROPERTY MANAGEMENT DEPARTMENT IN WRITING AT LEAST 48-HOURS PRIOR TO CONSTRUCTION. SUBMIT THE HCFCO 48-HOUR PRE-CONSTRUCTION NOTIFICATION FORM AND A COPY OF THE APPROVED CONSTRUCTION DRAWINGS TO HCFCO, 9900 NORTHWEST FREEWAY, HOUSTON, TEXAS 77092, ATTN: PROPERTY MANAGEMENT DEPARTMENT.
2. ENGINEER SHALL SUBMIT CERTIFICATION LETTER AND RECORD DRAWINGS TO THE HCFCO, PROPERTY MANAGEMENT DEPARTMENT, REQUESTING INSPECTION OF ITEMS CONSTRUCTED IN HCFCO RIGHT-OF-WAY. PRIOR TO REQUESTING INSPECTION, THE DRAINAGE RIGHT-OF-WAY AND/OR EASEMENTS SHALL BE STAKED AND FLAGGED.
3. PROTECT, MAINTAIN, AND RESTORE EXISTING BACKSLOPE DRAINAGE SYSTEMS.
4. BACKSLOPE SWALE AND INTERCEPTOR STRUCTURE ELEVATIONS AND LOCATIONS SHOWN ON PLANS ARE APPROXIMATE. FINAL ELEVATIONS AND LOCATIONS SHALL BE VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.
5. ESTABLISH TURF GRASS ON ALL DISTURBED AREAS WITHIN THE CHANNEL OR DETENTION RIGHT-OF-WAY, EXCEPT THE CHANNEL BOTTOM AND WHERE STRUCTURAL EROSION MEASURES ARE USED. MINIMUM ACCEPTANCE CRITERIA ARE 75% COVERAGE OF LIVE BERMUUDA GRASS AND NO EROSION OF RILLS DEEPER THAN 4-IN.
6. BACKFILL ALL TRENCHES AND BORE PITS IN ACCORDANCE WITH THE SPECIFICATION, SECTION 02317-EXCAVATION AND BACKFILL FOR UTILITIES.
7. EXCAVATE CHANNEL FLOWLINE TO DESIGN ELEVATION AS SHOWN ON PLANS AND DOWNSTREAM, AS NECESSARY, TO ENSURE NO WATER IN STORM SEWER DURING "DRY" CONDITIONS.
8. MAINTAIN FLOW IN CHANNEL DURING CONSTRUCTION AND RESTORE CHANNEL TO ORIGINAL CONDITION.
9. REMOVE ALL EXCAVATED MATERIAL FROM THE HCFCO OR DRAINAGE RIGHT-OF-WAY. NO FILL IS TO BE PLACED WITHIN A DESIGNATED FLOOD PLAIN AREA WITHOUT FIRST OBTAINING A FILL PERMIT FROM THE APPROPRIATE JURISDICTIONAL AUTHORITY.
10. OBTAIN AND COMPLY WITH ALL APPLICABLE CITY, COUNTY, STATE, AND FEDERAL PERMITS AND APPROVALS, WITH ASSISTANCE FROM ENGINEER, IF NECESSARY.

UTILITY NOTES

CAUTION: UNDERGROUND GAS FACILITIES

LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC, WHERE APPLICABLE) ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (713) 223-4567 OR 1-800-669-8344 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

- WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL (713) 967-8037 (7:00 A.M. TO 4:30 P.M.) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
• WHEN EXCAVATING WITHIN 18-IN OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
• WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.

THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

WARNING: OVERHEAD ELECTRICAL LINES

OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:

- ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN 6-FT OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
• OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN 10-FT OF LIVE OVERHEAD HIGH VOLTAGE LINES.

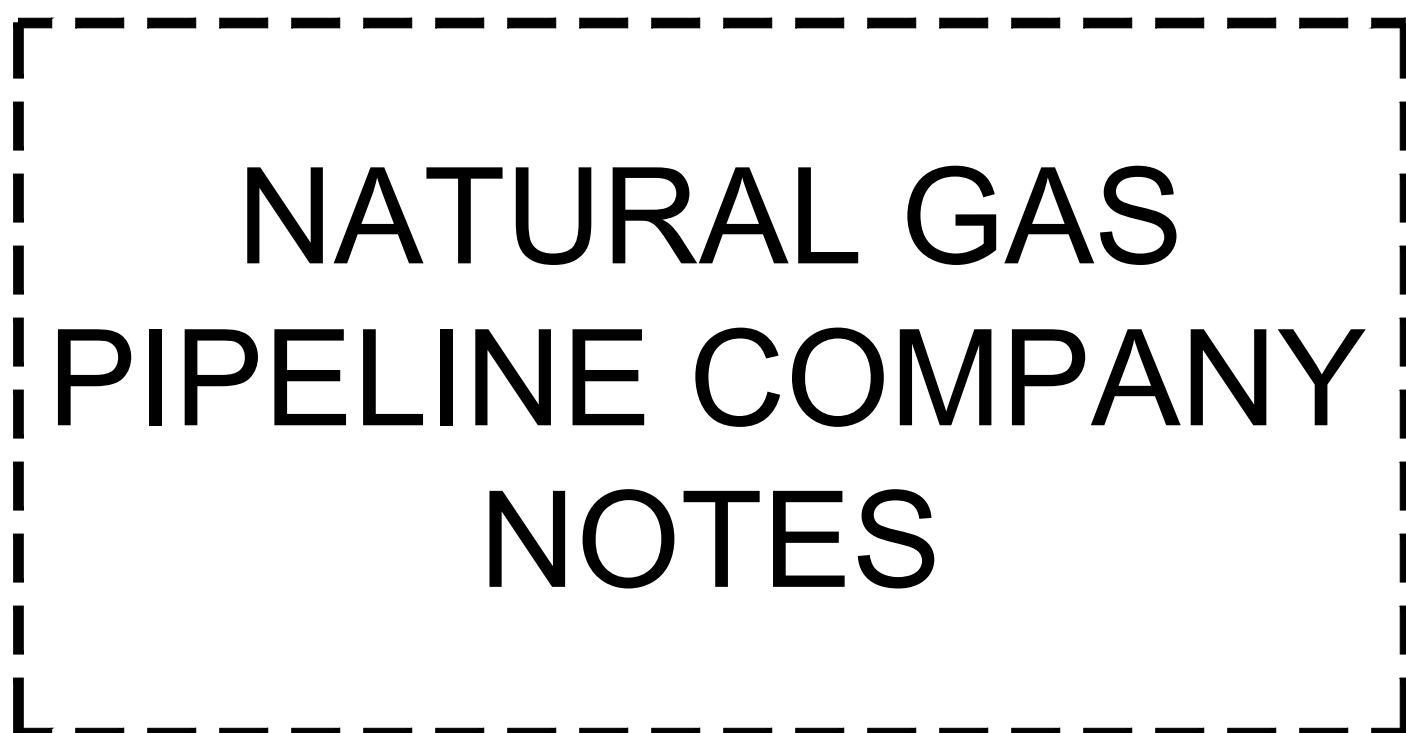
PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS, ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

AT&T TEXAS/SWBT FACILITIES

- 1. THE LOCATIONS OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL 1-800-344-8377 (TEXAS 811) A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN 18-IN OF THE INDICATED LOCATION OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.
4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES OR BURIED CABLE FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.
6. PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER MR. ROOSEVELT LEE JR. AT (713) 567-4552 OR EMAIL HIM AT RL7259@ATT.COM, IF THERE ARE QUESTIONS ABOUT BORING OR EXCAVATING NEAR OUR AT&T TEXAS/SWBT FACILITIES.

TEXAS WATER DEVELOPMENT BOARD NOTES:

- 1. AS PER AN AGREEMENT WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (PROJECT NO. SWG-2016-00933) THE AUTHORITY AGREES TO USE TRENCHLESS CONSTRUCTION METHODS AT ALL STREAM CROSSINGS;
2. IN ACCORDANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM, PRIOR TO CONSTRUCTION WITHIN ANY GIVEN FLOODPLAIN, A FLOODPLAIN PERMIT MUST BE OBTAINED FROM THE LOCAL FLOODPLAIN ADMINISTRATOR;
3. STANDARD EMERGENCY CONDITION FOR THE DISCOVERY OF CULTURAL RESOURCES; AND
4. STANDARD EMERGENCY CONDITION FOR THE DISCOVERY OF THREATENED AND ENDANGERED SPECIES.



Program Manager
DANNENBAUM
ENGINEERING CORPORATION

Table with 2 columns: Company Name, Address, Telephone No., Texas Firm No.; INTERIM REVIEW ONLY. Includes signature of John D. Doe dated 08/31/2019.

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GENERAL CONSTRUCTION NOTES

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

CITY OF HOUSTON HOUSTON PUBLIC WORKS

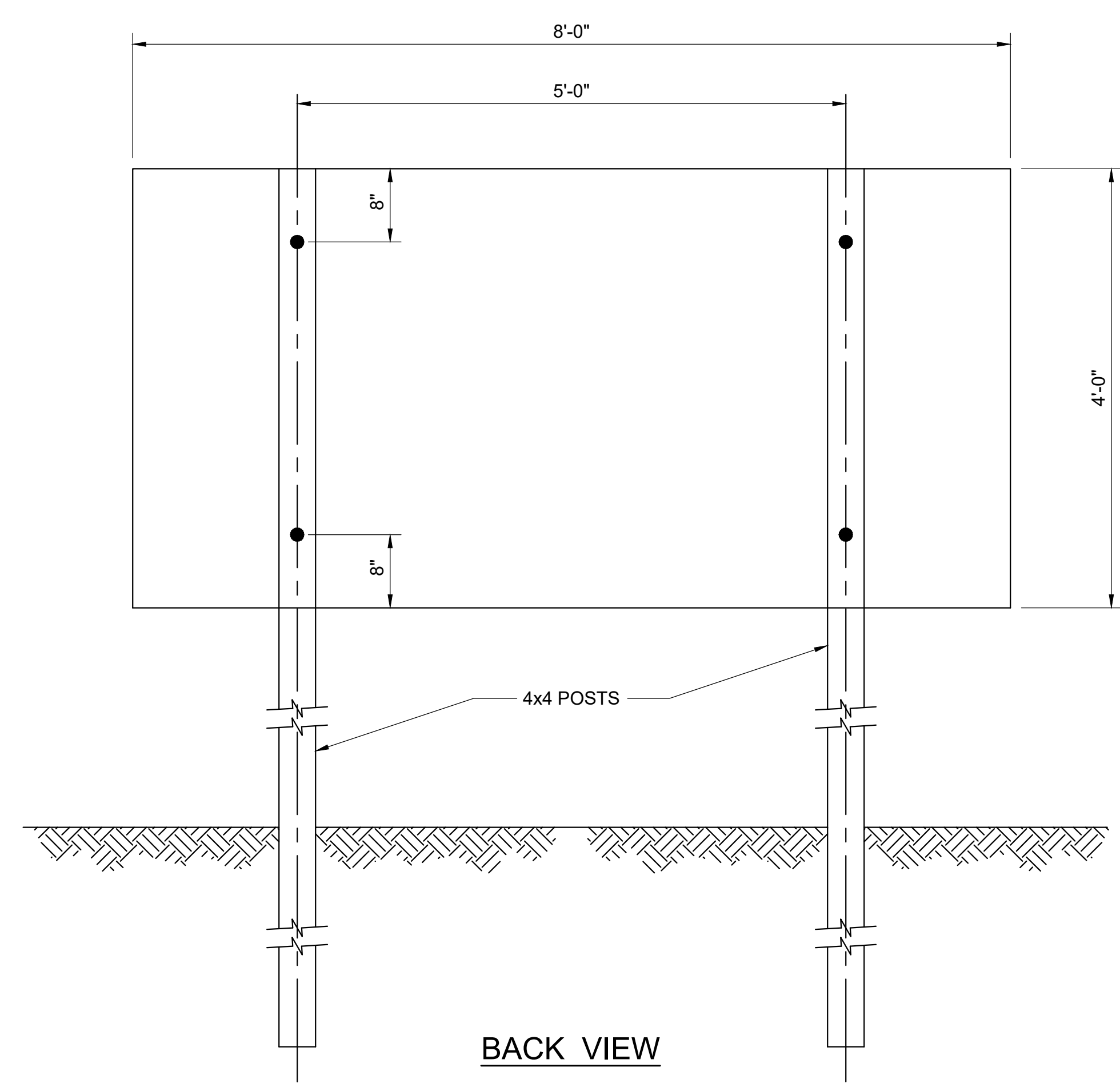
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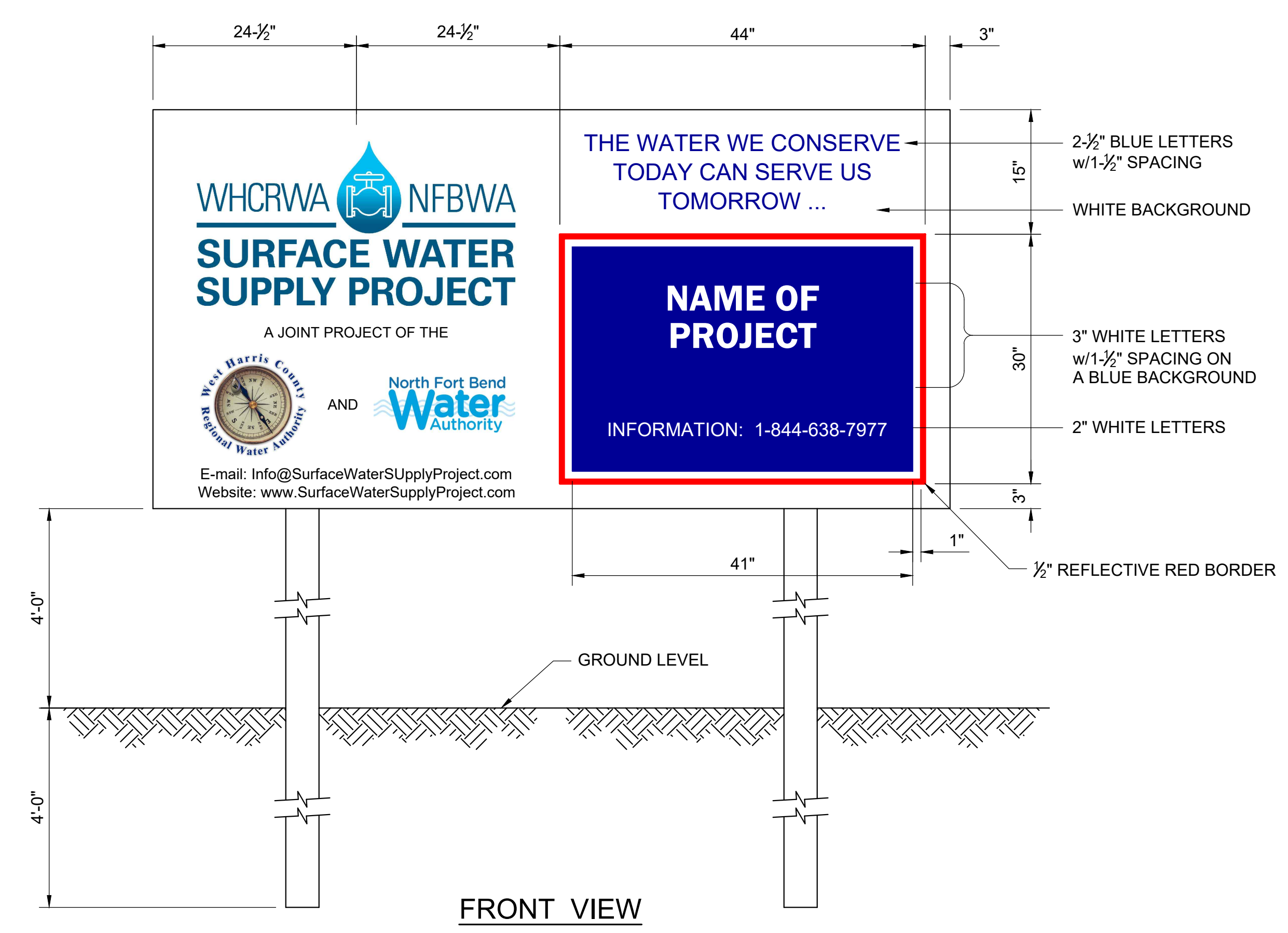
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MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO.	DATE	REVISION
		APP.

- NOTES:
1. CONTRACTOR TO PROVIDE 2 SIGNS. NO SEPARATE PAY.
  2. SIGNS TO BE INSTALLED AT LOCATIONS AS DIRECTED BY ENGINEER.

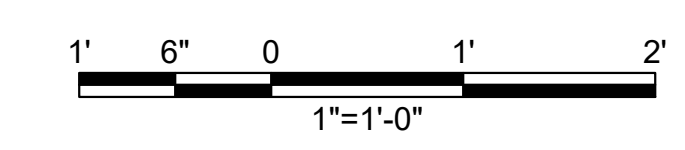


BACK VIEW



FRONT VIEW

1 CONSTRUCTION PROJECT SIGN  
SCALE: 1"=1'-0"



WHCRWA NFBWA  
**SURFACE WATER SUPPLY PROJECT**

Program Manager  
**DANNENBAUM**  
ENGINEERING CORPORATION

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CONTRACT KM "X"

**PROJECT SIGN  
DETAIL**

NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

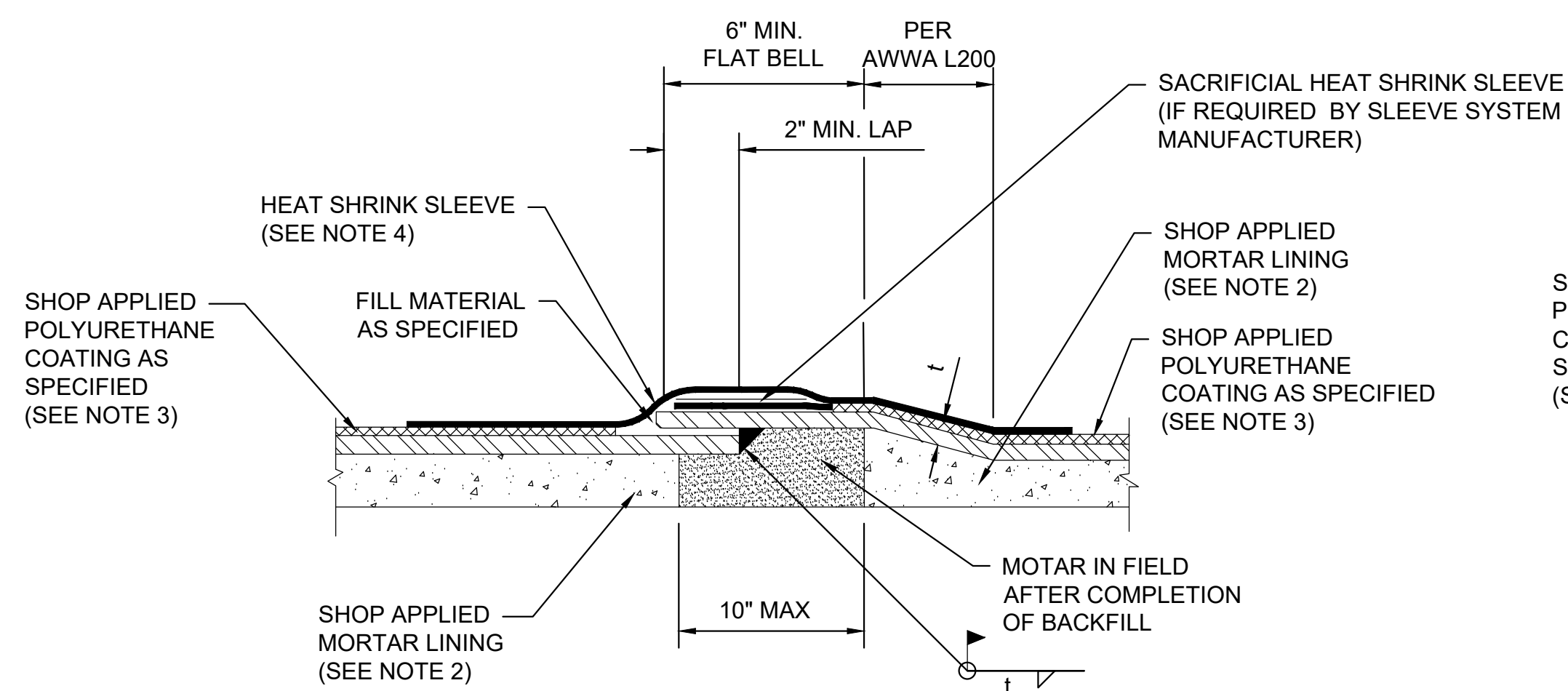
**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. D-01	HORIZ: HORIZ VERT: VERT
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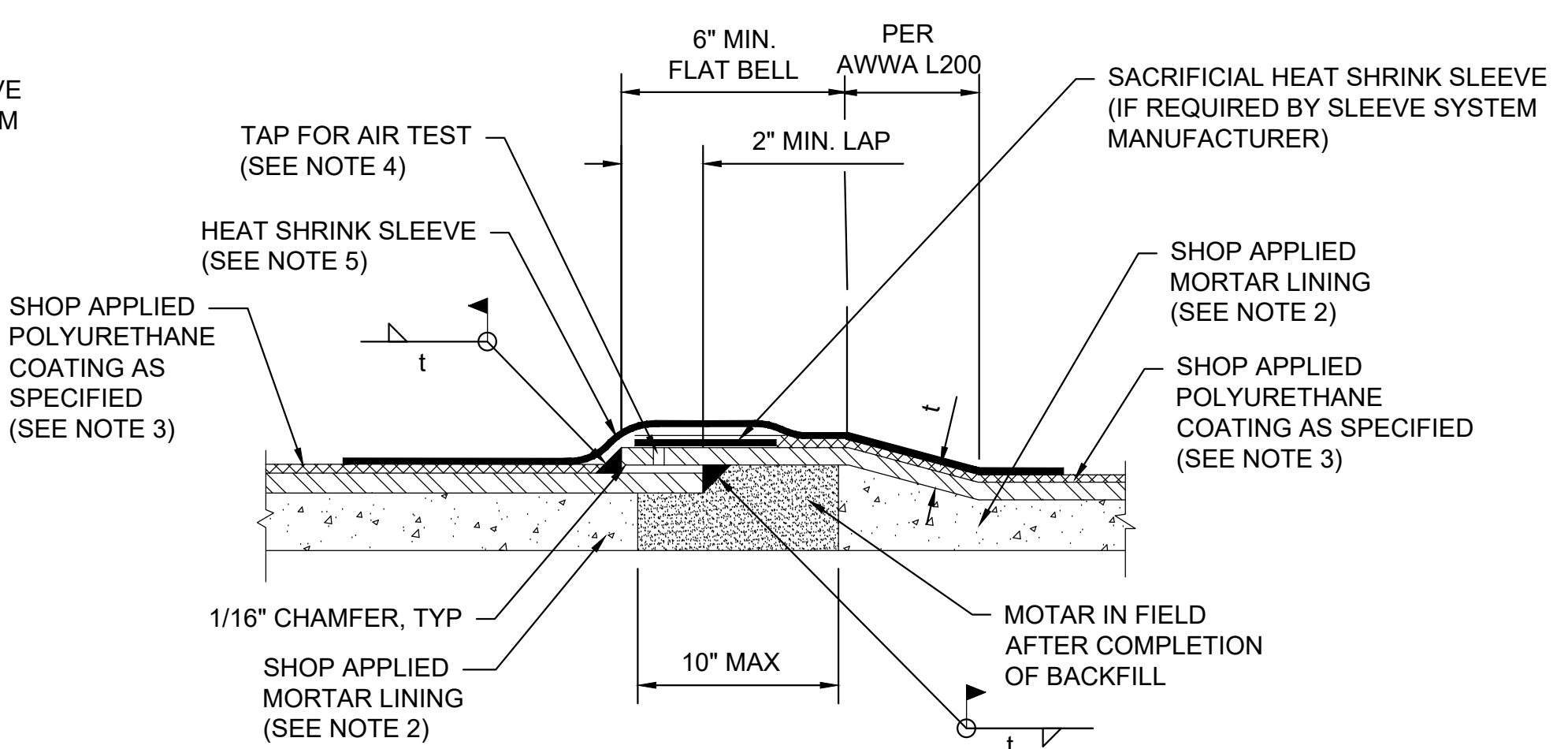
SHEET NO. XX OF XXX DRAWING SCALE  
FOR CITY OF HOUSTON USE ONLY

MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
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NO. DATE	REVISION	APP.



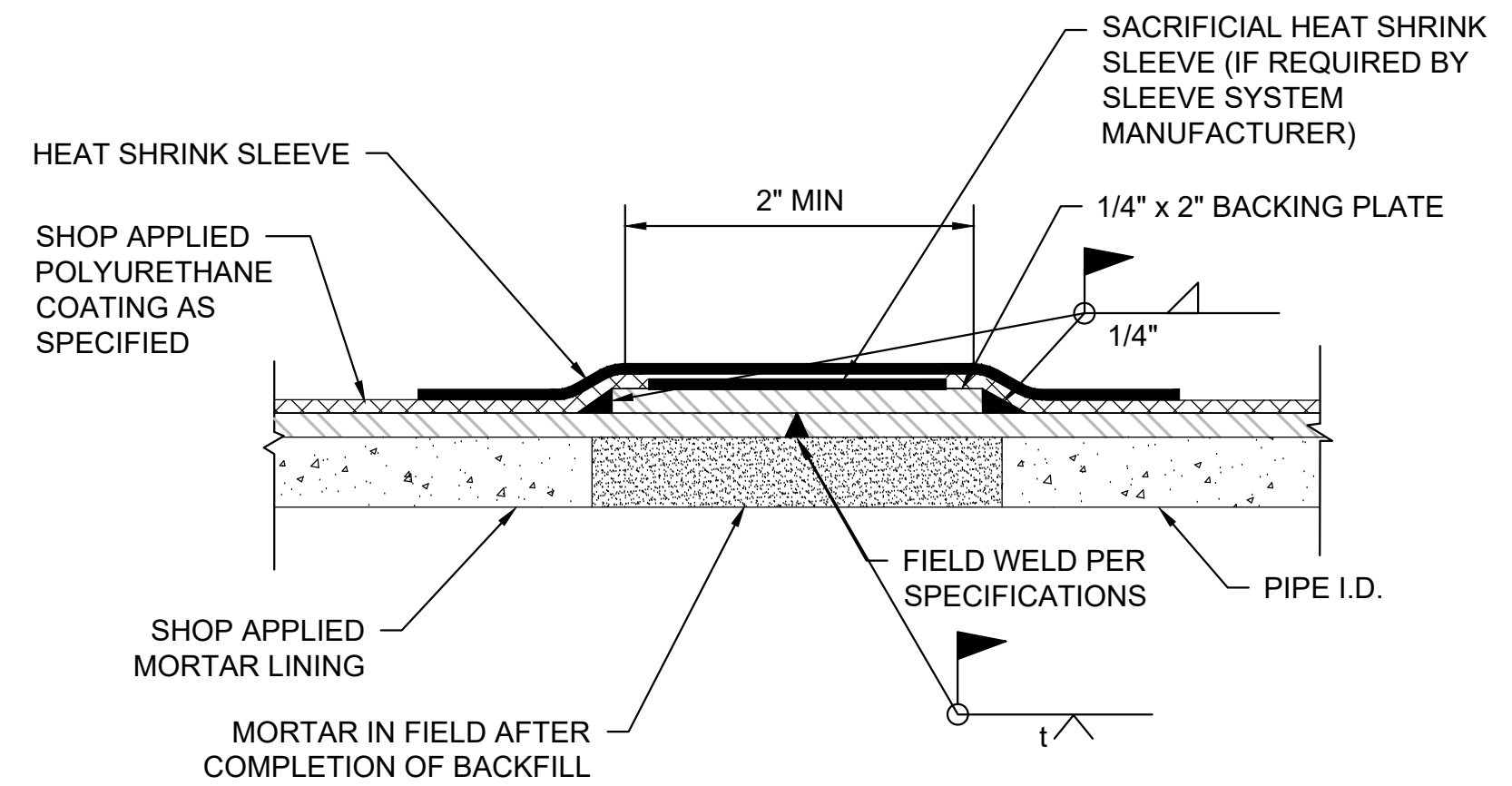
- NOTES:**
- 2" MIN FROM BELL TANGENT TO WELD.
  - HOLD BACK SHOP APPLIED MORTAR LINING MIN. 6 INCHES ON BELL END AND 2 INCHES ON SPIGOT END.
  - HOLD BACK SHOP APPLIED POLYURETHANE COATING MIN. 5 INCHES ON BELL END AND 4 INCHES ON SPIGOT END.
  - FIELD APPLY HEAT SHRINK SLEEVE WITH A MINIMUM OVERLAP OF 4" OVER POLYURETHANE COATING.
  - "t" INDICATES THE THICKNESS OF THE STEEL PIPE AT THE SECTION WHERE USED.

**1 SINGLE WELD LAP JOINT DETAIL POLYURETHANE COATED STEEL PIPE**  
Scale: NTS.

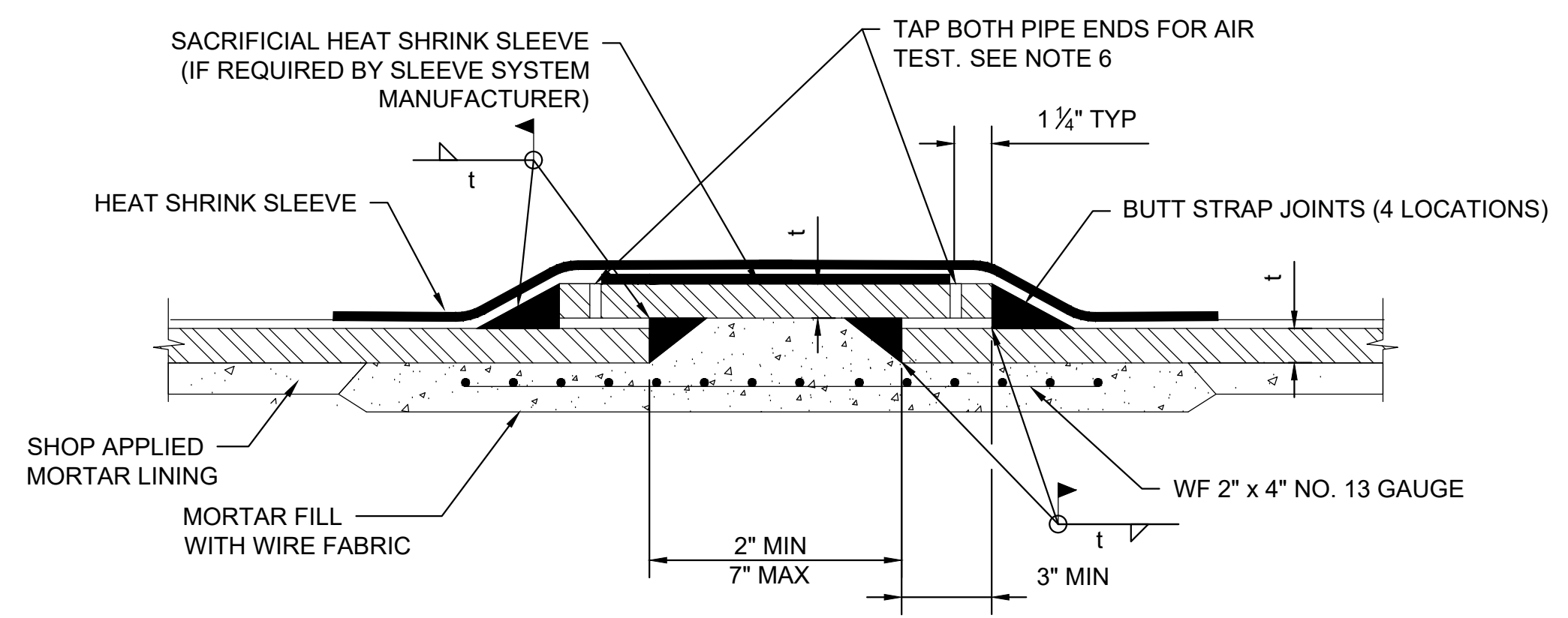


- NOTES:**
- 2" MIN FROM BELL TANGENT TO WELD.
  - HOLD BACK SHOP APPLIED MORTAR LINING MIN. 6 INCHES ON BELL END AND 2 INCHES ON SPIGOT END.
  - HOLD BACK SHOP APPLIED POLYURETHANE COATING MIN. 5 INCHES ON BELL END AND 4 INCHES ON SPIGOT END.
  - DRILL AND TAP 4- 1/4" DIA. HOLES EQUALLY SPACED FOR AIR-SOAP TEST. BEFORE WELDING, DRILL AND TAP HOLES. PLUG WELD HOLES AFTER SUCCESSFUL COMPLETION OF JOINT TEST.
  - FIELD APPLY HEAT SHRINK SLEEVE WITH A MINIMUM OVERLAP OF 4" OVER POLYURETHANE COATING.
  - "t" INDICATES THE THICKNESS OF THE STEEL PIPE AT THE SECTION WHERE USED.

**2 DOUBLE WELD LAP JOINT DETAIL POLYURETHANE COATED STEEL PIPE**  
Scale: NTS.

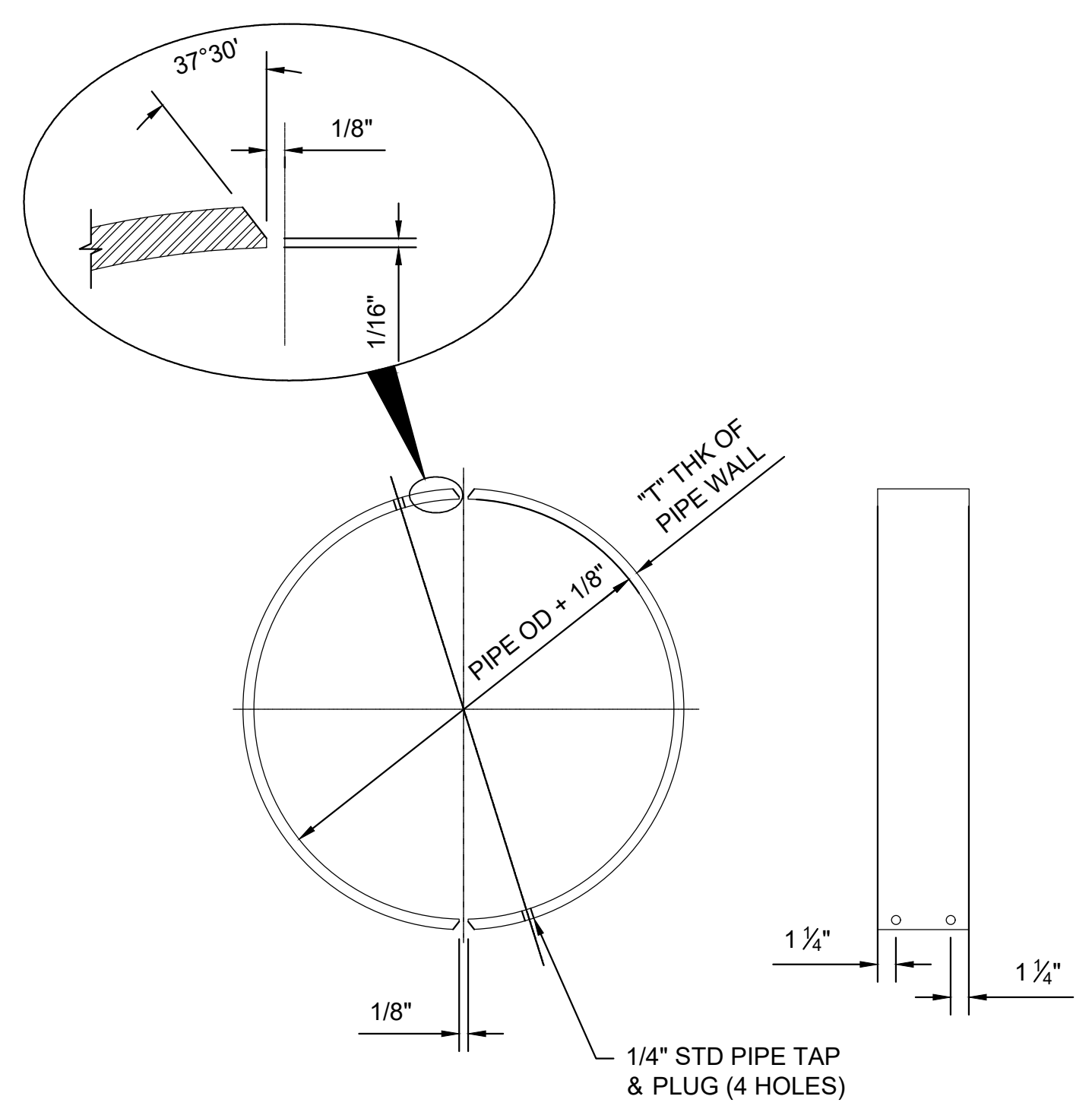


**3 BUTT WELD JOINT DETAIL POLYURETHANE COATED STEEL PIPE**  
Scale: NTS.

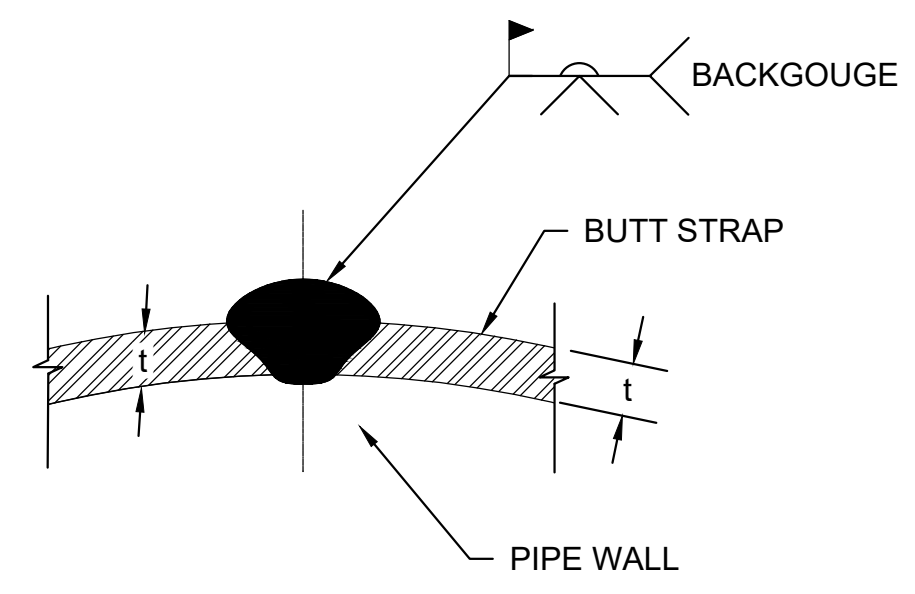


- NOTES:**
- ALL BUTT STRAP JOINTS SHALL BE WELDED ON THE EXTERIOR AND INTERIOR BOTH ENDS.
  - BUTT STRAPS TO BE FURNISHED IN TWO PIECES AND SHIPPED LOOSE FOR FIELD WELDING. BUTT STRAPS TO INCLUDE TABS TO ACCEPT ALL-THREAD FOR BOLTED CONNECTION TO FACILITATE FIELD LINE-UP AND WELDING.
  - 12" MAXIMUM LENGTH OF TYPICAL BUTT STRAP FOR FIELD CLOSING SECTION. (SEE SPECIFICATIONS).
  - SEE JOINT DETAILS FOR TYPICAL LAP WELD ON POLYURETHANE COATED STEEL PIPE AND FOR ADDITIONAL INFORMATION ON COATINGS, LININGS AND OTHER REQUIREMENTS.
  - "t" INDICATES THE THICKNESS OF THE STEEL PIPE AT THE SECTION WHERE USED.
  - DRILL AND TAP 4- 1/4" DIA. HOLES EQUALLY SPACED FOR AIR-SOAP TEST. BEFORE WELDING, DRILL AND TAP HOLES. PLUG WELD HOLES AFTER SUCCESSFUL COMPLETION OF JOINT TEST.
  - FIELD APPLY HEAT SHRINK SLEEVE WITH A MINIMUM OVERLAP OF 4" OVER POLYURETHANE COATING.

**4 WELDED BUTT STRAP JOINT DETAIL POLYURETHANE COATED STEEL PIPE**  
Scale: NTS.



**5 LOOSE BUTT STRAP**  
Scale: NTS.



**6 LONGITUDINAL WELD - BUTT STRAP**  
Scale: NTS.

**WHCROWA NFBWA SURFACE WATER SUPPLY PROJECT**  
Program Manager **DANNENBAUM ENGINEERING CORPORATION**

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**CONTRACT KM "X"**  
**STEEL PIPE DETAILS (SHEET 1 OF 2)**

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**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

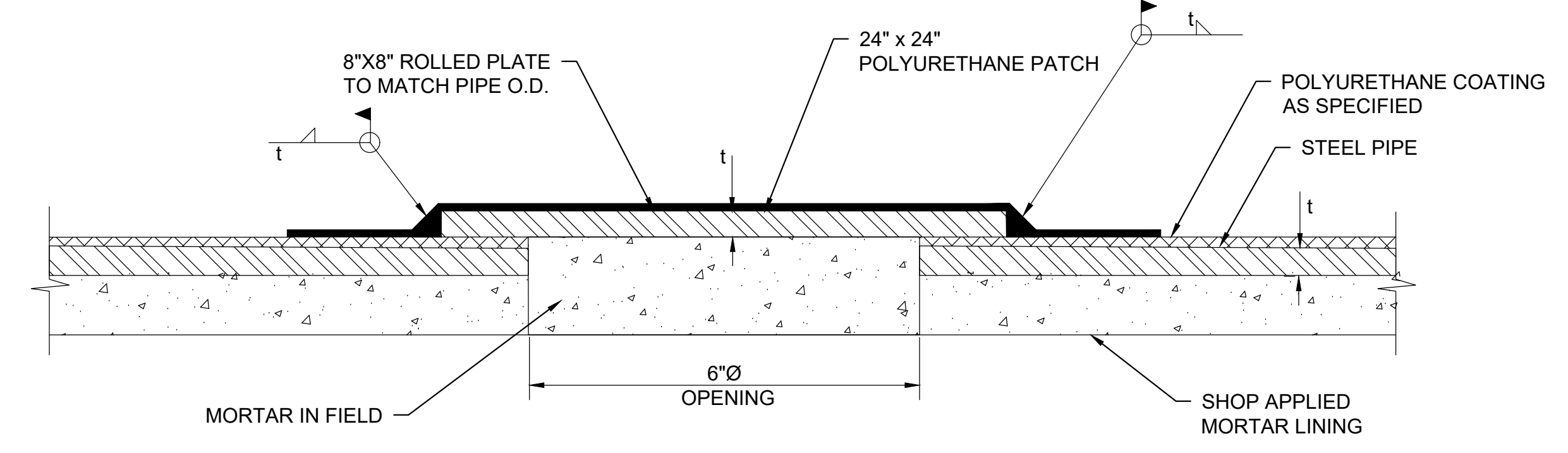
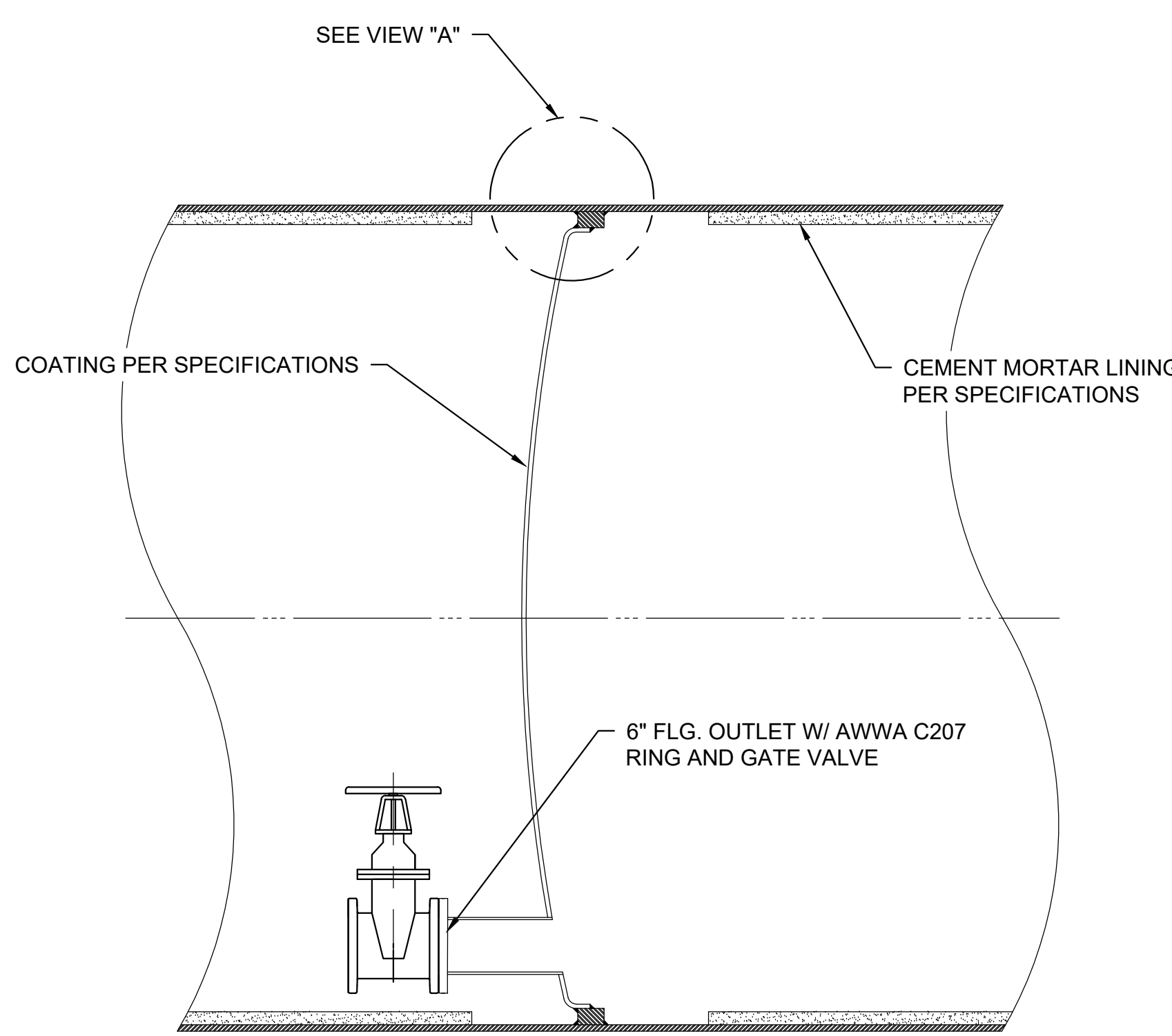
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WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. D-02	HORIZ: HORIZ VERT: VERT
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SHEET NO. XX OF XXX	DRAWING SCALE
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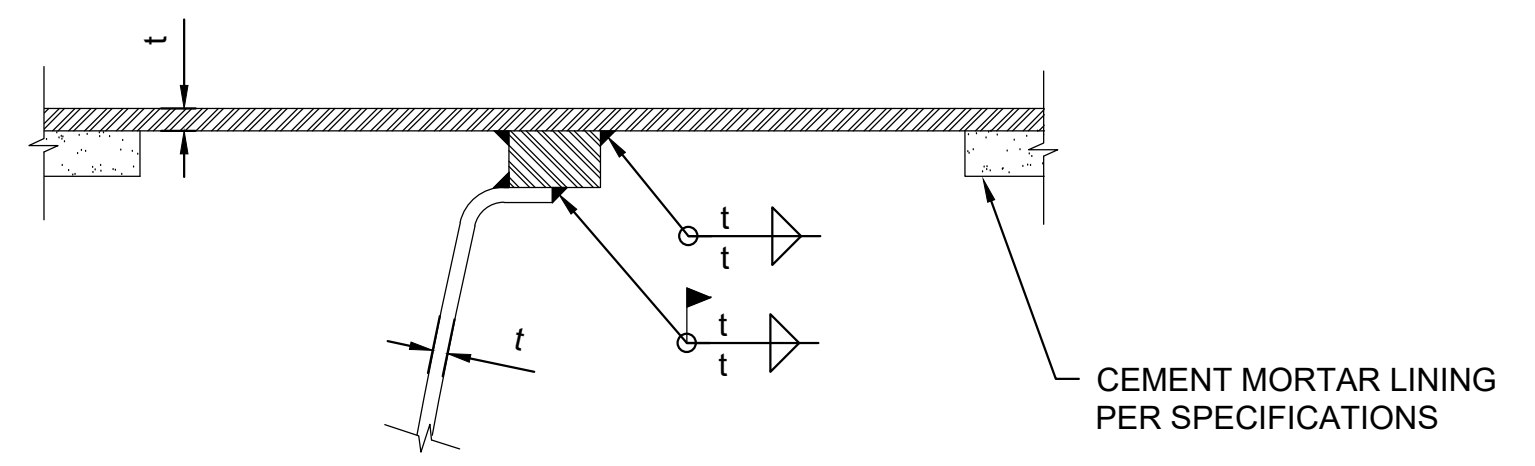
MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO. DATE	REVISION	APP.



t = 0.1875"  
 OUTLET ID = 7.00" (STEEL)  
 OUTLET OD = 7.25" (STEEL)

**NOTES:**

- PASS THROUGH FOR WELD LEADS MAY BE SPACED NO CLOSER THAN 500' AND NO CLOSER THAN 500' FROM AIR VALVE OR ACCESS MANHOLE OUTLETS.
- PASS-THROUGH TO BE DESIGNED PER AWWA M-11.
- ROLLED PLATE SHALL BE CENTERED OVER PASS-THROUGH OUTLET AND BE A MINIMUM OF 1/2" THICK OR EQUAL TO PIPE WALL THICKNESS, WHICHEVER IS GREATER.



**NOTES:**

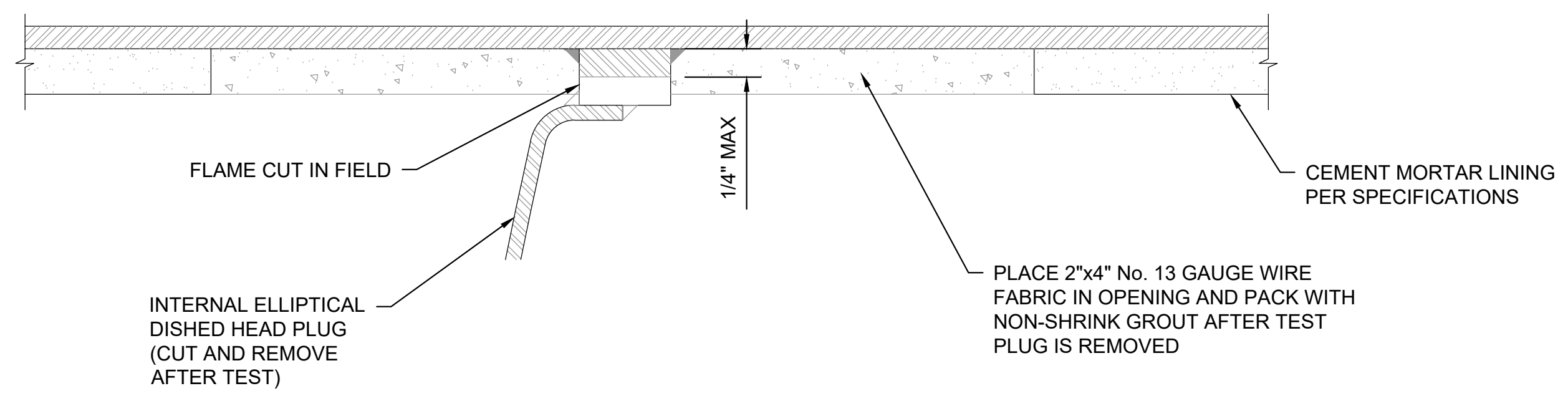
- DISHED HEAD PLUG TO BE INSTALLED AT LOCATION WHERE AIR CAN BE EXPELLED THROUGH AIR VALVE OR ACCESS MANHOLE DURING FILLING.
- DISHED HEAD PLUGS SHALL BE CAPABLE OF WITHSTANDING THE HYDROSTATIC TEST PRESSURE FROM EITHER SIDE, WITH THE OPPOSITE SIDE EMPTY OF WATER
- t = STEEL PIPE WALL THICKNESS AND SIZE OF FILLET ATTACHMENT WELD.

**VIEW A**  
 Scale: N.T.S.

**INTERNAL ELLIPTICAL DISHED HEAD PLUG DETAIL**  
**POLYURETHANE COATED STEEL PIPE**

**1** Scale: N.T.S.

**3 6" PASS-THROUGH FOR WELD LEADS**  
 Scale: NTS.



NOTE: USE CAUTION WHEN REMOVING BULK HEADS. ALL GOUGES AND SURFACE DEFECTS SHALL BE REPAIRED AS DIRECTED BY ENGINEER.

**2 INTERNAL ELLIPTICAL DISHED HEAD PLUG REMOVAL**  
 Scale: N.T.S.

WHCROWA NFBWA  
**SURFACE WATER SUPPLY PROJECT**  
 Program Manager  
**DANNENBAUM ENGINEERING CORPORATION**

**Company Name**  
 Address  
 Telephone No.  
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**STEEL PIPE DETAILS**  
 (SHEET 2 OF 2)

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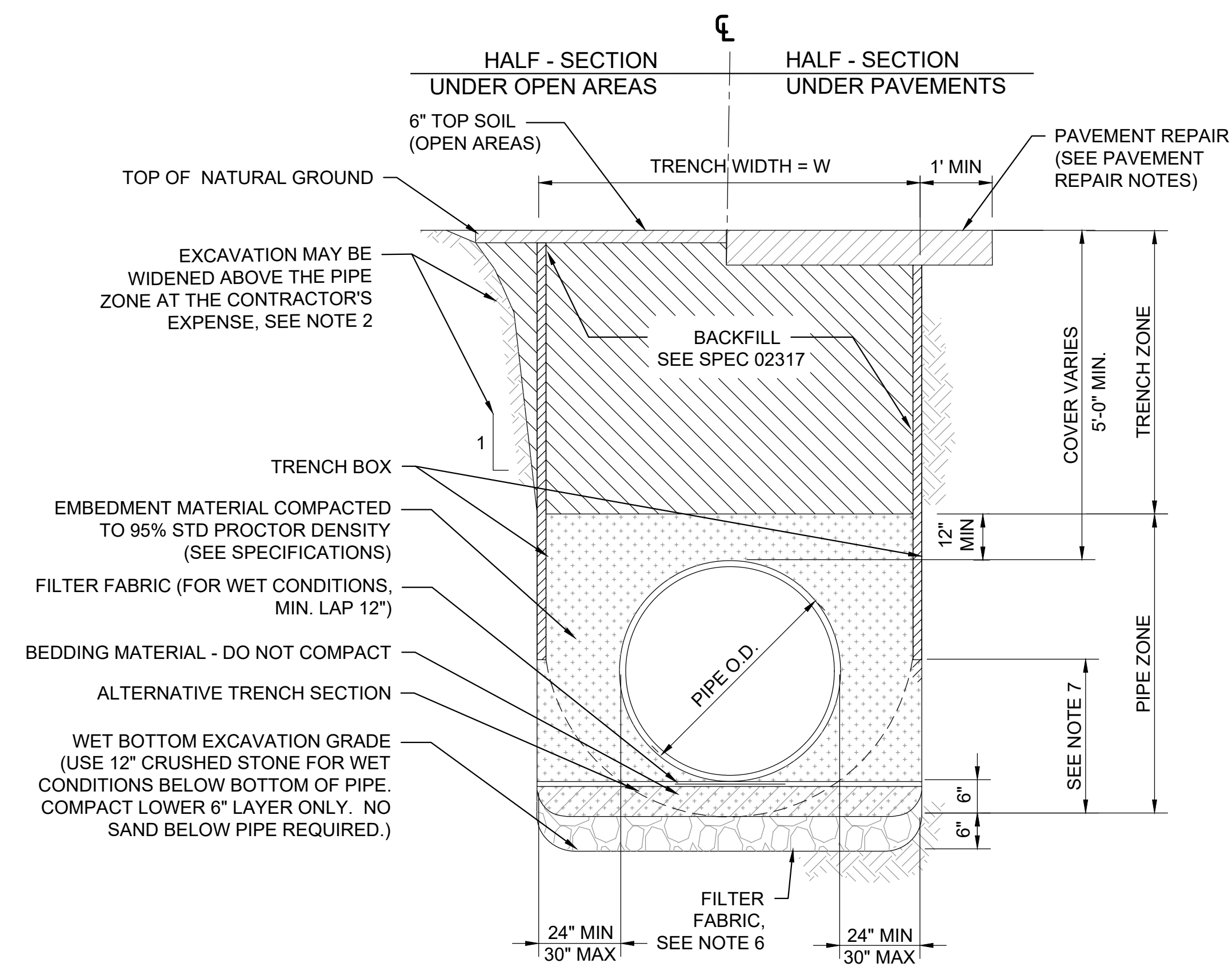
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WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. D-03	HORIZ: HORIZ VERT: VERT
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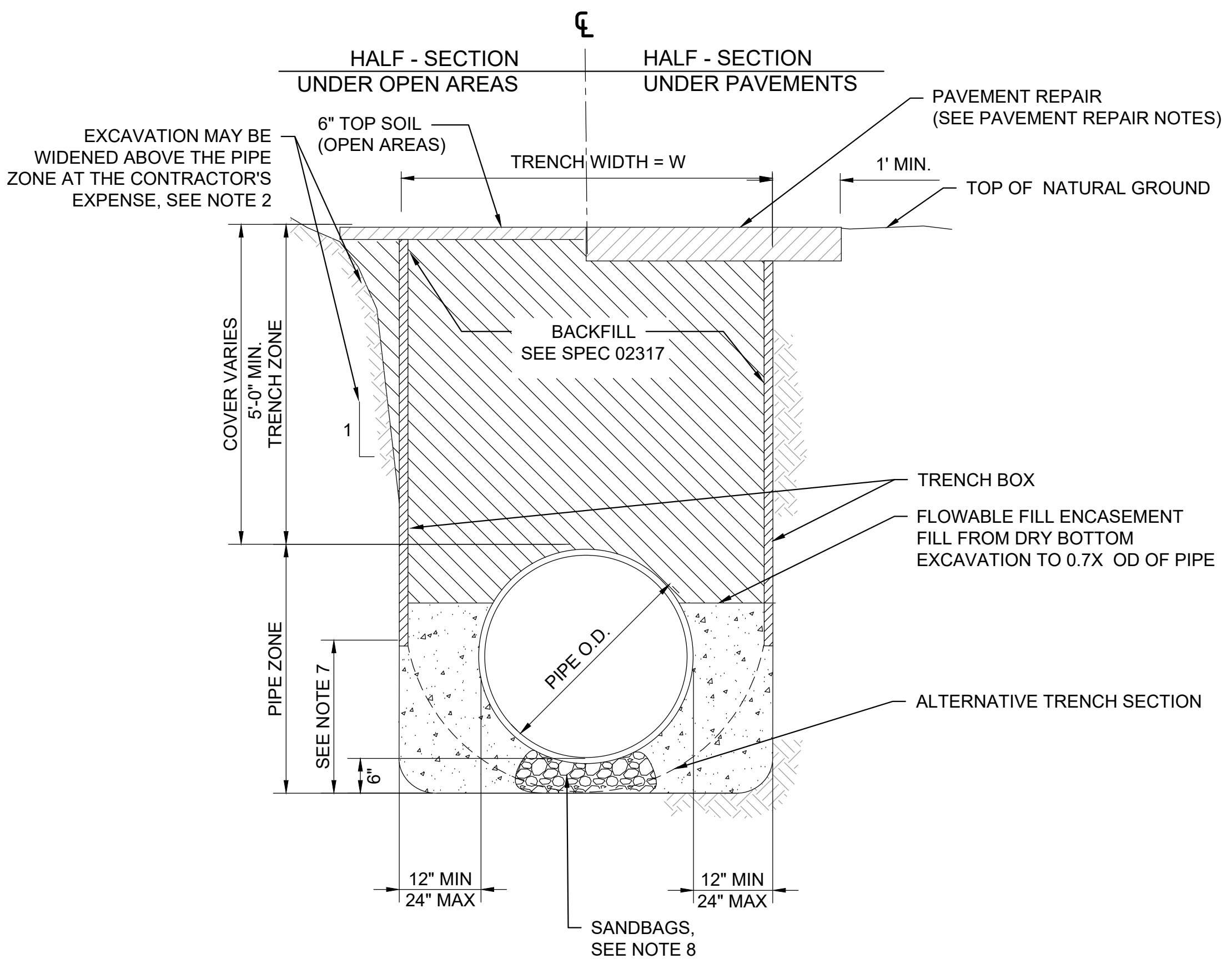
SHEET NO. XX OF XXX	DRAWING SCALE
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MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO. DATE	REVISION	APP.

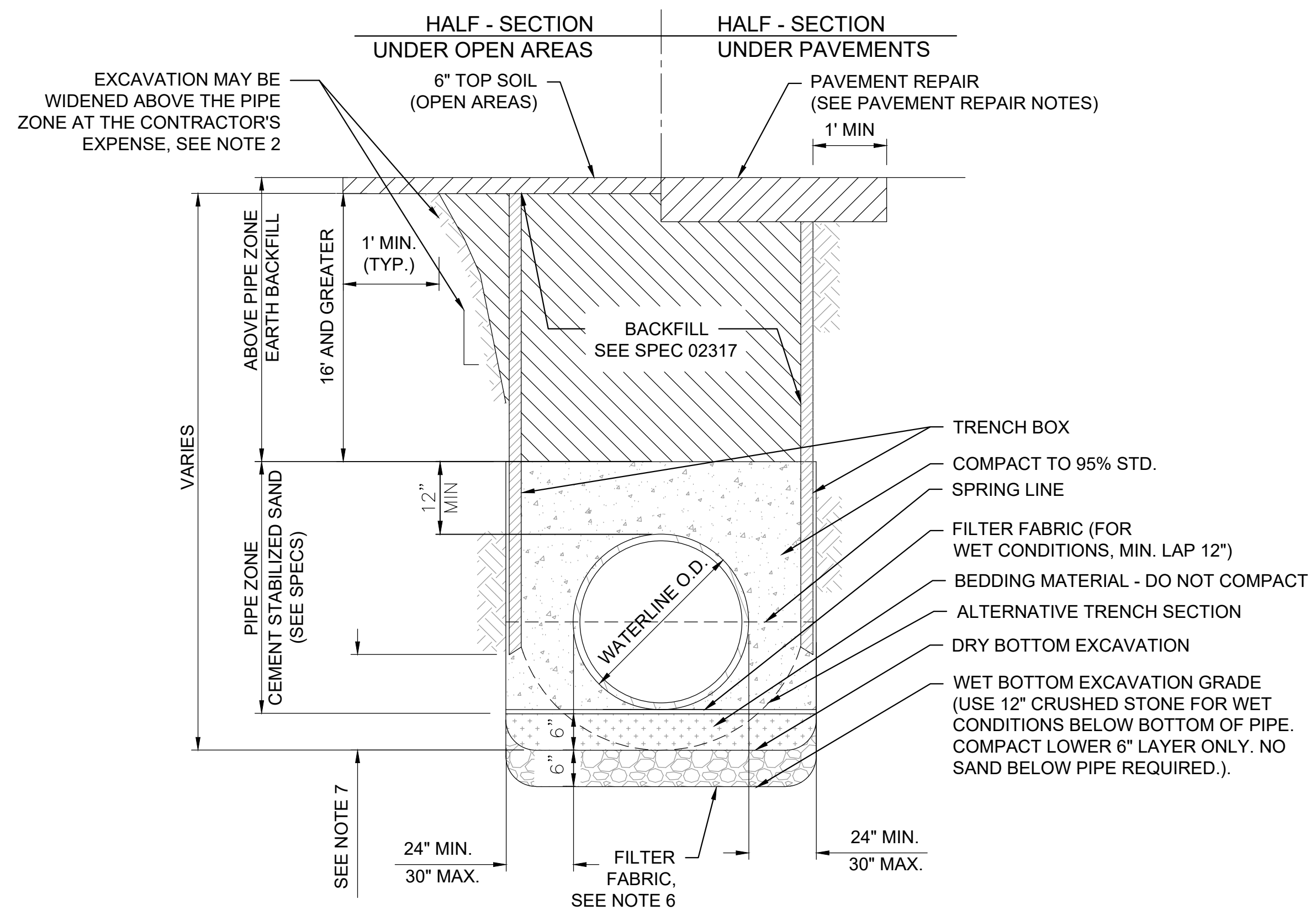


1 TYPICAL TRENCH SECTION OPTION A  
SCALE: NTS.



2 FLOWABLE FILL ENCASEMENT OPTION B  
SCALE: NTS.

- GENERAL NOTE:**
- BACKFILL TO NATURAL GROUND SURFACE UNLESS OTHERWISE SHOWN ON PLAN AND PROFILE DRAWINGS
  - SEE TRENCH SAFETY SYSTEM SPECIFICATION FOR MAXIMUM ALLOWABLE SLOPES AND TRENCH BOX REQUIREMENTS.
  - FOR WET BOTTOM EXCAVATION LIMITS OF CRUSHED STONE, EXTEND AS SHOWN. PROVIDE FILTER FABRIC AROUND CRUSHED STONE.
  - PIPE EMBEDMENT ZONE MUST BE FILLED AND RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD (APPLIES TO DETAILS 1 AND 3).
  - USE FILTER FABRIC OR POLYETHYLENE WRAP AS A BOND BREAKER BETWEEN CEMENT STABILIZED SAND AND PIPE.
  - REFER TO SPEC 02317 FOR GEOTEXTILE REQUIREMENTS AROUND EMBEDMENT.
  - ADJUST HEIGHT OF UNSUPPORTED TRENCH AS NEEDED FOR SAFE CONDITIONS.
  - PROVIDE SANDBAGS FOR FLOWABLE FILL ENCASEMENT TO SUPPORT PIPE TO CORRECT GRADE ABOVE TRENCH BOTTOM. USE ONE SUPPORT 5 FEET FROM EACH END AND AT 10 FEET O.C. FOR THE MIDDLE. FOR PIPE FURNISHED IN 12 FOOT LENGTHS, USE ONE SUPPORT 3 FEET FROM EACH END.
  - IN WETLAND AREAS WITH OPEN-CUT CONSTRUCTION, STRIP AND STOCKPILE 6" OF TOPSOIL. RESTORE TOPSOIL AFTER BACKFILLING TO MATCH PRE-CONSTRUCTION GRADE. SEE PLAN AND PROFILE SHEETS FOR AREAS WITH DELINEATED WETLANDS.



3 EXCAVATION & BACKFILL DETAIL SCALE: NTS.  
(FOR WATER MAIN WITH HEIGHT OF COVER GREATER THAN 16')

- DETAIL 3 APPLICABLE IN THE FOLLOWING AREAS:
- WATER MAIN WITH HEIGHT OF COVER GREATER THAN 16'
  - TUNNEL SHAFT LIMITS
  - PPCA LIMITS

- PAVEMENT REPAIR NOTES:**
- REMOVE AND REPLACE PAVEMENT AS SHOWN IN DRAWINGS.
  - PAVEMENT REPLACEMENT TO BE DONE IN ACCORDANCE WITH COUNTY OR CITY STANDARDS.
  - NEW CONCRETE PAVEMENTS TO BE SAME THICKNESS AS EXISTING, UNLESS OTHERWISE DIRECTED BY THE WHCRWA.
  - STREETS OR DRIVEWAYS SHALL BE REPAIRED OR REPLACED USING HIGH EARLY STRENGTH CONCRETE AS INDICATED ON DRAWINGS, ACCORDING TO PAVEMENT REPLACEMENT SCHEDULE WHERE PROVIDED, OR AS DIRECTED BY WHCRWA.
  - ANY REMOVAL AND REPLACEMENT OF PAVEMENT NOT IDENTIFIED ON THE DRAWINGS SHALL BE COORDINATED WITH THE ENGINEER AND THE WHCRWA.
  - WHEN CURB IS REMOVED AND REPLACED, INSTALL 1 FOOT STRIP OF SOD GRASS BEHIND CURB TO PREVENT EROSION UNTIL GRASS IS ESTABLISHED.
  - ROADWAY EXCAVATION, SITE GRADING, AND HYDROMULCH SEEDING OR SODDING WITHIN R.O.W. AND/OR LIMITS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH CONSTRUCTION SPECIFICATIONS.

WHCRWA NFBWA  
**SURFACE WATER SUPPLY PROJECT**  
Program Manager  
**DANNENBAUM ENGINEERING CORPORATION**

**Company Name**  
Address  
Telephone No.  
Texas Firm No.

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**CONTRACT KM "X"**

**EXCAVATION BEDDING AND BACKFILL DETAILS**

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**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. D-04	HORIZ: HORIZ VERT: VERT
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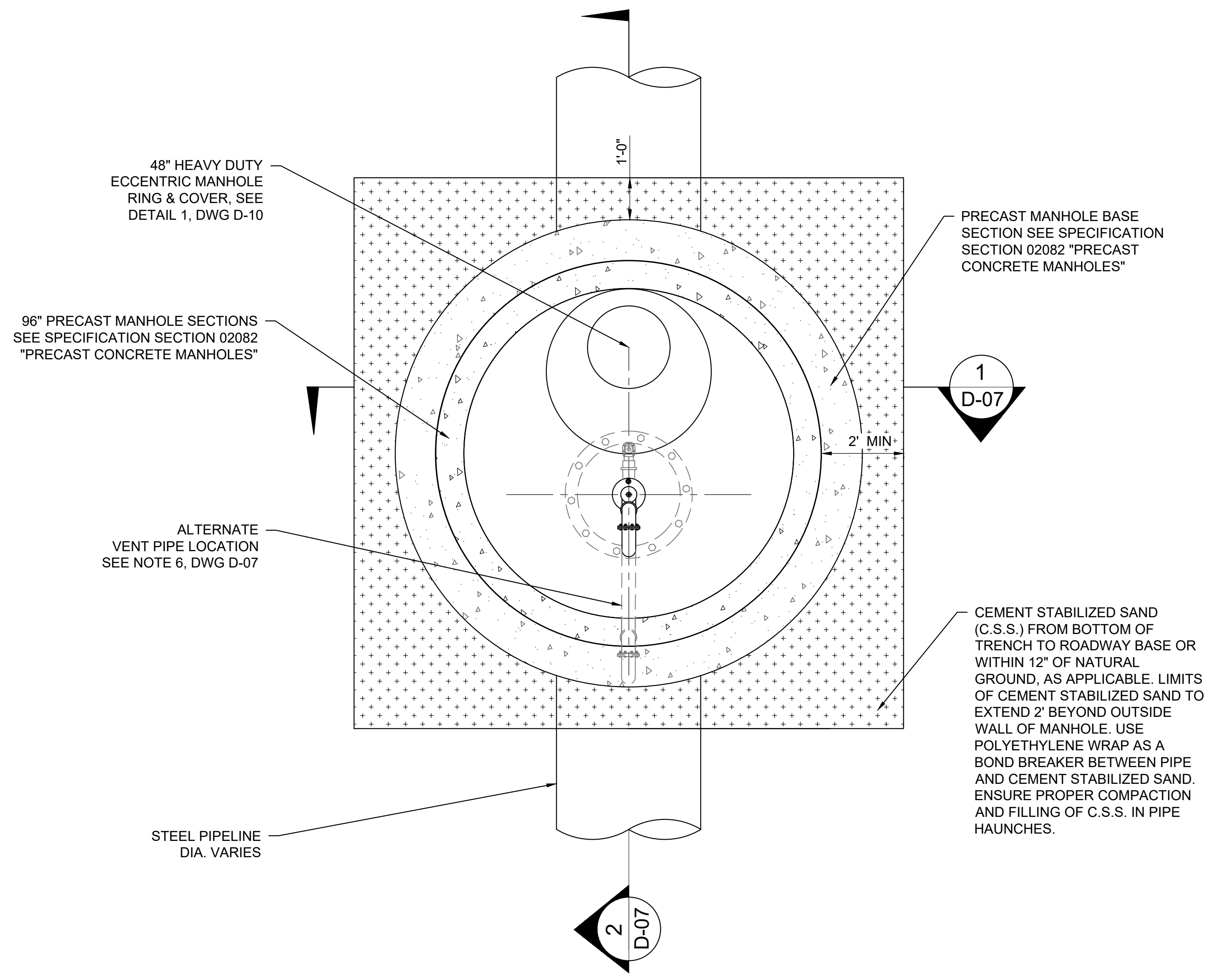
SHEET NO. XX OF XXX	DRAWING SCALE
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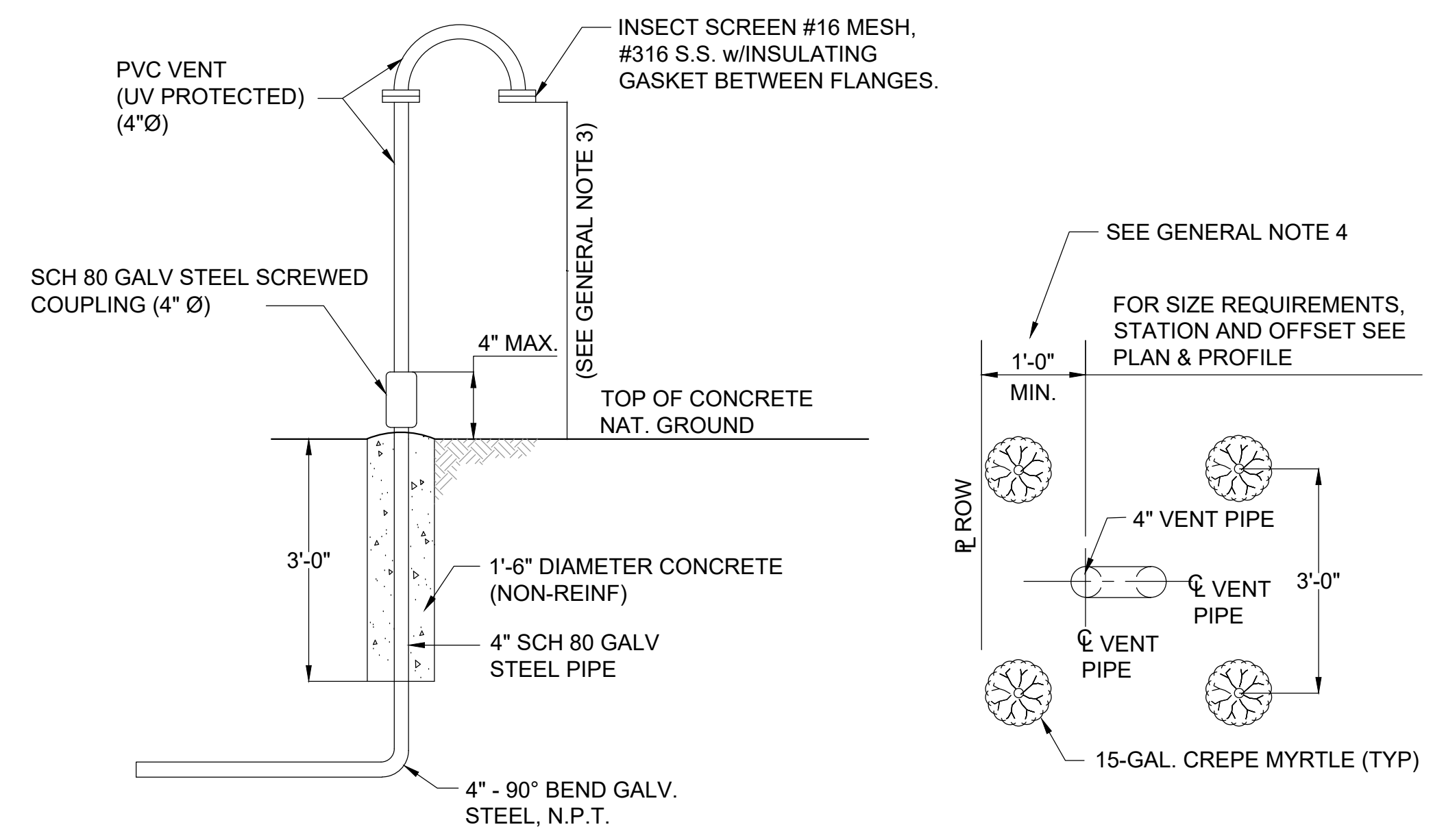




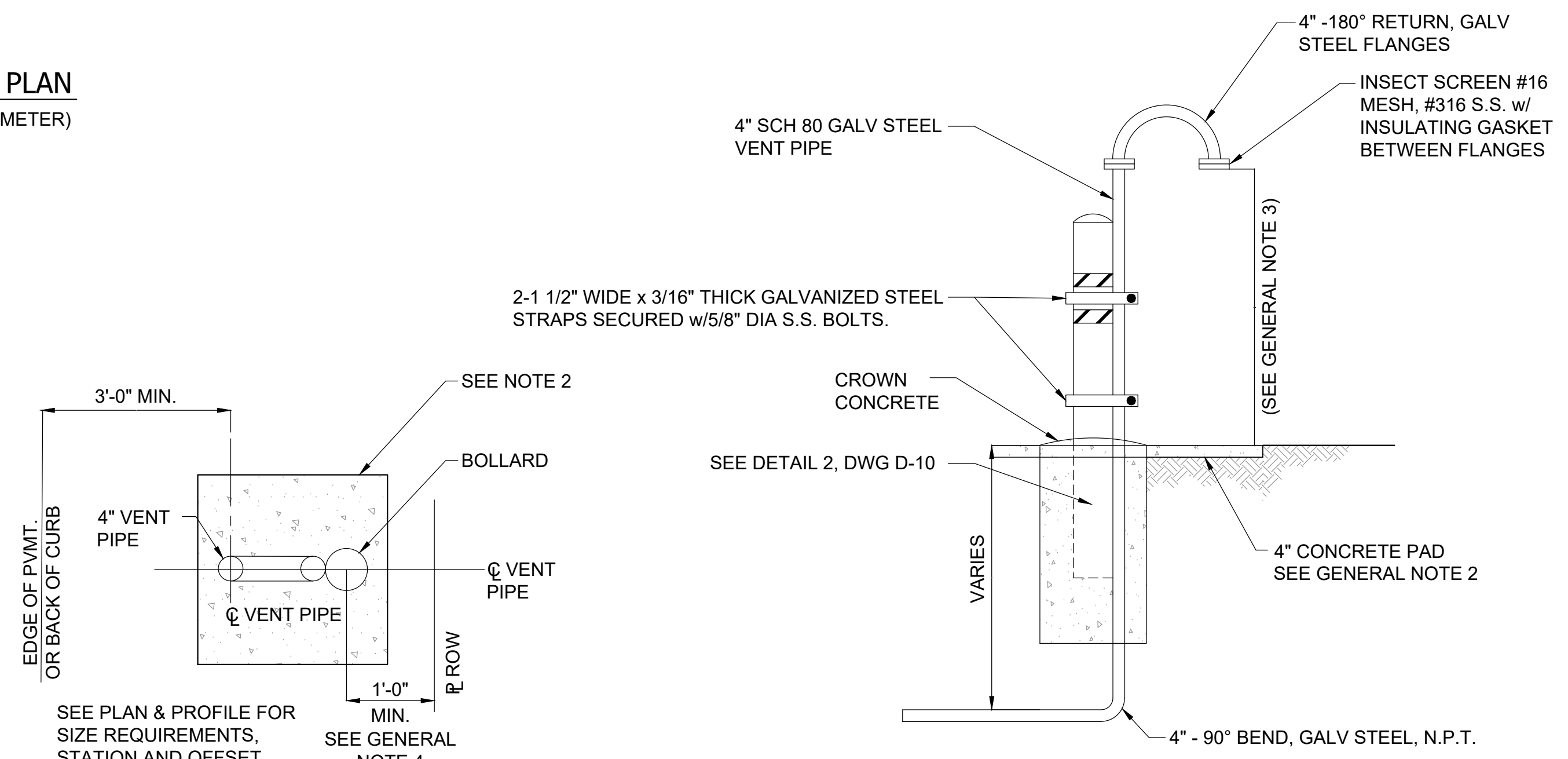
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MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO. DATE	REVISION	APP.



**1 COMBINATION AIR VALVE ASSEMBLY IN ACCESS MANHOLE & PIPING PLAN**  
 SCALE: NTS. (FOR WATER LINES 42" & LARGER IN DIAMETER)



**2 BREAKWAY VENT PIPE DETAIL**  
 (VENT PIPES WITHIN HARRIS COUNTY ROW)



**3 VENT PIPE W/ BOLLARD DETAIL**

- GENERAL NOTE:**
1. DETAILS 2 & 3 SHOULD ONLY BE USED WITH ALTERNATE VENT PIPE CONFIGURATION WHEN VENT PIPE MUST BE BROUGHT OUTSIDE MANHOLE FOOTPRINT AS INDICATED ON PLAN AND PROFILE DRAWINGS. FOR ALL OTHER CASES, REFER TO DWG D-07 AS NORMAL.
  2. PROVIDE 3"x3"x4" WWM CONCRETE PAD CENTERED ON VENT PIPE FOR ALTERNATE VENT PIPE LOCATIONS OUTSIDE MANHOLE FOOTPRINT.
  3. VERIFY THAT LOCATION OF VENT PIPE SCREEN IS 1 FOOT ABOVE 100-YEAR FLOOD PLAIN ELEVATION OR 4 FEET ABOVE NATURAL GROUND, WHICHEVER IS HIGHER.
  4. FOR VENT PIPE IN HCFCD ROW, INSTALL VENT PIPE NO MORE THAN 1 FOOT FROM ROW LINE.
  5. FOR VENT PIPE IN HCFCD ROW, DO NOT USE DETAIL 2 ON THIS SHEET. TREES NOT TO BE PLANTED IN HCFCD ROW.

**WHCROW NFBWA**  
**SURFACE WATER SUPPLY PROJECT**

Program Manager  
**DANNENBAUM**  
 ENGINEERING CORPORATION

**Company Name**  
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**CONTRACT KM "X"**

**AIR VALVE DETAILS**  
 (SHEET 1 OF 2)

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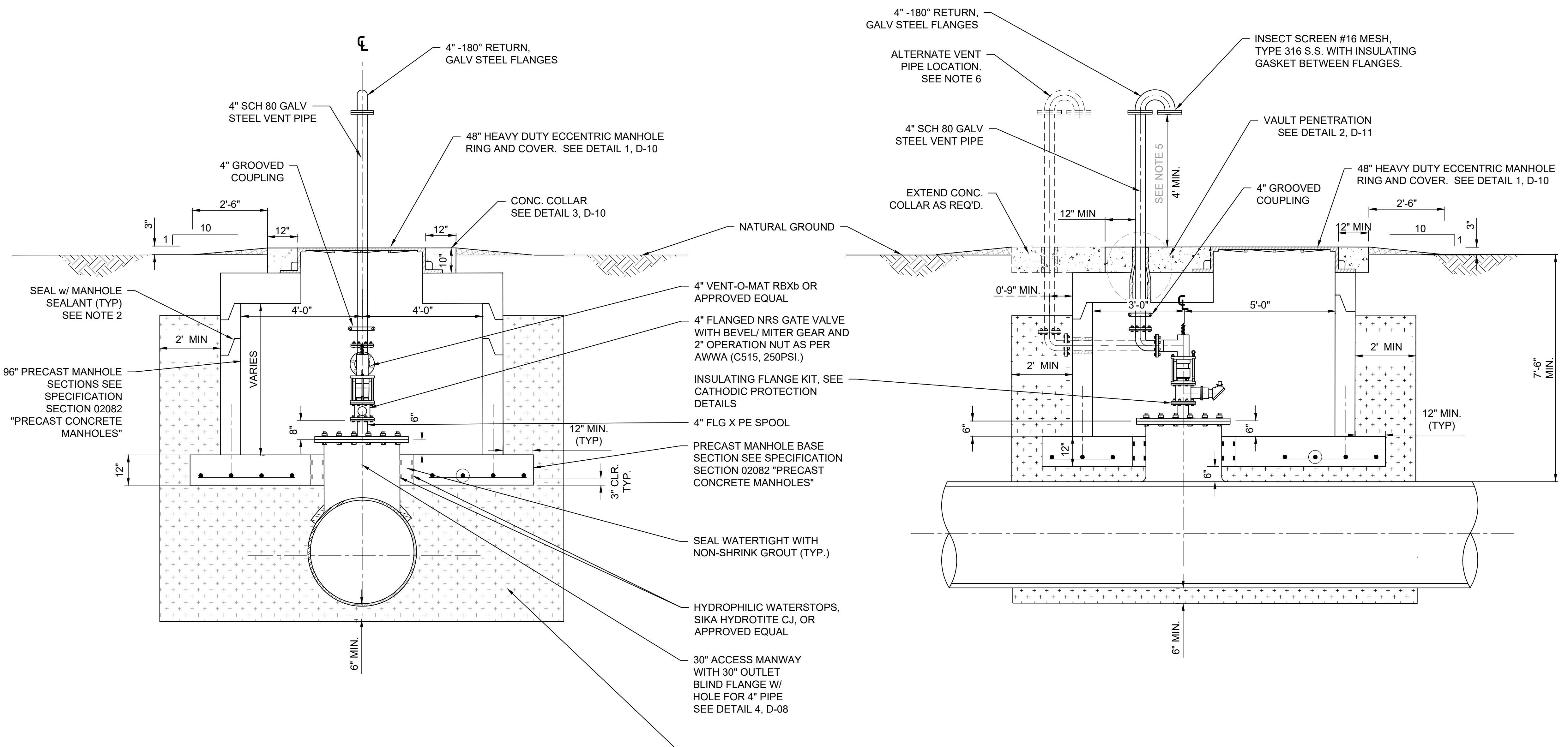
**CITY OF HOUSTON**  
 HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. D-06	HORIZ: HORIZ VERT: VERT
SHEET NO. XX OF XXX	DRAWING SCALE

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MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO. DATE	REVISION	APP.



**1 COMBINATION AIR VALVE ASSEMBLY IN ACCESS MANHOLE**  
SCALE: NTS. (FOR WATER LINES 42" & LARGER IN DIAMETER)

**2 COMBINATION AIR VALVE ASSEMBLY IN ACCESS MANHOLE**  
SCALE: NTS. (FOR WATER LINES 42" & LARGER IN DIAMETER)

CEMENT STABILIZED SAND (C.S.S.) FROM BOTTOM OF TRENCH TO ROADWAY BASE OR WITHIN 12" OF NATURAL GROUND, AS APPLICABLE. LIMITS OF CEMENT STABILIZED SAND TO EXTEND 2' BEYOND OUTSIDE WALL OF MANHOLE. USE FILTER FABRIC OR POLYETHYLENE WRAP AS A BOND BREAKER BETWEEN PIPE AND CEMENT STABILIZED SAND. ENSURE PROPER COMPACTION AND FILLING OF C.S.S. IN PIPE HAUNCHES.

**GENERAL NOTES:**

- SEE AWWA C207 FOR METHOD OF ATTACHMENT FOR RING TO OUTLET PIPE.
- PROVIDE RAM-NEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
- PROVIDE AN APPROVED PETROLATUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLE.
- COATING FOR EXPOSED DUCTILE IRON AND STEEL PIPE AND FITTING IN VAULT SHALL CONFORM TO SPECIFICATION 02518.
- VERIFY THAT LOCATION OF VENT PIPE SCREEN IS 1 FOOT ABOVE 100-YEAR FLOOD PLAIN ELEVATION OR 4 FEET ABOVE NATURAL GROUND ELEVATION, WHICHEVER IS HIGHER.
- ALTERNATE VENT PIPE CONFIGURATION SHOULD ONLY BE USED AS INDICATED ON PLANS. INSTALL ALTERNATE VENT PIPE ALONG CENTERLINE OF WATER LINE, UNLESS OTHERWISE DETERMINED BY R.O.W. NEGOTIATIONS.

**WHCROWA NFBWA**  
**SURFACE WATER SUPPLY PROJECT**

Program Manager  
**DANNENBAUM**  
ENGINEERING CORPORATION

**Company Name**  
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Telephone No.  
Texas Firm No.

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**CONTRACT KM "X"**

**AIR VALVE DETAILS**  
**(SHEET 2 OF 2)**

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**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

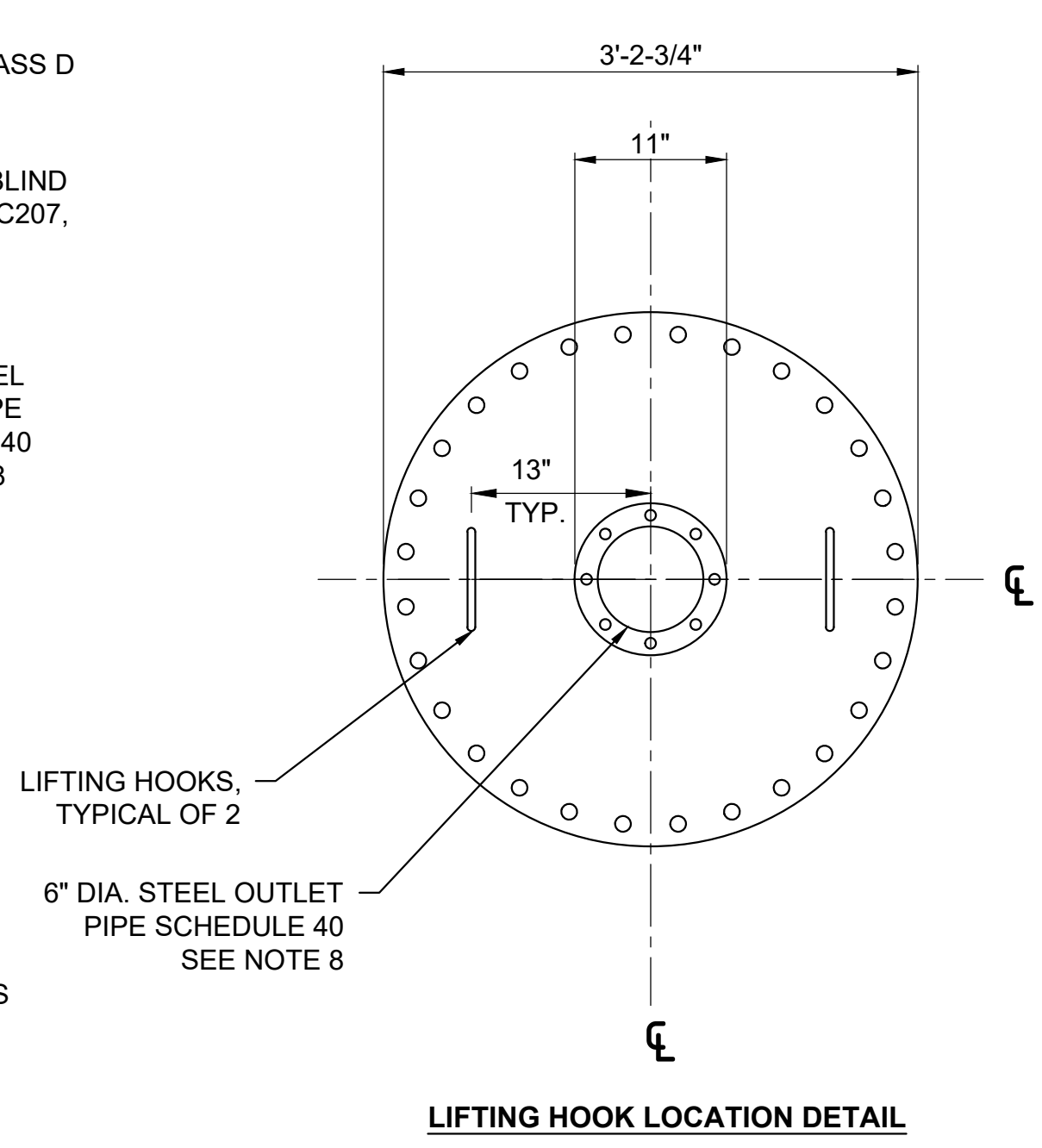
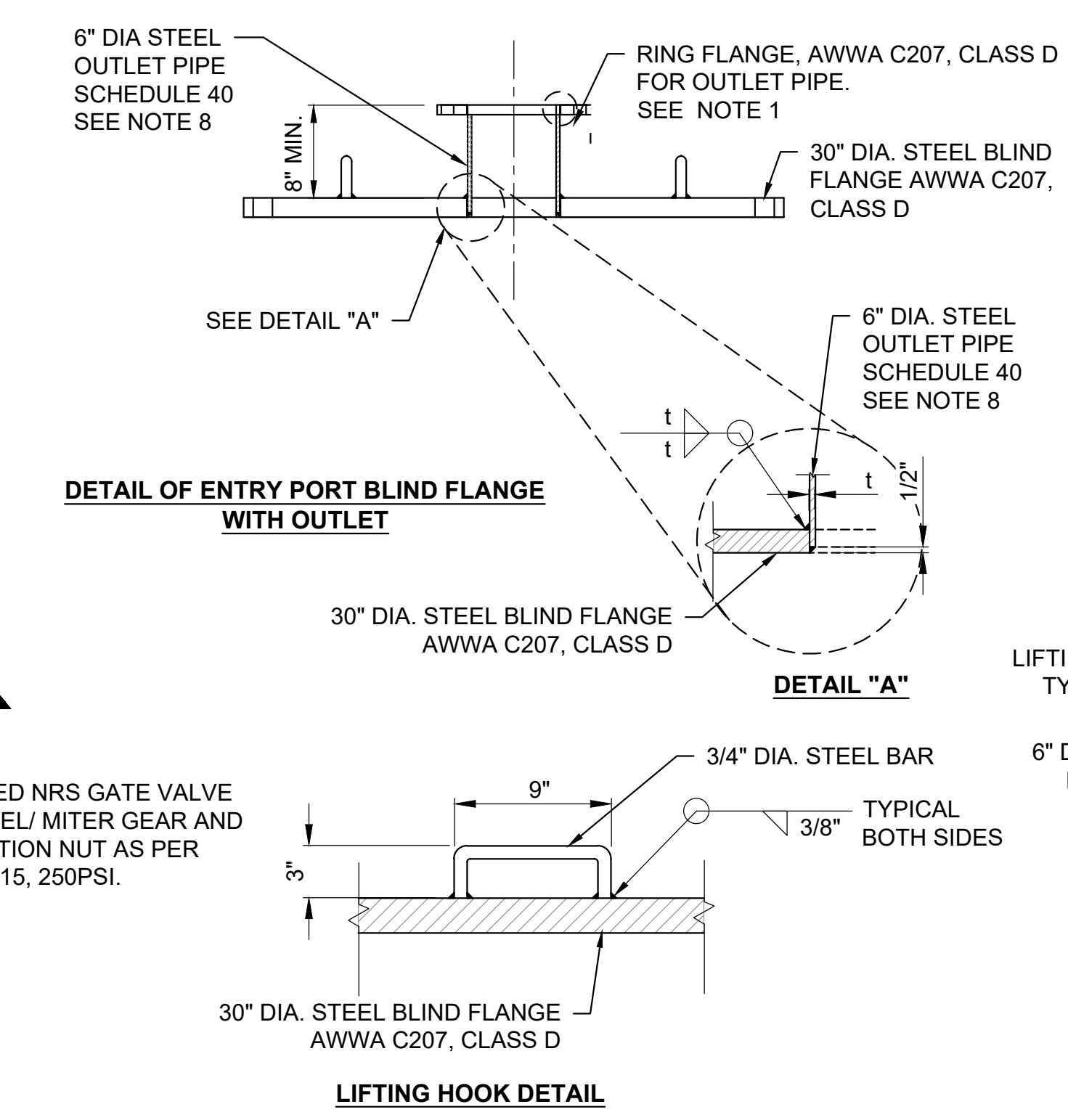
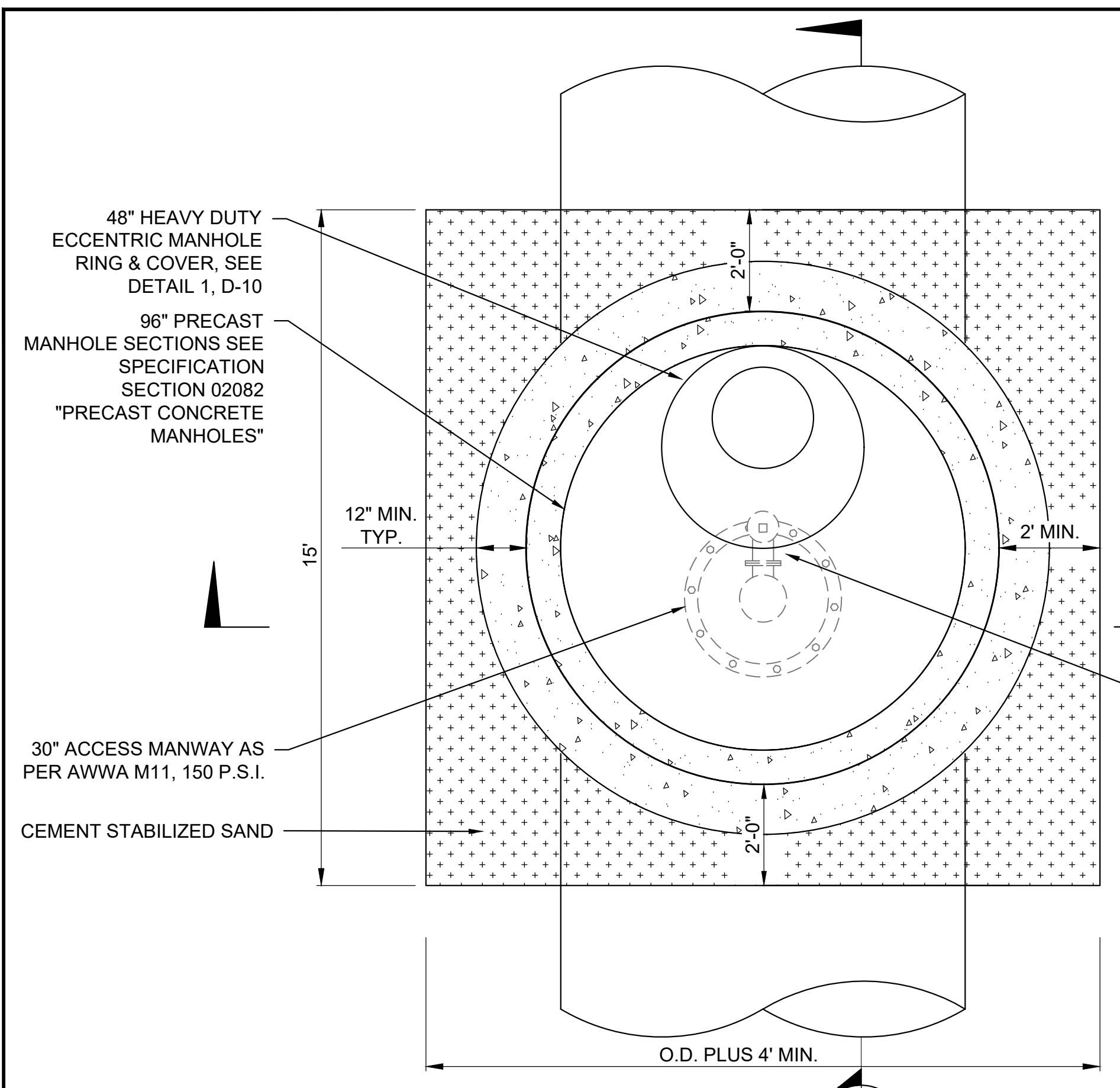
WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. <b>D-07</b>	HORIZ: NTS. VERT: NTS.
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SHEET NO. <b>XX</b> OF <b>XXX</b>	<b>DRAWING SCALE</b>
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MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO.	DATE	REVISION
APP.		

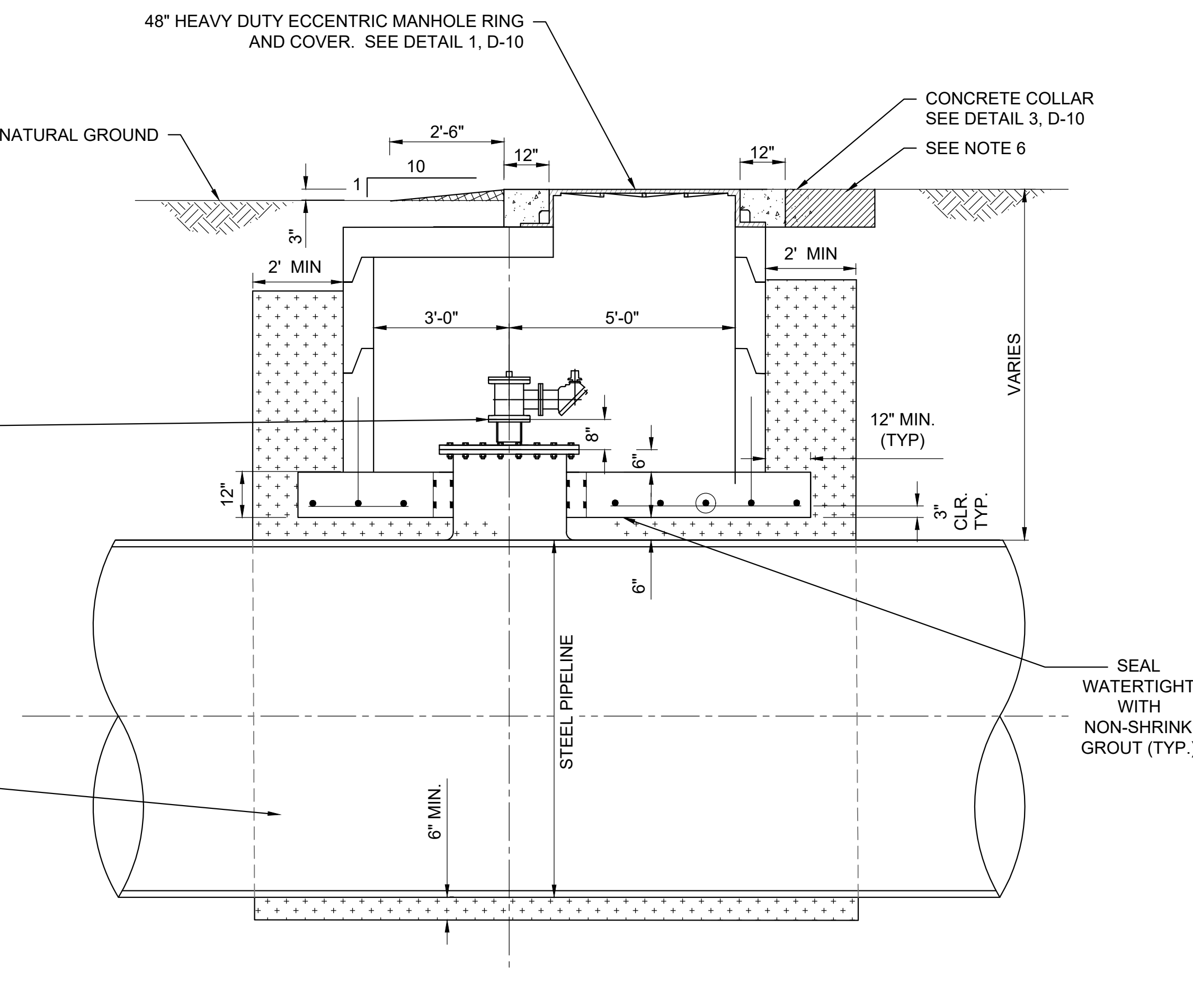
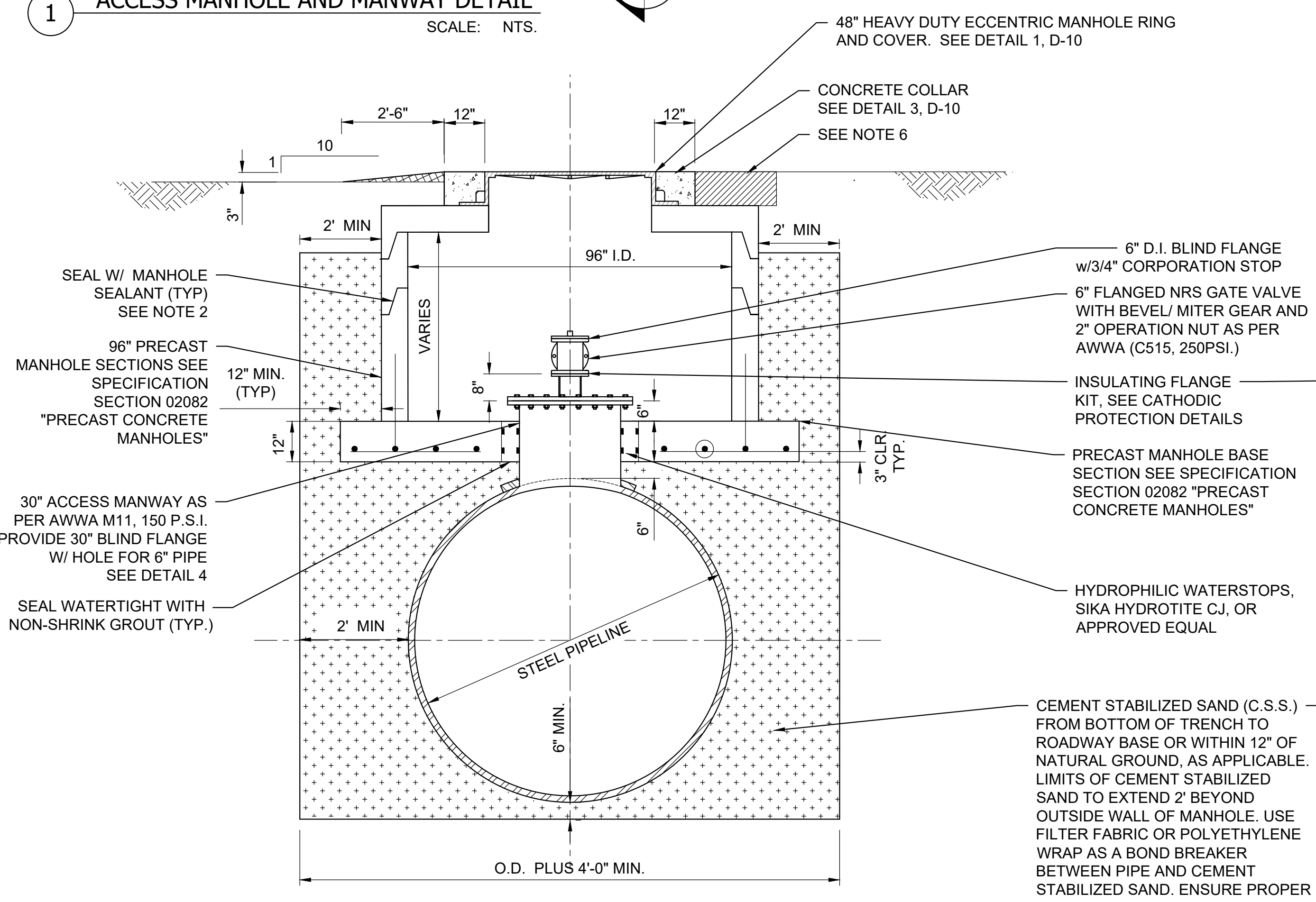


- GENERAL NOTES:**
- SEE AWWA C207 FOR METHOD OF ATTACHMENT FOR RING TO OUTLET PIPE.
  - PROVIDE RAM-NEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
  - PROVIDE AN APPROVED PETROLATUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLE.
  - FOR MANHOLE GREATER THAN OR EQUAL TO 8 FEET DEEP, PROVIDE FIXED LADDER WITH FALL PROTECTION SYSTEM: MILLER SAFE-T CLIMB OR APPROVED EQUAL SEE DETAIL 4, DWG D-10.
  - COATING FOR EXPOSED DUCTILE IRON AND STEEL PIPE AND FITTING IN MANHOLE SHALL CONFORM TO SPECIFICATION 02518.
  - FOR PAVEMENT REPAIR, SEE "PAVEMENT REPAIR NOTES ON SHEET D-04.
  - ALL STRUCTURAL CONCRETE TO HAVE MIN. COMPRESSIVE STRENGTH OF 4,500 P.S.I. AS SPECIFIED IN SECTION 03315-CONCRETE FOR UTILITY CONSTRUCTION.
  - FOR CAV USE, MATCH OUTLET SIZE TO CAV REFERENCED IN D-07.

1 ACCESS MANHOLE AND MANWAY DETAIL SCALE: NTS.

4 BLIND FLANGE DETAILS FOR ACCESS MANHOLE MANWAY SCALE: NTS.

**WHCROWA NFBWA SURFACE WATER SUPPLY PROJECT**  
Program Manager **DANNENBAUM ENGINEERING CORPORATION**



2 ACCESS MANHOLE AND MANWAY SECTION SCALE: NTS. VIEW 1

3 ACCESS MANHOLE AND MANWAY SECTION SCALE: NTS. VIEW 2

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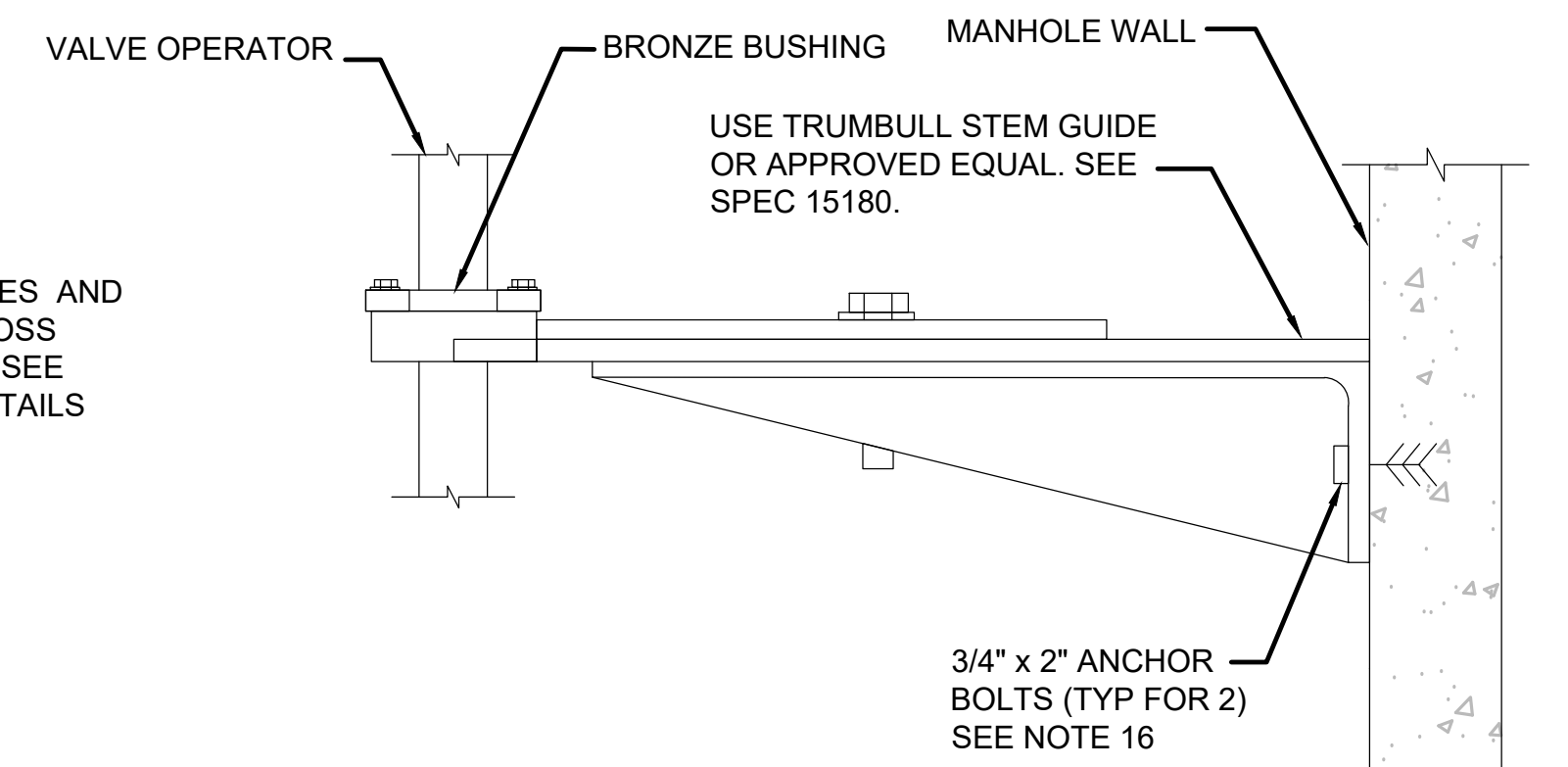
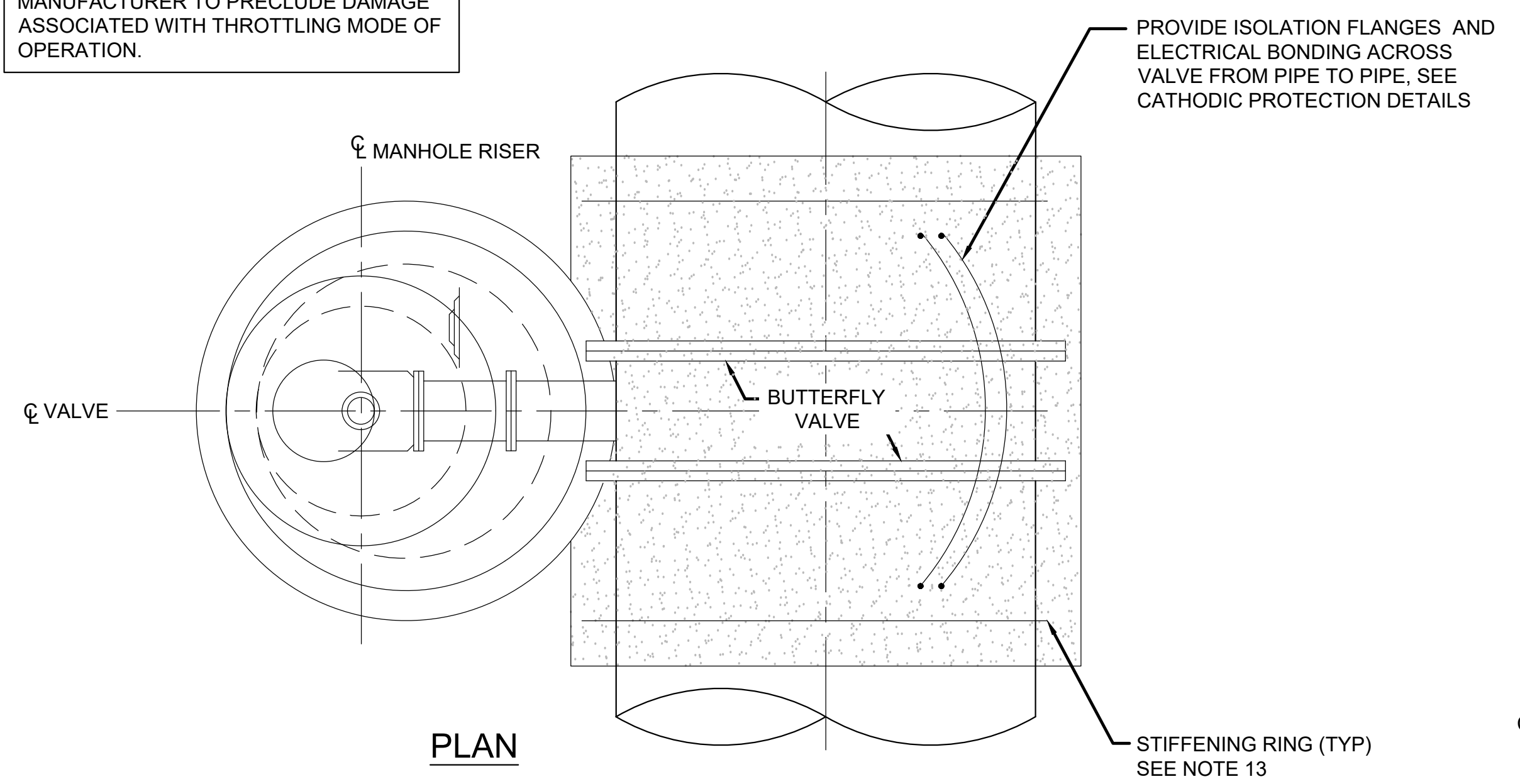
<b>CONTRACT KM "X"</b>	
<b>LARGE DIAMETER ACCESS MANHOLE AND MANWAY</b>	
NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES	
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WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE
DRAWING NO. D-08	HORIZ: HORIZ VERT: VERT
SHEET NO. XX OF XXX	DRAWING SCALE
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Standard Details Ver. March 2020

FILE PATH: G:\1110\STANDARDS\SWSP\_Kinder Morgan (Standard Details)\Standard Details\01-Details\D-08 Large Diameter Access Manhole And Manhole Details\DWG 5/28/2020 9:29 AM PEN TABLE: SWSP-34x22-PDF.ctb

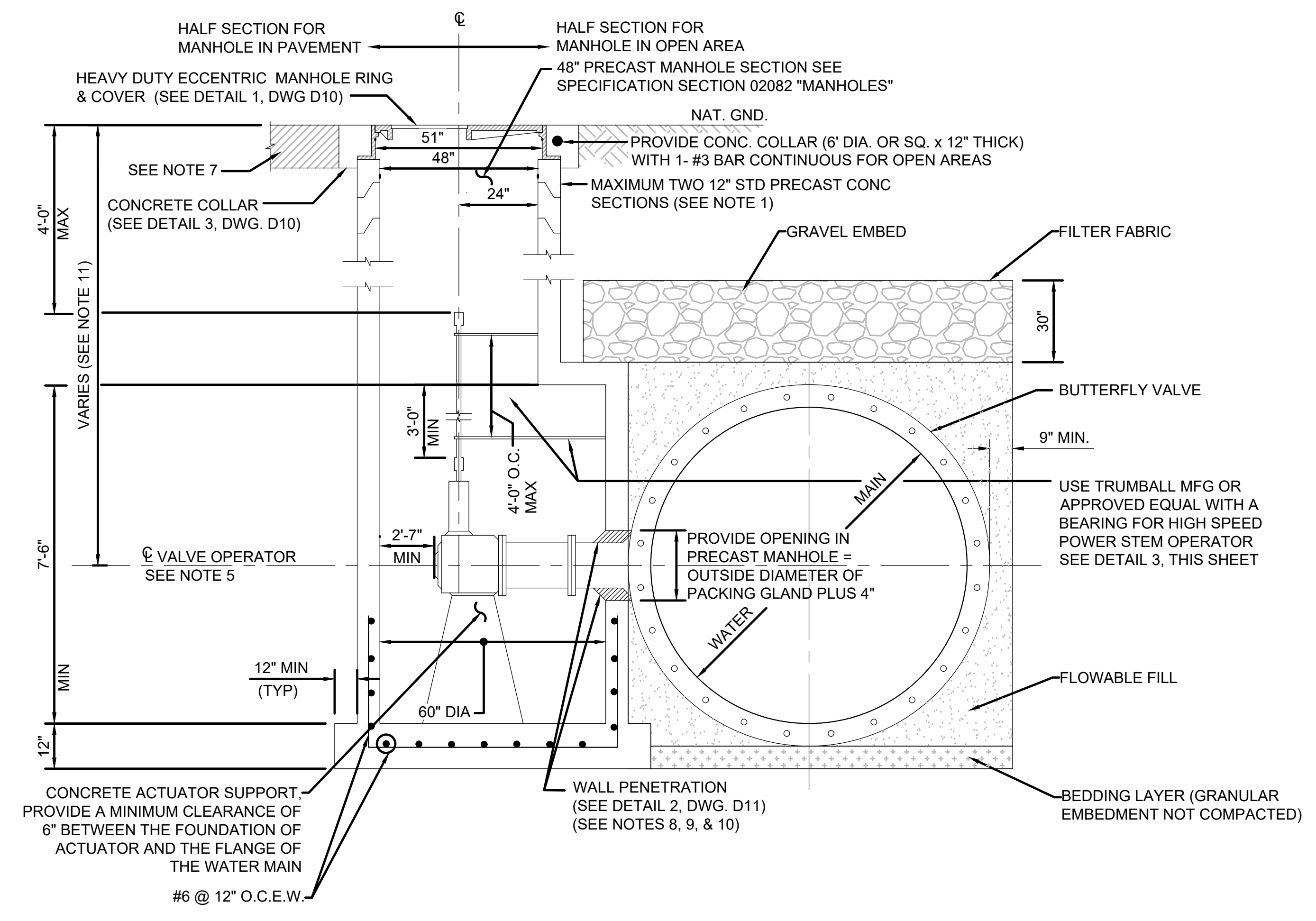
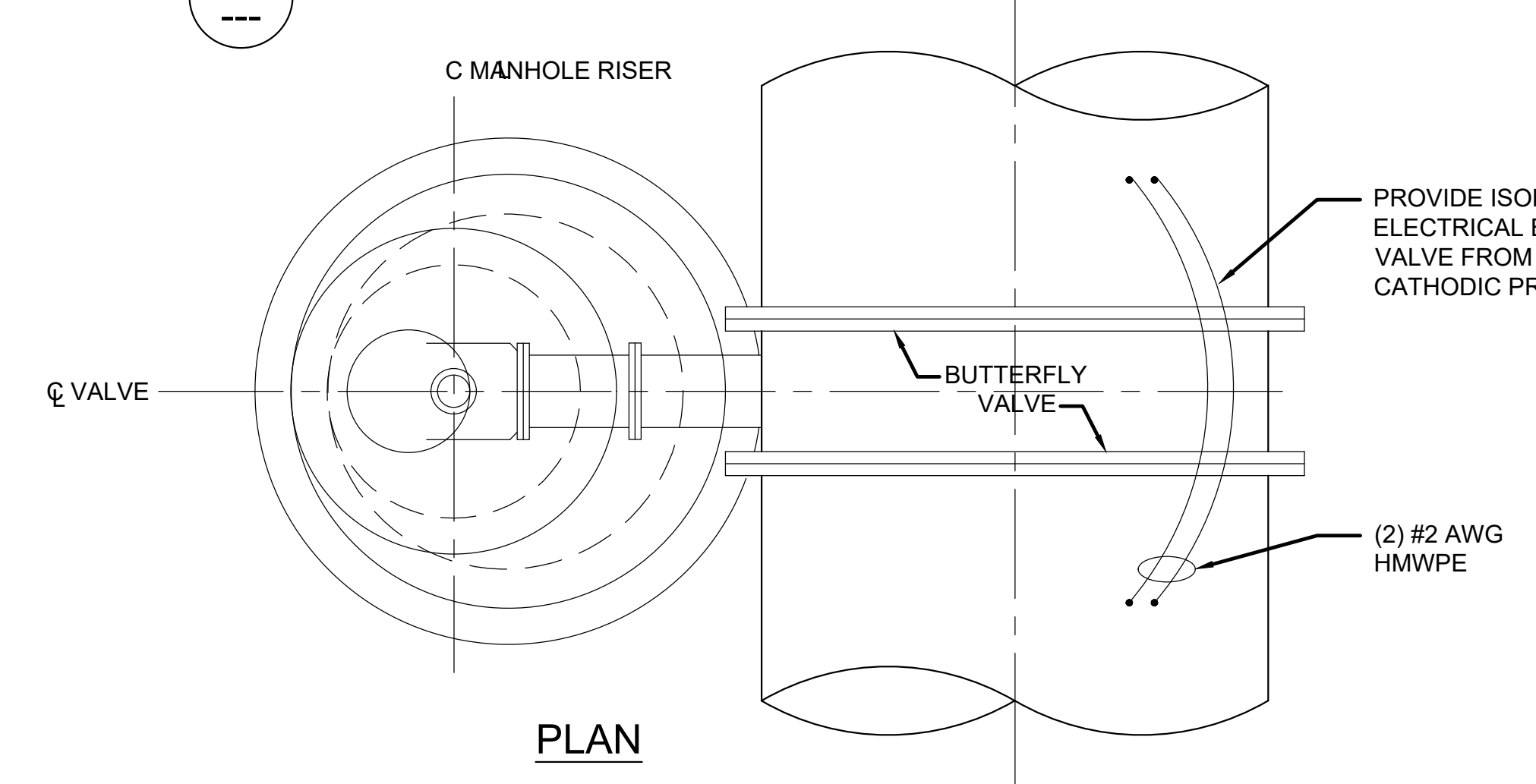
NOTE:  
SHOULD CONTRACTOR DESIRE TO USE VALVES IN A THROTTLED POSITION FOR FILLING OF LINE SEGMENTS, OBSERVE RECOMMENDATIONS OF VALVE MANUFACTURER TO PRECLUDE DAMAGE ASSOCIATED WITH THROTTLING MODE OF OPERATION.



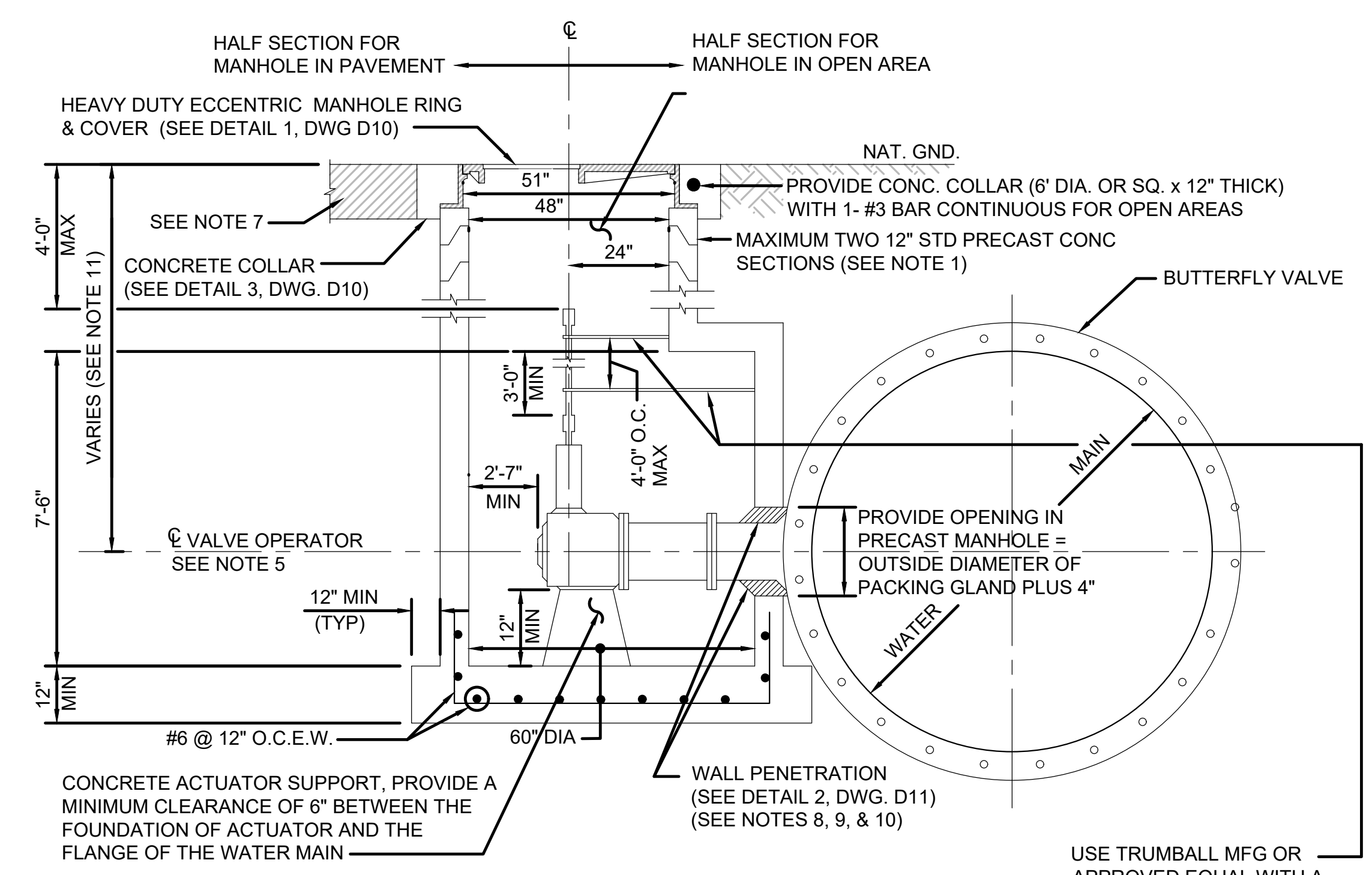
**GENERAL NOTES:**

1. PROVIDE RAMNEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. PROVIDE AN APPROVED PETROLEUM BASED TAPE ENCAPSULATING ALL BOLTS IN MANHOLES & VAULTS.
3. ALL JOINTS SHALL BE BONDED, BONDING DETAILS AT ISOLATION/ BUTTERFLY VALVES. SEE THE CATHODIC PROTECTION DETAILS.
4. FIELD COAT ALL FLANGE BOLTS, FLANGE COUPLING, FLANGE COUPLING ADAPTER AND THRUST TIE ASSEMBLIES AFTER ASSEMBLY TO 35 MDDT W/2 COATS OF COAL TAR EXPOXY.
5. 2" OPERATING NUT ON LARGE DIAMETER BUTTERFLY VALVES SHALL TURN CLOCKWISE TO OPEN VALVE ABOVE - GROUND & PLANT VALVES SHALL OPEN COUNTER CLOCKWISE.
6. PLACE MANHOLE ON COMPACTED (95% SPD) BOTTOM.
7. FOR PAVEMENT REPAIR, SEE PAVEMENT REPAIR NOTES ON DWG D-04.
8. POLYSULFIDE SEALANT EXTERIOR SIDE OF WALL PENETRATION ONLY.
9. SOLID SYNTHETIC RUBBER INTERLOCKING MODULAR LINKS W/STAINLESS STEEL BOLTS AND NUTS, THUNDERLINK LINK SEAL, OR APPROVED EQUAL.
10. IF MANHOLE IS CAST IN PLACE CONSTRUCTION, PROVIDE DETAIL(S) FOR WALL PENETRATION INCLUDING EXTRA REINFORCING. DETAILS TO BE SEALED BY PROFESSIONAL ENGINEER LICENSED IN TEXAS.
11. FOR MANHOLES DEEPER THAN 8 FEET, INCREASE SIZE OF ACCESS MANHOLES TO 72-INCH OR 84-INCH DIAMETER & PROVIDE FIXED LADDER WITH SAF-T-CLIMB OR APPROVED EQUAL. SEE DETAIL 4, DWG D-10
12. FOR CONCRETE COLLAR SEE DETAIL 3, DWG D-10.
13. ON STEEL PIPE, MANUFACTURERS SHALL SUPPLY PIPE OR FITTING/ADAPTORS CONNECTED TO THE BUTTERFLY VALVE WITH MINIMUM 5/8" THICK X 6" TALL STIFFENING RINGS UPSTREAM AND DOWNSTREAM OF BUTTERFLY VALVE. THESE RINGS SHALL BE PLACED 4' FROM THE CENTERLINE OF THE BUTTERFLY VALVE AND SHALL BE DESIGNED SUCH THAT THE PIPE ADJACENT TO VALVE IS LIMITED TO NO MORE THAN 0.25% DEFLECTION AT THE DEPTH OF COVER SHOWN ON THE PLANS.
14. THE CONTRACTOR SHALL ENSURE ALL STULLING IN PIPE ADJACENT TO VALVES REMAINS IN PLACE UNTIL FLOWABLE FILL HAS BEEN PLACED AND CURED.
15. CONTRACTOR SHALL PLACE FLOWABLE FILL IN EQUAL LIFTS ON EITHER SIDE OF PIPE AND VALVE AND ENSURE THE PIPE AND VALVE REMAIN ROUND WITHOUT DEFLECTION UNTIL FLOWABLE FILL CURES.
16. MATCH ANCHOR BOLT MATERIAL TO TRUMBULL STEM GUIDE.

**3 VALVE OPERATOR SUPPORT**



**1 BUTTERFLY VALVE w/ OPERATOR MANHOLE**  
(FOR WATER LINES 54-INCHES AND LARGER)



**2 BUTTERFLY VALVE w/ OPERATOR MANHOLE**  
(FOR WATER LINES 30-INCHES TO 54-INCHES)

**WHCROWA NFBWA**  
**SURFACE WATER SUPPLY PROJECT**  
Program Manager  
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ENGINEERING CORPORATION

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**CONTRACT KM "X"**  
**VALVE AND SERVICE MANHOLE**

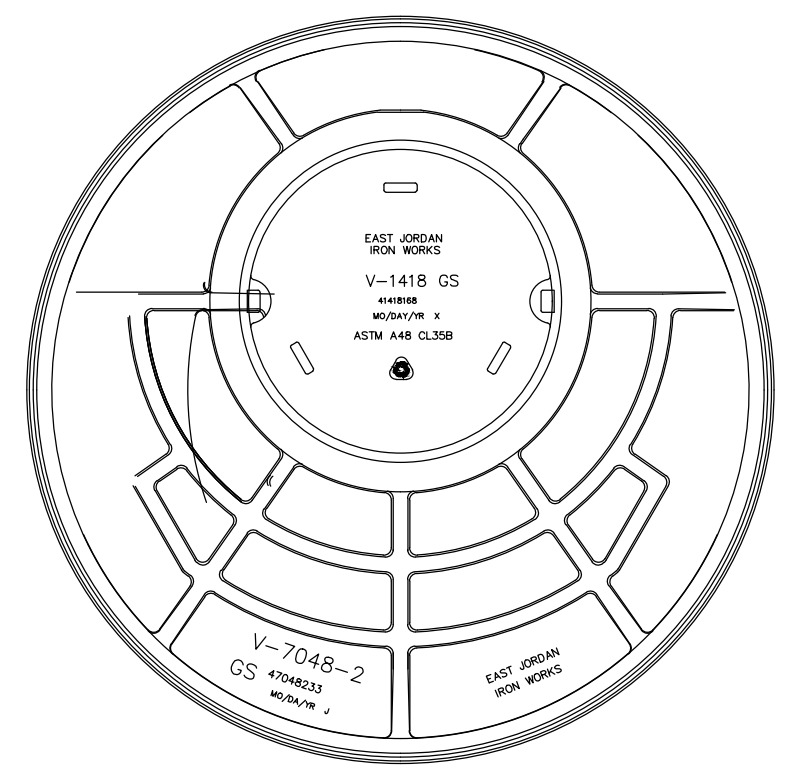
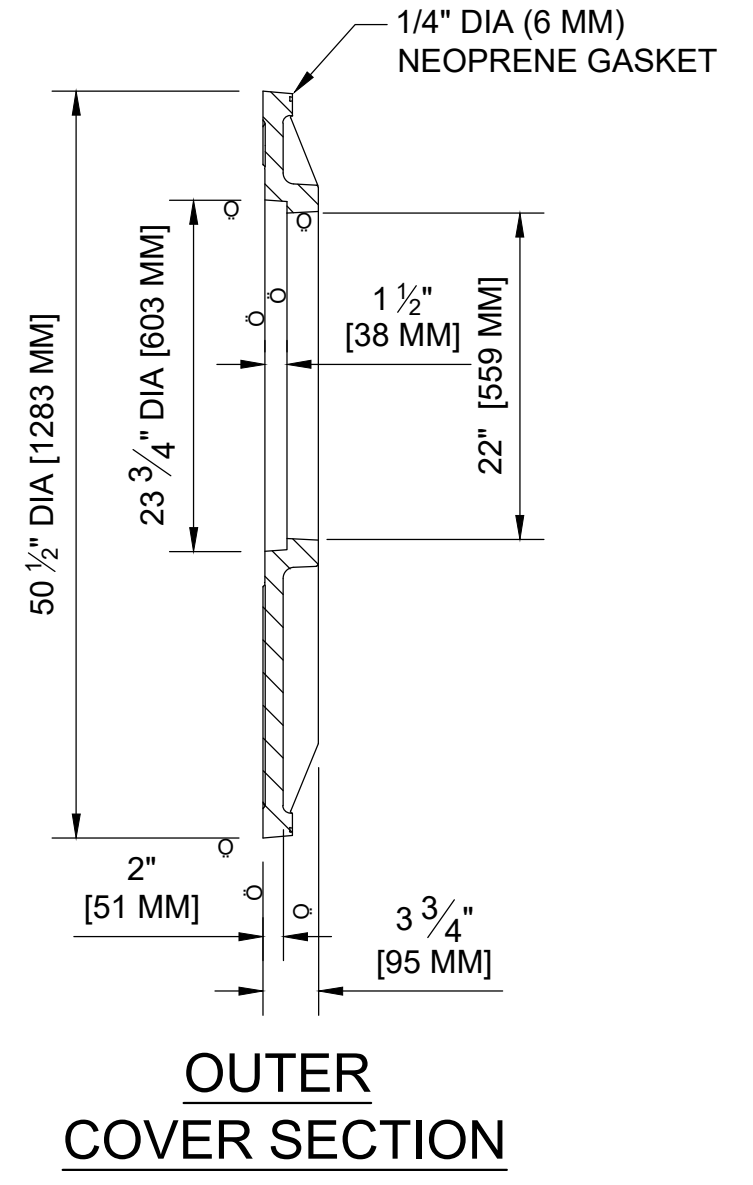
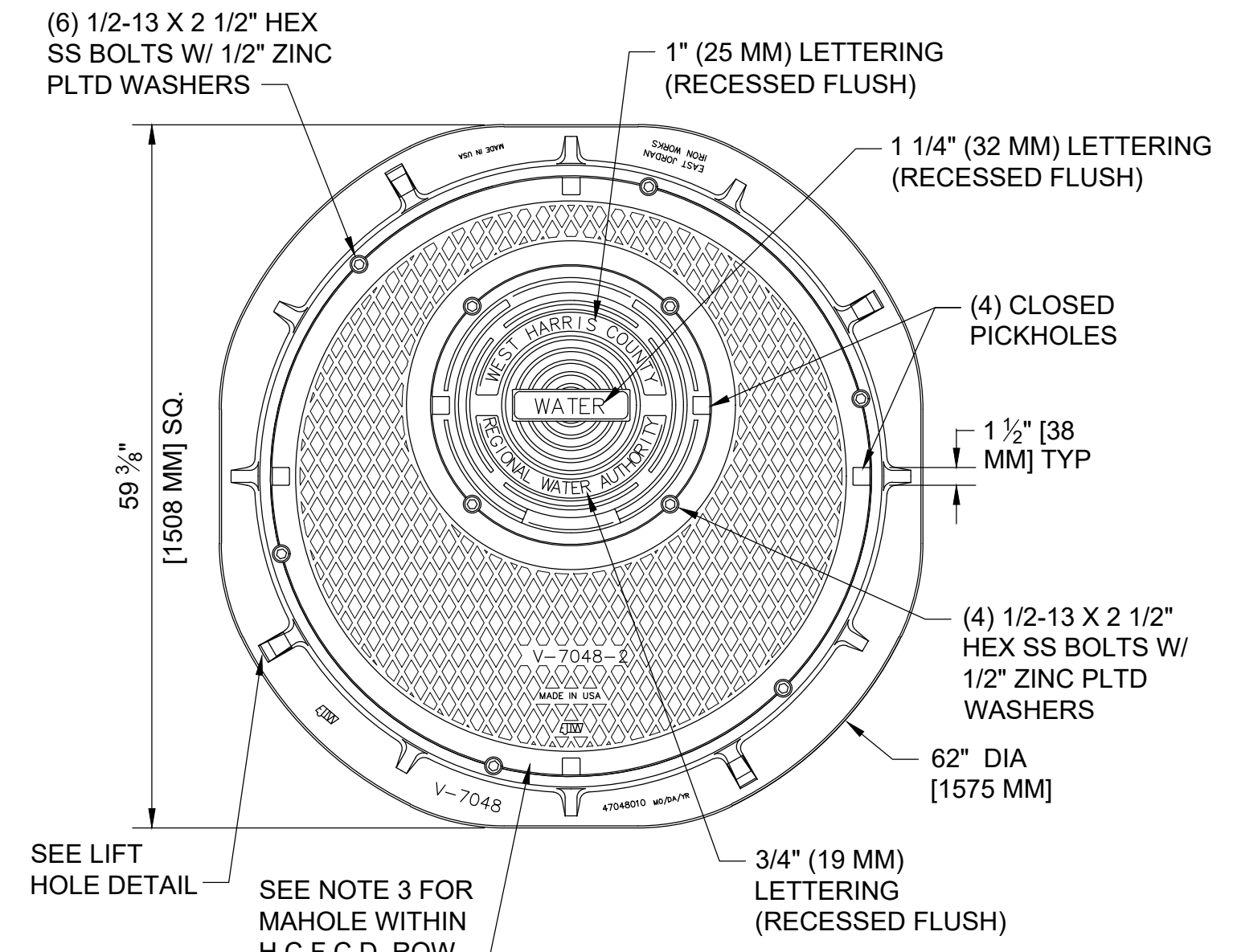
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**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

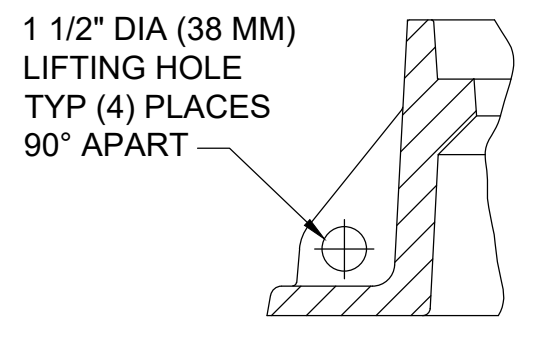
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SHEET NO. <b>XX</b> OF <b>XXX</b>	DRAWING SCALE

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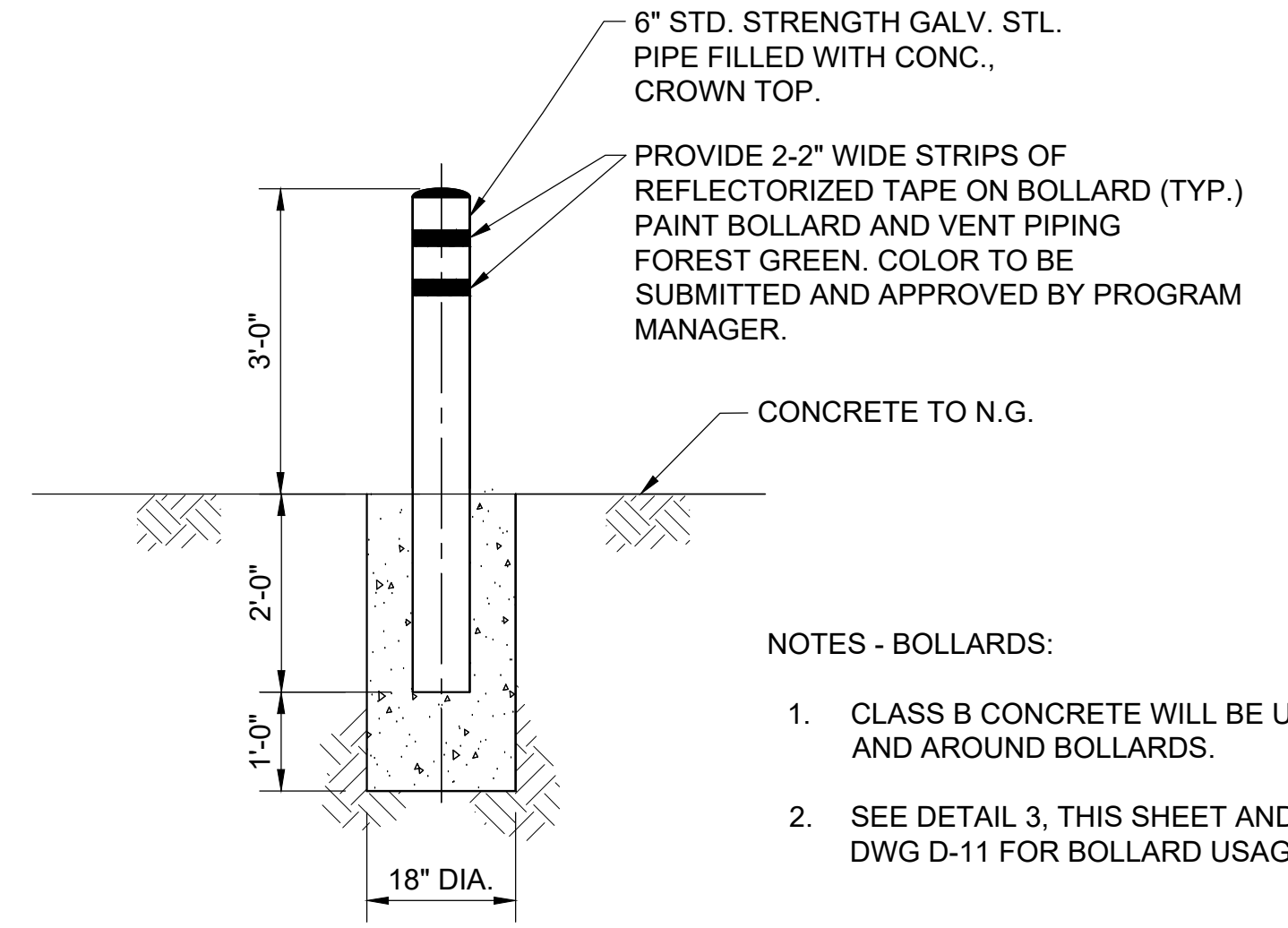
MM/DD/YY	BRIEF DESCRIPTION	XXX
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NO. DATE	REVISION	APP.



**BOTTOM VIEW OF COVERS**



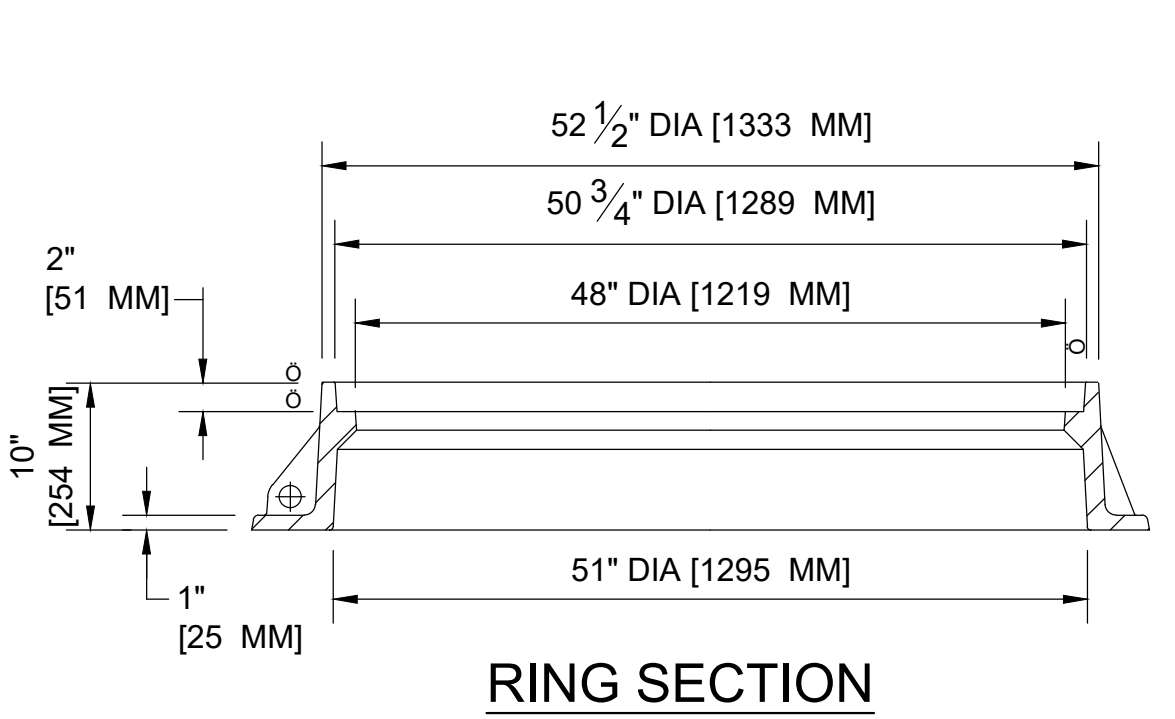
**LIFT HOLE DETAIL**



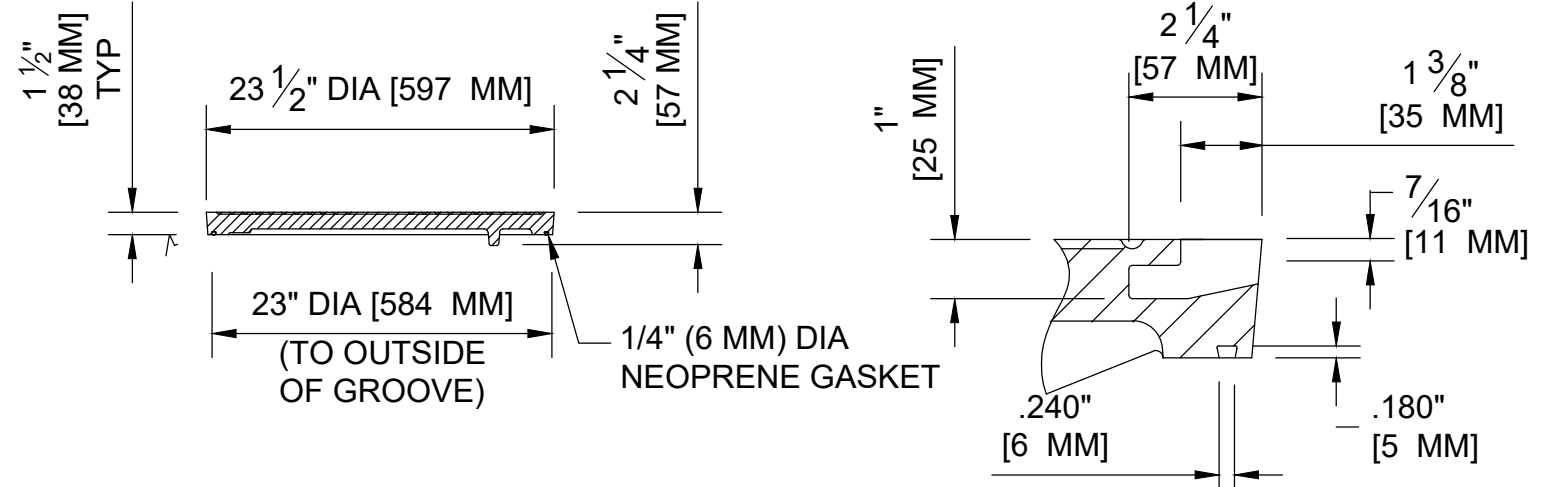
**NOTES - BOLLARDS:**

- CLASS B CONCRETE WILL BE USED IN AND AROUND BOLLARDS.
- SEE DETAIL 3, THIS SHEET AND DETAIL 6, DWG D-11 FOR BOLLARD USAGE.

**2 BOLLARD DETAIL**  
SCALE: NTS



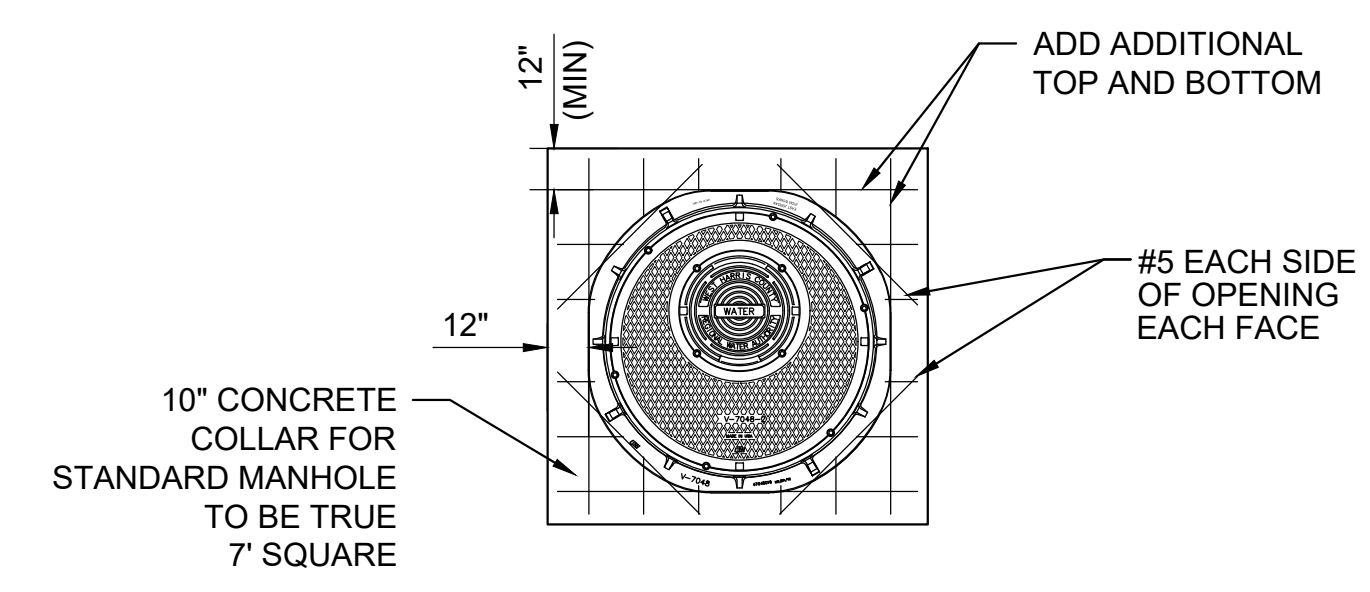
**RING SECTION**



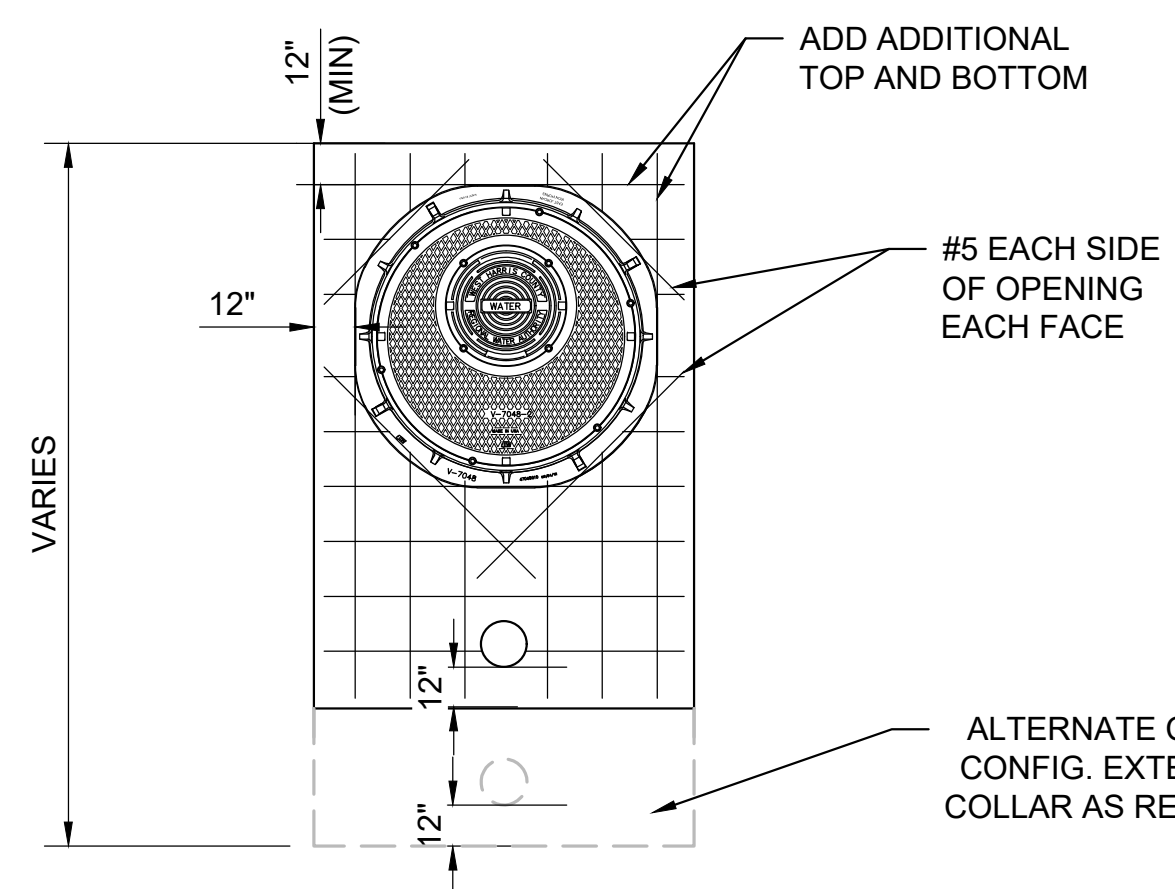
**INNER COVER SECTION**

**PICKHOLE & GASKET GROOVE DETAIL**

**1 HEAVY DUTY MANHOLE RING AND COVER**  
(MANHOLE RING AND COVER TO BE EAST JORDAN IRON WORKS (EJIW) OR EQUAL)  
SCALE: NTS



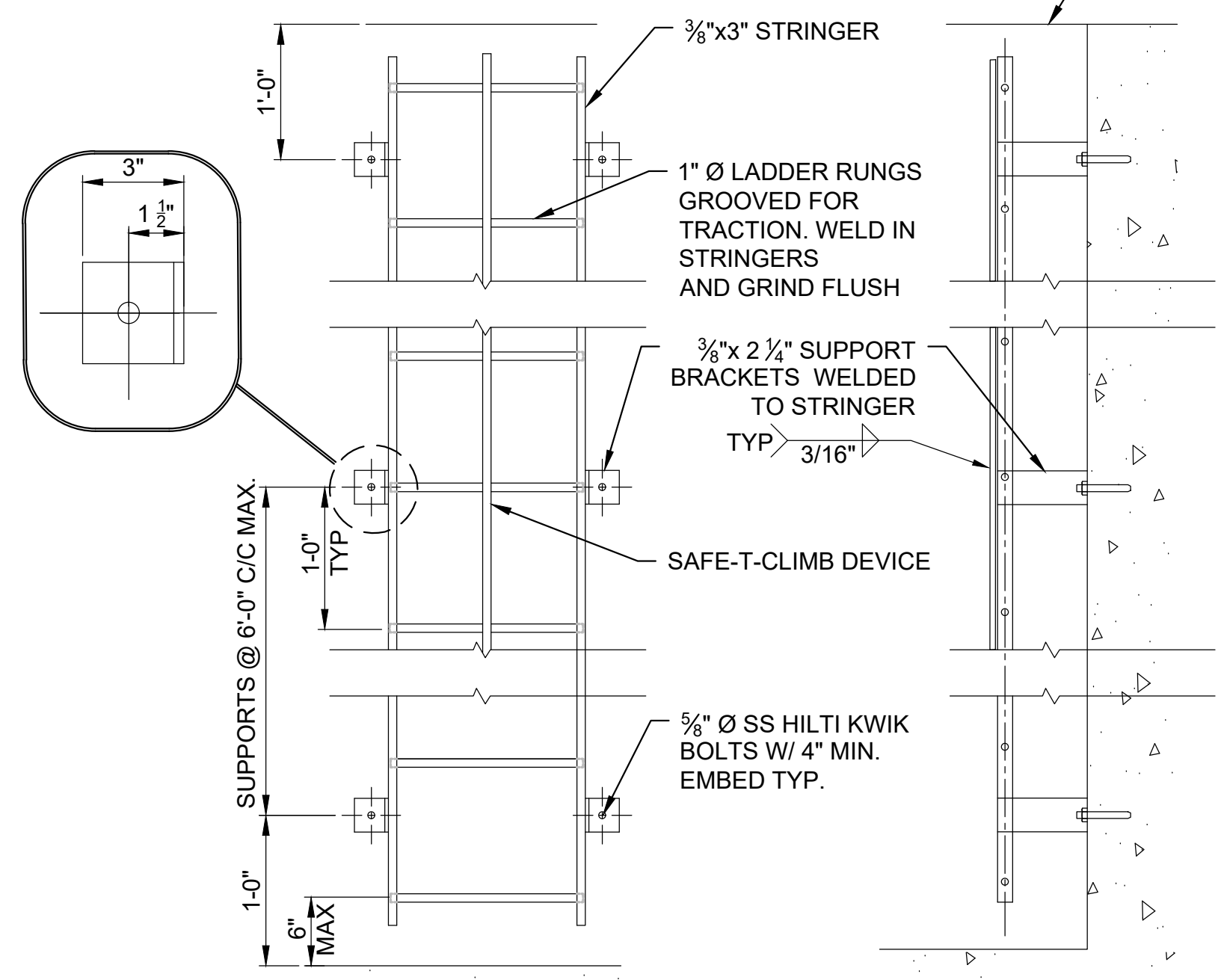
**STANDARD MANHOLE COLLAR**  
SCALE: NTS



**CAV MANHOLE COLLAR (AND ALTERNATE)**  
SCALE: NTS

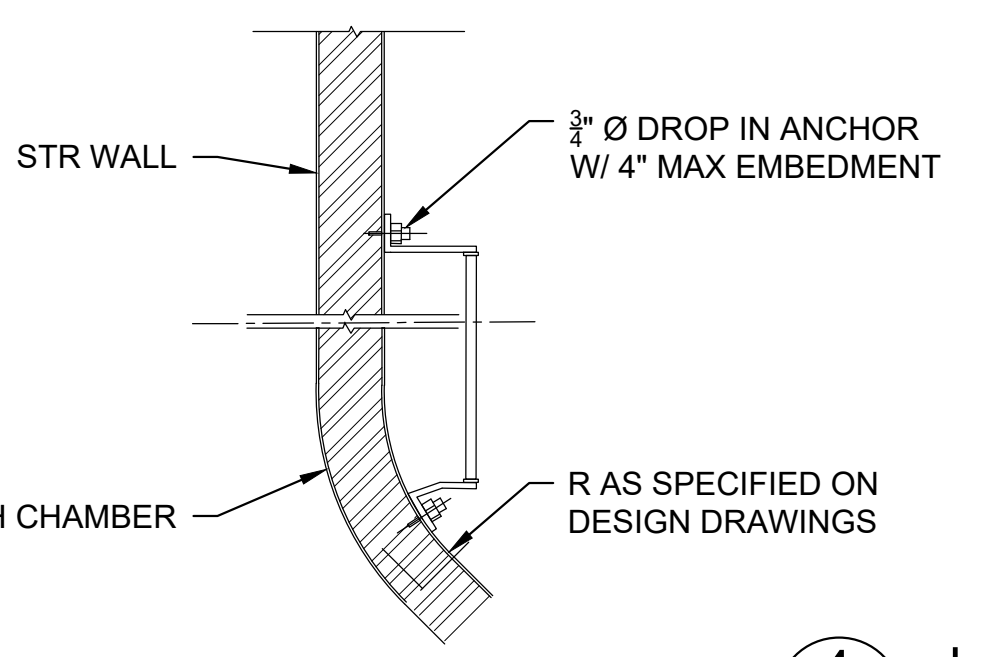
**NOTES:**

- CONSTRUCT THE FINAL 2 FEET OF THE MANHOLE AND PLACE CONCRETE WITHIN BLOCKOUT AFTER STREET PAVEMENT HAS BEEN INSTALLED OR NATURAL GROUND HAS BEEN RE-ESTABLISHED.
- ALL MANHOLE COVERS WITHIN HCFCD ROW SHALL BE FLUSH WITH NATURAL GROUND, SEALED, AND BOLTED.
- FOR HEAVY DUTY MANHOLE RING, SEE DETAIL 1, THIS DWG.
- REINFORCEMENT DEPICTED IN DETAIL IS FOR STANDARD CONCRETE COLLAR CONFIGURATION. EXTEND REINFORCEMENT PER SPECIFICATIONS IF ALTERNATE OPTION IS USED.
- FOR BUTTERFLY VALVE MANHOLES ON WATER MAINS 30-INCHES TO 78-INCHES, CENTER MANHOLE IN CONCRETE COLLAR.
- INSTALL SQUARE COLLAR W/ BOLLARDS AT CORNERS WITHIN CENTERPOINT ENERGY CORRIDOR. SEE DETAIL 2, THIS SHEET.



**SECTION**

**SECTION**



**4 LADDER DETAIL**  
SCALE: NTS.

**NOTES:**

- ALL LADDER MEMBERS SHALL BE GALVANIZED STEEL UNLESS OTHERWISE NOTED.

**WHCWA NFBWA SURFACE WATER SUPPLY PROJECT**

Program Manager  
**DANNENBAUM** ENGINEERING CORPORATION

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John D. Doe  
XXXXXX  
08/31/2019  
Engineer of Record  
Texas Registered Engineering Firm F-#XXX

**CONTRACT KM "X"**

**MANHOLE COVER DETAILS**

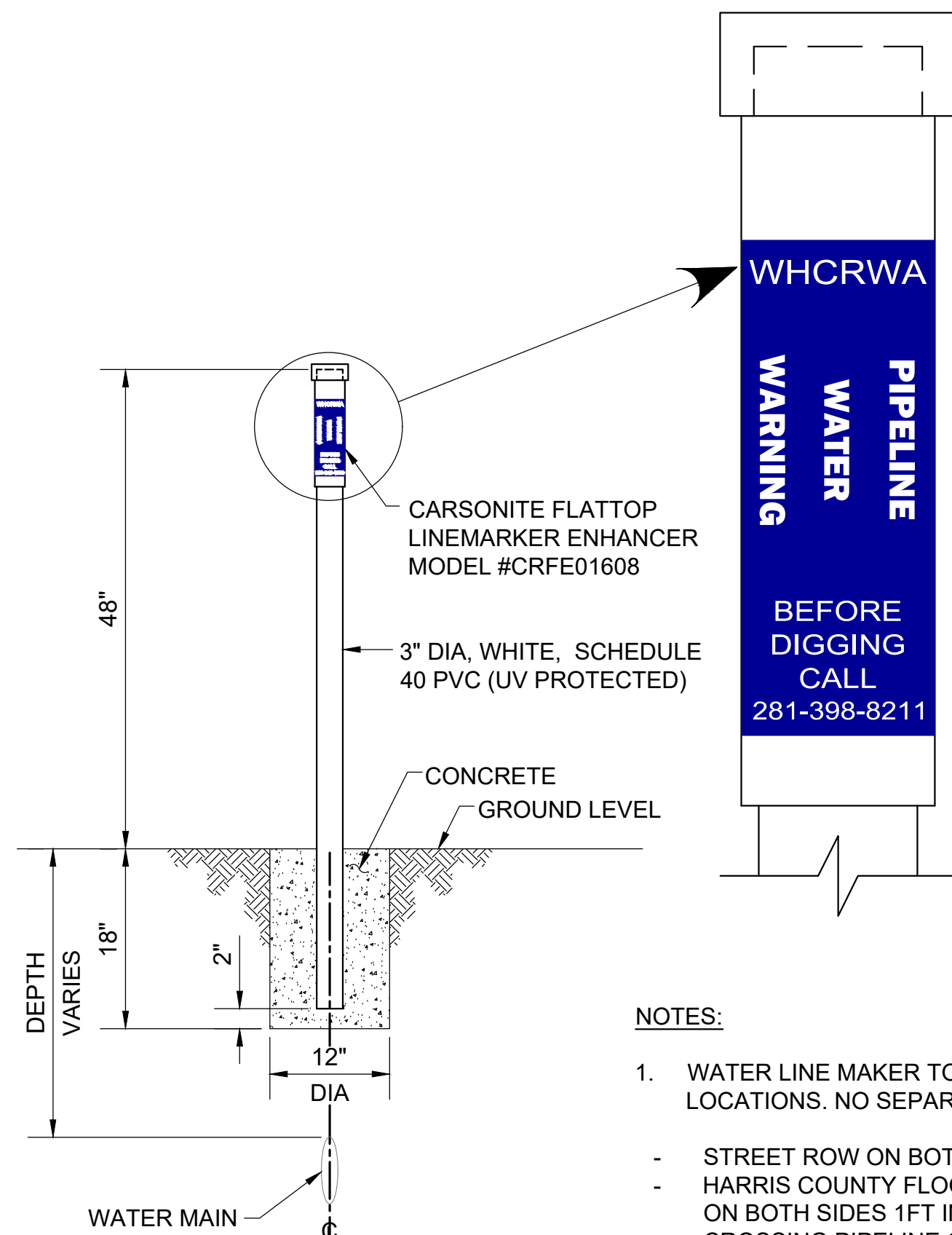
NOTE: CITY SIGNATURES VALID FOR ONE YEAR ONLY AFTER DATE OF SIGNATURES

**CITY OF HOUSTON**  
HOUSTON PUBLIC WORKS

WATER	STORM WATER QUALITY
WASTE WATER	FACILITIES
STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

DRAWING NO. <b>D-10</b>	HORIZ: HORIZ VERT: VERT
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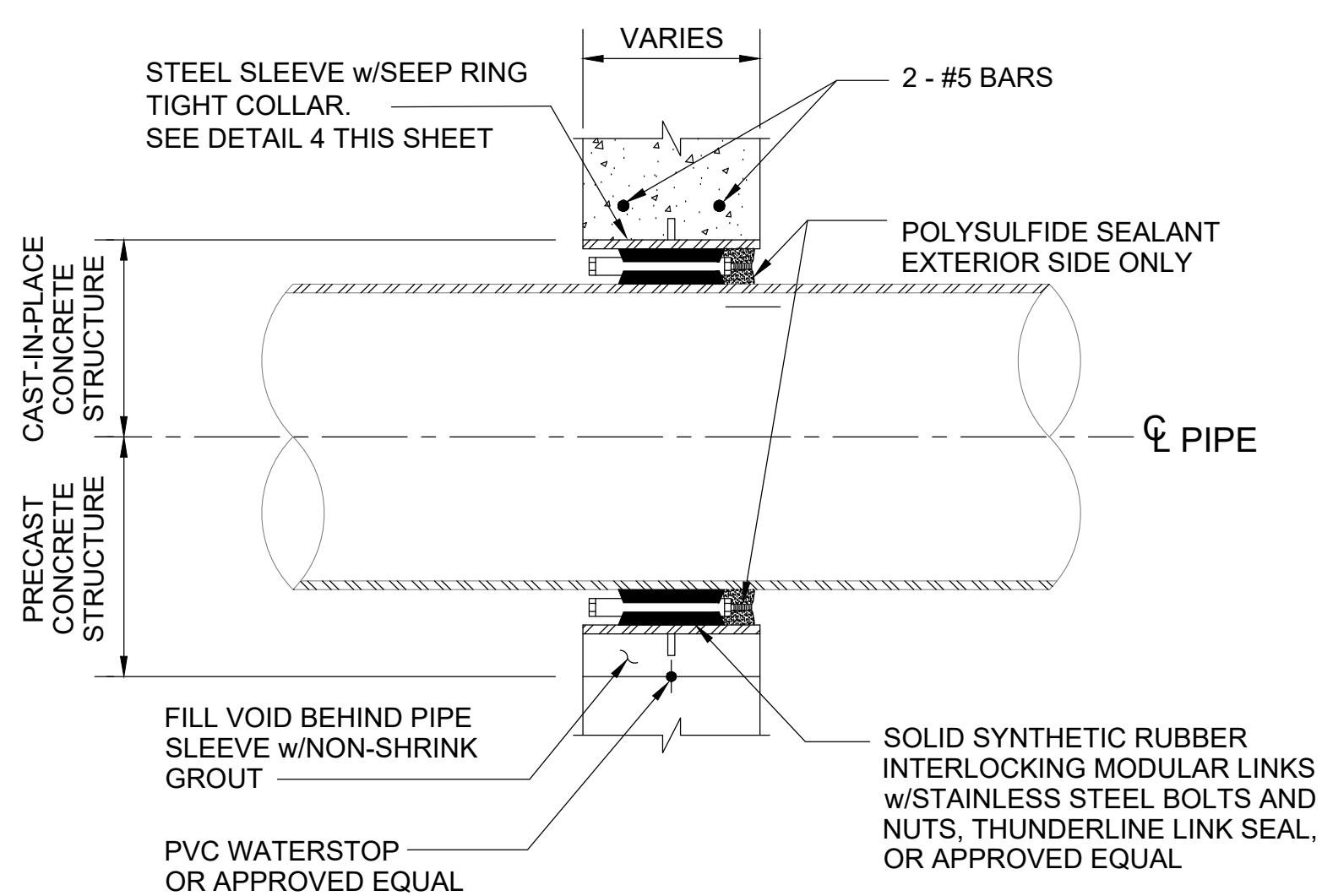
SHEET NO. <b>XX</b> OF <b>XXX</b>	DRAWING SCALE FOR CITY OF HOUSTON USE ONLY
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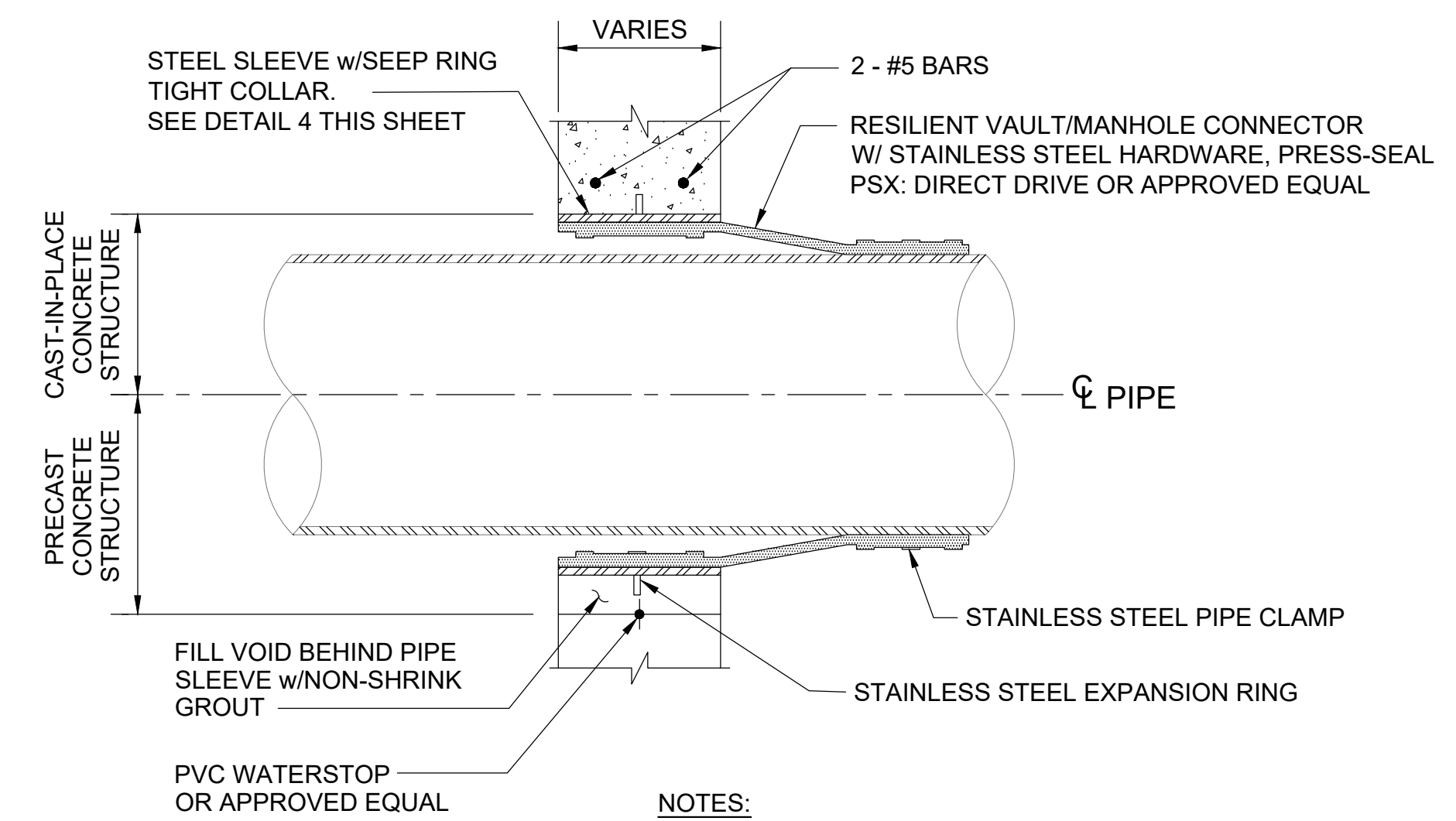
**NOTES:**

1. WATER LINE MAKER TO BE INSTALLED AT THE FOLLOWING LOCATIONS. NO SEPARATE PAY
  - STREET ROW ON BOTH SIDES 1FT INSIDE ROW.
  - HARRIS COUNTY FLOOD CONTROL DRAINAGE EASEMENTS ON BOTH SIDES 1FT INSIDE ROW.
  - CROSSING PIPELINE CORRIDORS ON BOTH SIDES.
  - CHANGES IN WATERLINE HORIZONTAL DIRECTION GREATER THAN 20 DEGREES.
  - OTHER LOCATIONS AS INDICATED ON PLANS.

**1 WATER LINE MARKER**  
SCALE: NTS.

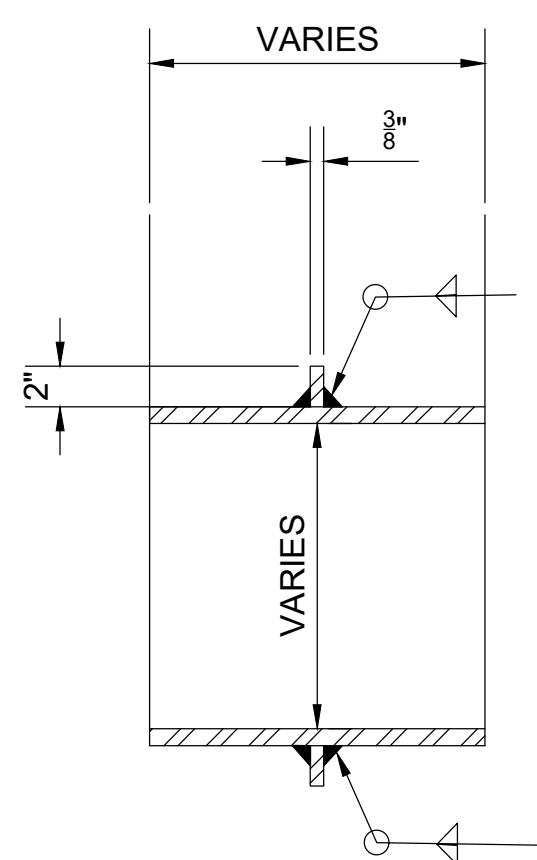


**2 TYPICAL WALL PENETRATION DETAIL**  
SCALE: NTS.

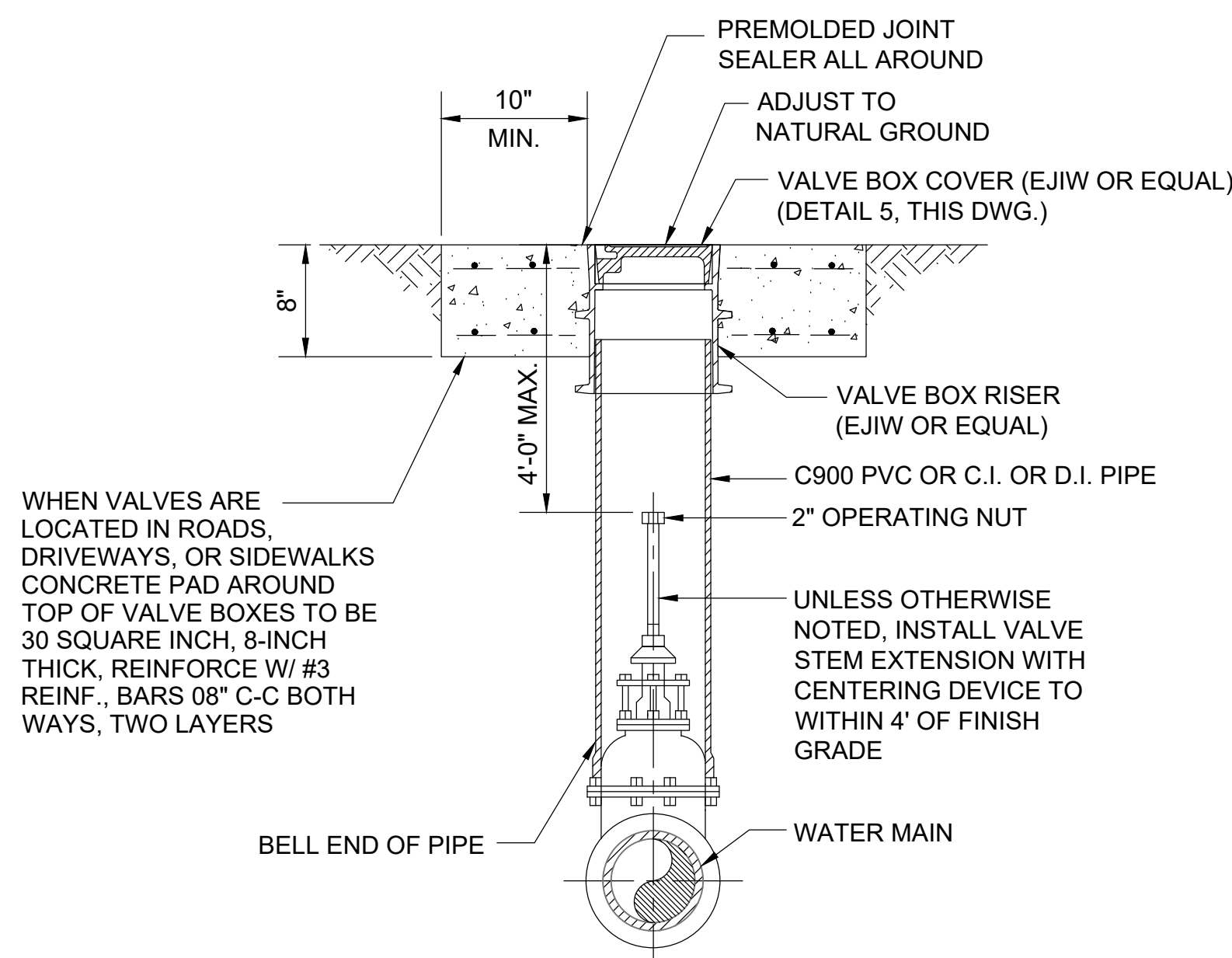


**NOTES:**

1. POLYSULFIDE SEALANT EXTERIOR SIDE ONLY.
2. SOLID SYNTHETIC RUBBER INTERLOCKING MODULAR LINKS w/STAINLESS STEEL BOLTS AND NUTS, THUNDERLINE LINK SEAL, OR APPROVED EQUAL.
3. IF MANHOLE IS CAST IN PLACE CONSTRUCTION, PROVIDE DETAIL(S) FOR WALL PENETRATION INCLUDING EXTRA REINFORCING. DETAILS TO BE SEALED BY A PROFESSIONAL ENGINEER LICENSED IN TEXAS.
4. CAST OR CORE PENETRATION W/IN MANUFACTURER'S SPECIFIED TOLERANCES FOR THE PRODUCT. INSTALL CONNECTOR PER MANUFACTURER RECOMMENDATIONS.
5. COORDINATE WITH SEAL MANUFACTURER FOR SIZE OF STEEL SLEEVE.

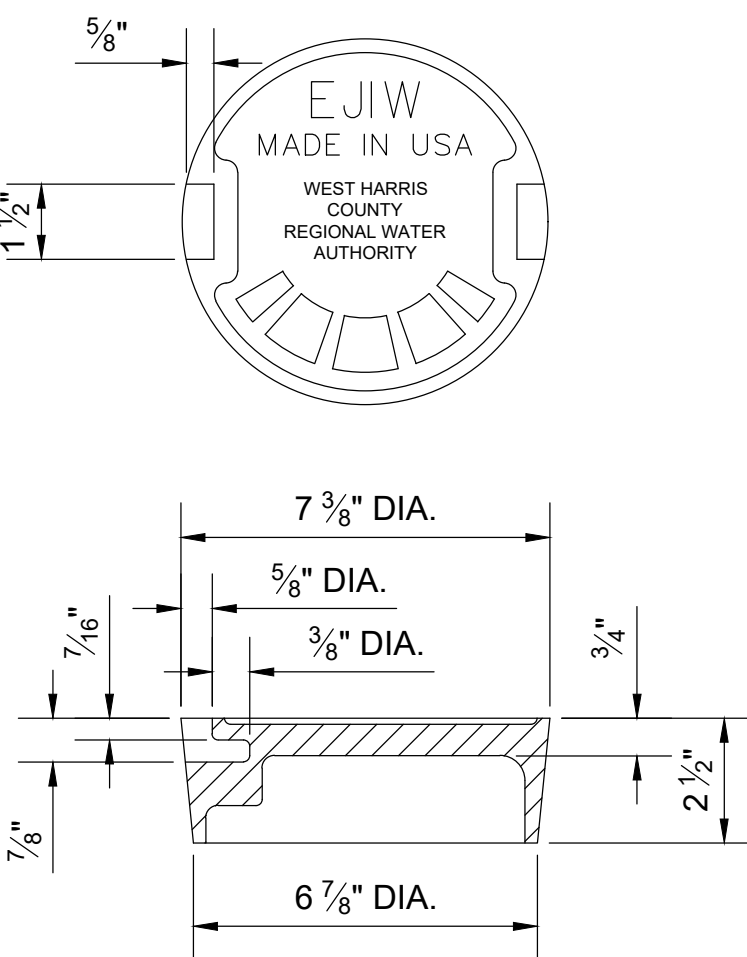


**4 STEEL SLEEVE W/SEEP RING**  
SCALE: NTS.



**3 VALVE BOX DETAIL**  
SCALE: NTS.

- NOTES:**
1. - WEIGHTS FRAME - 45 LBS, COVER - 10 LBS
  2. MATERIAL - GRAY IRON ASTM A48 CL35B



**5 VALVE BOX COVER DETAIL**  
(EAST JORDAN IRON WORKS (EJIW) OR EQUAL)  
SCALE: NTS.

**WHCROWA NFBWA**  
**SURFACE WATER SUPPLY PROJECT**  
Program Manager  
**DANNENBAUM**  
ENGINEERING CORPORATION

**Company Name**  
**Address**  
**Telephone No.**  
**Texas Firm No.**

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**STANDARD WATER LINE DETAILS**

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HOUSTON PUBLIC WORKS

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STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

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MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
MM/DD/YY	BRIEF DESCRIPTION	XXX
NO. DATE	REVISION	APP.

TUNNEL DETAIL EXAMPLE -  
TO BE REPLACED  
BY CONSULTANT

MINIMUM TUNNEL LINER / CASING SIZES AND THICKNESS

LOCATION	WATER MAIN DIAMETER (IN)	PIPE MATERIAL	NOMINAL DIA/WALL THICKNESS (NOTE 1) (IN)		CASING I.D. / WALL THICKNESS
			2-FLANGE LINER PLATE (SEE NOTE 2)	4-FLANGE LINER PLATE	
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX
STA. XX+XX TO STA. XX+XX	XX	STEEL	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	XX/X.XXXX XX/X.XXXX XX/X.XXXX XX/X.XXXX	X.XXX X.XXX X.XXX X.XXX

NOTES:

- DIAMETER OF LINER PLATE IS AT NEUTRAL AXIS.
- LINER PLATE IS TWO FLANGE AND NOMINALLY 2-INCH CORRUGATION BY 6-INCH PROFILE.
- ALL JOINTS WITHIN LIMITS OF CASING MUST BE RESTRAINED.

WHCROWA NFBWA  
**SURFACE WATER SUPPLY PROJECT**  
Program Manager  
**DANNENBAUM**  
ENGINEERING CORPORATION

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**TUNNEL AND CASING DETAILS**

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HOUSTON PUBLIC WORKS

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STORM WATER	TRAFFIC & TRANSPORTATION/ STREET & BRIDGE

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