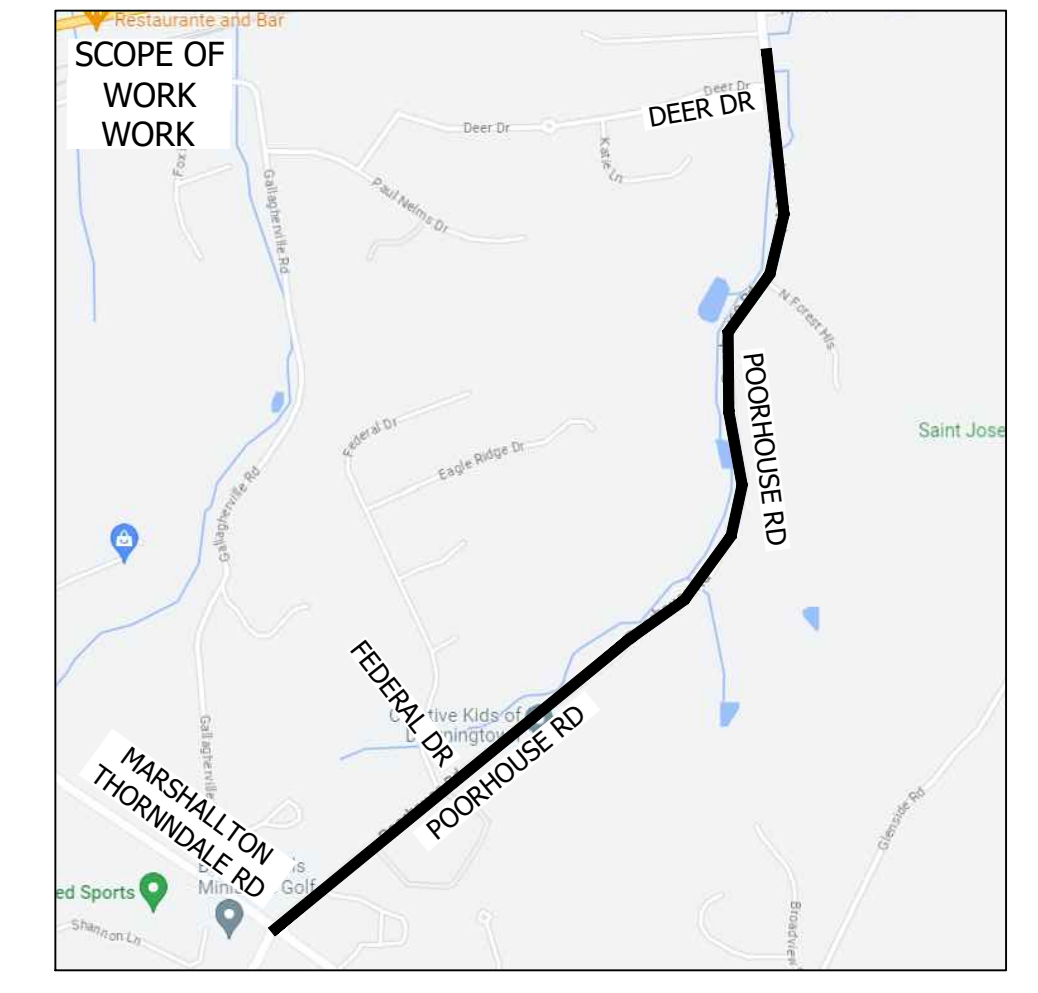
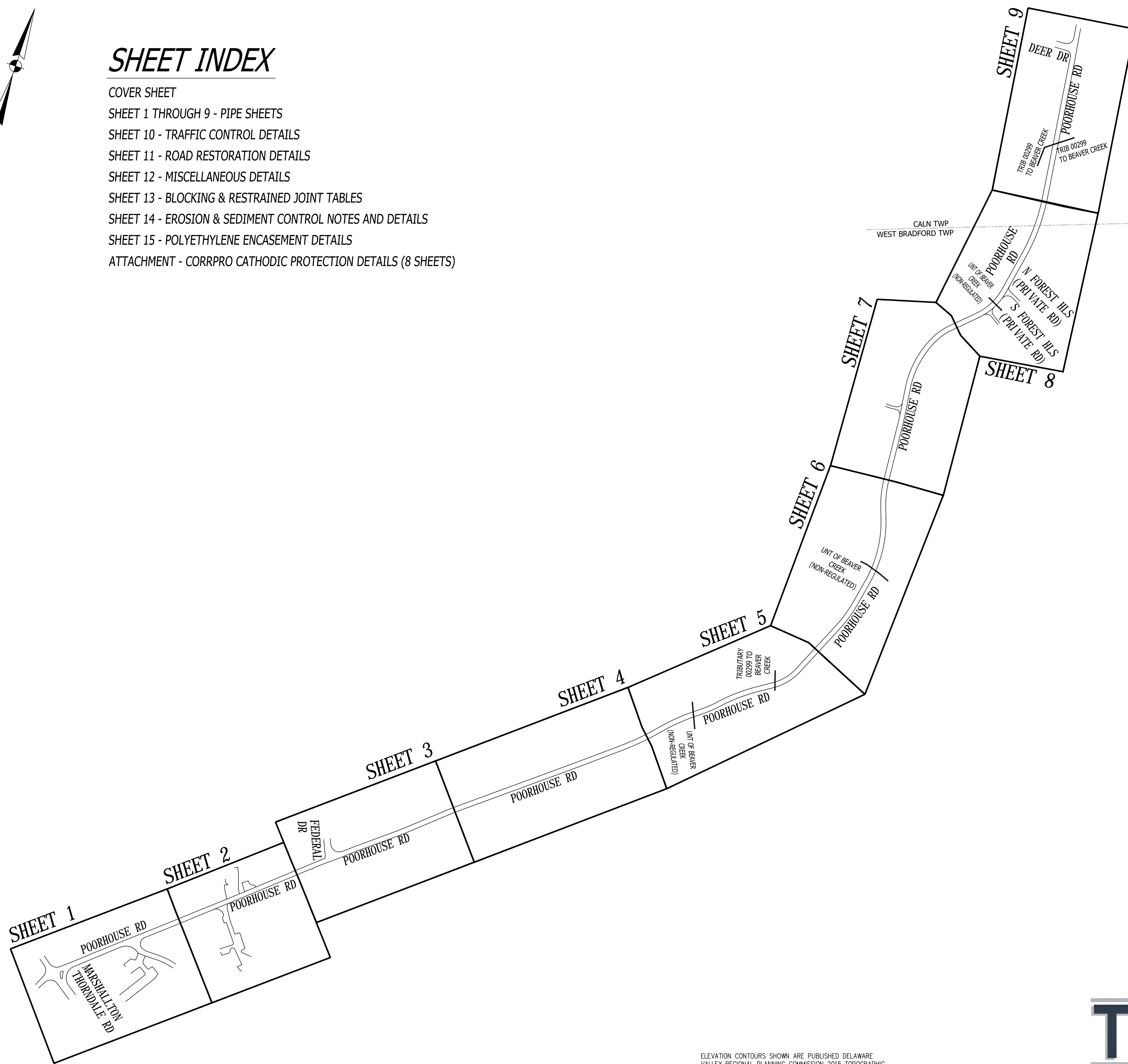
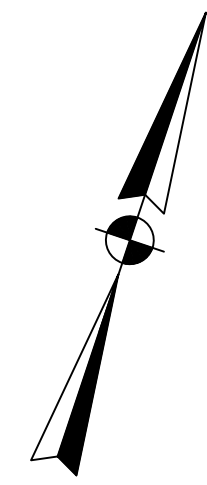


# SHEET INDEX

- COVER SHEET
- SHEET 1 THROUGH 9 - PIPE SHEETS
- SHEET 10 - TRAFFIC CONTROL DETAILS
- SHEET 11 - ROAD RESTORATION DETAILS
- SHEET 12 - MISCELLANEOUS DETAILS
- SHEET 13 - BLOCKING & RESTRAINED JOINT TABLES
- SHEET 14 - EROSION & SEDIMENT CONTROL NOTES AND DETAILS
- SHEET 15 - POLYETHYLENE ENCASEMENT DETAILS
- ATTACHMENT - CORRPRO CATHODIC PROTECTION DETAILS (8 SHEETS)



LOCATION MAP

**GENERAL NOTES:**

1. ALL GATE VALVES ARE TO OPEN LEFT.
2. 1" MAV/CL2 ASSEMBLIES ARE REQUIRED ON ALL WATER MAIN EXTENSIONS. THE EXACT QUANTITY AND LOCATION WILL BE DETERMINED AT THE PROJECT SITE BY THE ASSIGNED AQUA PENNSYLVANIA INSPECTOR.
3. ALL DIRECTIONAL CHANGE FITTINGS REQUIRE RETAINING GLANDS (MEGA-LUG or EQUAL) AND THE PROPER SQUARE FOOTAGE OF CONCRETE BLOCKING.
4. ALL PERMANENT BLOW-OFFS ARE TO BE BLOCKED WITH A STEEL RAIL AND THE PROPER SQUARE FOOTAGE OF CONCRETE BLOCKING.
5. WHEN THE WORKING PRESSURE OF THE MAIN EXCEEDS 80 PSI, PRESSURE REDUCING VALVES ARE REQUIRED ON THE AFFECTED SERVICES. PRESSURE REDUCING VALVES ARE NOT SUPPLIED OR MAINTAINED BY AQUA PENNSYLVANIA, INC.
6. ALL THRUST BLOCK VALUES ARE DETERMINED ACCORDING TO THE INTENDED WORKING PRESSURE OF THE PROPOSED MAIN. WHEN PRESSURES ARE IN EXCESS OF 200 PSI, THE ENGINEERING DEPARTMENT WILL PROVIDE SPECIFIC REQUIREMENTS.
7. THIS PLAN WAS PREPARED FROM INFORMATION OBTAINED FROM PLANS PROVIDED BY: API PLANS & FIELD NOTES.

MATERIAL RECORD				
FEET	PIPE (TYPE & CLASS)	QUAN	SIZE	ARTICLE
				MAV ASSEMBLY
				BLOW-OFF ASSEMBLY
				BLOW-OFF ASSEMBLY
				TEES
QUAN	SIZE	ARTICLE		TEES
		TAP VLV		TAP SLV
		VALVES		
		VALVES		
		VALVES		BENDS
		VALVE BOXES COMPLETE		BENDS
				BENDS
EXCAVATION IN CUBIC YARDS				
EARTH:		ROCK:		CONCRETE
PAVING:	SF	OTHER:		
STARTED:				
FINISHED:				
WATER ON:				
INSPT BY:				
REMARKS:				

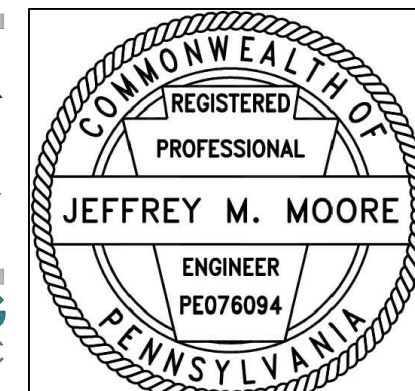
**OPA 1**  
**1-800-242-1776**  
**Dig Safely.**

PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR CONSTRUCTION PHASE AND 10 WORKING DAYS IN DESIGN STAGE - STOP CALL  
 POC'S PRELIMINARY DESIGN SERIAL NUMBER(S): 20231213426, 20231213427

NO	DATE	REVISION	INTL
0	07/05/2023	ISSUED FOR CONSTRUCTION	PG
0	07/03/2023	DESIGN COMPLETION	PG

THE FOLLOWING MAIN(S) HAVE BEEN ABANDONED:  
 8" DI 90103-G NP  
 6" DI 90103-G NP

E & S PLAN



AQUA PENNSYLVANIA, INCORPORATED  
 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010

PROJECT PLAN FOR:  
**LLOYD AVENUE PHASE I PROJECT**  
 COVER SHEET  
 CALN TWP & W BRADFORD TWP, CHESTER COUNTY

DRAWN BY: CR    CHK'D BY: JMM/AC    EXT No: 20131-G  
 DATE: 11/08/2021    SCALE: N.T.S.    PLATE: PP25,PP26,0026  
 PROJECT No: 217.23    ACTIVITY No: 100000623  
 APPROVED: *Jeffrey M. Moore*

**A - 67657**  
 COVER

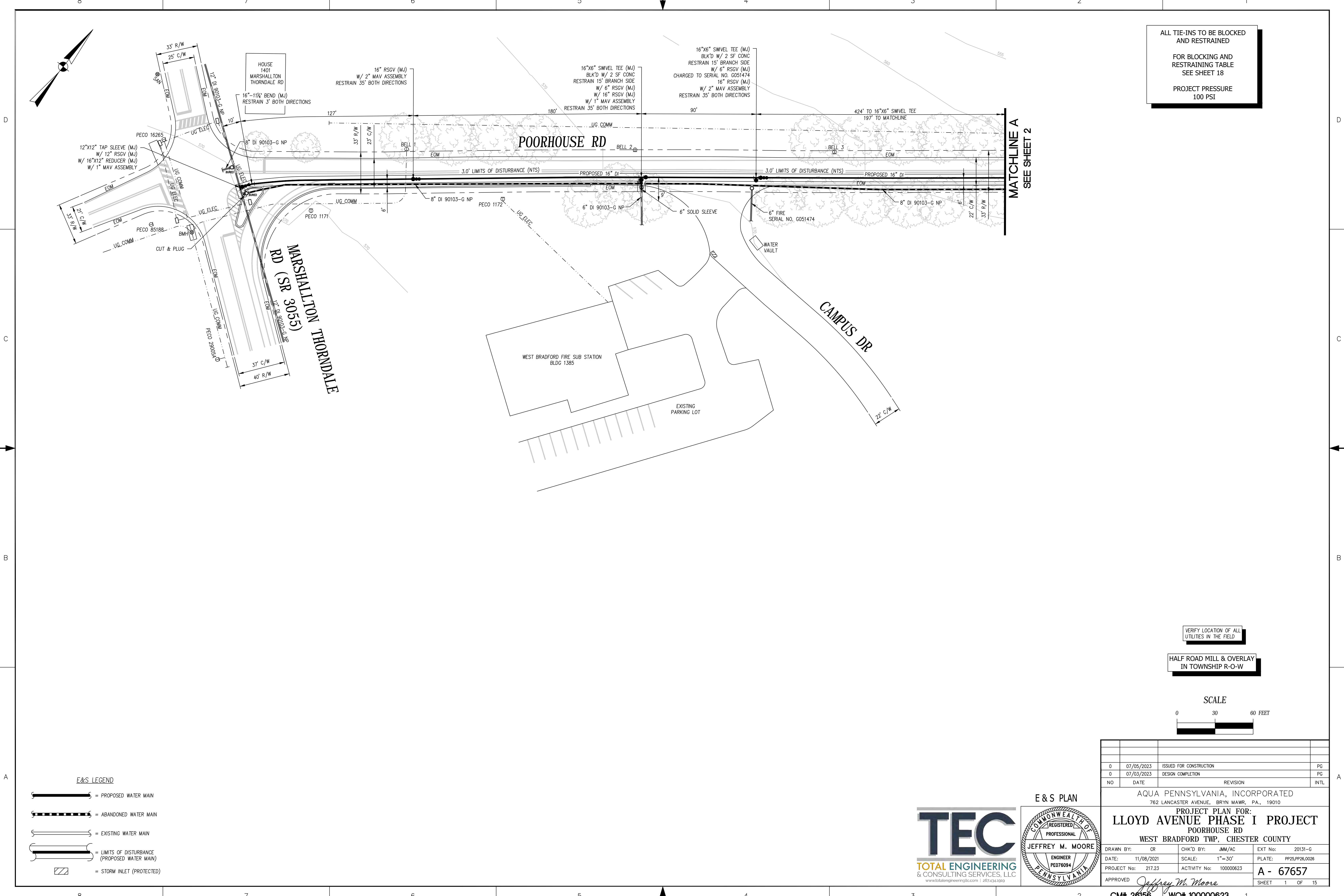
COORDINATE SYSTEM: NAD 1983 STATE PLANE PENNSYLVANIA SOUTH FIPS 3702 (US FEET)

ELEVATION CONTOURS SHOWN ARE PUBLISHED DELAWARE VALLEY REGIONAL PLANNING COMMISSION 2015 TOPOGRAPHIC CONTOURS USING THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 CONTOUR INTERVAL 5 FEET

CM# 26156    WO# 10000623



ALL TIE-INS TO BE BLOCKED AND RESTRAINED  
 FOR BLOCKING AND RESTRAINING TABLE SEE SHEET 18  
 PROJECT PRESSURE 100 PSI

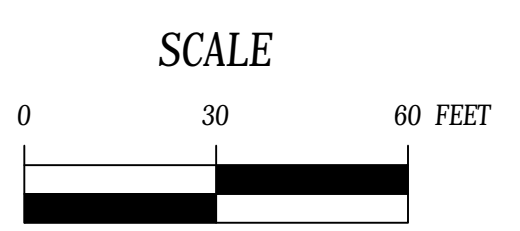


MATCHLINE A  
 SEE SHEET 2

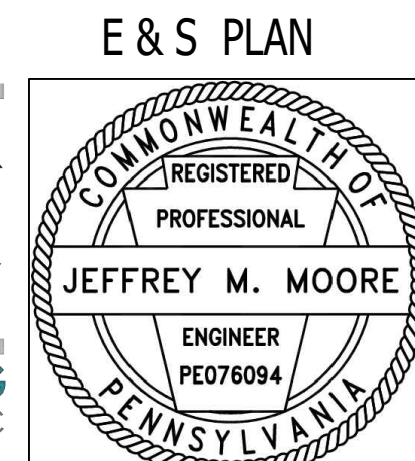
- E&S LEGEND**
- = PROPOSED WATER MAIN
  - = ABANDONED WATER MAIN
  - = EXISTING WATER MAIN
  - = LIMITS OF DISTURBANCE (PROPOSED WATER MAIN)
  - = STORM INLET (PROTECTED)

VERIFY LOCATION OF ALL UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY IN TOWNSHIP R-O-W



NO	DATE	REVISION	INTL
0	07/05/2023	ISSUED FOR CONSTRUCTION	PG
0	07/03/2023	DESIGN COMPLETION	PG



**E & S PLAN**

AQUA PENNSYLVANIA, INCORPORATED  
 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010

**PROJECT PLAN FOR:  
 LLOYD AVENUE PHASE I PROJECT  
 POORHOUSE RD  
 WEST BRADFORD TWP, CHESTER COUNTY**

DRAWN BY: CR	CHK'D BY: JMM/AC	EXT No: 20131-G
DATE: 11/08/2021	SCALE: 1"=30'	PLATE: PP25,PP26,0026
PROJECT No: 217.23	ACTIVITY No: 100000623	<b>A - 67657</b>
APPROVED: <i>Jeffrey M. Moore</i>		SHEET 1 OF 15

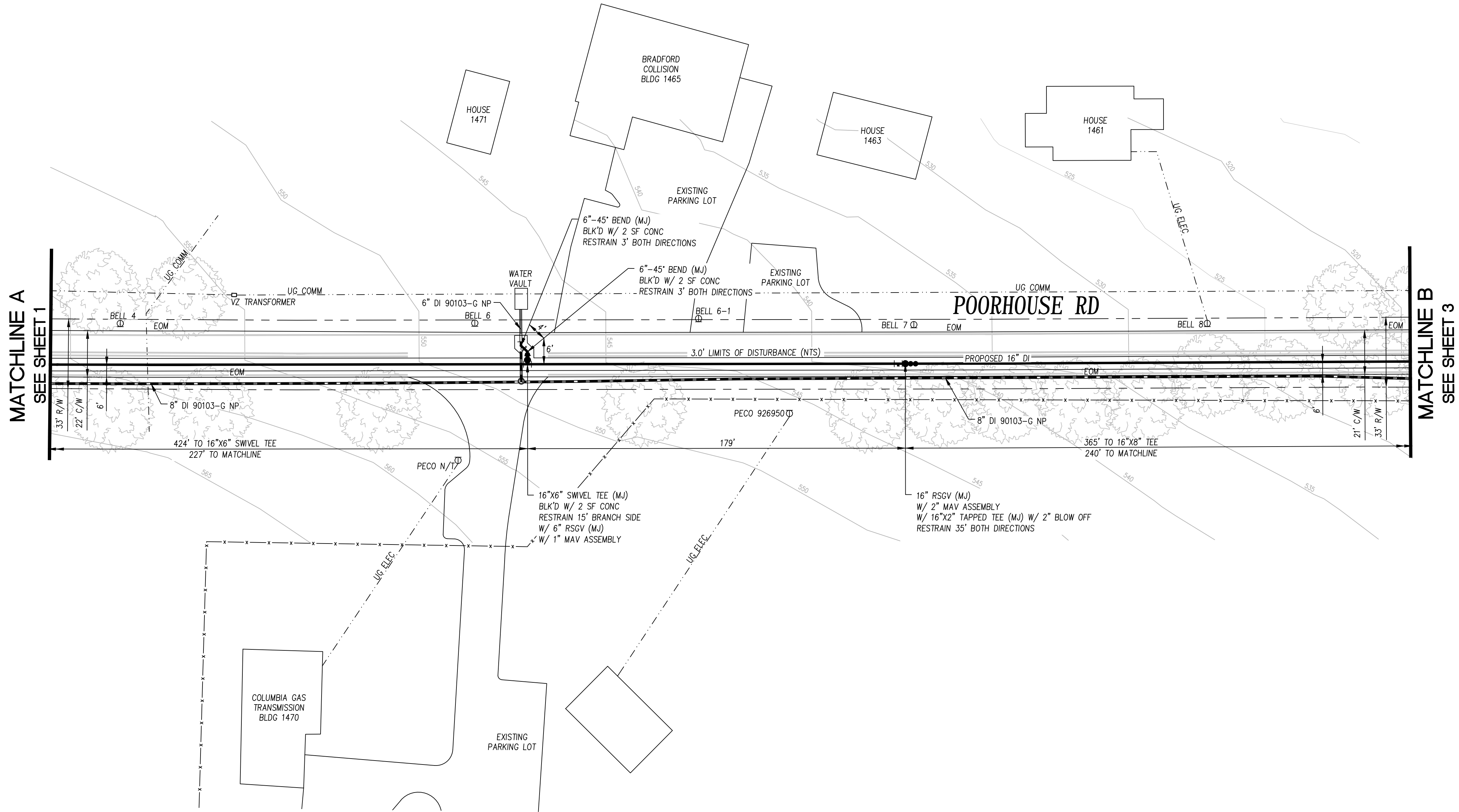
CM# 26156 WO# 100000623



ALL TIE-INS TO BE BLOCKED  
AND RESTRAINED

FOR BLOCKING AND  
RESTRAINING TABLE  
SEE SHEET 18

PROJECT PRESSURE  
100 PSI



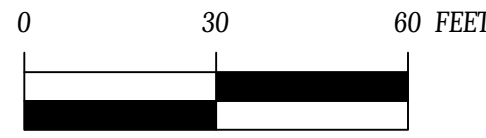
MATCHLINE A  
SEE SHEET 1

MATCHLINE B  
SEE SHEET 3

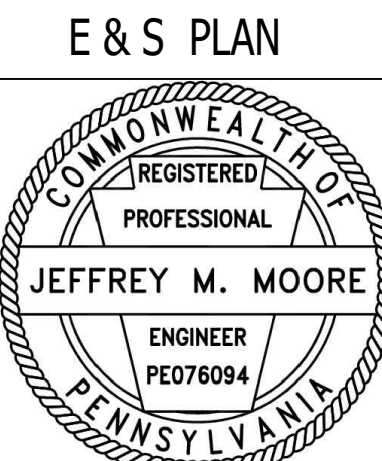
VERIFY LOCATION OF ALL  
UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY  
IN TOWNSHIP R-O-W

SCALE



- E&S LEGEND**
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0	07/03/2023	DESIGN COMPLETION	PG

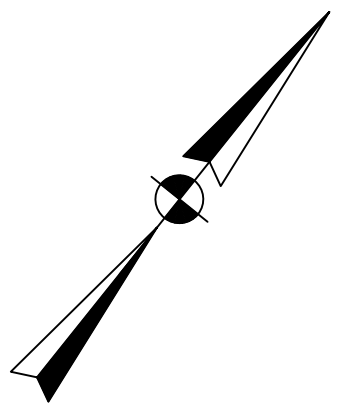
AQUA PENNSYLVANIA, INCORPORATED  
 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010  
**PROJECT PLAN FOR:**  
**LLOYD AVENUE PHASE I PROJECT**  
 POORHOUSE RD  
 WEST BRADFORD TWP, CHESTER COUNTY

DRAWN BY:	CR	CHK'D BY:	JMM/AC	EXT No:	20131-G
DATE:	11/08/2021	SCALE:	1"=30'	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED	<i>Jeffrey M. Moore</i>			SHEET	2 OF 15

CM# 26156 WO# 100000623

E & S PLAN

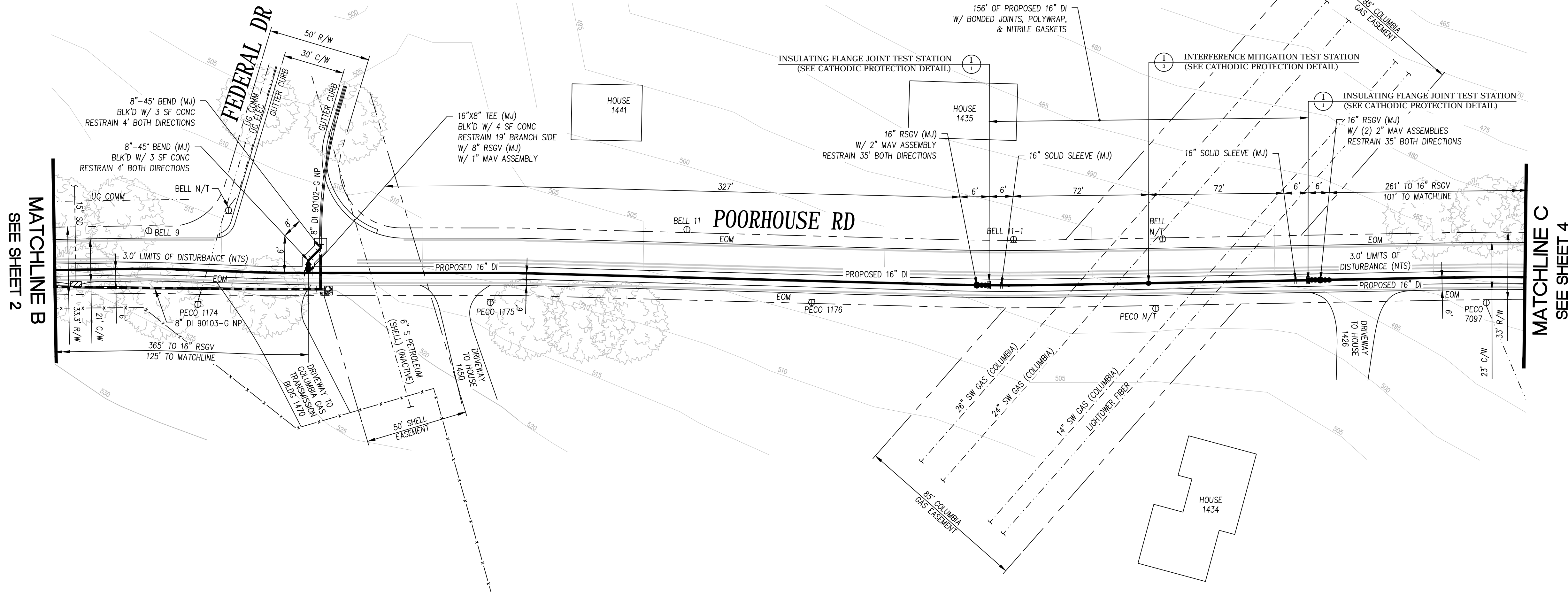




ALL TIE-INS TO BE BLOCKED AND RESTRAINED  
FOR BLOCKING AND RESTRAINING TABLE SEE SHEET 18  
PROJECT PRESSURE  
100 PSI

- POLYETHYLENE ENCASUREMENT**
- POLYETHYLENE ENCASUREMENT SHALL BE USED FOR DUCTILE IRON PIPE, FITTINGS, VALVES, AND APPURTENANCES AS DELINEATED ON PLAN SHEETS.
  - ALL JOINTS BETWEEN TEST STATIONS (AND W/ POLYETHYLENE ENCASUREMENT) SHALL BE BONDED W/ TWO JUMPERS WIRES PER JOINT WITH EXOTHERMIC WELDS IN ACCORDANCE WITH WELD DETAILS. SEE ATTACHED CORRPRO CATHODIC PROTECTION DETAIL SHEETS.
  - POLYETHYLENE ENCASUREMENT MATERIALS SHALL BE IN ACCORDANCE WITH ANSI/AWWA C105/A21.5 STANDARDS.
  - INSTALL POLYETHYLENE IN ACCORDANCE WITH METHOD A OF THE ANSI/AWWA C105/21.5 STANDARD. SEE POLYETHYLENE ENCASUREMENT DETAILS SHEET.

ALL JOINTS ARE TO BE BONDED AND TESTED FOR CONTINUITY PRIOR TO POLYETHYLENE ENCASUREMENT  
SEE CATHODIC PROTECTION DETAILS



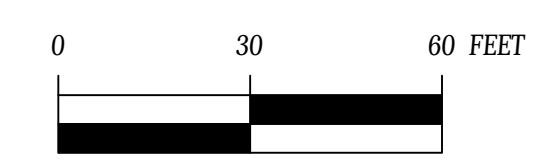
MATCHLINE B  
SEE SHEET 2

MATCHLINE C  
SEE SHEET 4

VERIFY LOCATION OF ALL UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY IN TOWNSHIP R-O-W

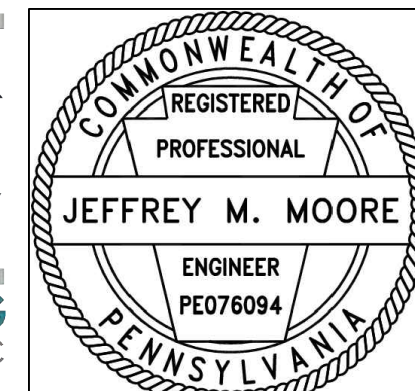
SCALE



**E&S LEGEND**

- = PROPOSED WATER MAIN
- = ABANDONED WATER MAIN
- = EXISTING WATER MAIN
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- = STORM INLET (PROTECTED)

E & S PLAN



NO	DATE	REVISION	INTL
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0	07/03/2023	DESIGN COMPLETION	PG

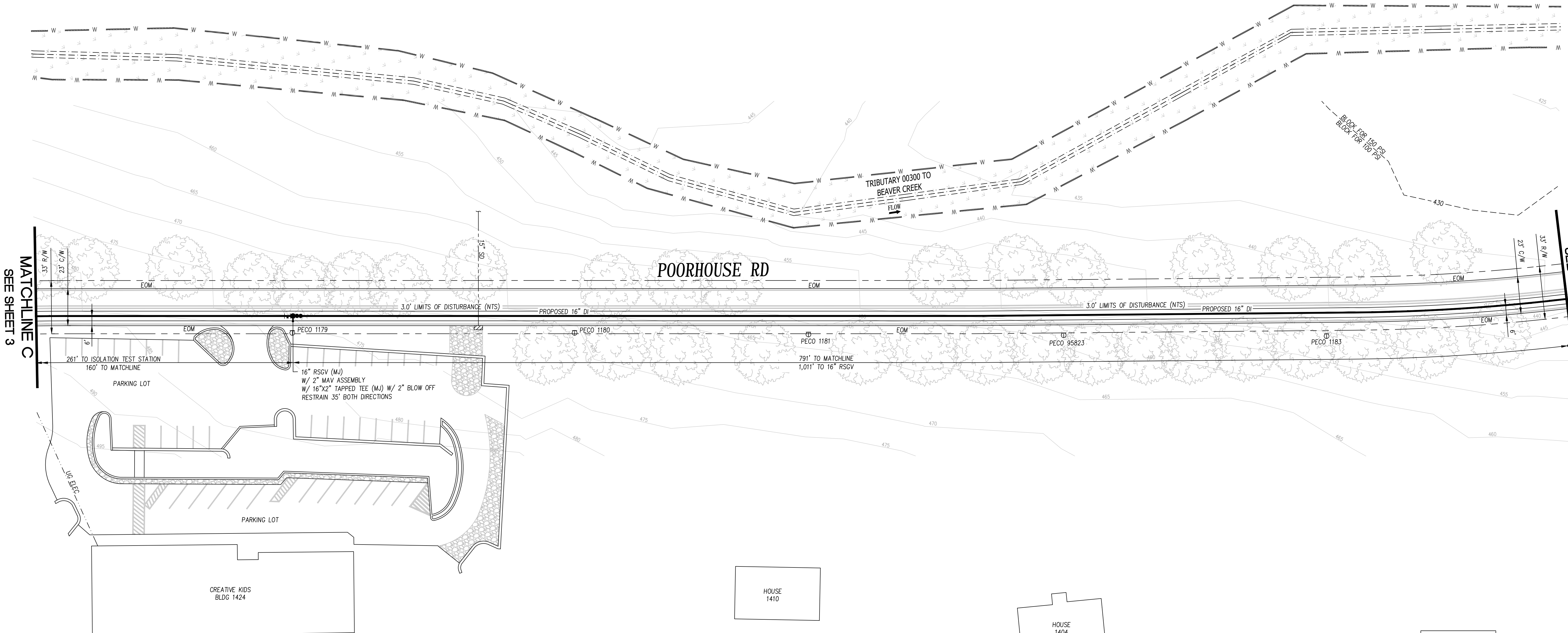
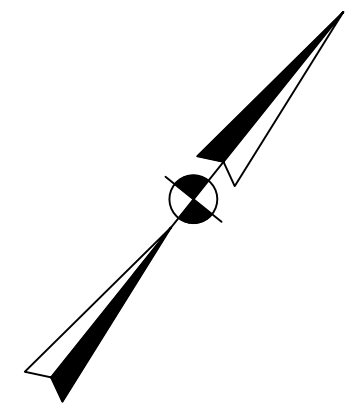
AQUA PENNSYLVANIA, INCORPORATED  
 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010  
**PROJECT PLAN FOR:**  
**LLOYD AVENUE PHASE I PROJECT**  
 POORHOUSE RD  
 WEST BRADFORD TWP, CHESTER COUNTY

DRAWN BY:	CR	CHK'D BY:	JMM/AC	EXT No:	20131-G
DATE:	11/08/2021	SCALE:	1"=30'	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED:	<i>Jeffrey M. Moore</i>			SHEET	3 OF 15

CM# 26156 WO# 100000623



ALL TIE-INS TO BE BLOCKED AND RESTRAINED  
 FOR BLOCKING AND RESTRAINING TABLE SEE SHEET 18  
 PROJECT PRESSURE  
 100 PSI

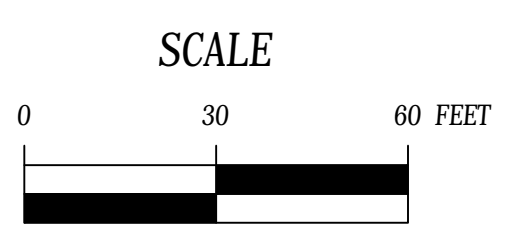


MATCHLINE C  
 SEE SHEET 3

MATCHLINE D  
 SEE SHEET 5

VERIFY LOCATION OF ALL UTILITIES IN THE FIELD

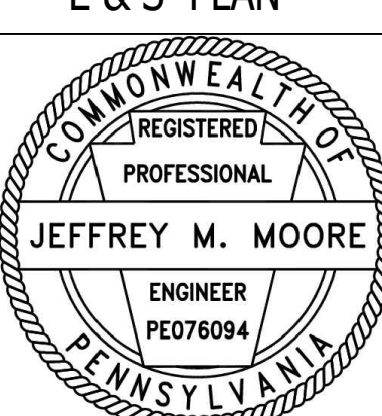
HALF ROAD MILL & OVERLAY IN TOWNSHIP R-O-W



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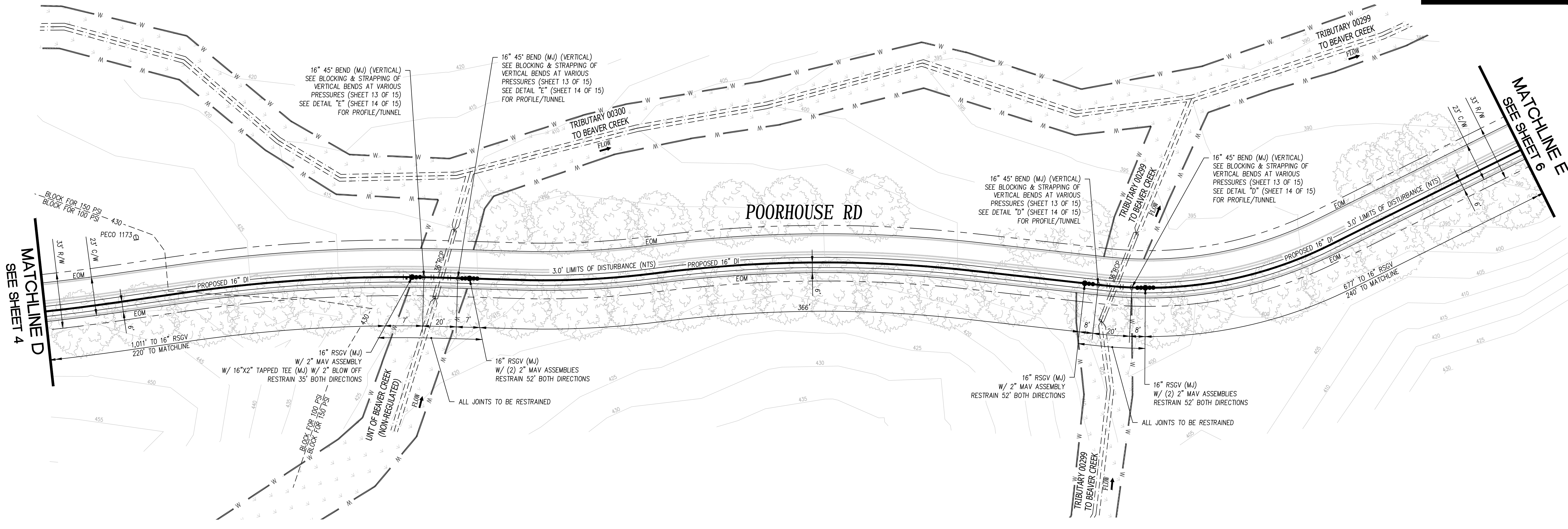
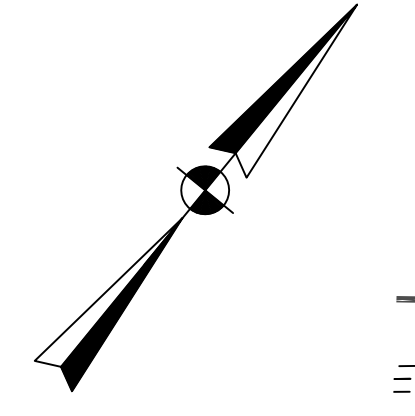
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0	07/03/2023	DESIGN COMPLETION	PG

AQUA PENNSYLVANIA, INCORPORATED 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010			
PROJECT PLAN FOR: <b>LLOYD AVENUE PHASE I PROJECT</b> POORHOUSE RD WEST BRADFORD TWP, CHESTER COUNTY			
DRAWN BY: CR	CHK'D BY: JMM/AC	EXT No: 20131-G	
DATE: 11/08/2021	SCALE: 1"=30'	PLATE: PP25,PP26,0026	
PROJECT No: 217.23	ACTIVITY No: 100000623	<b>A - 67657</b>	
APPROVED: <i>Jeffrey M. Moore</i>		SHEET 4 OF 15	





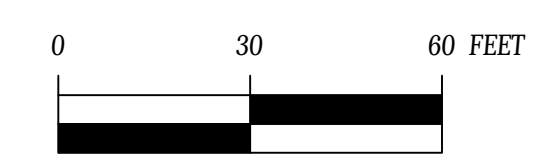
ALL TIE-INS TO BE BLOCKED AND RESTRAINED  
 FOR BLOCKING AND RESTRAINING TABLE SEE SHEET 18  
 PROJECT PRESSURE 100/150 PSI



VERIFY LOCATION OF ALL UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY IN TOWNSHIP R-O-W

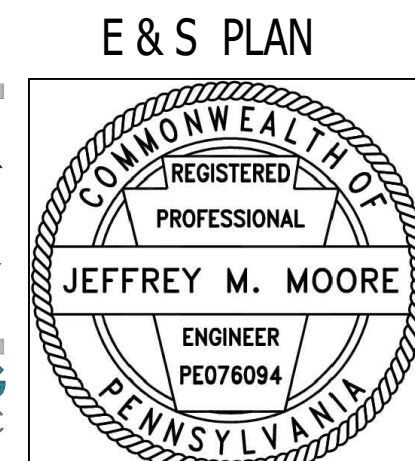
SCALE



- E&S LEGEND**
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  - = EXISTING WATER MAIN
  - = LIMITS OF DISTURBANCE (PROPOSED WATER MAIN)
  - = STORM INLET (PROTECTED)

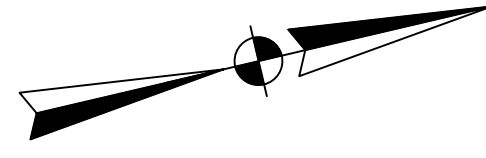
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0	07/03/2023	DESIGN COMPLETION	PG

AQUA PENNSYLVANIA, INCORPORATED 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010			
PROJECT PLAN FOR: <b>LLOYD AVENUE PHASE I PROJECT</b> POORHOUSE RD WEST BRADFORD TWP, CHESTER COUNTY			
DRAWN BY:	CR	CHK'D BY:	JMM/AC
DATE:	11/08/2021	SCALE:	1"=30'
PROJECT No:	217.23	ACTIVITY No:	100000623
APPROVED	<i>Jeffrey M. Moore</i>		EXT No: 20131-G
CM# 26156	WO# 10000623	PLATE: PP25,PP26,0026	
			<b>A - 67657</b>
			SHEET 5 OF 15



E & S PLAN

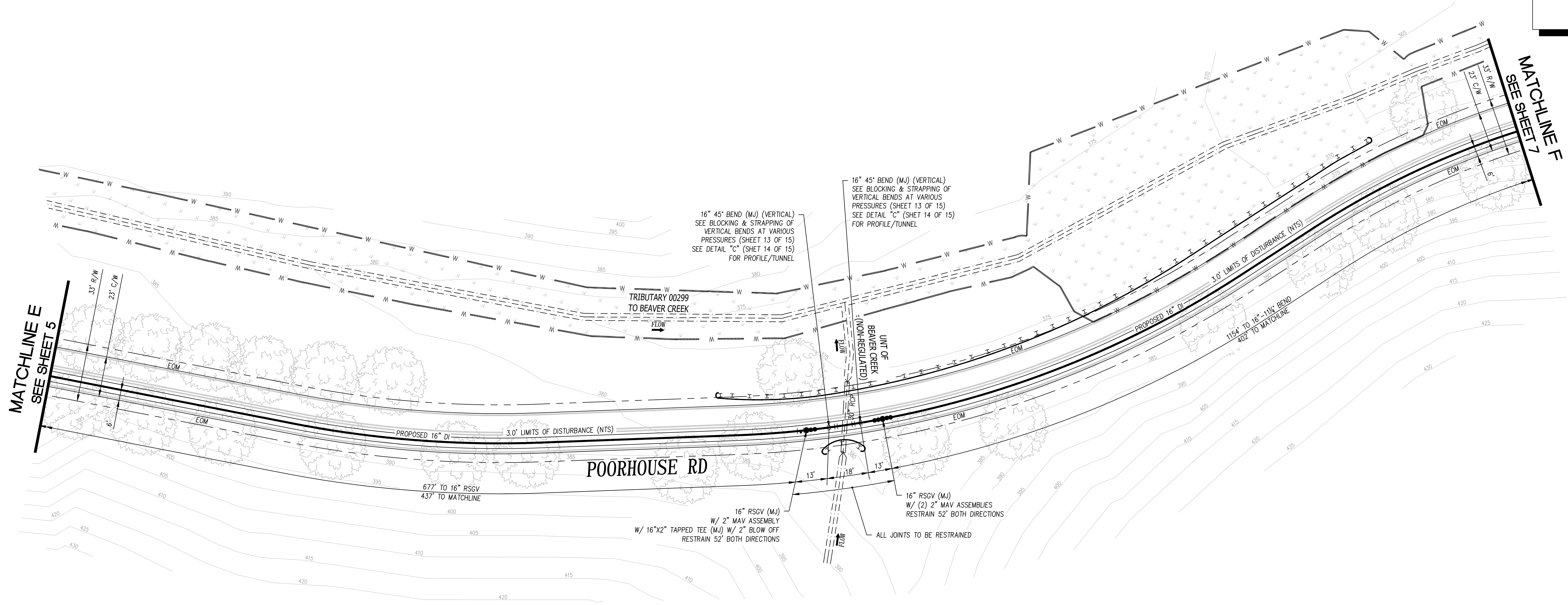




ALL TIE-INS TO BE BLOCKED  
AND RESTRAINED

FOR BLOCKING AND  
RESTRAINING TABLE  
SEE SHEET 18

PROJECT PRESSURE  
150 PSI



MATCHLINE E  
SEE SHEET 5

MATCHLINE F  
SEE SHEET 7

POORHOUSE RD

- E&S LEGEND**
- = PROPOSED WATER MAIN
  - = ABANDONED WATER MAIN
  - = EXISTING WATER MAIN
  - = LIMITS OF DISTURBANCE (PROPOSED WATER MAIN)
  - = STORM INLET (PROTECTED)

16" 45° BEND (MJ) (VERTICAL)  
SEE BLOCKING & STRAPPING OF  
VERTICAL BENDS AT VARIOUS  
PRESSURES (SHEET 13 OF 15)  
SEE DETAIL "C" (SHEET 14 OF 15)  
FOR PROFILE/TUNNEL

16" 45° BEND (MJ) (VERTICAL)  
SEE BLOCKING & STRAPPING OF  
VERTICAL BENDS AT VARIOUS  
PRESSURES (SHEET 13 OF 15)  
SEE DETAIL "C" (SHEET 14 OF 15)  
FOR PROFILE/TUNNEL

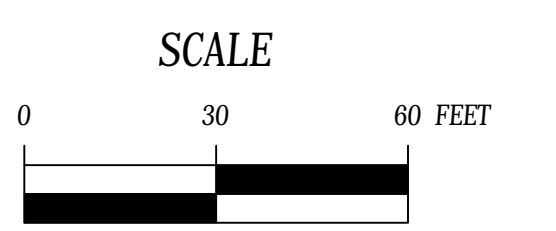
16" RSGV (MJ)  
W/ 2" MAV ASSEMBLY  
W/ 16"x2" TAPPED TEE (MJ) W/ 2" BLOW OFF  
RESTRAIN 52" BOTH DIRECTIONS

16" RSGV (MJ)  
W/ (2) 2" MAV ASSEMBLIES  
RESTRAIN 52" BOTH DIRECTIONS

ALL JOINTS TO BE RESTRAINED

VERIFY LOCATION OF ALL  
UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY  
IN TOWNSHIP R-O-W

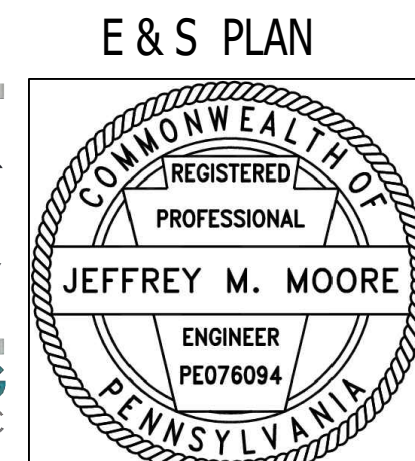


NO	DATE	REVISION	INTL
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0	07/03/2023	DESIGN COMPLETION	PG

AQUA PENNSYLVANIA, INCORPORATED  
 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010  
**PROJECT PLAN FOR:  
 LLOYD AVENUE PHASE I PROJECT  
 POORHOUSE RD  
 WEST BRADFORD TWP, CHESTER COUNTY**

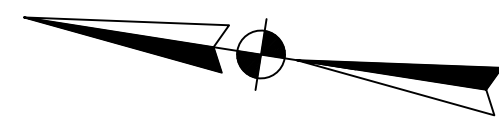
DRAWN BY:	CR	CHK'D BY:	JMM/AC	EXT No:	20131-G
DATE:	11/08/2021	SCALE:	1"=30'	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED	<i>Jeffrey M. Moore</i>			SHEET	6 OF 15

**CM# 26156**    **WO# 10000623**



E & S PLAN





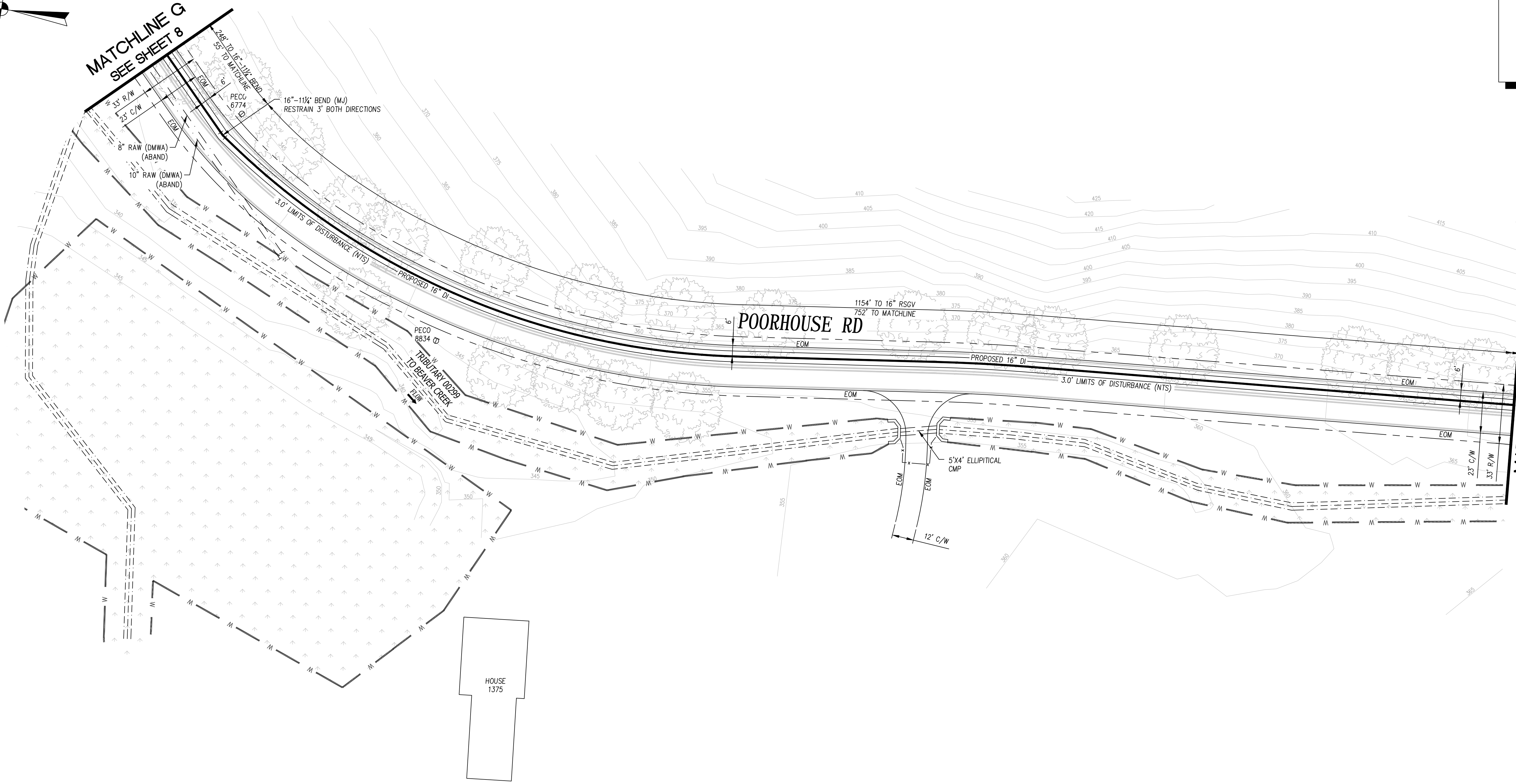
ALL TIE-INS TO BE BLOCKED  
AND RESTRAINED

FOR BLOCKING AND  
RESTRAINING TABLE  
SEE SHEET 18

PROJECT PRESSURE  
150 PSI

**MATCHLINE G**  
SEE SHEET 8

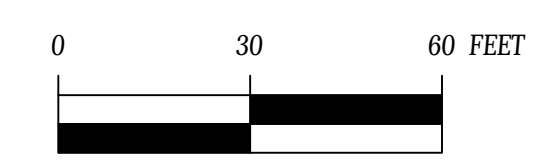
**MATCHLINE F**  
SEE SHEET 6



VERIFY LOCATION OF ALL  
UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY  
IN TOWNSHIP R-O-W

SCALE



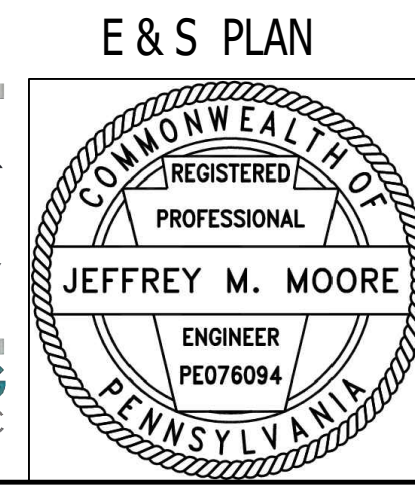
**E&S LEGEND**

- = PROPOSED WATER MAIN
- = ABANDONED WATER MAIN
- = EXISTING WATER MAIN
- = LIMITS OF DISTURBANCE (PROPOSED WATER MAIN)
- = STORM INLET (PROTECTED)

NO	DATE	REVISION	INTL
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0	07/03/2023	DESIGN COMPLETION	PG

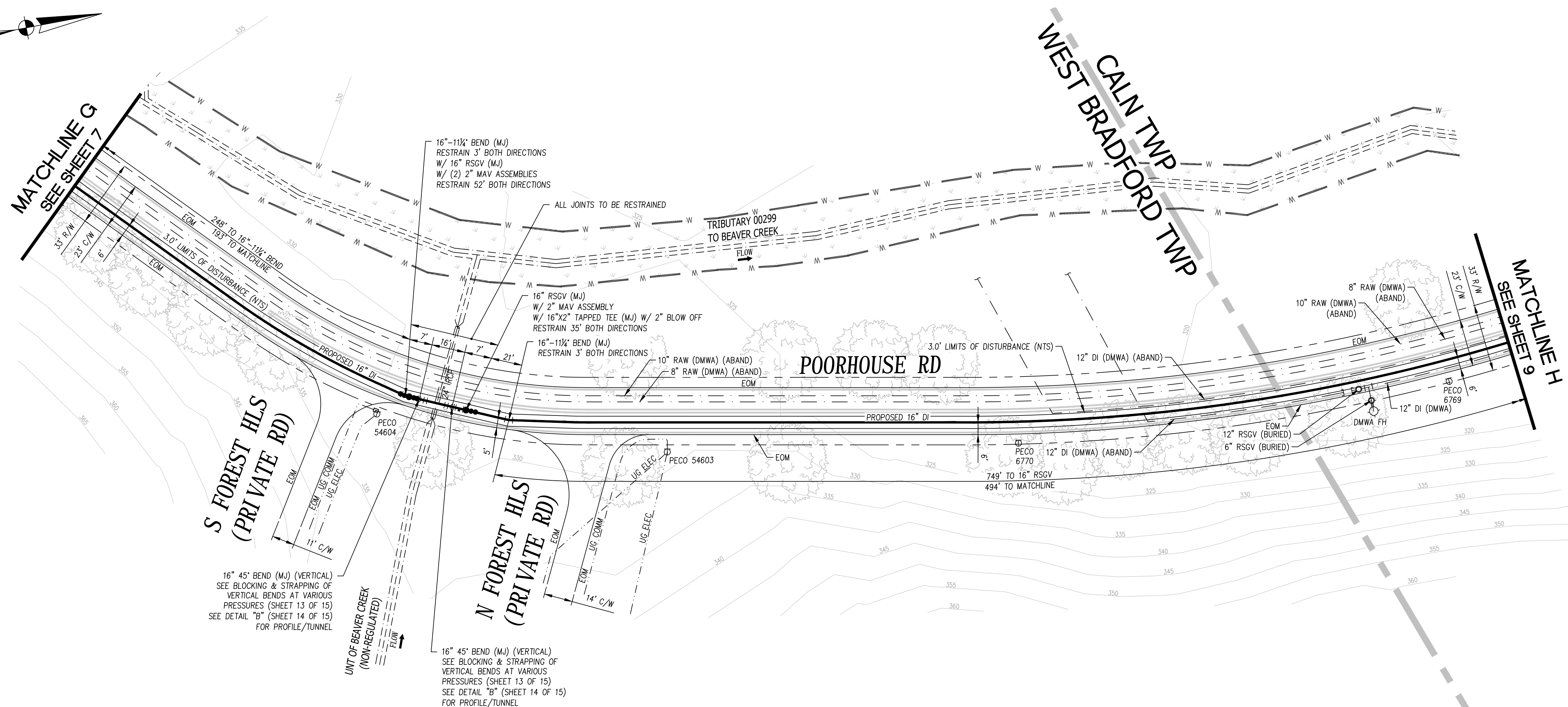
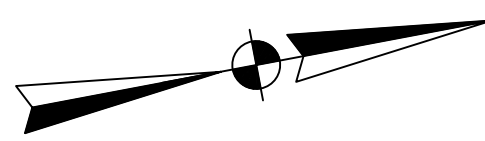
AQUA PENNSYLVANIA, INCORPORATED 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010			
<b>PROJECT PLAN FOR: LLOYD AVENUE PHASE I PROJECT POORHOUSE RD WEST BRADFORD TWP, CHESTER COUNTY</b>			
DRAWN BY: CR	CHK'D BY: JMM/AC	EXT No: 20131-G	
DATE: 11/08/2021	SCALE: 1"=30'	PLATE: PP25,PP26,0026	
PROJECT No: 217.23	ACTIVITY No: 100000623	<b>A - 67657</b>	
APPROVED: <i>Jeffrey M. Moore</i>		SHEET 7 OF 15	



E & S PLAN



ALL TIE-INS TO BE BLOCKED AND RESTRAINED  
 FOR BLOCKING AND RESTRAINING TABLE SEE SHEET 18  
 PROJECT PRESSURE 150 PSI



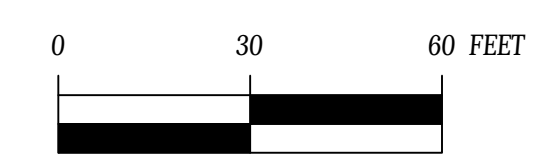
16" 45' BEND (MJ) (VERTICAL)  
 SEE BLOCKING & STRAPPING OF VERTICAL BENDS AT VARIOUS PRESSURES (SHEET 13 OF 15)  
 SEE DETAIL "B" (SHEET 14 OF 15) FOR PROFILE/TUNNEL

16" 45' BEND (MJ) (VERTICAL)  
 SEE BLOCKING & STRAPPING OF VERTICAL BENDS AT VARIOUS PRESSURES (SHEET 13 OF 15)  
 SEE DETAIL "B" (SHEET 14 OF 15) FOR PROFILE/TUNNEL

VERIFY LOCATION OF ALL UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY IN TOWNSHIP R-O-W

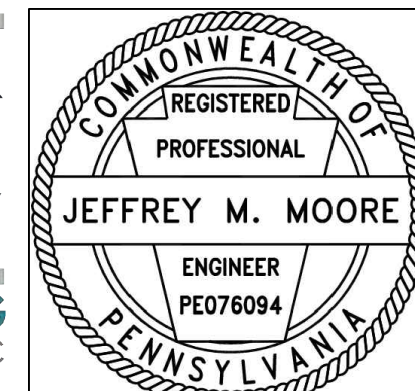
SCALE



E&S LEGEND

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- = EXISTING WATER MAIN
- = LIMITS OF DISTURBANCE (PROPOSED WATER MAIN)
- = STORM INLET (PROTECTED)

E & S PLAN

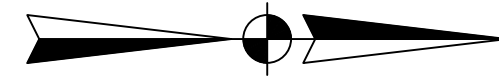


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0	07/03/2023	DESIGN COMPLETION	PG

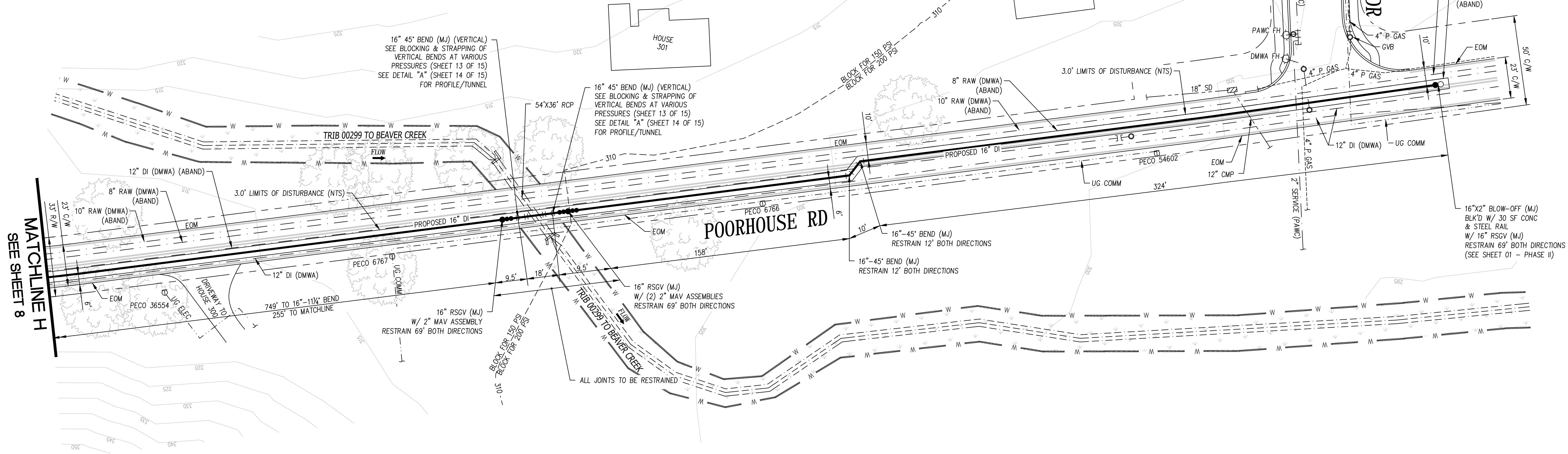
  

AQUA PENNSYLVANIA, INCORPORATED 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010			
PROJECT PLAN FOR: <b>LLOYD AVENUE PHASE I PROJECT</b> POORHOUSE RD WEST BRADFORD TWP & CALN TWP, CHESTER COUNTY			
DRAWN BY:	CR	CHK'D BY:	JMM/AC
DATE:	11/08/2021	SCALE:	1" = 30'
PROJECT No:	217.23	ACTIVITY No:	100000623
APPROVED:	<i>Jeffrey M. Moore</i>		EXT No: 20131-G
CM# 26156	WO# 10000623	A - 67657	
		SHEET 8 OF 15	





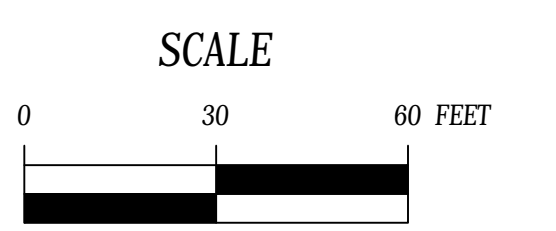
ALL TIE-INS TO BE BLOCKED AND RESTRAINED  
FOR BLOCKING AND RESTRAINING TABLE SEE SHEET 18  
PROJECT PRESSURE 200 PSI



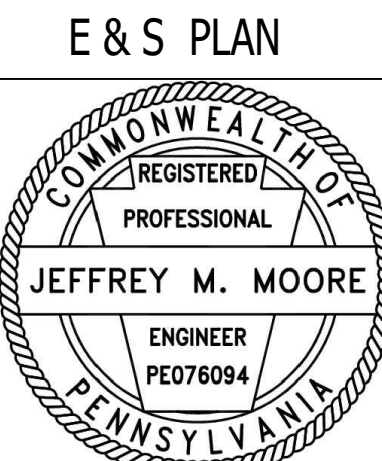
MATCHLINE H  
SEE SHEET 8

VERIFY LOCATION OF ALL UTILITIES IN THE FIELD

HALF ROAD MILL & OVERLAY IN TOWNSHIP R-O-W



- E&S LEGEND**
- = PROPOSED WATER MAIN
  - = ABANDONED WATER MAIN
  - = EXISTING WATER MAIN
  - = LIMITS OF DISTURBANCE (PROPOSED WATER MAIN)
  - = STORM INLET (PROTECTED)



NO	DATE	REVISION	INTL
0	07/05/2023	ISSUED FOR CONSTRUCTION	PG
0	07/03/2023	DESIGN COMPLETION	PG
NO			INTL

**E & S PLAN**

AQUA PENNSYLVANIA, INCORPORATED  
762 LANCASTER AVENUE, BRYN MAWR, PA., 19010

**PROJECT PLAN FOR:  
LLOYD AVENUE PHASE I PROJECT  
POORHOUSE RD  
CALN TWP, CHESTER COUNTY**

DRAWN BY:	CR	CHK'D BY:	JMM/AC	EXT No:	20131-G
DATE:	11/08/2021	SCALE:	1"=30'	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED	<i>Jeffrey M. Moore</i>			SHEET	9 OF 15

CM# 26156 WO# 10000623



PATA 103

- 1. The RIGHT REVERSE CURVE sign shall only be used when lane shifts onto shoulder.
- 2. When a shadow vehicle is not used, distance E is measured from the end of the taper to the beginning of the work space.



Speed S (MPH)	Channelizing Devices Spacing 2S (Feet)	Sign Spacing		Buffer Space E (Feet)	Roll Ahead Space H (Feet)
		Urban A (Feet)	Rural A (Feet)		
25	50	100 - 200	500 - 800	155	150
30	60	100 - 200	500 - 800	200	150
35	70	100 - 200	500 - 800	250	150
40	80	350 - 500	500 - 800	305	150
45	90	350 - 500	500 - 800	360	150
50	100	350 - 500	500 - 800	425	250
55	110	350 - 500	500 - 800	495	250

Taper Lengths and Minimum Number of Channelizing Devices					
Speed S (MPH)	Shifting Taper: 1/2L		Shoulder Taper: 1/3L		50' Per Lane Taper
	Length (Feet)	Minimum Number Of Devices	Length (Feet)	Minimum Number Of Devices	Length (Feet)
25	65	6	45	6	50
30	90	6	60	6	50
35	125	6	85	6	50
40	160	6	110	6	50
45	270	7	180	6	50
50	300	7	200	6	50
55	330	7	220	6	50

PATA 107

- 1. Flaggers shall be clearly visible to traffic for a minimum distance of E.
- 2. For operations of 15 minutes or less:
  - a) The ROAD WORK, ONE LANE ROAD, and FLAGGER SYMBOL signs are not required.
  - b) All channelizing devices may be eliminated if a shadow vehicle is present and the operation does not proceed against normal traffic flow.
- 3. When a shadow vehicle is not used, distance E is measured from the end of the taper to the beginning of the work space.



Speed S (MPH)	Channelizing Devices Spacing 2S (Feet)	Sign Spacing		Buffer Space E (Feet)	Roll Ahead Space H (Feet)
		Urban A (Feet)	Rural A (Feet)		
25	50	100 - 200	500 - 800	155	150
30	60	100 - 200	500 - 800	200	150
35	70	100 - 200	500 - 800	250	150
40	80	350 - 500	500 - 800	305	150
45	90	350 - 500	500 - 800	360	150
50	100	350 - 500	500 - 800	425	250
55	110	350 - 500	500 - 800	495	250

Taper Lengths and Minimum Number of Channelizing Devices		
Speed S (MPH)	50' Per Lane Taper	
	Length (Feet)	Minimum Number Of Devices
25	50	6
30	50	6
35	50	6
40	50	6
45	50	6
50	50	6
55	50	6

PATA 109 (A Through L)

- 1. PATA 109 drawings show work spaces on roads that approach and depart T-intersections with through-roads. Single-flagger or multi-flagger intersection control is illustrated for intersections with three types of permanent control:
  - a) One-Way Stop
  - b) All-Way Stop
  - c) Traffic Signal
- 2. Flaggers shall be clearly visible to traffic for a minimum distance of E.
- 3. For operations of 15 minutes or less:
  - a) The ROAD WORK, ONE LANE ROAD, and FLAGGER SYMBOL signs are not required.
  - b) All channelizing devices may be eliminated if a shadow vehicle is present and the operation does not proceed against normal traffic flow.
- 4. When a shadow vehicle is not used, distance E is measured from the end of the taper to the beginning of the work space.



Speed S (MPH)	Channelizing Devices Spacing 2S (Feet)	Sign Spacing		Buffer Space E (Feet)	Roll Ahead Space H (Feet)
		Urban A (Feet)	Rural A (Feet)		
25	50	100 - 200	500 - 800	155	150
30	60	100 - 200	500 - 800	200	150
35	70	100 - 200	500 - 800	250	150
40	80	350 - 500	500 - 800	305	150
45	90	350 - 500	500 - 800	360	150
50	100	350 - 500	500 - 800	425	250
55	110	350 - 500	500 - 800	495	250

Taper Lengths and Minimum Number of Channelizing Devices		
Speed S (MPH)	50' Per Lane Taper	
	Length (Feet)	Minimum Number Of Devices
25	50	6
30	50	6
35	50	6
40	50	6
45	50	6
50	50	6
55	50	6

PATA 110 (A Through T)

- 1. PATA 110 drawings show work spaces on roads that approach and depart 4-Way intersections. Single-flagger or multi-flagger intersection control is illustrated for intersections with three types of permanent control:
  - a) One-Way Stop
  - b) All-Way Stop
  - c) Traffic Signal
- 2. Flaggers shall be clearly visible to traffic for a minimum distance of E.
- 3. For operations of 15 minutes or less:
  - a) The ROAD WORK, ONE LANE ROAD, and FLAGGER SYMBOL signs are not required.
  - b) All channelizing devices may be eliminated if a shadow vehicle is present and the operation does not proceed against normal traffic flow.
- 4. When a shadow vehicle is not used, distance E is measured from the end of the taper to the beginning of the work space.



Speed S (MPH)	Channelizing Devices Spacing 2S (Feet)	Sign Spacing		Buffer Space E (Feet)	Roll Ahead Space H (Feet)
		Urban A (Feet)	Rural A (Feet)		
25	50	100 - 200	500 - 800	155	150
30	60	100 - 200	500 - 800	200	150
35	70	100 - 200	500 - 800	250	150
40	80	350 - 500	500 - 800	305	150
45	90	350 - 500	500 - 800	360	150
50	100	350 - 500	500 - 800	425	250
55	110	350 - 500	500 - 800	495	250

Taper Lengths and Minimum Number of Channelizing Devices		
Speed S (MPH)	50' Per Lane Taper	
	Length (Feet)	Minimum Number Of Devices
25	50	6
30	50	6
35	50	6
40	50	6
45	50	6
50	50	6
55	50	6

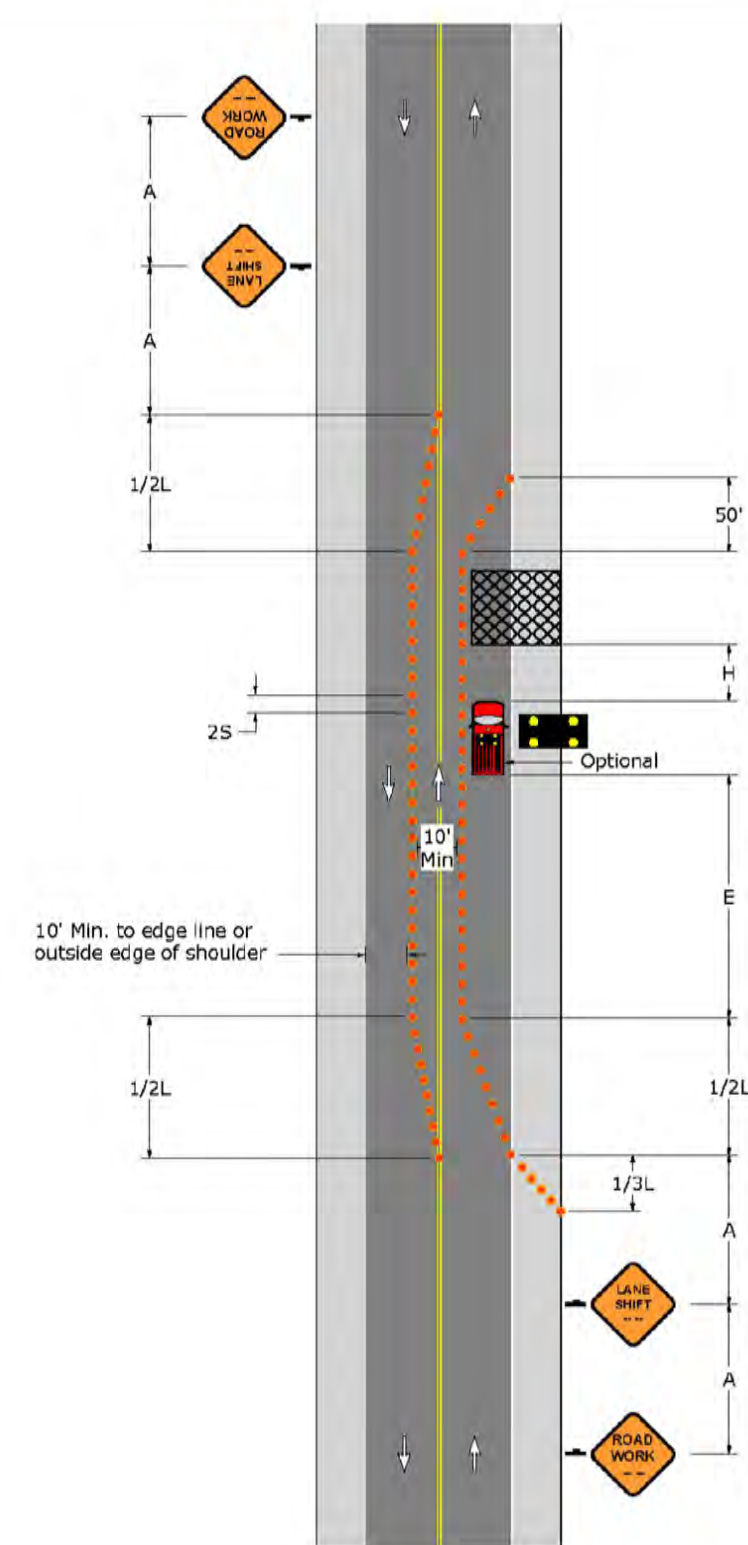
PENNDOT CONSTRUCTION NOTES:

- TOWNSHIP TO BE NOTIFIED PRIOR TO WORKING NEAR SCHOOL SIGNALS AND SHALL MARK OUT AS REQUIRED.
- SHOULDER AREAS PRONE TO WASHOUT SHALL BE PAVED.
- ANY DAMAGE TO TREES OR CUT SLOPES CAUSING THEM TO FAIL SHALL BE THE RESPONSIBILITY OF THE PERMITEE.
- MAIN TO BE SLEEVED OR ENCASED WHERE PASSING THROUGH GUARDRAIL.
- PERMITEE AND HIS CONTRACTOR ARE RESPONSIBLE FOR FAMILIARIZING THEMSELVES WITH THE REQUIRED EROSION AND SEDIMENTATION CONTROL MEASURES. APPROPRIATE CONTROLS ARE TO BE IN PLACE PRIOR TO SITE DISTURBANCE, CONTINUALLY MAINTAINED DURING CONSTRUCTION UNTIL REMOVED AND LEFT IN PLACE UNTIL SITE IS STABILIZED.
- TOWNSHIP TO BE NOTIFIED PRIOR TO WORKING NEAR TRAFFIC SIGNAL LOOPS AND SHALL MARK OUT AS REQUIRED.
- A BRIDGE OCCUPANCY LICENSE SHALL BE OBTAINED FOR THE STRUCTURE EXCEPT IN EMERGENCY SITUATION.
- EACH FLAGGER STATION SHALL BE ILLUMINATED AT NIGHT WITH AN OVERHEAD LIGHTING SOURCE HAVING 30,000 TO 40,000 LUMENS MINIMUM OF LIGHT OUTPUT FOR AN AREA OF NOT LESS THAN 7,500 SQUARE FEET. THE LIGHTING SOURCE SHALL HAVE A MINIMUM COLOR TEMPERATURE OF 3,000 DEGREES AND A MAXIMUM OF 4,000 DEGREES. POSITION THE LIGHT SO THE FLAGGERS CAN BE SEEN AND NOT CAUSE EXCESSIVE GLARE TO MOTORIST TRAVELING THROUGH THE WORK ZONE.
- NOTIFY THE DISTRICT 6-0 REGIONAL TRAFFIC MANAGEMENT CENTER (RTMC) 610-205-6934 FIFTEEN (15) MINUTES IN ADVANCE OF ANY PROPOSED LANE OR SHOULDER RESTRICTION, ROAD CLOSURE, OR ANY OPERATION IMPEDING THE FLOW OF TRAFFIC. NOTIFY THE RTMC WHEN THE ROAD IS RESTORED TO NORMAL OPERATION.
- SUBMIT A COMPLETED M-937R FORM TO THE DISTRICT HAULING PERMIT OFFICE (610-205-6787) AND THE INSPECTOR-IN-CHARGE TEN WORKING DAYS IN ADVANCE OF ALL TRAFFIC RESTRICTIONS.
- PROTECT DROP-OFFS ADJACENT TO A TRAVEL LANE IN ACCORDANCE WITH PUBLICATION 408, SECTION 901.3.(i).
- THE WORK MUST BE PERFORMED IN WAY THAT WILL NOT CREATE A HAZARD FOR VEHICLE TRAFFIC OR PEDESTRIAN TRAFFIC.
- COORDINATE DELIVERY OF EQUIPMENT, MATERIAL TO MINIMIZE INCONVENIENCE TO TRAVELING PUBLIC.
- REPLACE ALL PAVEMENT MARKINGS WHICH HAD BEEN REMOVED DURING CONSTRUCTION, UNLESS OTHERWISE NOTED.

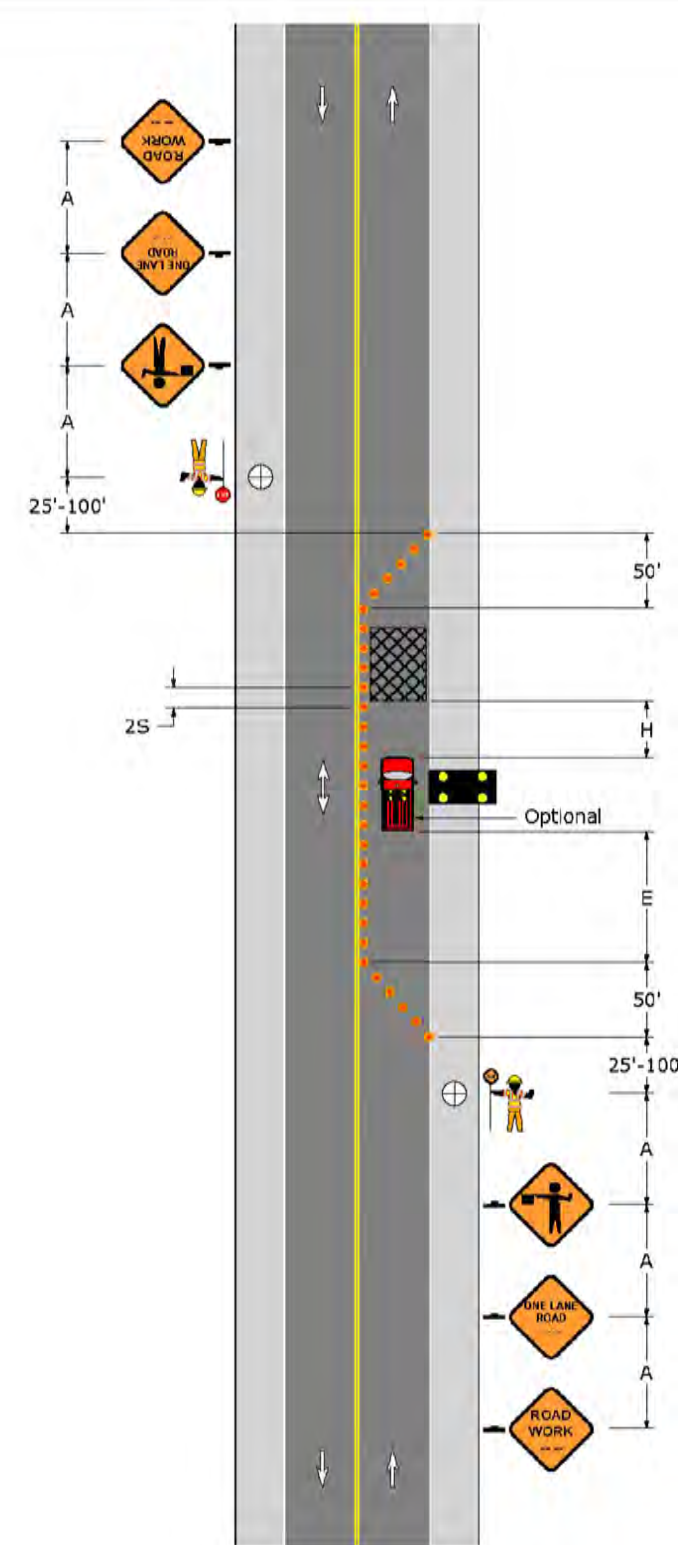
NOTES:

- ALL SIGNS SHALL BE REFLECTORIZED.
- ALL FLAGGERS MUST BE IN COMMUNICATION WITH EACH OTHER AND PENNDOT CERTIFIED.
- EACH FLAGGER SHOULD BE CLEARLY VISIBLE TO THE TRAFFIC WHICH IS BEING CONTROLLED.
- NOTIFY THE LOCAL MUNICIPALITY WHEN A SIGNALIZED INTERSECTION FALLS WITHIN THE WORK ZONE. DO NOT FLAG A SIGNALIZED INTERSECTION WITHOUT THE MUNICIPALITY PLACING THE SIGNAL ON FLASH.
- NO OPEN TRENCHES WILL BE PERMITTED AT NIGHT.
- MAINTAIN ALL ACCESS TO DRIVEWAYS AND SIDE ROADS.
- NO LANE CLOSURES OR TRAFFIC RESTRICTIONS ON LEGAL HOLIDAYS AND BETWEEN THE HOURS OF 6:00 AM TO 9:00 AM AND 3:00 PM TO 7:00 PM.
- NOTIFY LOCAL EMERGENCY UNITS (POLICE, FIRE, MEDICAL, ETC.), LOCAL BUSINESSES, SCHOOL DISTRICT, THE LOCAL MEDIA AND THE REPRESENTATIVE TEN (10) WORKING DAYS IN ADVANCE OF THE START OF WORK.
- THE CONTRACTOR IS REQUIRED TO SUBMIT A ROAD RESTRICTION FORM TO THE DISTRICT 6-0 PRESS OFFICE ONE WEEK IN ADVANCE OF ANY LANE CLOSURES AND TWO WEEKS IN ADVANCE OF ANY FULL CLOSURES THAT NECESSITATE A DETOUR. THE FORM IS AVAILABLE ONLINE AT [penndot.gov/district6/roadrestrictionform](http://penndot.gov/district6/roadrestrictionform) OR BY CALLING 610-205-6797.

PATA 103



PATA 107



PATA 109 (A Through L)

Intersection Flagging Options

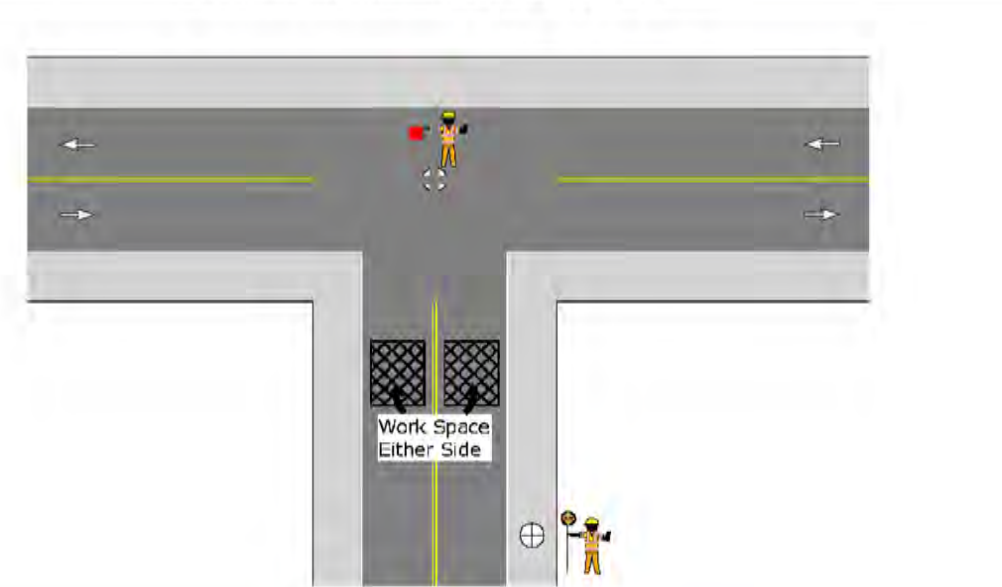


Figure 109-1 One Flagger Within Intersection

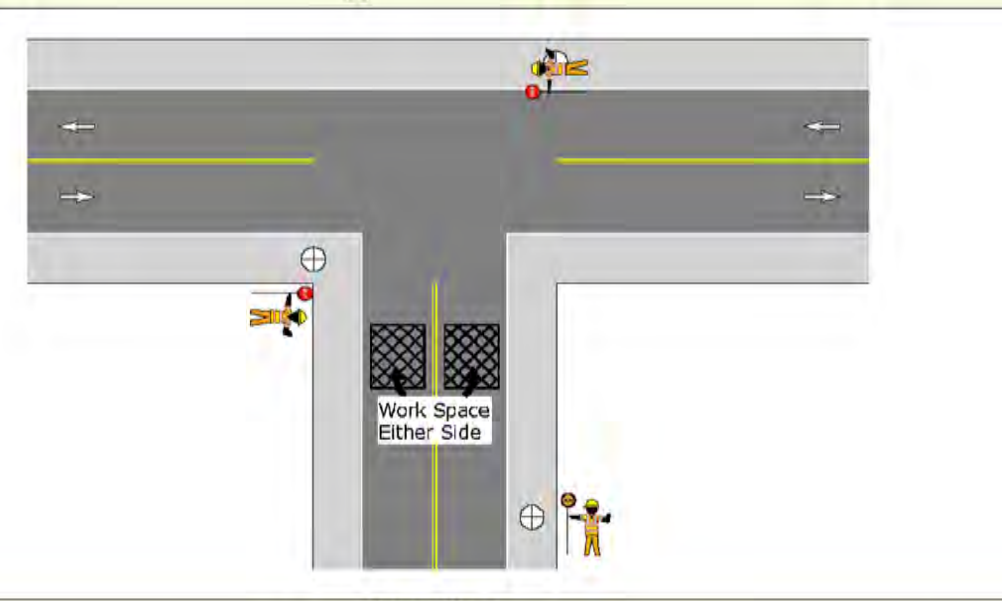


Figure 109-2 Two Flaggers at Intersection

NOTE: CONTRACTOR TO SELECT APPROPRIATE TRAFFIC CONTROL OPTION (PATA 109-A THROUGH PATA 109-L) BASED ON TYPE OF PERMANENT CONTROL AND FIELD CONDITIONS.

PATA 110 (A Through T)

Intersection Flagging Options

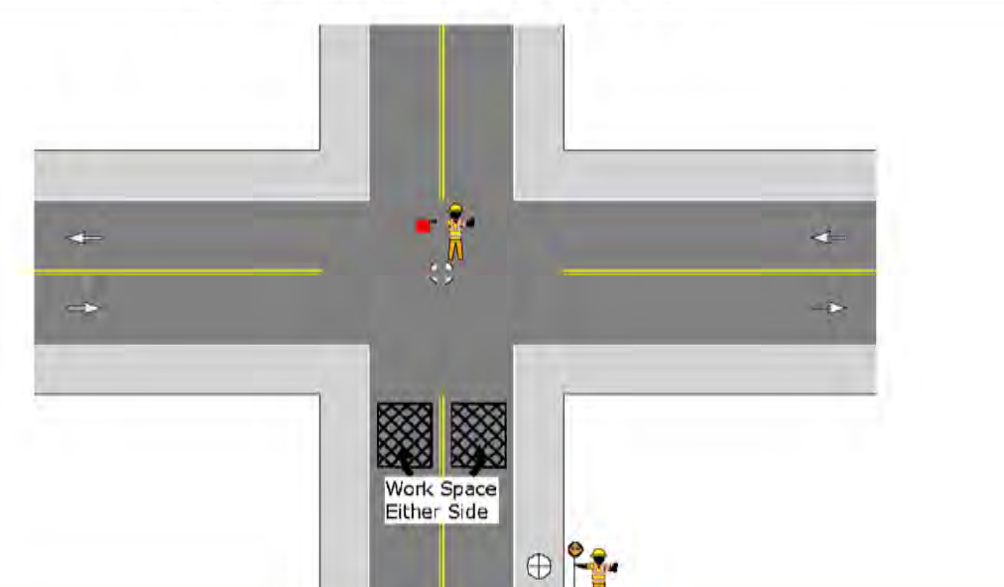


Figure 110-1 One Flagger Within Intersection

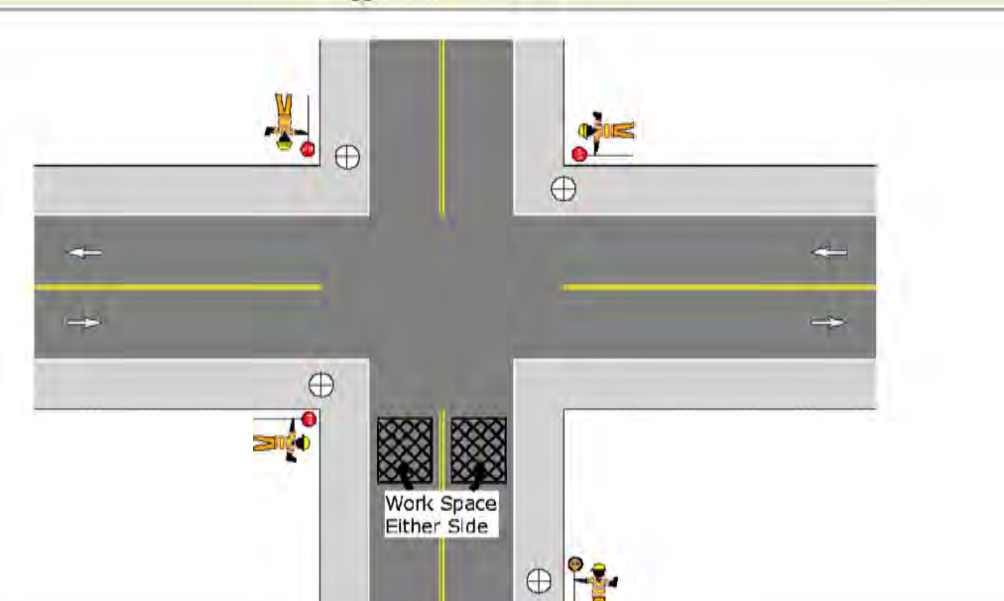
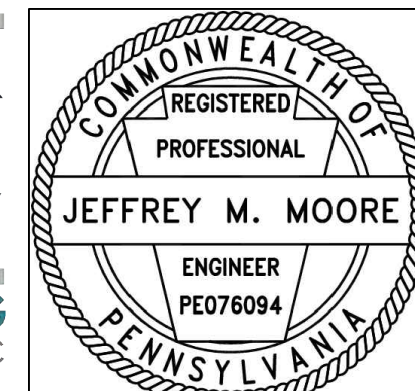


Figure 110-2 Three Flaggers at Intersection

NOTE: CONTRACTOR TO SELECT APPROPRIATE TRAFFIC CONTROL OPTION (PATA 110-A THROUGH PATA 110-T) BASED ON TYPE OF PERMANENT CONTROL AND FIELD CONDITIONS.

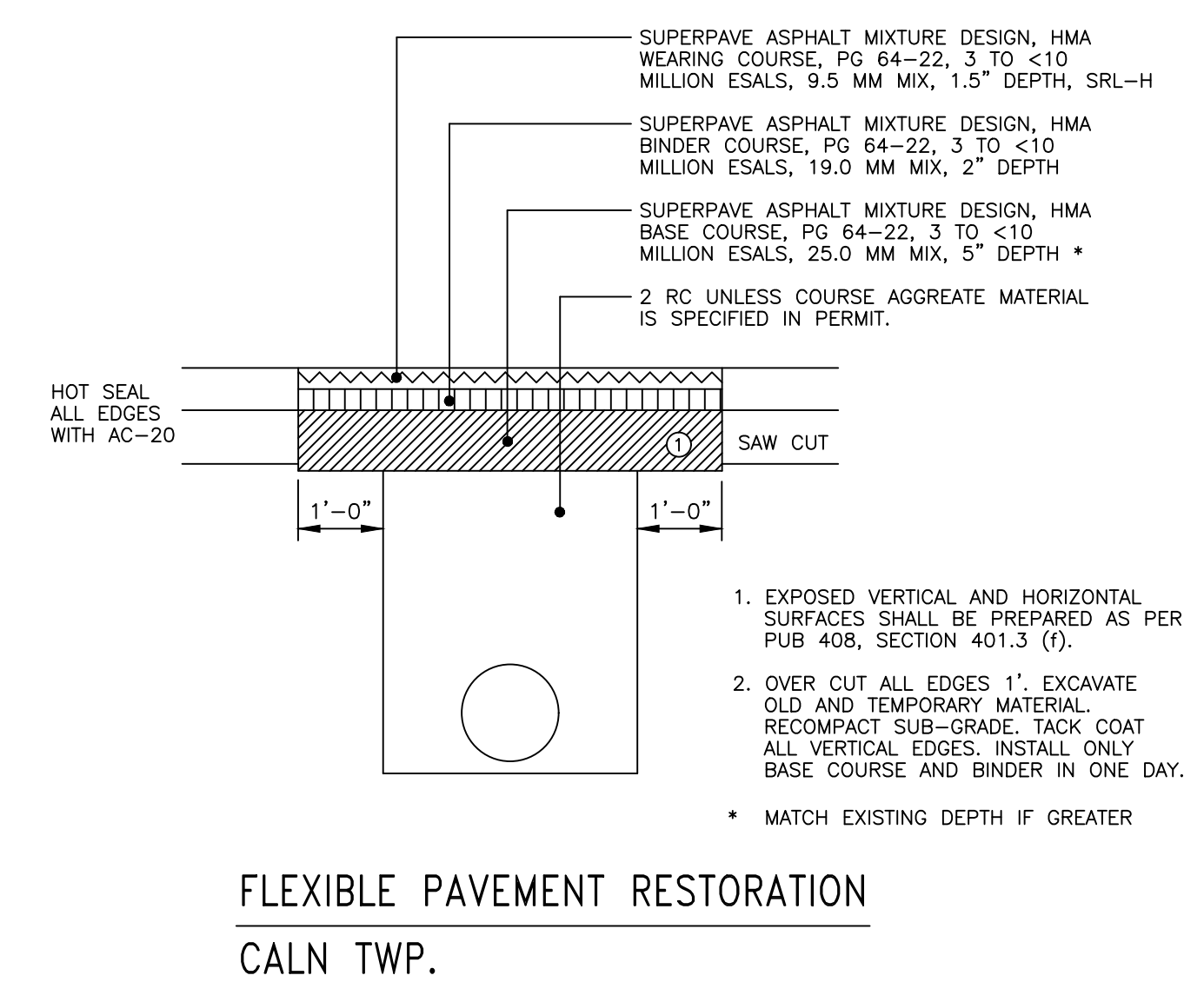
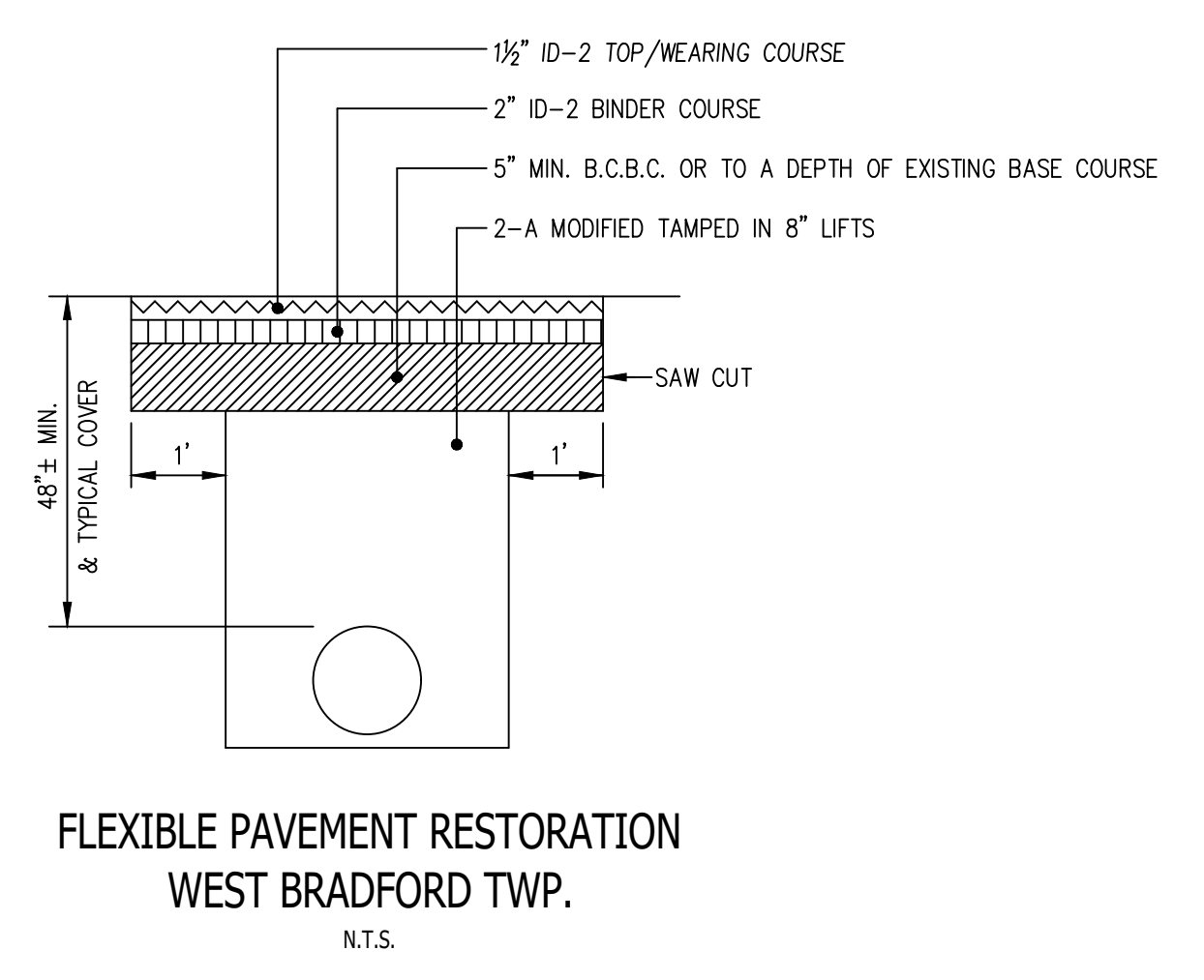
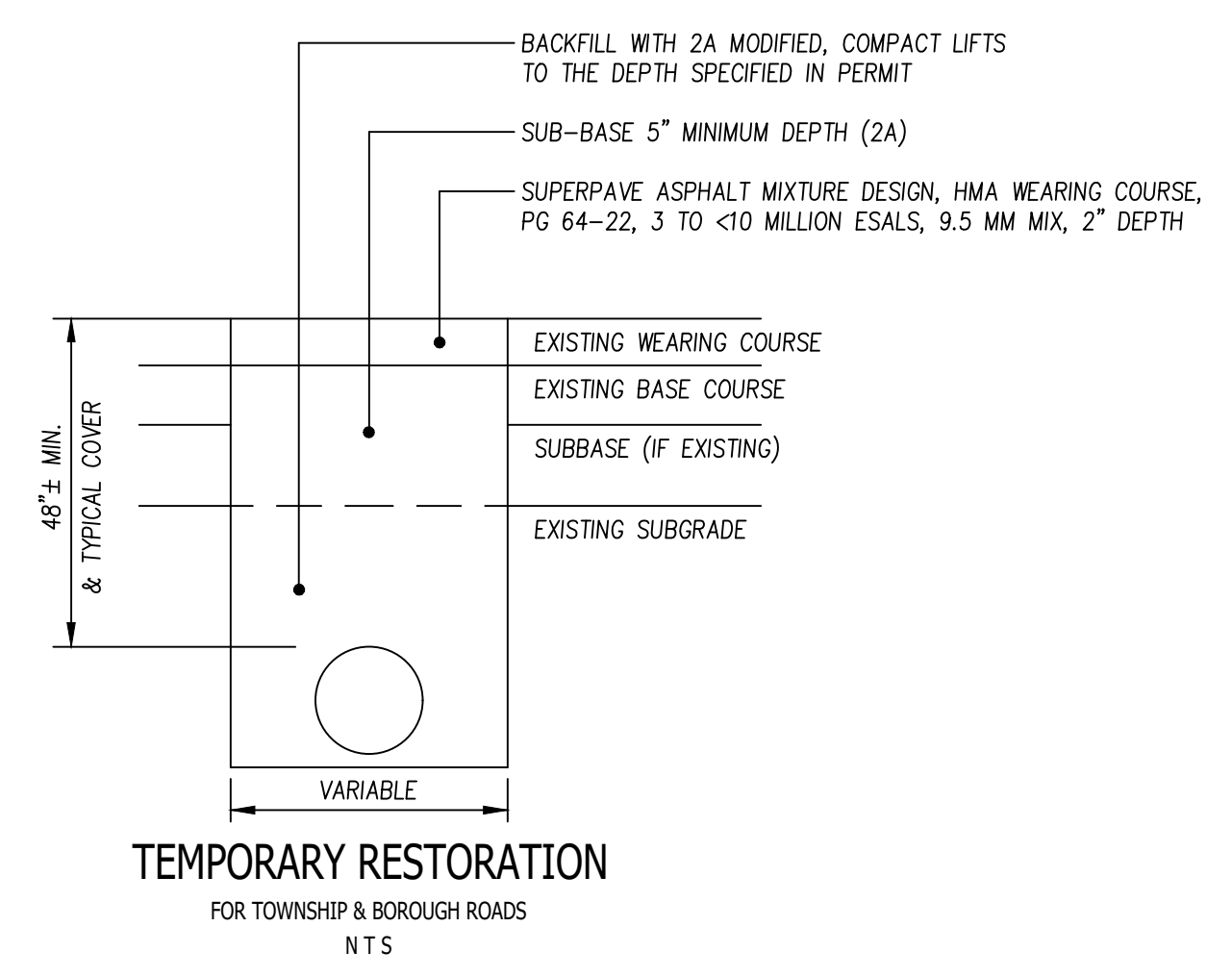
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0	07/03/2023	DESIGN COMPLETION	PG

AQUA PENNSYLVANIA, INCORPORATED  
762 LANCASTER AVENUE, BRYN MAWR, PA., 19010  
PROJECT PLAN FOR:  
**LLOYD AVENUE PHASE I PROJECT**  
TRAFFIC CONTROL DETAILS  
CALN TWP & W BRADFORD TWP, CHESTER COUNTY



DRAWN BY:	CR	CHK'D BY:	JMM/AC	EXT No:	20131-G
DATE:	11/08/2021	SCALE:	N.T.S.	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED:	<i>Jeffrey M. Moore</i>			SHEET	10 OF 15



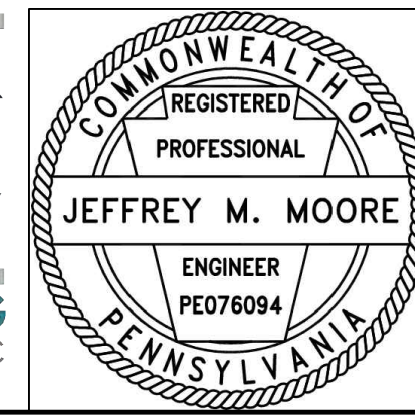


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0	07/03/2023	DESIGN COMPLETION	PG

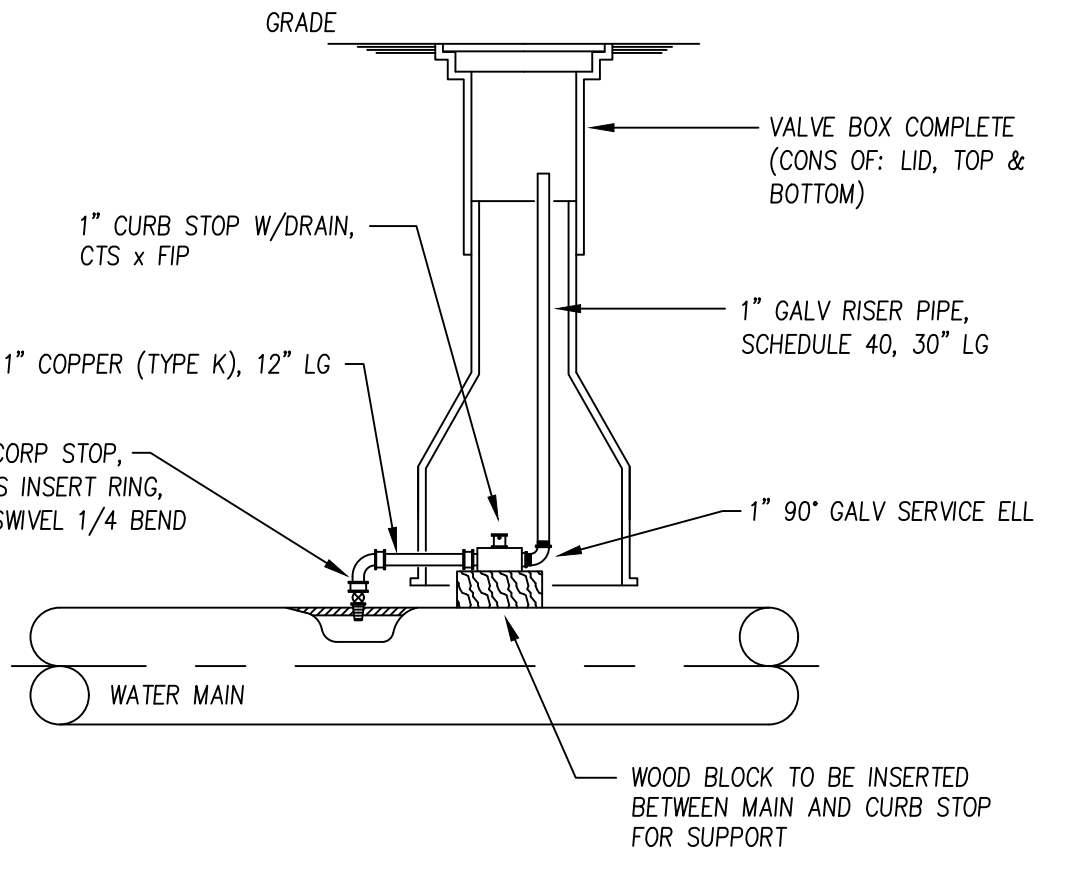
AQUA PENNSYLVANIA, INCORPORATED  
762 LANCASTER AVENUE, BRYN MAWR, PA., 19010

PROJECT PLAN FOR:  
**LLOYD AVENUE PHASE I PROJECT**  
ROAD RESTORATION DETAILS  
CALN TWP & W BRADFORD TWP, CHESTER COUNTY

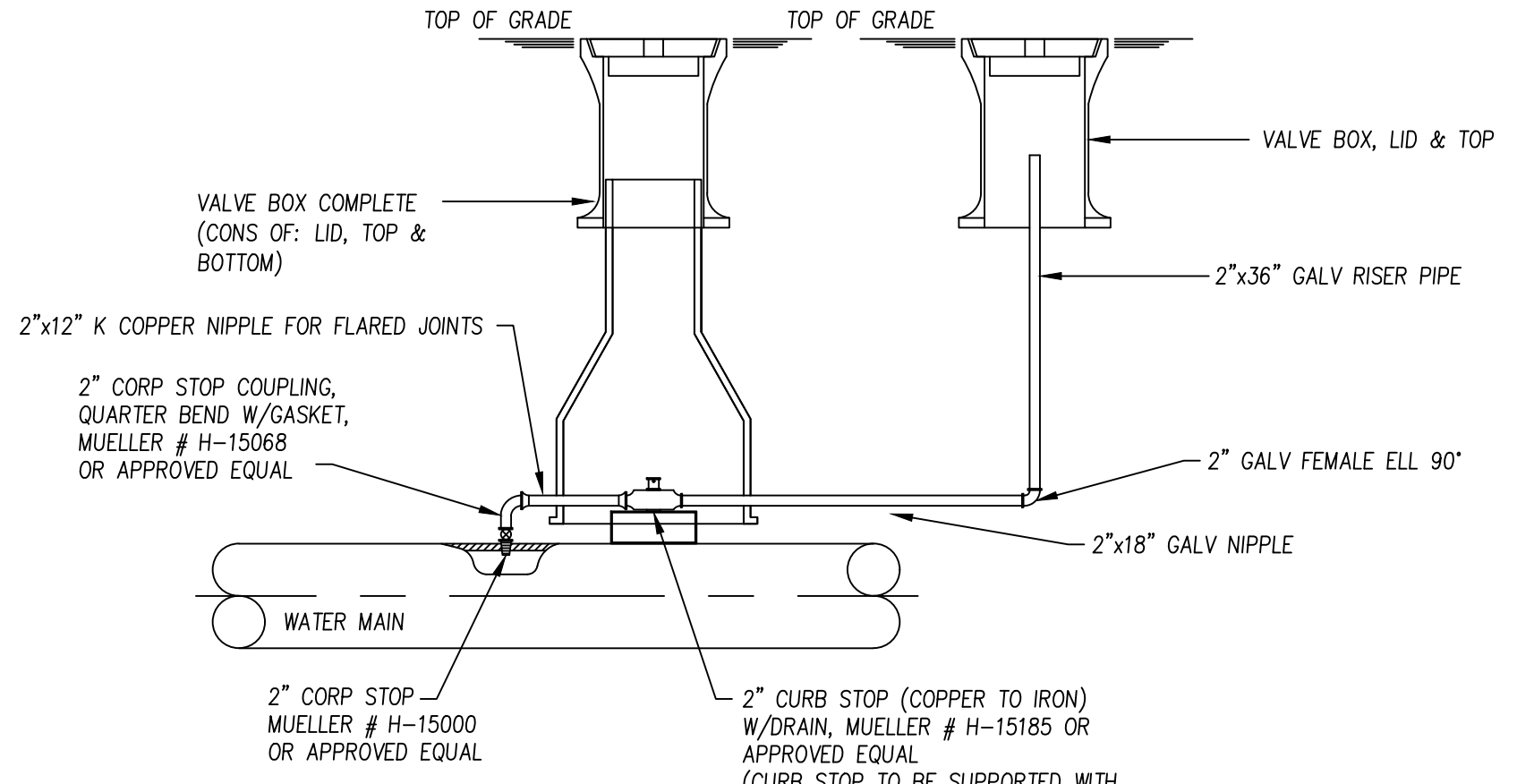
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DATE:	11/08/2021	SCALE:	N.T.S.	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED	<i>Jeffrey M. Moore</i>			SHEET	11 OF 15



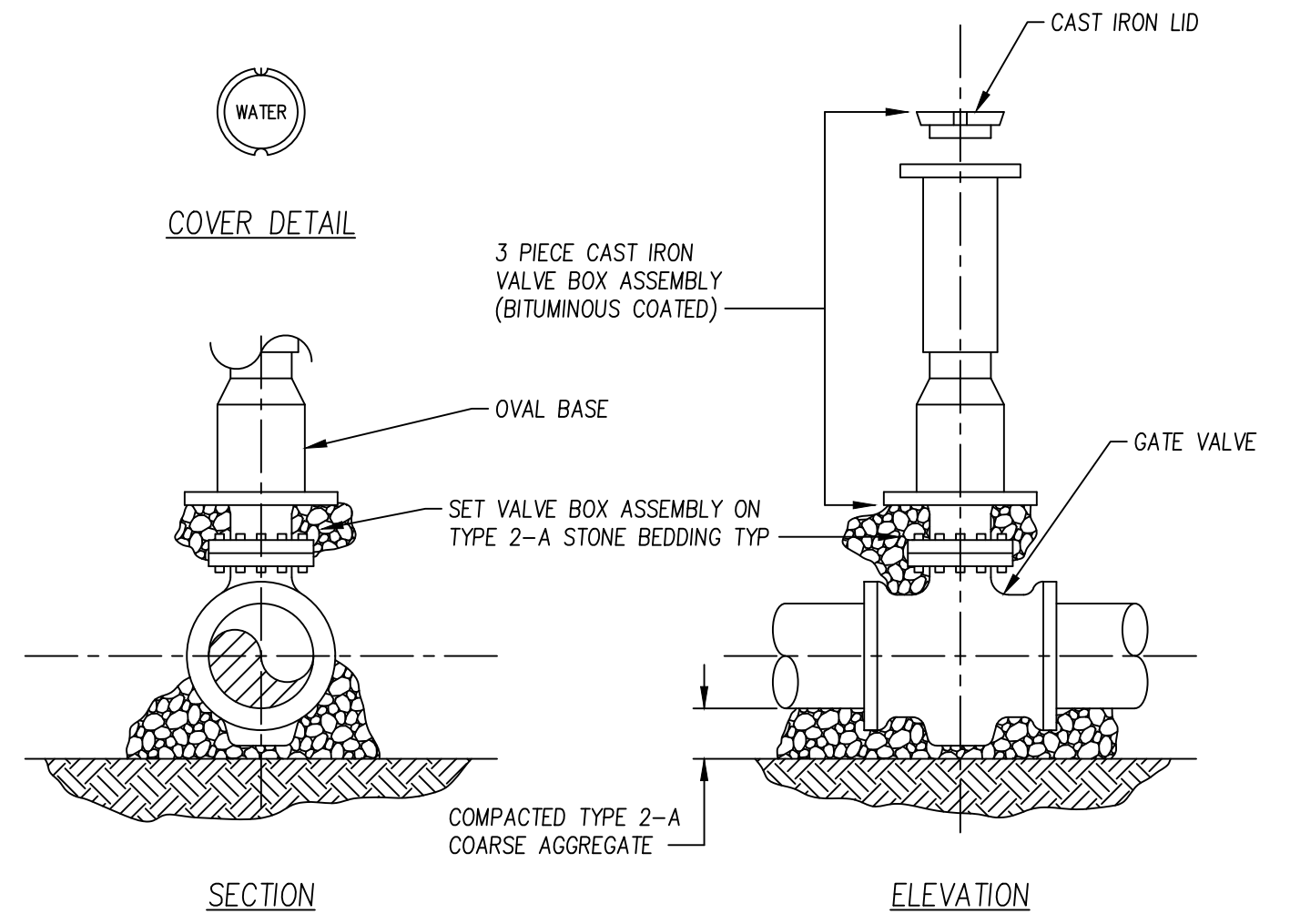




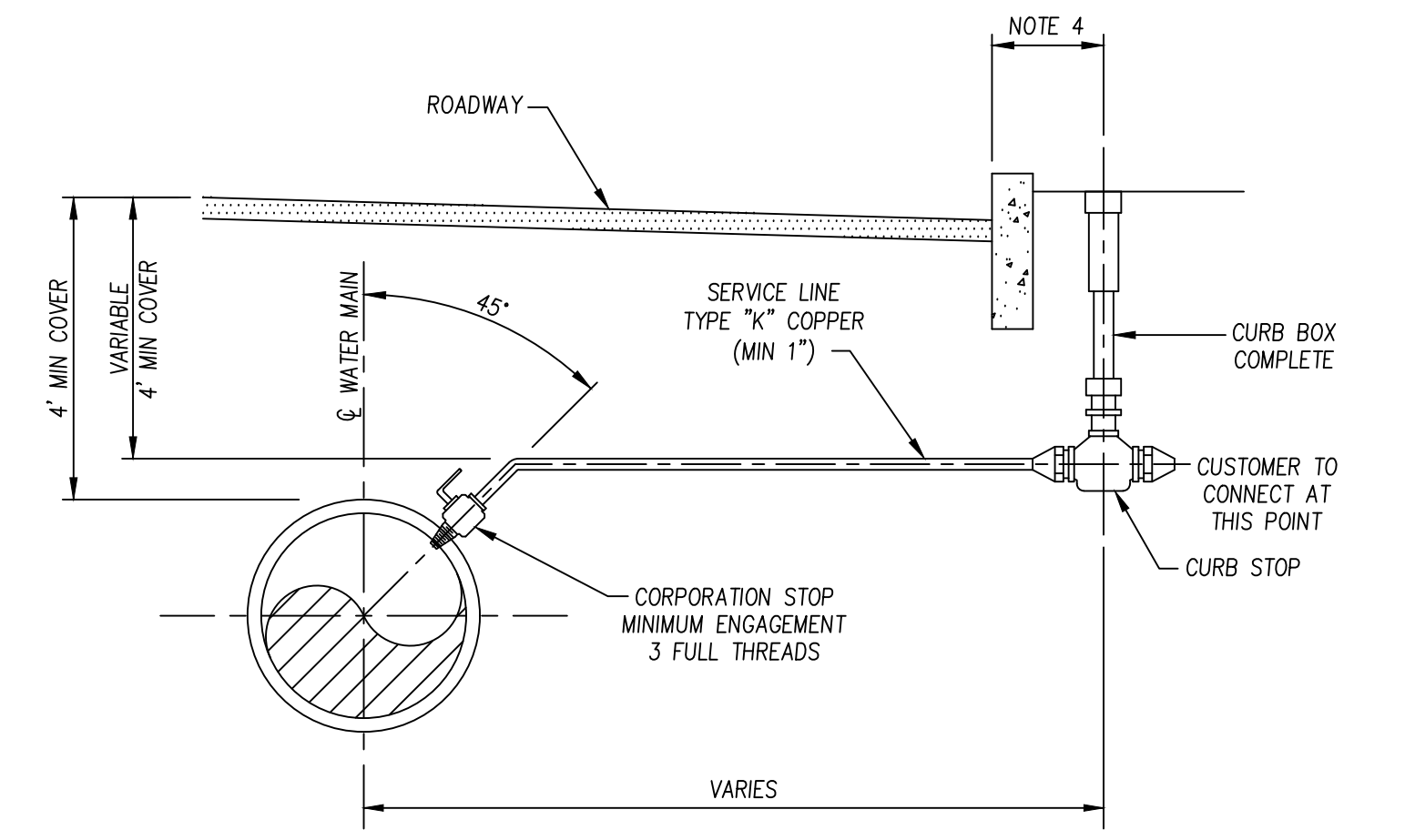
**STANDARD 1" MAV & CL2 ASSEMBLY**  
NTS



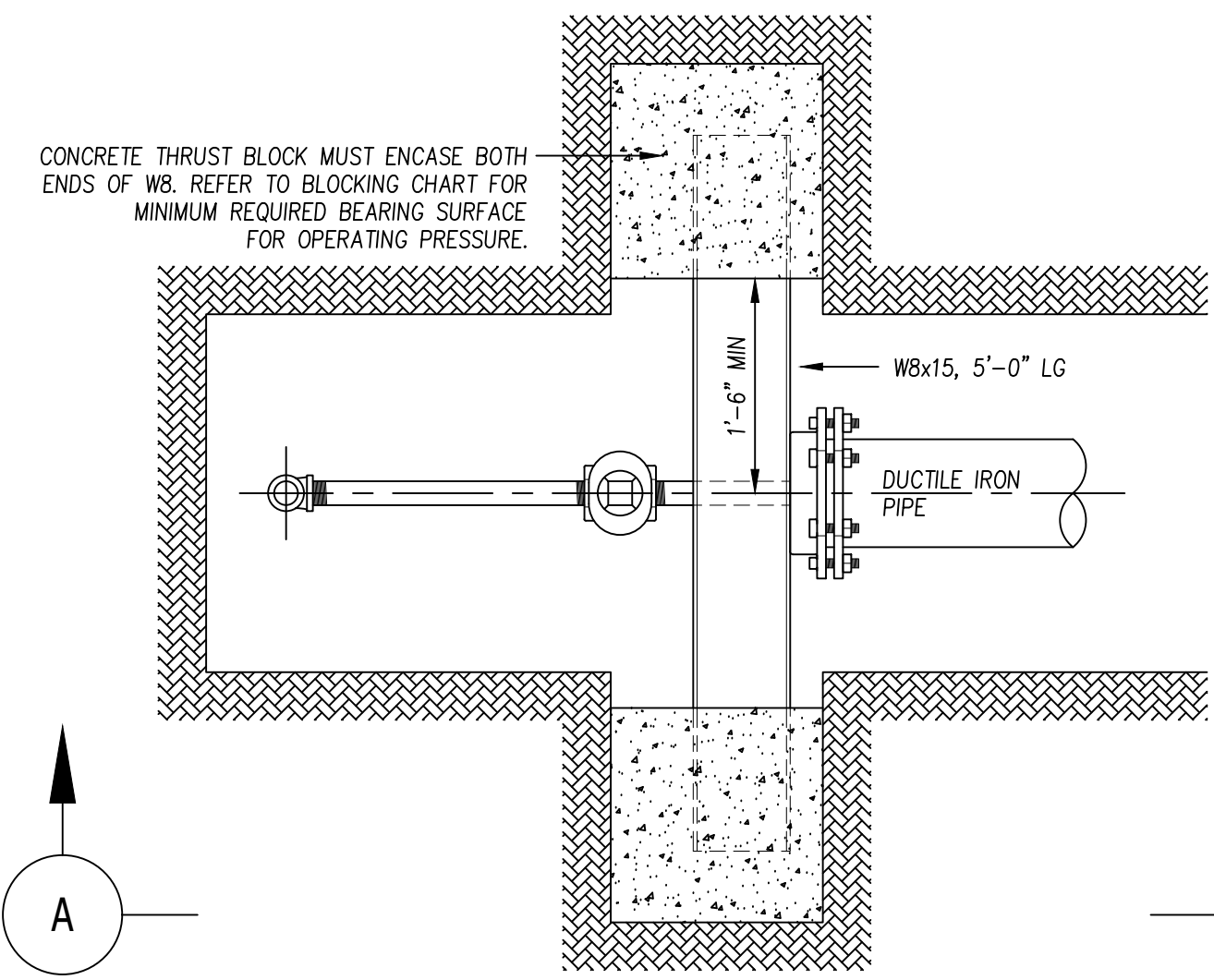
**STANDARD 2" MAV & CL2 ASSEMBLY**  
NTS



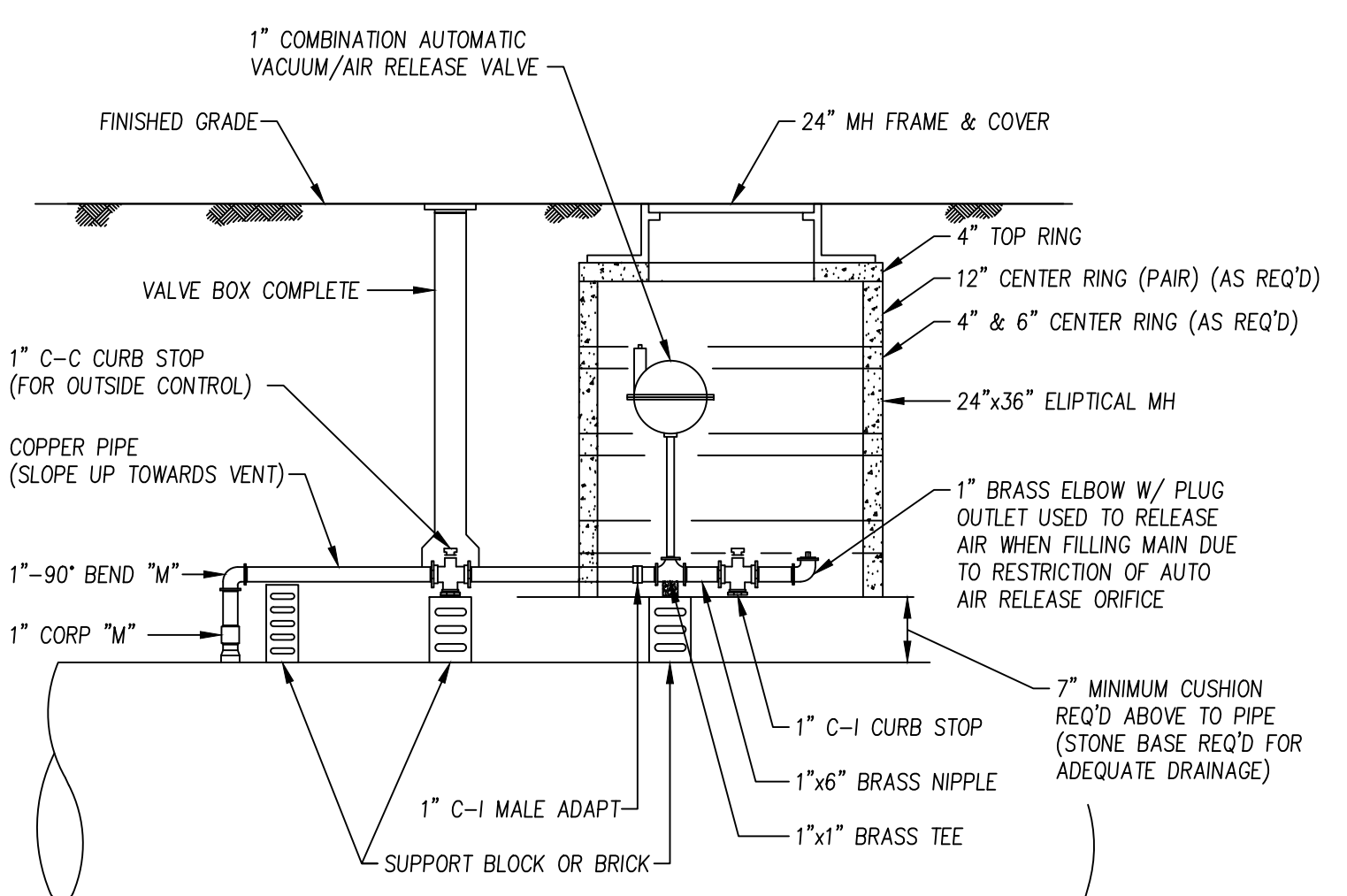
**STANDARD GATE VALVE AND VALVE BOX ASSEMBLY DETAIL**  
NTS



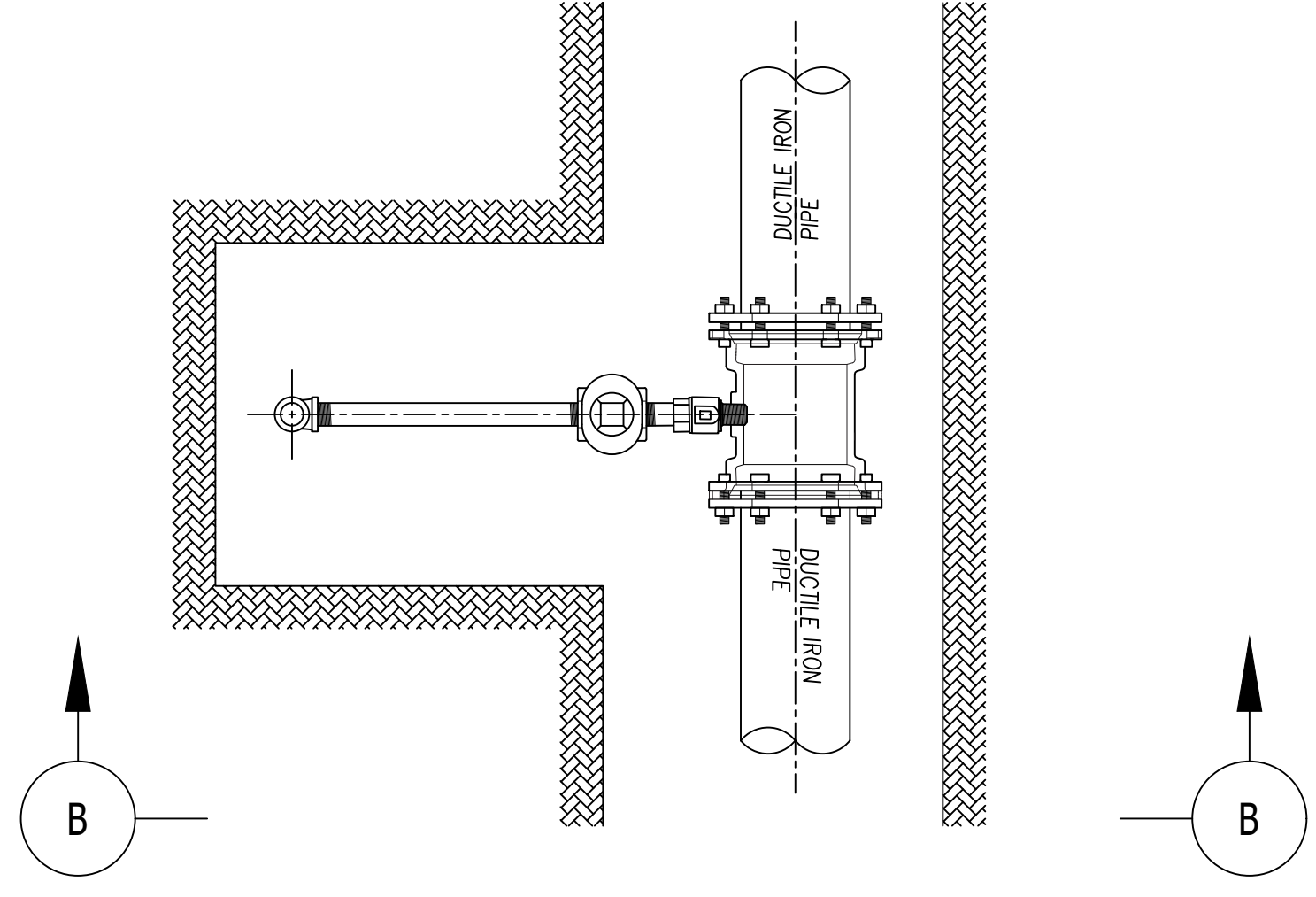
**STANDARD SERVICE CONNECTION**  
NTS



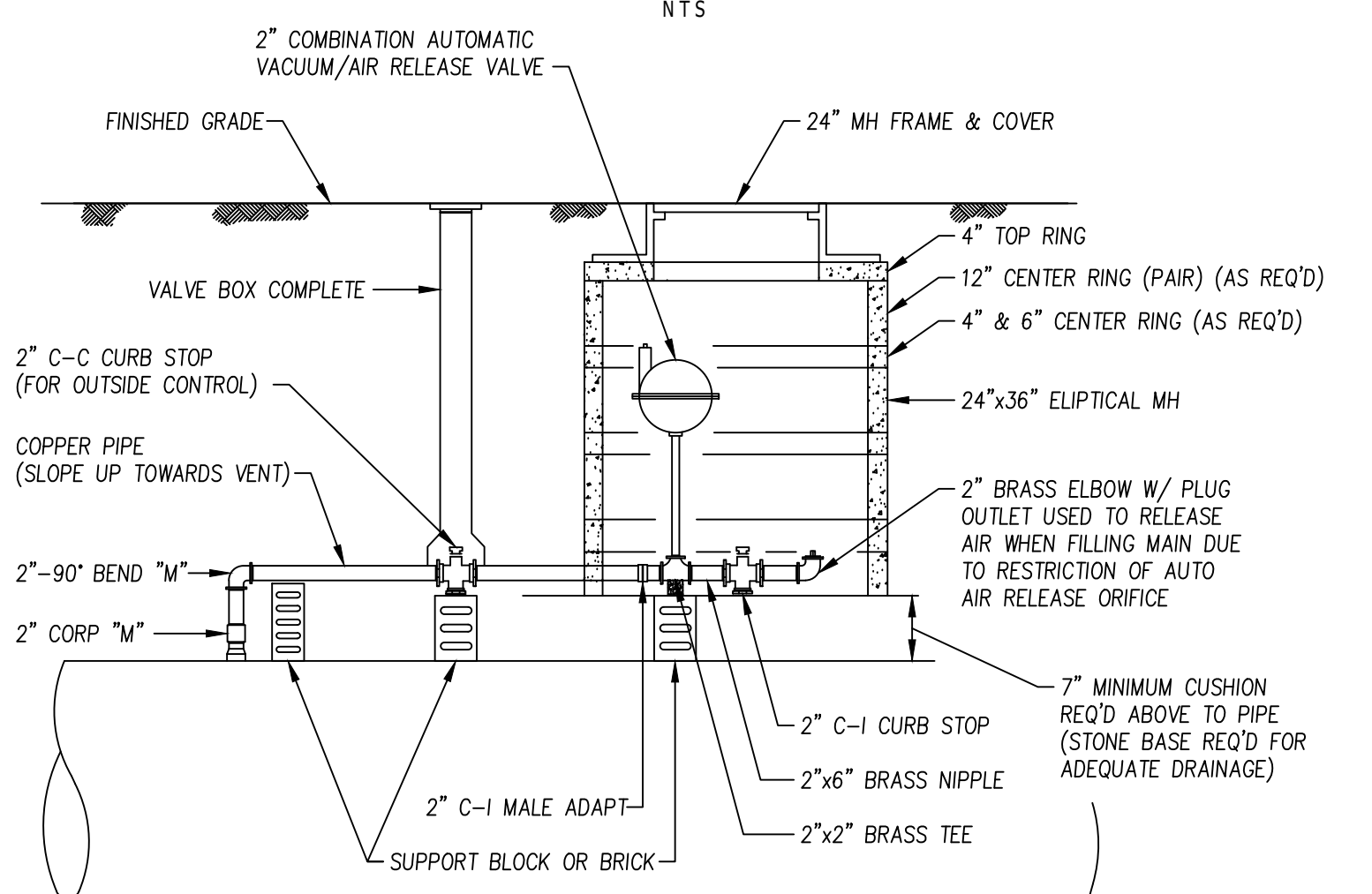
**PLAN VIEW**



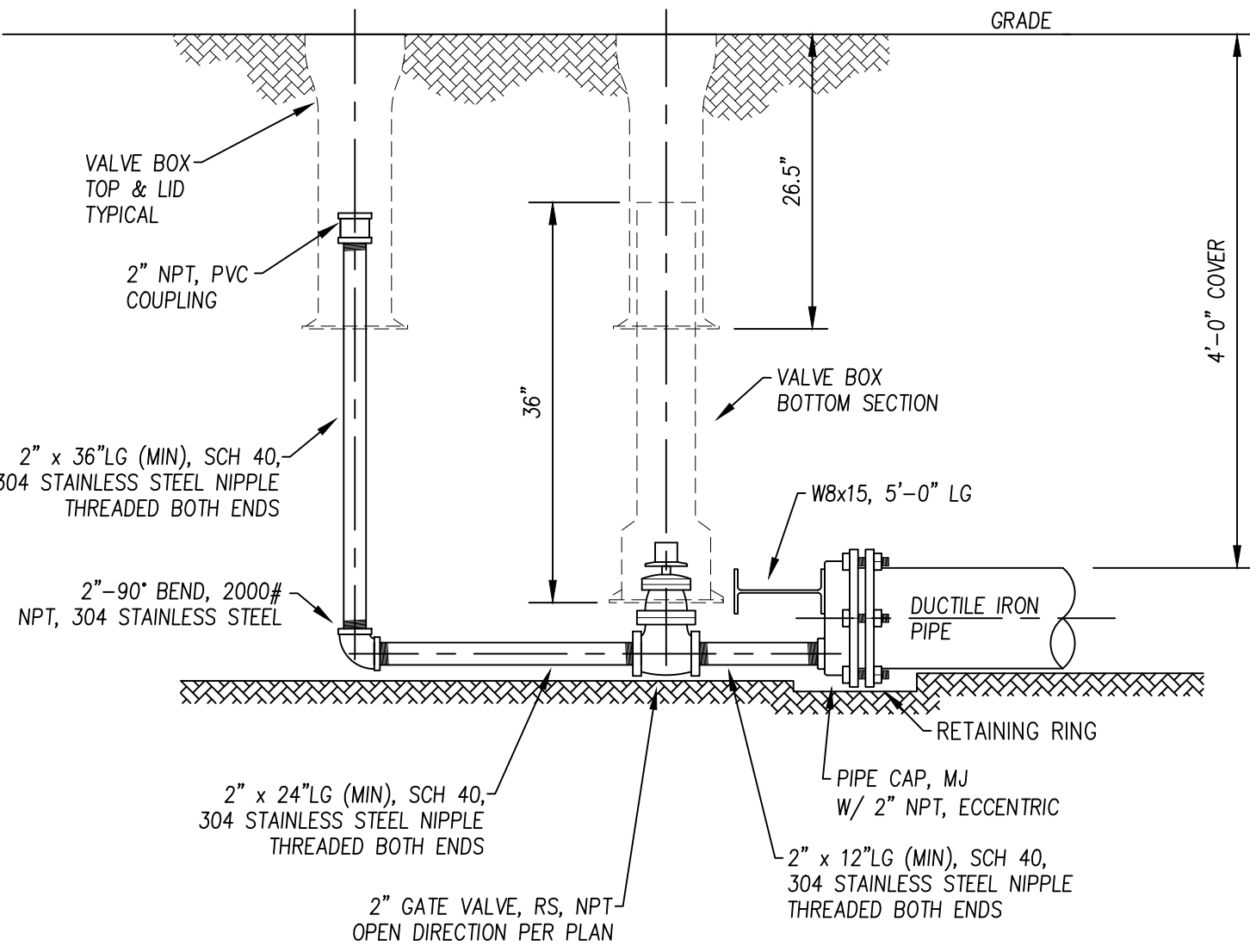
**PLAN VIEW**



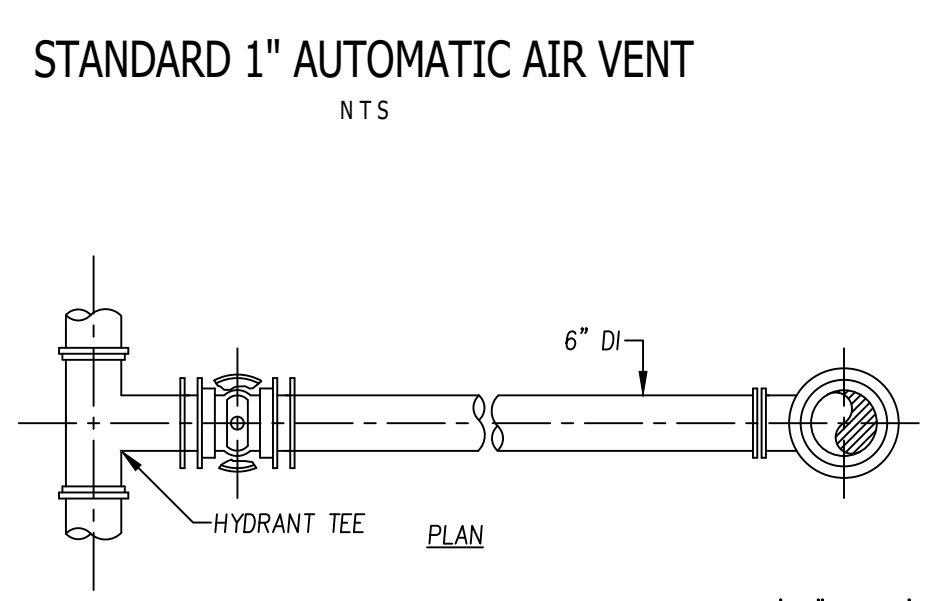
**PLAN VIEW**



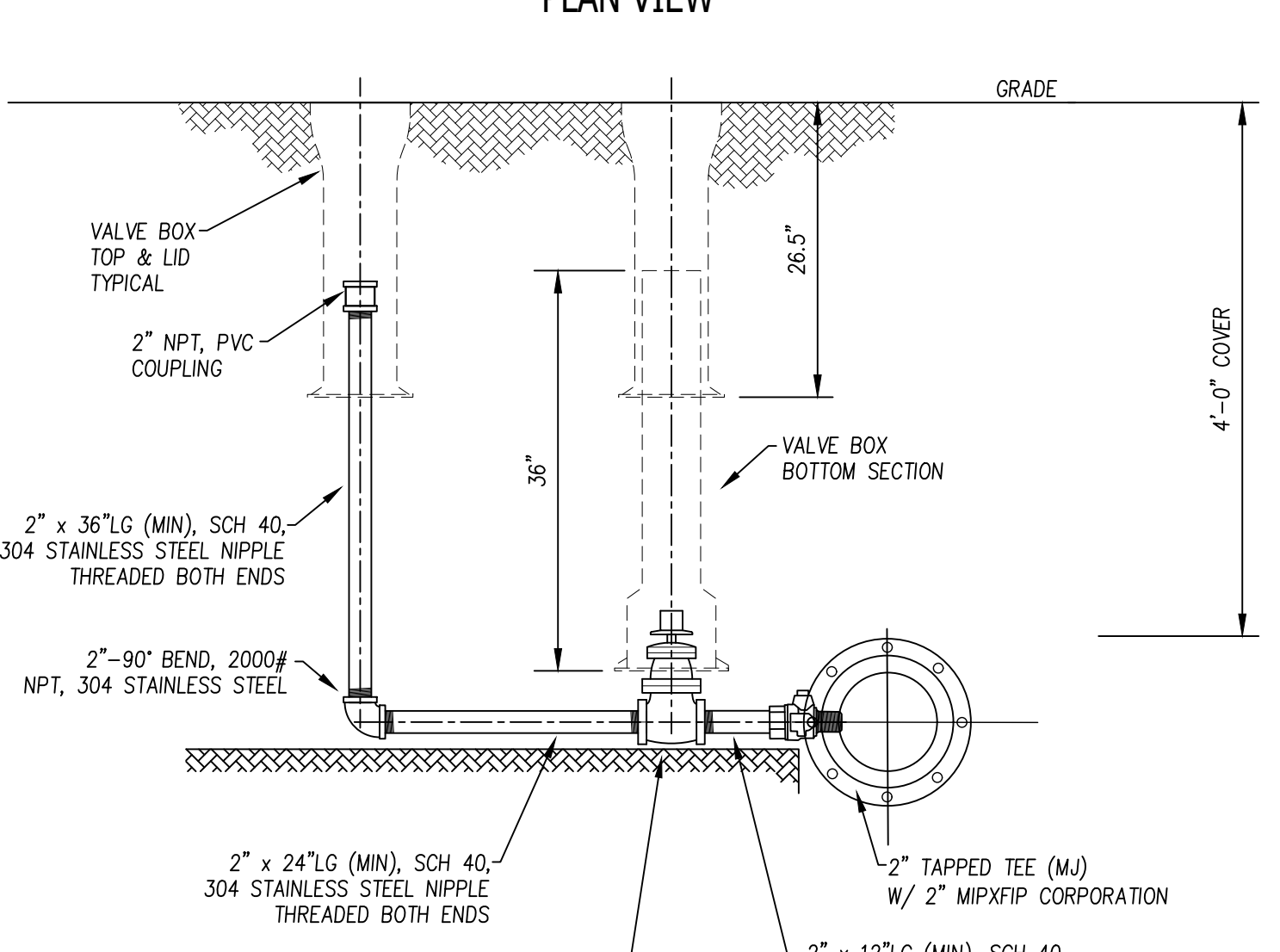
**PLAN VIEW**



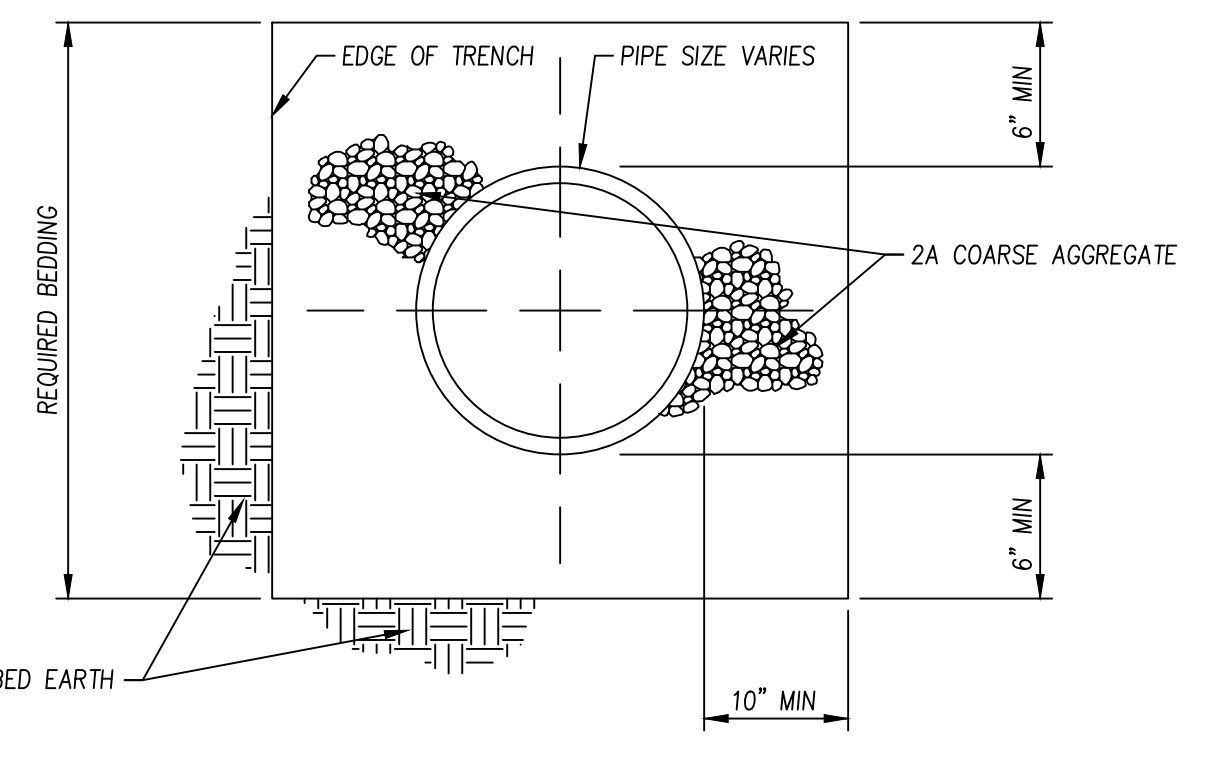
**SECTION A**



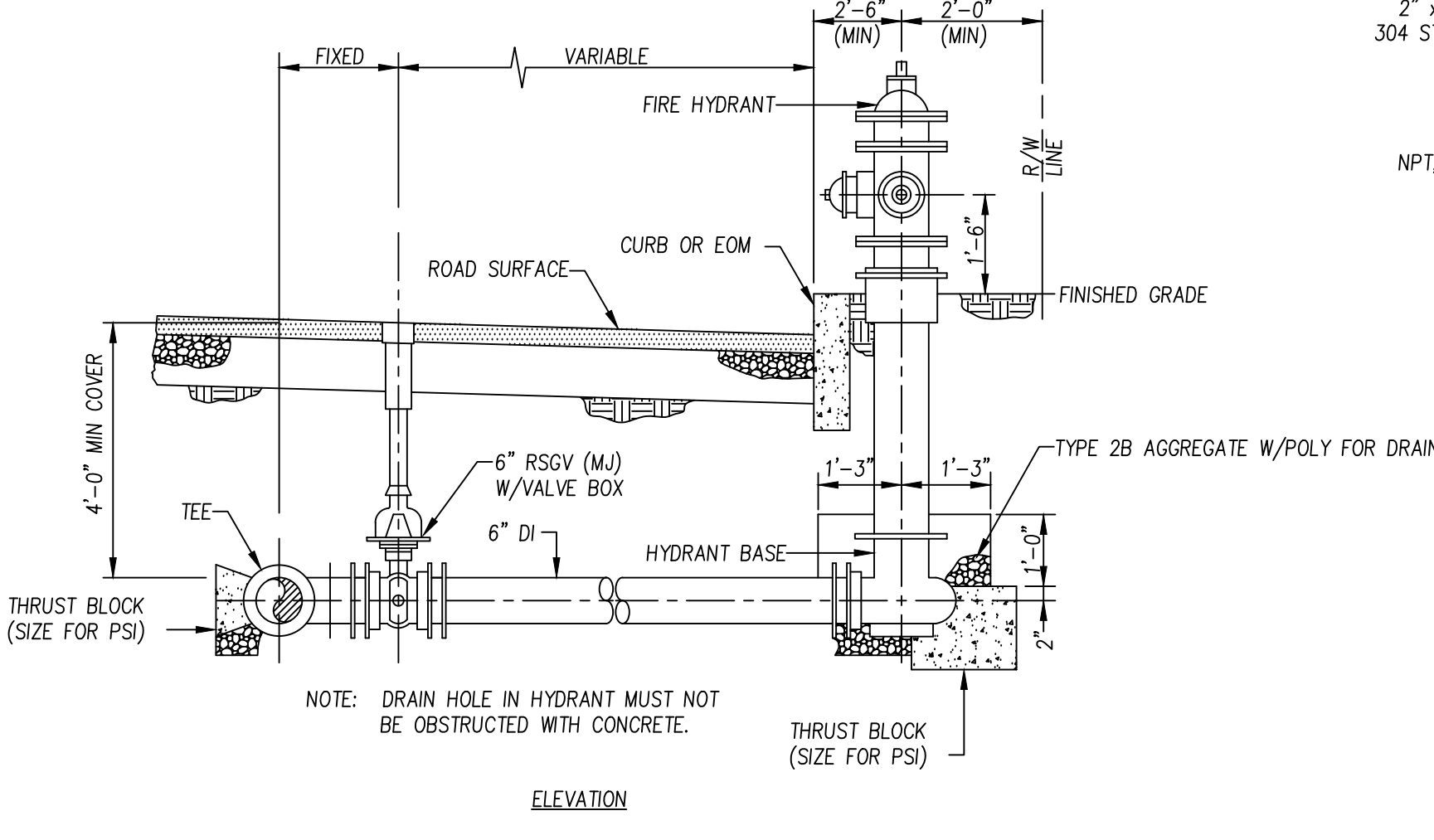
**PLAN**



**SECTION B**



**STANDARD PIPE BEDDING DETAIL**  
NTS



**FIRE HYDRANT DETAIL**  
NTS

**2" TAPPED TEE W/ 2" BLOW OFF**  
NTS

- NOTES:
1. WS MEMBER MUST MAKE FULL CONTACT WITH CAP OR PLUG, AND MUST BE SUPPORTED TO PROVIDE 1" MINIMUM VERTICAL CLEARANCE FROM STAINLESS STEEL PIPE.
  2. CONCRETE THRUST BLOCKS MUST BE POURED AGAINST UNDISTURBED SOIL. NO EXCAVATION IS PERMITTED DOWNSTREAM OF BLOCKING. CONSULT WITH THE ENGINEERING DEPT OF AQUA PA FOR MINIMUM PERMITTED DISTANCE.
  3. ALL MALE PIPE THREADS ARE TO BE COATED WITH 1/2" WIDE PTFE (TEFLON) THREAD SEAL TAPE, MIL SPEC 127730A, 4 TO 6 WRAPS PER JOINT.

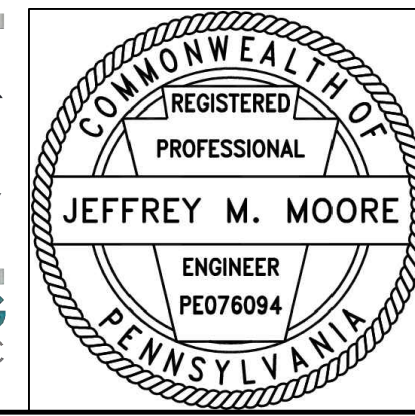
**STANDARD 2" BLOW OFF**  
NTS

- NOTES:
1. FOR STANDARD 1" CONNECTION, PROVIDE A TAPPED COUPLING WITH THREADED INSERT OR DOUBLE-STRAPPED SADDLE CLAMP.
  2. DO NOT PLACE CURB STOP IN PAVED AREAS.
  3. ALL SERVICE CONNECTIONS SHALL BE LOCATED AT THE MIDPOINT BETWEEN SIDE LOT LINES OR AS DIRECTED BY A AQUA PA FIELD REPRESENTATIVE.
  4. WHERE SIDEWALK PARALLELS ROADWAY, THE CURB BOX SHALL BE PLACED BETWEEN THE CURB AND SIDEWALK. ALL OTHER LOCATIONS, CURB BOX TO BE PLACED AS DIRECTED BY A AQUA PA FIELD REPRESENTATIVE.

NO	DATE	REVISION	INTL
0	07/05/2023	ISSUED FOR CONSTRUCTION	PG
0	07/03/2023	DESIGN COMPLETION	PG

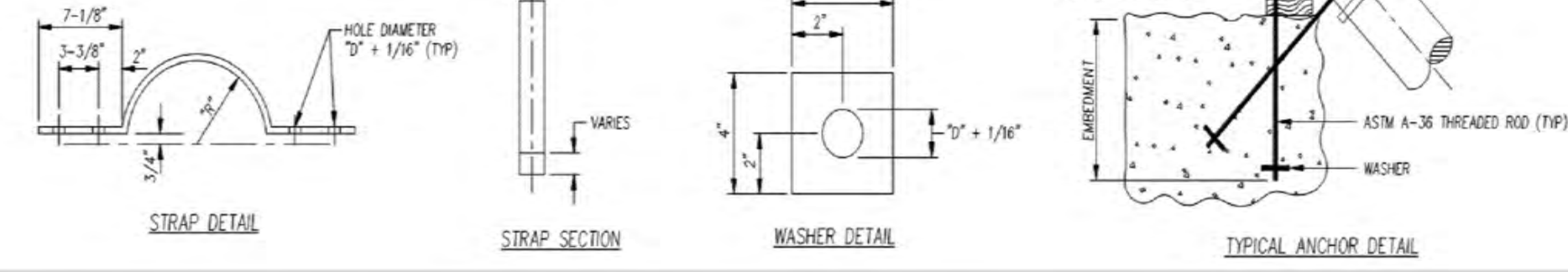
AQUA PENNSYLVANIA, INCORPORATED  
762 LANCASTER AVENUE, BRYN MAWR, PA., 19010  
**PROJECT PLAN FOR:  
LLOYD AVENUE PHASE I PROJECT  
MISCELLANEOUS DETAILS**  
CALN TWP & W BRADFORD TWP, CHESTER COUNTY

DRAWN BY:	CR	CHK'D BY:	JMM/AC	EXT No:	20131-G
DATE:	11/08/2021	SCALE:	N.T.S.	PLATE:	PP25,PP26,0026
PROJECT No:	217.23	ACTIVITY No:	100000623	<b>A - 67657</b>	
APPROVED	<i>Jeffrey M. Moore</i>				SHEET 12 OF 15





**MINIMUM CONCRETE VOLUMES AND STEEL STRAP SIZES REQUIRED FOR BLOCKING 6", 8", 12" AND 16" VERTICAL BENDS**

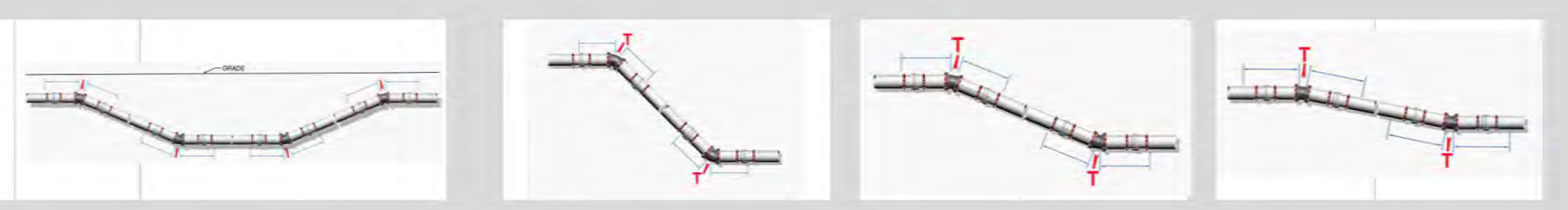


KEY	PIPE DIAMETER (INCH)	PRESSURE (PSI)	BEND ANGLE (DEGREE)	CONCRETE REQUIRED (CU YD)	STEEL STRAP SIZE	"R" STRAP RADIUS	ANCHOR BOLT DIAMETER "D" AND NUMBER REQUIRED PER STRAP	EMBEDMENT LENGTH
A	6	0-100	ALL	1.0	1/4" x 2 1/2"	3 5/8"	(2) 3/4"	24"
A-1	6	101-200	ALL	2.5	1/4" x 2 1/2"	3 5/8"	* (2) 1"	36"
B	8	0-100	ALL	2.0	3/8" x 3"	4 3/4"	* (2) 1"	36"
B-1	8	101-200	45	3.0	3/8" x 3"	4 3/4"	* (2) 1"	36"
B-2	8	101-200	90	4.0	3/8" x 3"	4 3/4"	(4) 1"	36"
C	12	0-100	ALL	4.5	1/2" x 3"	6 3/4"	(4) 1"	36"
C-1	12	101-200	45	6.0	(2) 1/2" x 3"	6 3/4"	(4) 1"	36"
C-2	12	101-200	90	8.5	(2) 1/2" x 3"	6 3/4"	(4) 1"	36"
D	16	0-100	ALL	10.0	5/8" x 4"	8 3/4"	(4) 1 1/4"	48"
D-1	16	101-200	45	11.0	(2) 5/8" x 4"	8 3/4"	(4) 1 1/4"	48"
D-2	16	101-200	90	15.0	(2) 5/8" x 4"	8 3/4"	(4) 1 1/4"	48"

- NOTES:**  
 1. ALL STEEL SHALL CONFORM TO ASTM A-36  
 2. (2) STRAPS ARE REQUIRED, EACH WITH (4)-1" DIAMETER ANCHOR BOLTS FOR CASES C-1 AND C-2  
 3. REFER TO AQUA DRAWING E-4453 FOR USE AS PIPE AND VALVE CLAMP  
 4. CONTACT ENGINEERING DEPARTMENT FOR DESIGN ON PRESSURE EXCEEDING 200 PSI OR IF PIPE SIZE IS LARGER THAN 12"  
 5. COAT ALL EXPOSED METAL WITH 12 MILS OF ROSKOTE  
 6. BOLT LENGTH WILL EQUAL "EMBEDMENT LENGTH" + SHIM + 1/2" OD OF PIPE + 3-1/2"

**VERTICAL BLOCKING TABLE**

**MINIMUM RESTRAINT LENGTH FOR VERTICAL FITTINGS**



3.5' MIN COVER / COMPACTED	1.5:1 SAFETY FACTOR / EBBA		VERTICAL 45 BEND		VERTICAL 22 1/2 BEND		VERTICAL 11 1/4 BEND	
	DIA. (INCH)	MATERIAL	100 PSI/LF RESTRAINT	200 PSI/LF RESTRAINT	100 PSI/LF RESTRAINT	200 PSI/LF RESTRAINT	100 PSI/LF RESTRAINT	200 PSI/LF RESTRAINT
2A Modify (GW)	6"	DIP	7'	14'	4'	7'	2'	4'
	6"	Poly Wrapped DIP	20'	40'	10'	19'	5'	10'
	6"	PVC	11'	22'	6'	11'	3'	6'
2A Modify (GW)	8"	DIP	9'	18'	5'	9'	3'	5'
	8"	Poly Wrapped DIP	26'	52'	13'	25'	7'	13'
	8"	PVC	14'	28'	7'	14'	4'	7'
2A Modify (GW)	12"	DIP	13'	25'	6'	12'	3'	6'
	12"	Poly Wrapped DIP	37'	73'	18'	35'	9'	18'
	12"	PVC	20'	40'	10'	20'	5'	10'
2A Modify (GW)	16"	DIP	17'	33'	8'	16'	4'	8'
	16"	Poly Wrapped DIP	47'	94'	23'	45'	12'	23'
	16"	PVC	26'	52'	13'	25'	7'	13'

- NOTES:**  
 1. IMAGES ARE DI FITTINGS WITH PVC PIPE FOR CLARITY OF THE FITTING. IMAGES INCLUDE MECHANICAL RESTRAINT SYSTEM. PREFERRED METHOD IS THE USE OF (SURE/STOP FIELD LOK) RESTRAINING GASKET AT PUSH ON JOINTS AND APPROPRIATE MEGALUG RESTRAINTS AT MECHANICAL JOINTS (M).  
 2. RESTRAINED JOINT METHOD IS INTENDED TO BE USED ON NEW PIPE ONLY (NOT RETROFITTED TO EXISTING PIPE TO REMAIN). WHERE RESTRAINT AT CONNECTIONS TO EXISTING PIPE IS REQUIRED, USE VERTICAL STRAPPING METHOD.  
 3. FOR PRESSURES OVER 200 PSI AND DEPTHS OF COVER LESS THAN 3.5 FT. PLEASE CONTACT ENGINEERING DEPARTMENT FOR REQUIRED RESTRAINED LENGTH IF NOT OTHERWISE SPECIFIED.

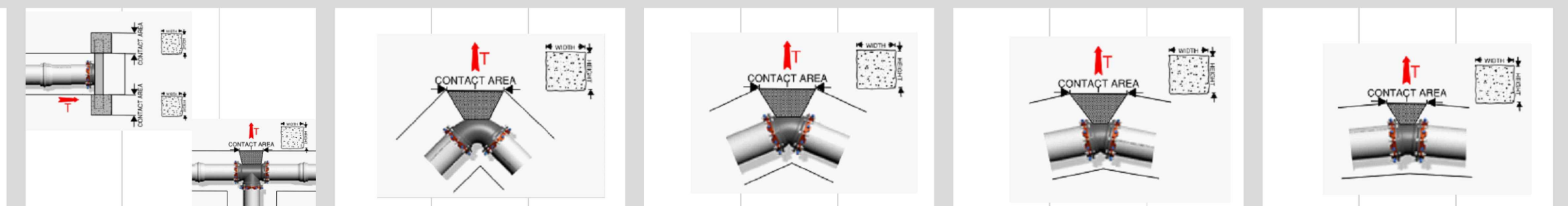
**VERTICAL RESTRAINED JOINT TABLE**

**MINIMUM THRUST BLOCK AREAS REQUIRED (SQUARE FEET (SF) OF CONTACT SURFACE AREA ALONG TRENCH WALL)**

$$bh_{tee} = \frac{s_p PA}{s_b}$$

$$bh_{bend} = \frac{s_p 2PA \sin(\theta/2)}{s_b}$$

$$A = \frac{\pi}{4} D^2$$

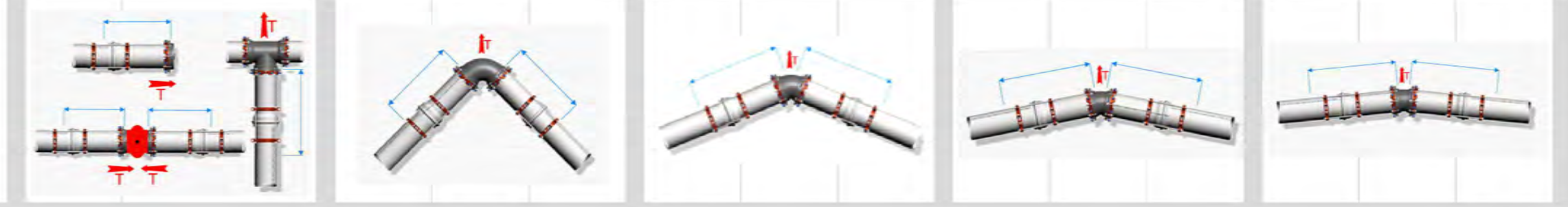


4' COVER	1.5:1 SAFETY FACTOR		DEAD-END / C&P / BO / HYD/TEE			HORIZ 90 BEND			HORIZ 45 BEND			HORIZ 22 1/2 BEND			HORIZ 11 1/4 BEND		
	DIA. (INCH)	MATERIAL	100	150	200	100	150	200	100	150	200	100	150	200	100	150	200
2A Modify/Sand (GW)	6	DIP/PVC/POLYWRAP	2	3	4	3	4	6	2	2	3	1	1	2	1	1	1
2A Modify/Sand (GW)	8	DIP/PVC/POLYWRAP	4	6	8	5	8	11	3	4	6	1	2	3	1	1	1
2A Modify/Sand (GW)	12	DIP/PVC/POLYWRAP	8	13	17	12	18	24	6	10	13	3	5	7	2	2	3
2A Modify/Sand (GW)	16	DIP/PVC/POLYWRAP	15	23	30	21	32	43	12	17	23	6	9	12	3	4	6
2A Modify/Sand (GW)	20	DIP/PVC/POLYWRAP	24	35	47	33	50	67	18	27	36	9	14	18	5	7	9
2A Modify/Sand (GW)	24	DIP/PVC/POLYWRAP	34	51	68	48	72	96	26	39	52	13	20	26	7	10	13
2A Modify/Sand (GW)	30	DIP/PVC/POLYWRAP	53	80	106	75	112	150	41	61	81	21	31	41	10	16	21

- NOTES:**  
 1. IMAGES ARE DI FITTINGS WITH PVC PIPE FOR CLARITY OF THE FITTING.  
 2. CONTACT ENGINEERING DEPARTMENT FOR PRESSURES ABOVE 200 PSI

**HORIZONTAL BLOCKING TABLE**

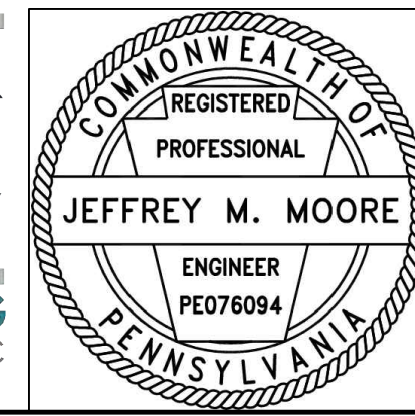
**MINIMUM RESTRAINT LENGTH FOR HORIZONTAL FITTINGS**



4' COVER / COMPACTED	1.5:1 SAFETY FACTOR / EBBA		INLINE VALVE/BLOW OFF/TEE BRANCH			HORIZ 90 BEND			HORIZ 45 BEND			HORIZ 22 1/2 BEND			HORIZ 11 1/4 BEND		
	DIA. (INCH)	MATERIAL	100 PSI/LF RESTRAIN	150 PSI/LF RESTRAIN	200 PSI/LF RESTRAIN	100 PSI/LF RESTRAIN	150 PSI/LF RESTRAIN	200 PSI/LF RESTRAIN	100 PSI/LF RESTRAIN	150 PSI/LF RESTRAIN	200 PSI/LF RESTRAIN	100 PSI/LF RESTRAIN	150 PSI/LF RESTRAIN	200 PSI/LF RESTRAIN	100 PSI/LF RESTRAIN	150 PSI/LF RESTRAIN	200 PSI/LF RESTRAIN
2A Modify (GW)	6"	DIP	15'	22'	29'	7'	10'	13'	3'	4'	6'	2'	2'	3'	1'	1'	2'
	6"	Poly Wrapped DIP	42'	63'	84'	9'	13'	17'	4'	6'	8'	2'	3'	4'	1'	2'	2'
	6"	PVC	23'	34'	46'	8'	11'	15'	3'	5'	6'	2'	3'	3'	1'	2'	2'
2A Modify (GW)	8"	DIP	19'	29'	38'	8'	12'	16'	4'	5'	7'	2'	3'	4'	1'	2'	2'
	8"	Poly Wrapped DIP	55'	82'	110'	12'	17'	23'	5'	7'	10'	3'	4'	5'	2'	2'	3'
	8"	PVC	30'	45'	60'	10'	15'	19'	4'	6'	8'	2'	3'	4'	1'	2'	2'
2A Modify (GW)	12"	DIP	27'	40'	54'	12'	17'	23'	5'	7'	10'	3'	4'	5'	2'	2'	3'
	12"	Poly Wrapped DIP	78'	117'	156'	16'	24'	31'	7'	10'	13'	4'	5'	7'	2'	3'	4'
	12"	PVC	43'	64'	85'	14'	20'	27'	6'	9'	12'	3'	4'	6'	2'	2'	3'
2A Modify (GW)	16"	DIP	35'	52'	69'	15'	22'	29'	6'	9'	12'	3'	5'	6'	2'	3'	3'
	16"	Poly Wrapped DIP	101'	151'	201'	20'	30'	40'	9'	13'	17'	4'	6'	8'	2'	3'	4'
	16"	PVC	55'	83'	110'	17'	26'	34'	8'	11'	15'	4'	6'	7'	2'	3'	4'
2A Modify (GW)	20"	DIP	42'	63'	84'	18'	26'	35'	8'	11'	15'	4'	6'	7'	2'	3'	4'
	20"	Poly Wrapped DIP	122'	183'	244'	24'	36'	48'	10'	15'	20'	5'	8'	10'	3'	4'	5'
	20"	PVC	67'	101'	134'	21'	31'	41'	9'	13'	17'	5'	7'	9'	3'	4'	5'
2A Modify (GW)	24"	DIP	50'	74'	99'	21'	31'	41'	9'	13'	17'	4'	6'	8'	2'	3'	4'
	24"	Poly Wrapped DIP	144'	215'	287'	28'	42'	55'	12'	18'	23'	6'	9'	11'	3'	5'	6'
	24"	PVC	79'	118'	157'	24'	36'	48'	10'	15'	20'	5'	8'	10'	3'	4'	5'
2A Modify (GW)	30"	DIP	60'	89'	119'	24'	36'	48'	10'	15'	20'	5'	8'	10'	3'	4'	5'
	30"	Poly Wrapped DIP	173'	260'	346'	33'	49'	65'	14'	21'	27'	7'	10'	13'	4'	5'	7'
	30"	PVC	95'	142'	189'	29'	43'	57'	12'	18'	24'	6'	9'	12'	3'	5'	6'

- NOTES:**  
 1. IMAGES ARE DI FITTINGS WITH PVC PIPE FOR CLARITY OF THE FITTING. IMAGES INCLUDE MECHANICAL RESTRAINT SYSTEM. PREFERRED METHOD IS THE USE OF (SURE/STOP FIELD LOK) RESTRAINING GASKET AT PUSH ON JOINTS AND APPROPRIATE MEGALUG RESTRAINTS AT MECHANICAL JOINTS (M).  
 2. RESTRAINED JOINT METHOD IS INTENDED TO BE USED ON NEW PIPE ONLY (NOT RETROFITTED TO EXISTING PIPE TO REMAIN). WHERE RESTRAINT AT CONNECTIONS TO EXISTING PIPE IS REQUIRED, USE BLOCKING METHOD.  
 3. FOR PRESSURES OVER 200 PSI AND DEPTHS OF COVER LESS THAN 4 FT. PLEASE CONTACT ENGINEERING DEPARTMENT FOR REQUIRED RESTRAINED LENGTH IF NOT OTHERWISE SPECIFIED.

**HORIZONTAL RESTRAINED JOINT TABLE**



AQUA PENNSYLVANIA, INCORPORATED  
 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010

**PROJECT PLAN FOR:  
 LLOYD AVENUE PHASE I PROJECT  
 BLOCKING & RESTRAINED JOINT TABLES  
 CALN TWP & W BRADFORD TWP, CHESTER COUNTY**

DRAWN BY: CR    CHK'D BY: JMM/AC    EXT No: 20131-G  
 DATE: 11/08/2021    SCALE: N.T.S.    PLATE: PP25,PP26,0026  
 PROJECT No: 217.23    ACTIVITY No: 100000623  
 APPROVED: *Jeffrey M. Moore*

**A - 67657**  
 SHEET 13 OF 15

CM# 26156    WO# 10000623



SEEDING NOTE:

1. LIME - AGRICULTURAL GRADE LIMESTONE:

Table with 3 columns: Lime, 4 tons per acre, 190 lbs. per 1000 s.f.

2. FERTILIZER - COMMERCIAL TYPE: 10-20-20

THE NEED FOR FERTILIZER CAN NOT BE UNDERESTIMATED. FERTILIZER WILL GREATLY INCREASE THE GROWTH OF BOTH THE PLANT AND ITS ROOTS...

Table with 3 columns: Fertilizer, 930 lbs. per acre, 25 lbs. per 1000 s.f.

3. MULCH - HAY OR STRAW

ALL AREAS WHICH ARE SEEDING WITH EITHER TEMPORARY OR PERMANENT SEED MIXTURES SHOULD BE MULCHED. MULCH IS A LOOSE 3/4" TO 1" DEEP OF HAY OR STRAW...

Table with 3 columns: Mulch, 3 tons per acre, 1400 lbs. per 1000 s.f.

4. SEEDING PREPARATION AND SEEDING METHODS:

PRIOR TO SEEDING, APPLY THE RECOMMENDED AMOUNT OF LIMESTONES AND WORK AS DEEPLY AS POSSIBLE INTO THE SOIL. AT SEEDING TIME WORK RECOMMENDED FERTILIZER AS DEEP AS POSSIBLE INTO THE SOIL...

Table with 3 columns: Lime, 1 ton per acre, 50 lbs. per 1000 s.f.; Fertilizer, 150 lbs. per acre, 5 lbs. per 1000 s.f.

THEN APPLY THE REMAINDER OF THE RECOMMENDED RATES DURING THE FINAL SEEDING PROCESS.

5. TEMPORARY SEED MIXTURE:

ANNUAL RYEGRASS IS A QUICK GERMINATING SPECIES OF GRASS WHICH CAN BE SEEDING AT ALMOST ANYTIME. IF YOU PLAN TO LEAVE YOUR PROJECT DISTURBED AND TEMPORARILY INACTIVE...

Table with 3 columns: Annual Ryegrass, 40 lbs. per acre, 1 lbs. per 1000 s.f.

6. PERMANENT SEED MIXTURES:

ESTABLISHING A PERMANENT VEGETATIVE COVER IS THE FINAL STEP TO EFFECTIVE EROSION AND SEDIMENT POLLUTION CONTROL. IT IS RECOMMENDED THAT THE PENN STATE AGRONOMY GUIDE BE CONSULTED...

Table with 3 columns: Kentucky Bluegrass, 30 lbs. per acre, 12 oz. per 1000 s.f.; Redtop, 3 lbs. per acre, 2 oz. per 1000 s.f.; Perennial Ryegrass, 20 lbs. per acre, 8 oz. per 1000 s.f.

Table with 3 columns: Pennlawn-Fine Fescue, 40 lbs. per acre, 16 oz. per 1000 s.f.; Redtop, 3 lbs. per acre, 2 oz. per 1000 s.f.; Perennial Ryegrass, 20 lbs. per acre, 8 oz. per 1000 s.f.

Table with 3 columns: Crownvetch, 25 lbs. per acre, 10 oz. per 1000 s.f.; Perennial Ryegrass, 25 lbs. per acre, 10 oz. per 1000 s.f.

\* - ALL MIXTURES GIVEN ABOUT ARE FOR PLS-PURE LIVE SEED 100% TO CALCULATE PLS, THE PERCENTAGE OF PURE SEED IS MULTIPLIED BY THE PERCENTAGE OF GERMINATION...

\*\* - CROWNVETCH IS A LEGUME AND WILL REQUIRE AN INOCULANT. PLEASE CONTACT YOUR SEED SUPPLIER FOR SPECIFIC DIRECTIONS ON APPLYING THE REQUIRED INOCULANT.

7. TIME OF SEEDING (PERMANENT):

FOR BEST RESULTS, GRASS AND LEGUME SEEDINGS SHOULD BE MADE IN THE SPRING. HOWEVER, WITH PROPER ESTABLISHMENT TECHNIQUES, DISTURBED SITES CAN BE SEEDING ALMOST ANYTIME FROM SPRING TO FALL.

A GENERAL RULE IS AS FOLLOWS: (1) LEGUME SEEDINGS NEED A GROWING PERIOD OF AT LEAST 10 TO 12 WEEKS PRIOR TO HARD FROSTS, (2) GRASSES GENERALLY REQUIRE AT LEAST 4 TO 6 WEEKS OF GROWTH PRIOR TO HARD FROSTS.

TRENCH EXCAVATION SIZING:

THE EXCAVATION AND BACK-FILL WORK SHALL CONFORM TO THE AWWA STANDARD C-600 FOR THE INSTALLATION OF DUCTILE IRON WATER MAINS AND THEIR APPURTENANCES...

ALL FEDERAL, STATE AND MUNICIPAL, INCLUDING OSHA REGULATIONS GOVERNING WORK OF THIS NATURE SHALL BE COMPLIED WITH BY THE CONTRACTOR.

DIMENSIONS FOR EXCAVATION WILL BE ACCORDING TO THE DEPTH AND WIDTH SPECIFIED FOR THE PIPE SIZE. THE DEPTH OF THE TRENCH WILL BE SUCH SO THE PROPOSED MAIN HAS THE DEPTH OF COVER OF (4.00) FOUR FEET, OR AS SHOWN ON THE DRAWINGS.

EXCEPT AT LOCATIONS WHERE ROCK OR UNSUITABLE MATERIAL IS ENCOUNTERED, EXTRA CARE SHOULD BE TAKEN NOT TO EXCEED THE DEPTH SPECIFIED. IF THE EXCAVATION DOES EXCEED THE PROPOSED DEPTH, THE BOTTOM OF THE TRENCH SHOULD BE BACK-FILLED IN SIX-INCH LIFTS...

SUB-GRADE MATERIAL MUST BE SUITABLE.

THE FOLLOWING ARE THE REQUIRED TRENCH SIZES FOR THE RESPECTIVE PIPE DIAMETERS: UP TO AND INCLUDING:

Table with 4 columns: Pipe Size, Trench Width, Pipe Size, Trench Width. Rows include 6" pipe, 8" pipe, 12" pipe, 16" pipe.

IN AREAS OF EXISTING ROADWAY, THE EXCAVATION SHALL BE COMPLETELY CLOSED AT THE END OF EACH WORK DAY. THE CONTRACTOR SHALL PROVIDE TEMPORARY RESTORATION OF ROADWAY IMMEDIATELY UPON BACK-FILLING THE TRENCH.

GENERAL NOTES:

- 1. AREA TO BE DISTURBED SHOULD BE KEPT TO THE IMMEDIATE AREA OF WORK. ALL DISTURBANCE SHOULD BE COMPLETED WITHIN ONE DAY.
2. NO TRACK EQUIPMENT SHOULD OPERATE IN THE CREEK BED. IF POSSIBLE, ALL WORK WITH MACHINERY SHOULD BE DONE FROM EITHER SIDE OF THE BANK.
3. SILT FENCE OR STRAW BALE DYKES SHOULD BE PLACED AROUND THE DISTURBED AREA.
4. ALL AREAS SHOULD BE MULCHED AND PERMANENTLY SEEDING IMMEDIATELY AFTER EARTH MOVING IS COMPLETED...

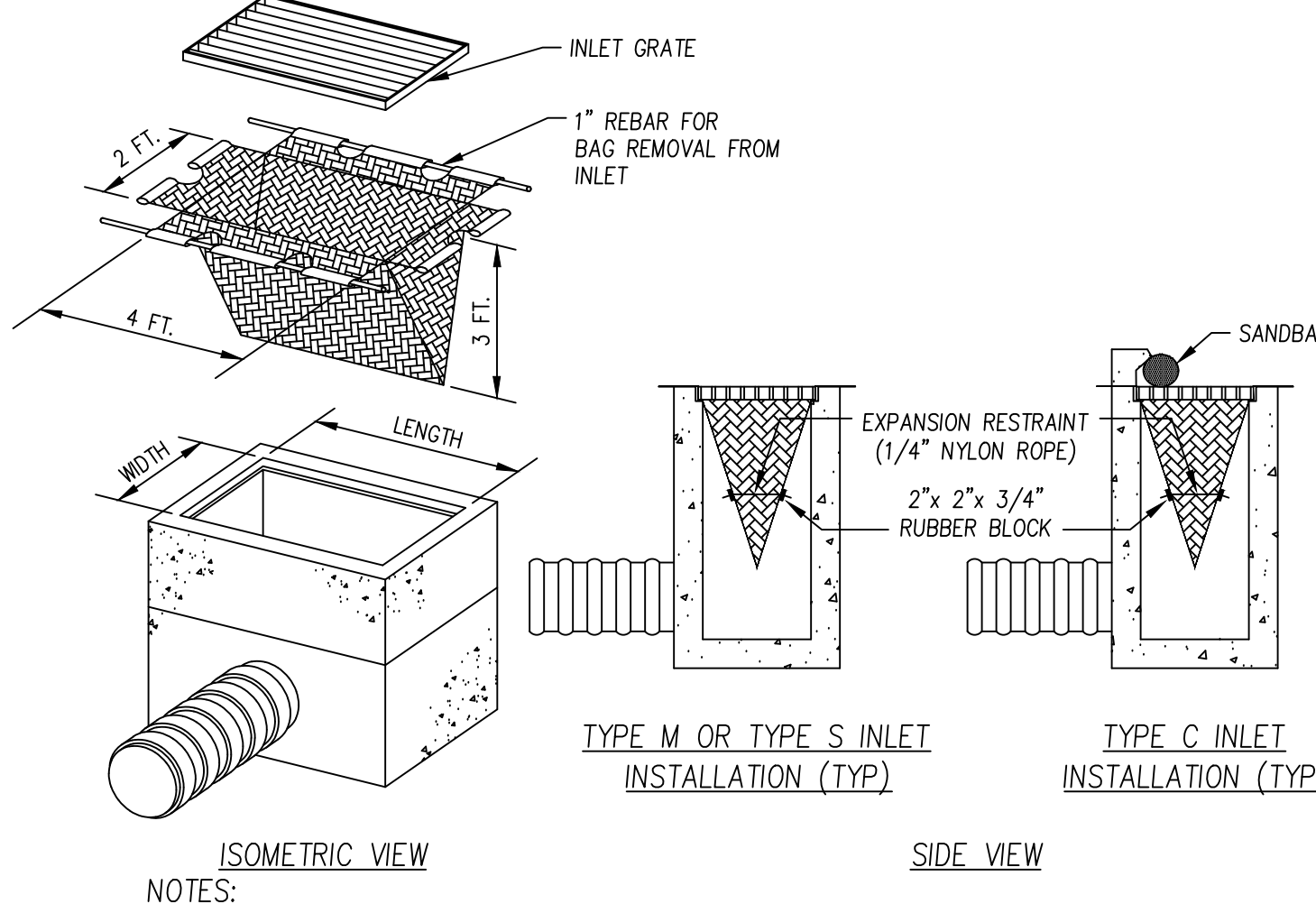
EROSION & SEDIMENT CONTROL PLAN STANDARD NOTES:

- 1. STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET. STOCKPILE SLOPES MUST NOT EXCEED 2:1 THE OPERATOR/RESPONSIBLE PERSON (O/RP) ON SITE SHALL ENSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY AND COMPLETELY IMPLEMENTED.
2. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE O/RP SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO ELIMINATE THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION.
3. THE O/RP SHALL ASSURE THAT AN EROSION AND SEDIMENT CONTROL PLAN HAS BEEN PREPARED, APPROVED BY THE CHESTER COUNTY CONSERVATION DISTRICT, AND IS BEING IMPLEMENTED AND MAINTAINED FOR ALL SOIL AND/OR ROCK SPOIL AND BORROW AREAS...

(TR) - SEQUENCE OF CONSTRUCTION FOR TRENCH EXCAVATION:

EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE FOLLOWING SEQUENCE. EACH STAGE SHALL BE COMPLETED BEFORE ANY FOLLOWING STAGE IS INITIATED.

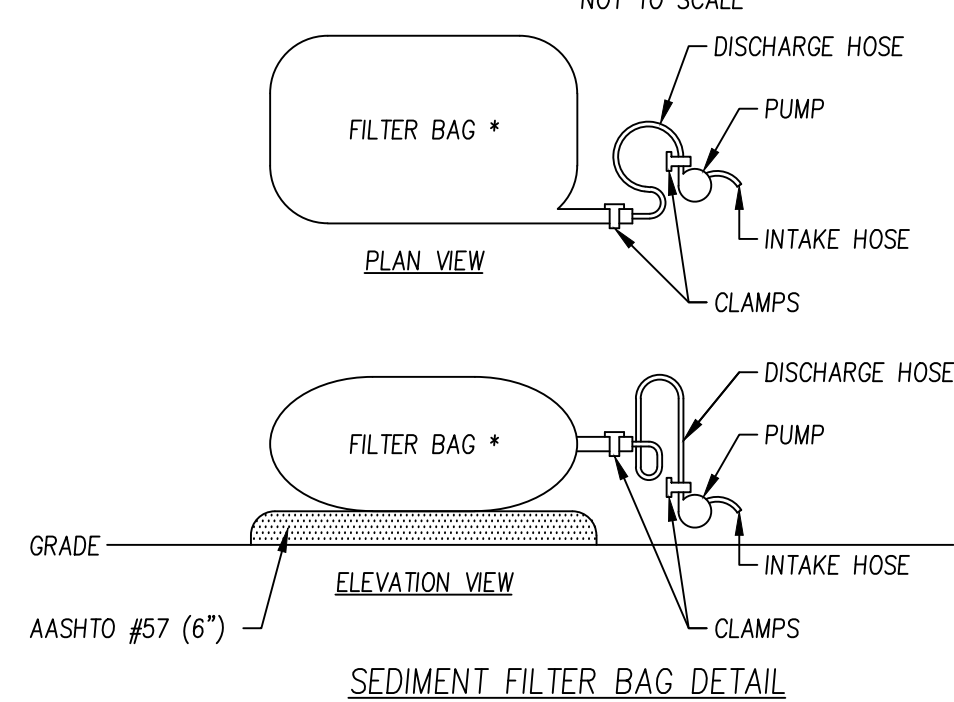
- 1. THE CHESTER COUNTY CONSERVATION DISTRICT SHALL BE NOTIFIED 72 HOURS PRIOR TO THE START OF CONSTRUCTION BY THE CONTRACTOR.
2. INSTALL INLET PROTECTION IN ALL INLETS PRIOR TO ANY EARTH DISTURBANCE.
3. PREPARATORY EARTHWORK OPERATIONS.
4. EXCAVATOR MOBILIZATION AND SET-UP.
5. ALL EXCAVATED MATERIALS SHALL BE REMOVED VIA DUMP TRUCK (NO STOCKPILING OF ANY EXCAVATED MATERIALS).



INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED...

DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS. IN LIEU OF INLET FILTER BAGS, REMOVE INCIDENTAL SEDIMENT FROM THE ROADWAY AT THE END OF EACH WORKDAY.

FILTER BAG INLET PROTECTION-TYPE M, S AND C INLETS



SEDIMENT FILTER BAG NOTES:

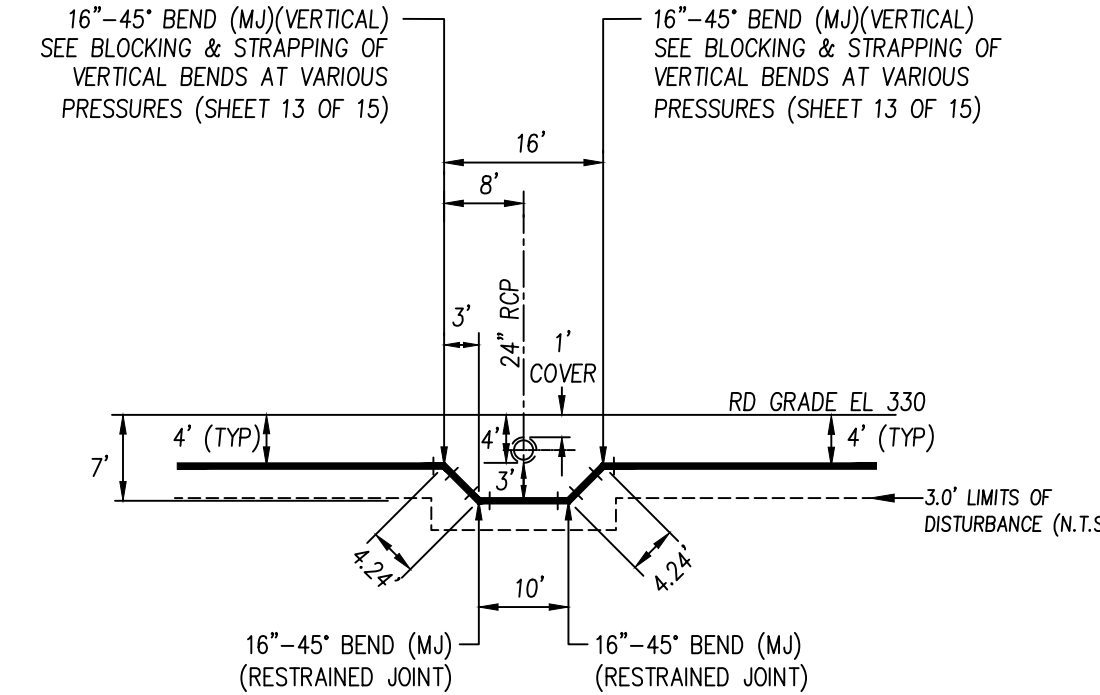
- 1. FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
2. A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED.
3. BAGS SHALL BE PLACED ON A BED OF CLEAN STONE LOCATED IN EXISTING ROAD SURFACE OR, WELL-VEGETATED (GRASSY) AREA, AND DISCHARGED INTO STABLE, EROSION RESISTANT AREAS...

(TU) - SEQUENCE OF CONSTRUCTION FOR TUNNELING:

EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE FOLLOWING SEQUENCE. EACH STAGE SHALL BE COMPLETED BEFORE ANY FOLLOWING STAGE IS INITIATED.

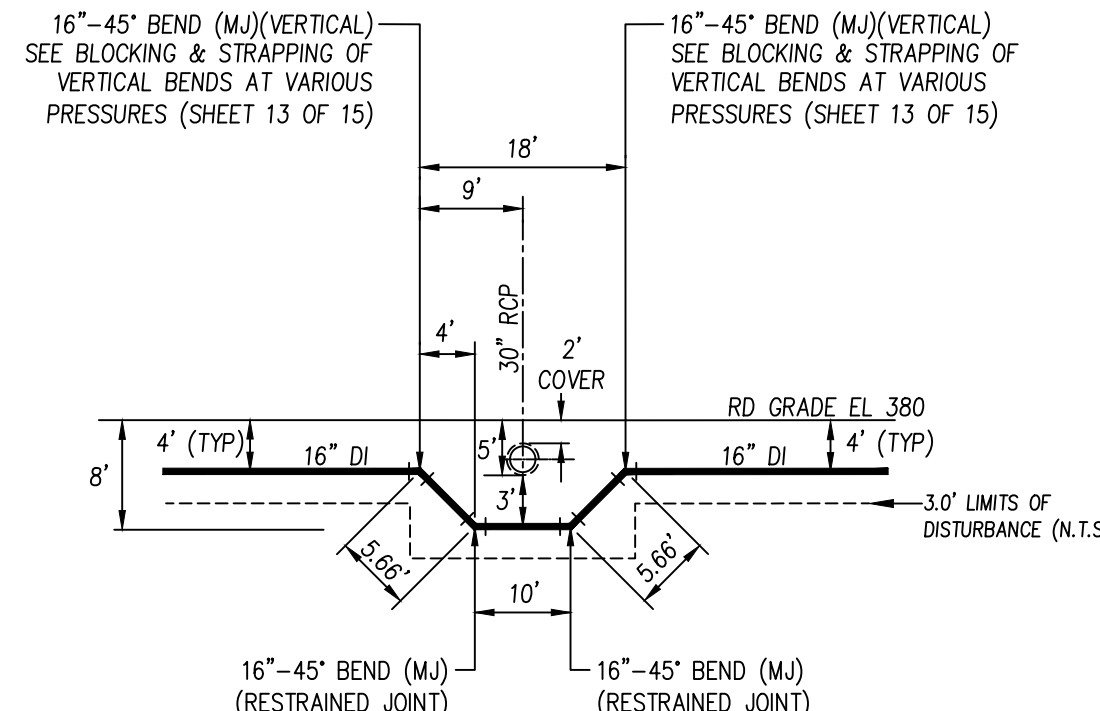
- 1. THE MONTGOMERY COUNTY CONSERVATION DISTRICT SHALL BE NOTIFIED 72 HOURS PRIOR TO THE START OF CONSTRUCTION BY THE CONTRACTOR.
2. INSTALL INLET PROTECTION IN ALL INLETS PRIOR TO ANY EARTH DISTURBANCE.
3. PREPARATORY EARTHWORK OPERATIONS.
4. EXCAVATOR MOBILIZATION AND SET-UP.
5. EXCAVATE FOR WATER PIPE INSTALLATION. IF GROUNDWATER SEEPAGE INTO WATER MAIN TRENCH OCCURS, PUMP WATER INTO SEDIMENT FILTER BAG. (ALL SATURATED SOILS TO BE REMOVED SHALL BE HAULED IN A WATER TIGHT CONTAINER/DUMP TRUCK.)

DETAIL B (SHEET 8 OF 15)



PROFILE/TUNNEL POORHOUSE RD (N.T.S.)

DETAIL C (SHEET 6 OF 15)

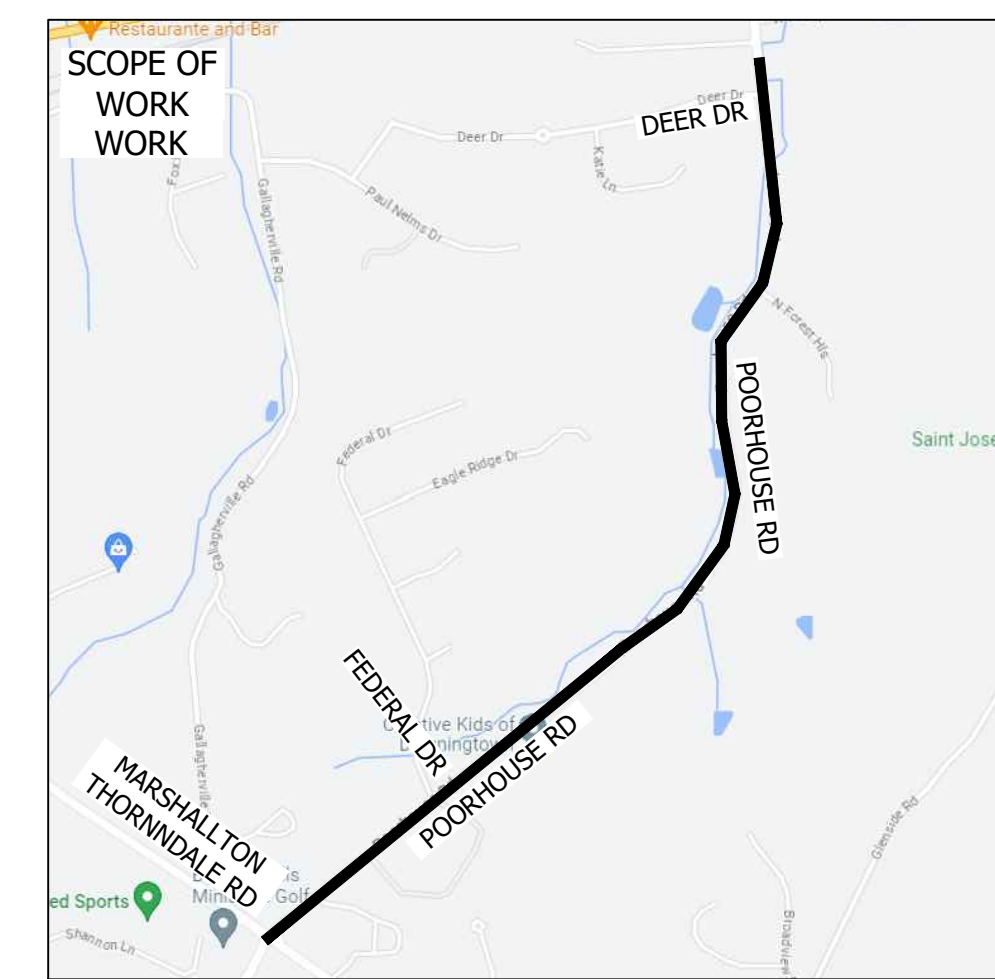
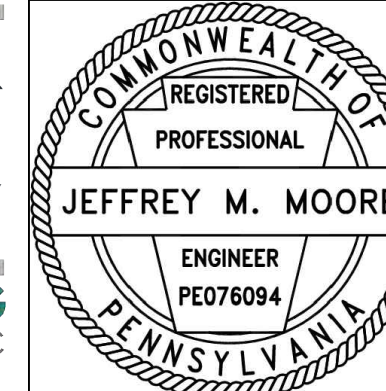


PROFILE/TUNNEL POORHOUSE RD (N.T.S.)

SOIL TYPE: GIB - GLENVILLE SILT LOAM, 3 TO 8 % SLOPES; Ho - HATBORO SILT LOAM; MoC - MANOR LOAM, 8 TO 15 % SLOPES; CWF - (COLD WATER FISHES); MaE - MANOR LOAM, 25 TO 35 % SLOPES; GgB - GLENELG SILT LOAM, 3 TO 8 % SLOPES

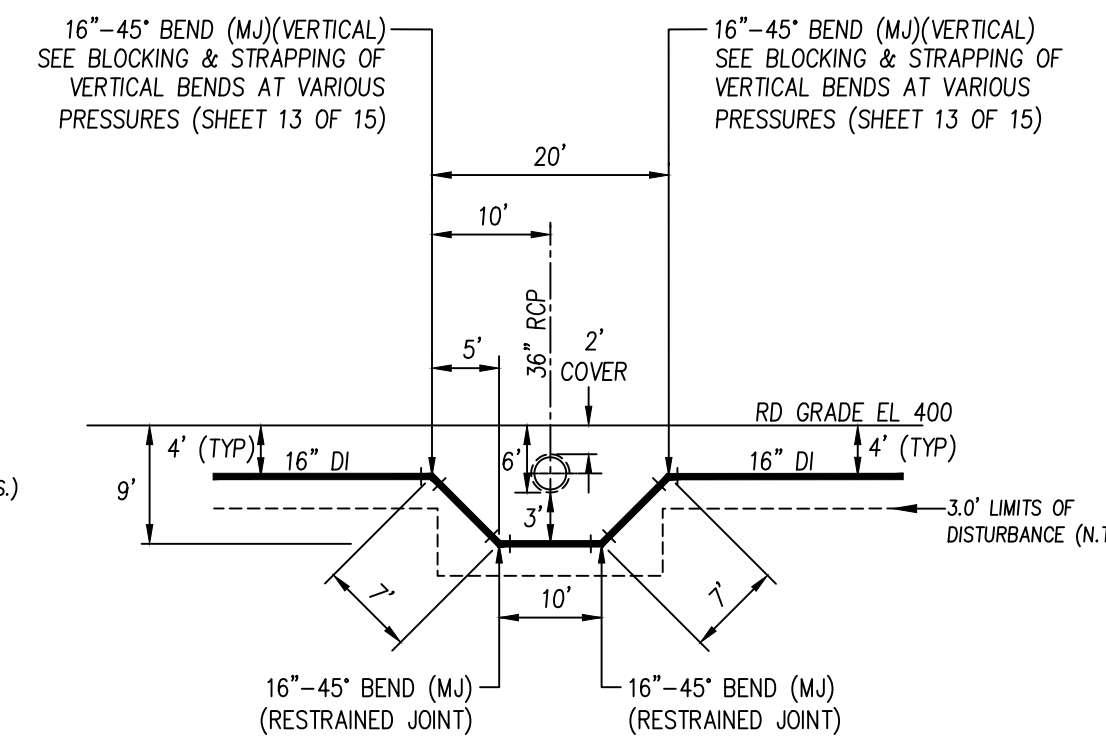
CHAPTER 93 DESIGNATION:

Table with 4 columns: Date, Designation, Description, Plate. Rows include 07/05/2023 ISSUED FOR CONSTRUCTION PG, 07/03/2023 DESIGN COMPLETION PG.



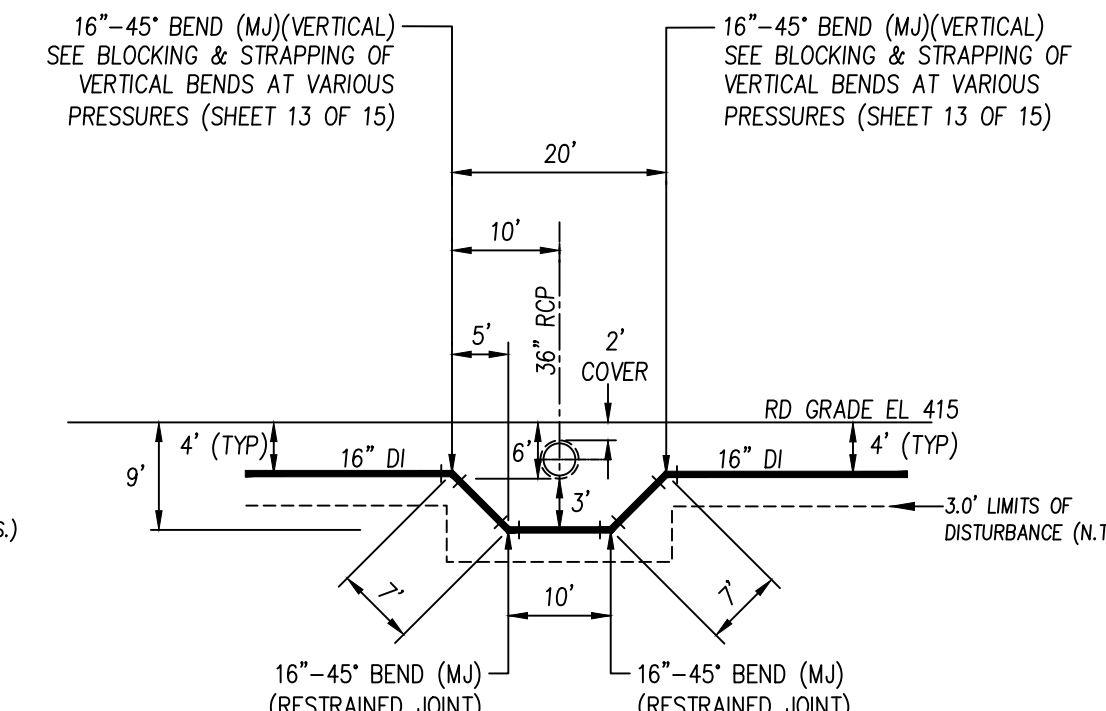
LOCATION PLAN N.T.S.

DETAIL D (SHEET 5 OF 15)



PROFILE/TUNNEL POORHOUSE RD (N.T.S.)

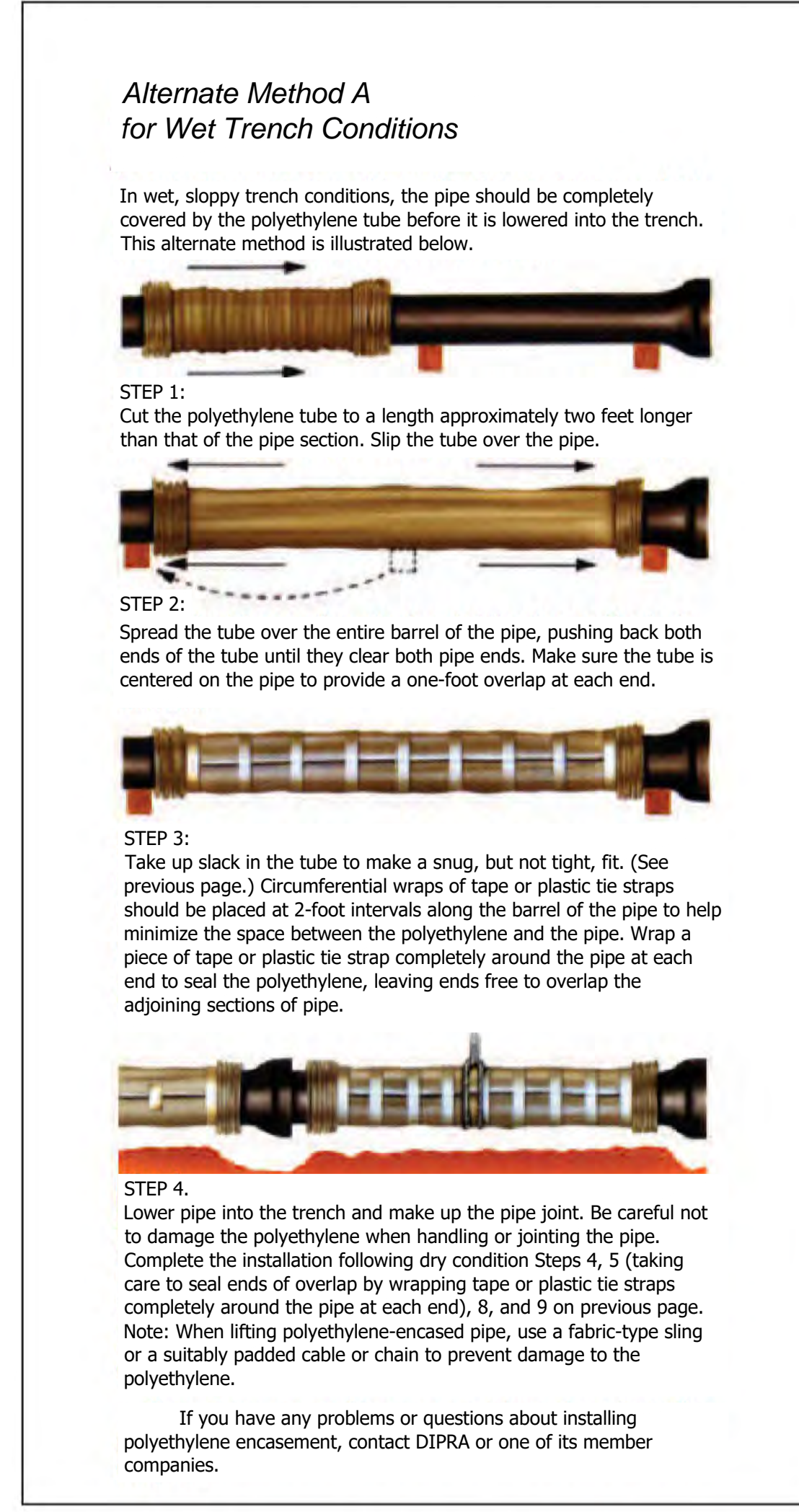
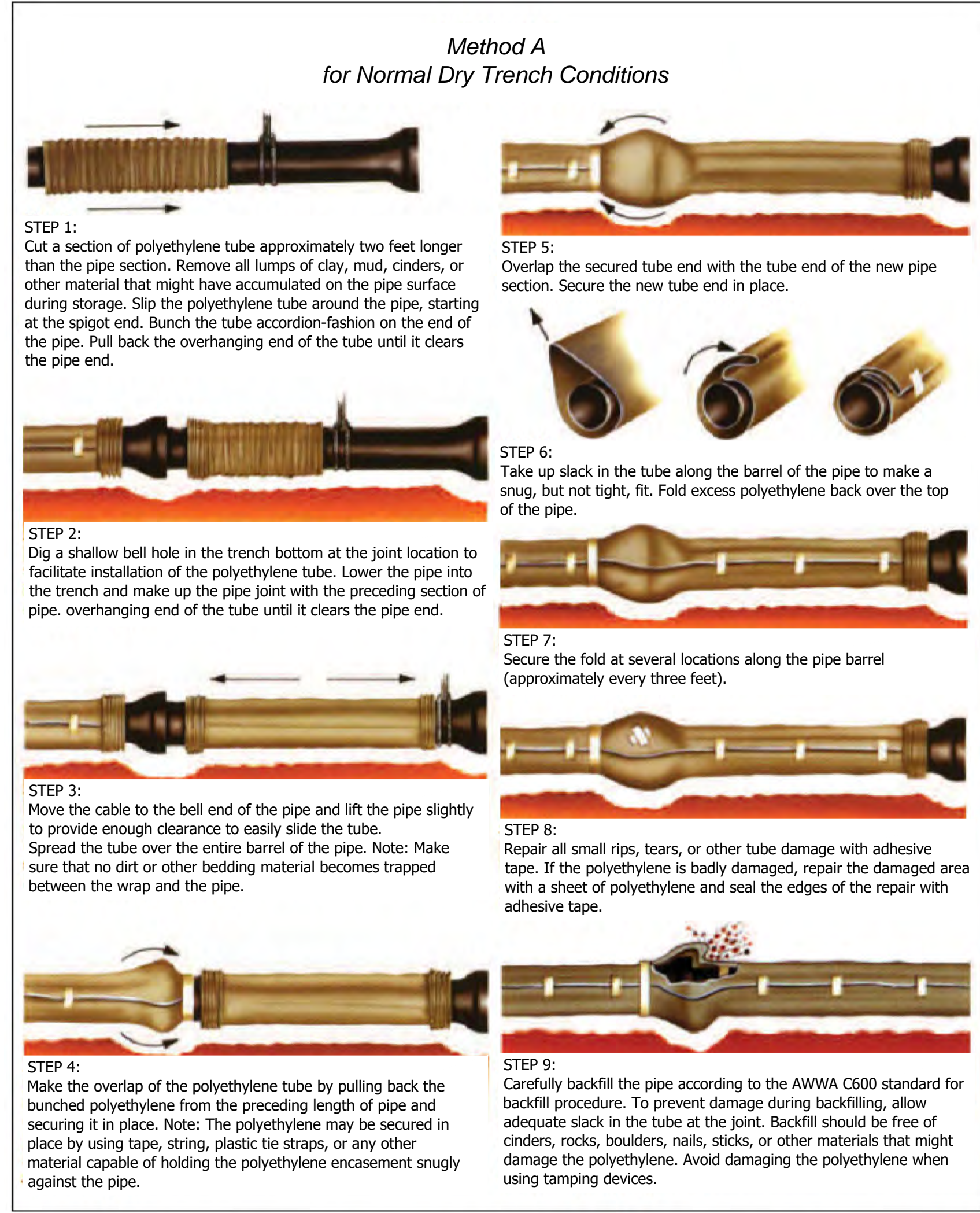
DETAIL E (SHEET 5 OF 15)



PROFILE/TUNNEL POORHOUSE RD (N.T.S.)

Table with 4 columns: Drawn By, Date, Project No, Approved. Includes project details for AQUA PENNSYLVANIA, INCORPORATED, PROJECT PLAN FOR: LLOYD AVENUE PHASE I, EROSION & SEDIMENT CONTROL DETAILS FOR: CALN TWP & W BRADFORD TWP, CHESTER COUNTY. Includes sheet number 14 of 15.





**REPAIRS:** REPAIR CUTS, TEARS, PUNCTURES, OR DAMAGE TO POLYETHYLENE WITH ADHESIVE TAPE OR WITH A SHORT LENGTH OF POLYETHYLENE SHEET, OR WITH A TUBE CUT OPEN, WRAPPED AROUND THE PIPE TO COVER THE DAMAGED AREA, AND SECURE IN PLACE.

**Appurtenances**

**Pipe-shaped appurtenances**  
Cover bends, reducers, offsets, and other pipe-shaped appurtenances in the same manner as the pipe.

**Odd-shaped appurtenances**  
Wrap odd-shaped appurtenances such as valves, tees, and crosses with a flat sheet or split length of polyethylene tube by passing the sheet under and then over the appurtenance and bringing it together around the body of the appurtenance. Make seams by bringing the edges of the polyethylene together, folding over twice, and taping them down.

**Joints**  
Overlap joints as in normal installation; then tape the polyethylene securely in place at valve stems and other penetrations. When bolted-type joints are used, care should always be taken to prevent bolts or other sharp edges of the joint configuration from penetrating the wrap.

**Branches, blowoffs, air valves**  
To provide openings for branches, blow-offs, air valves, and similar appurtenances, make an X-shaped cut in the polyethylene and temporarily fold back the film. After installing the appurtenance, tape the slack securely to the appurtenance and repair the cut and any other damaged areas in the polyethylene with tape.

**Service Taps**  
The preferred method of tapping polyethylene-encased Ductile Iron pipe involves wrapping two or three layers of polyethylene adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted. Then install the corporation stop directly through the tape and polyethylene. After the tap is made inspect the entire circumferential area for damage and make any necessary repairs.

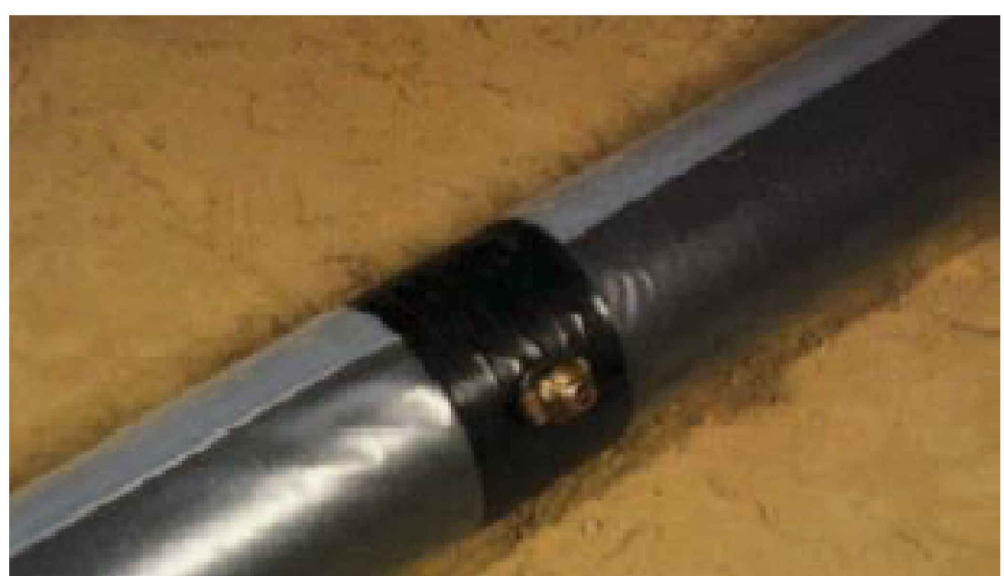
**Tapping Method**



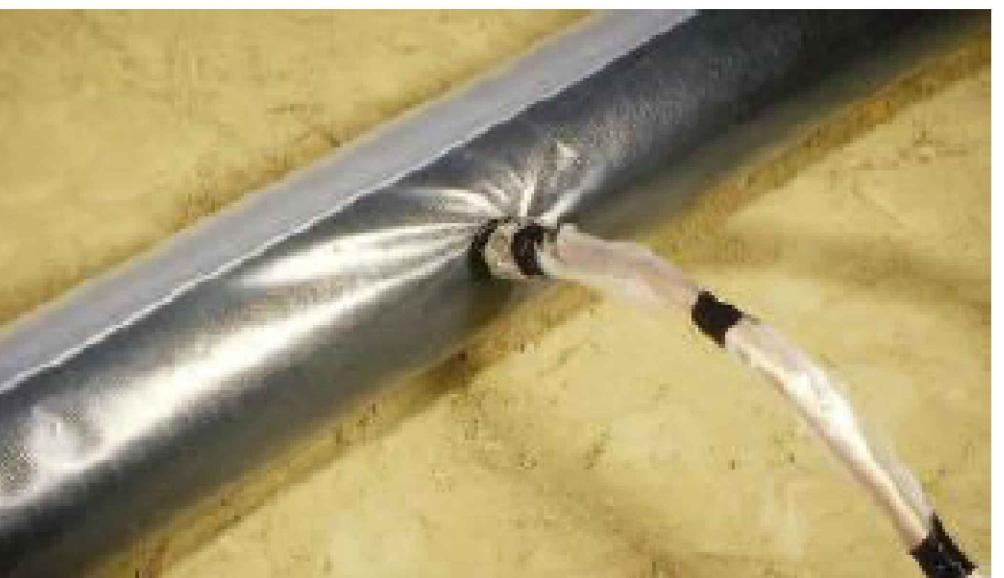
To perform the preferred method of tapping poly ethylene-encased Ductile Iron pipe, wrap two or three layers of poly ethylene adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted.



Mount the tapping machine on the pipe area covered by the poly ethylene tape. Then make the tap and install the corporation stop directly through the tape and polyethylene.



After making the direct service connection, inspect the entire circumferential area for damage and make any necessary repairs.



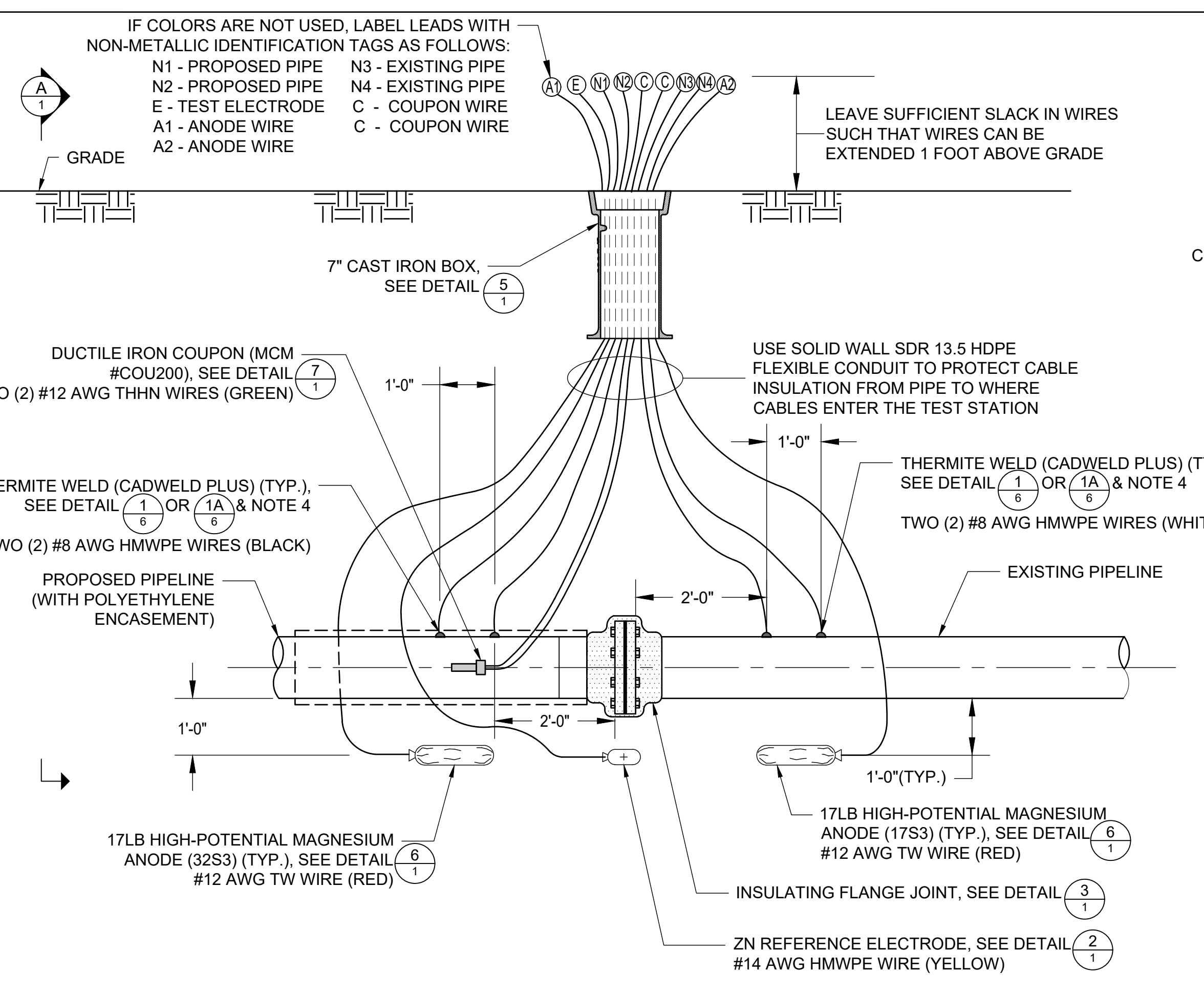
**House Services:**

- To minimize the possibility of dissimilar metal corrosion at service connections, wrap the corporation stop and a minimum clear distance of three feet of the copper service with polyethylene or a suitable dielectric tape.

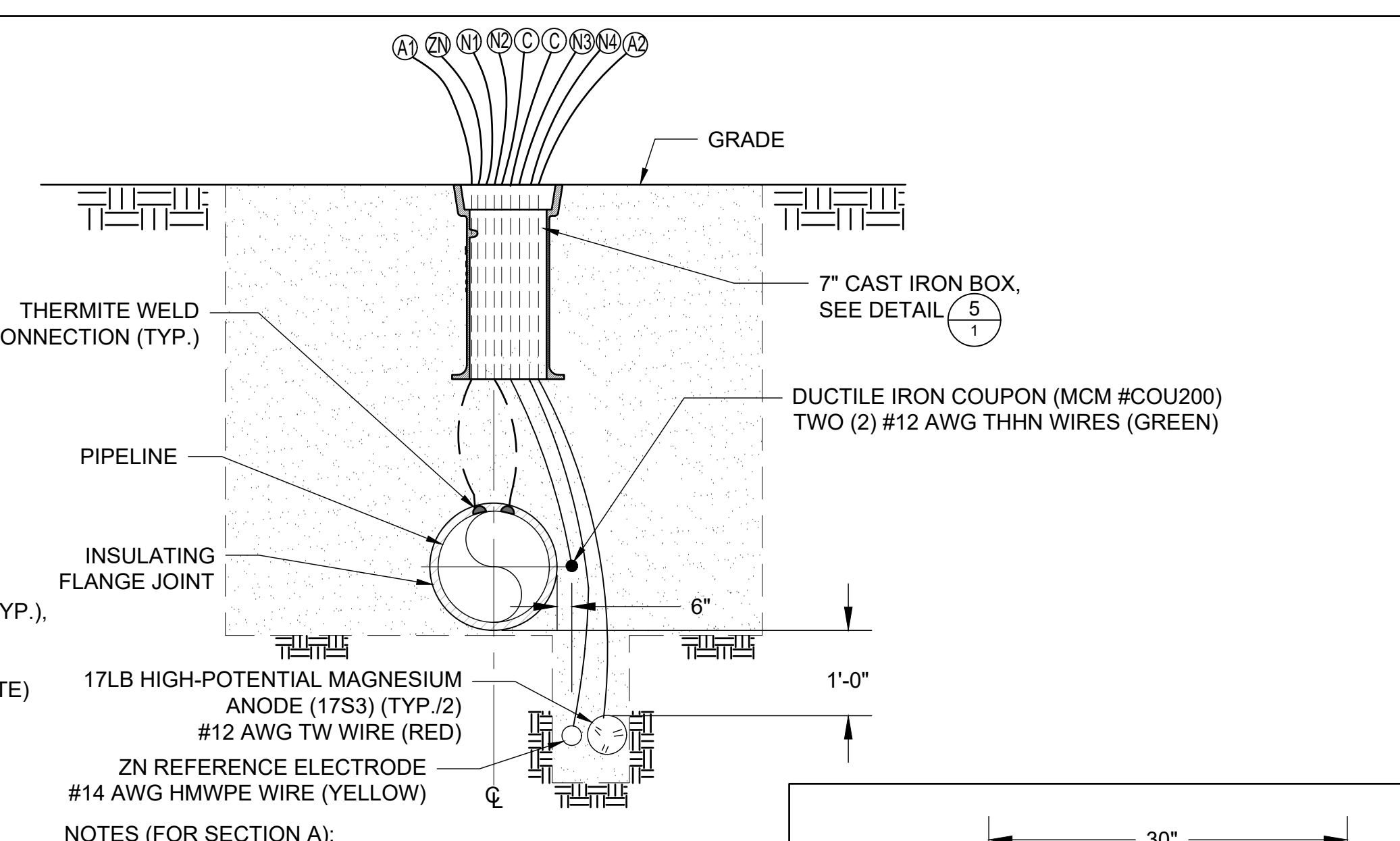
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0	07/03/2023	DESIGN COMPLETION	PG
NO	DATE	REVISION	INTL
AQUA PENNSYLVANIA, INCORPORATED 762 LANCASTER AVENUE, BRYN MAWR, PA., 19010			
PROJECT PLAN FOR: <b>LLOYD AVENUE PHASE I PROJECT</b> POLYETHYLENE ENCASEMENT DETAILS CALN TWP & W BRADFORD TWP, CHESTER COUNTY			
DRAWN BY:	CR	CHK'D BY:	JMM/AC
DATE:	11/08/2021	SCALE:	N.T.S.
PROJECT No:	217.23	ACTIVITY No:	100000623
APPROVED			<b>A - 67657</b>
			SHEET 15 OF 15



FILE: (CORRPRO) C:\USERS\PAUL\ONEBERG - AEGION\MAINTENANCE\2021\_08\_FOLDERS\VALVEBOX - AQUA PA - 2021\_2021 SERVICES CONTRACT - BRN MAR. PA15 - CAD DRAWINGS\STANDARD DETAILS\AQUA\_U40-D220334-C-01(140403595\_07\_DETAILS\_01420302)P2P.DWG [1]

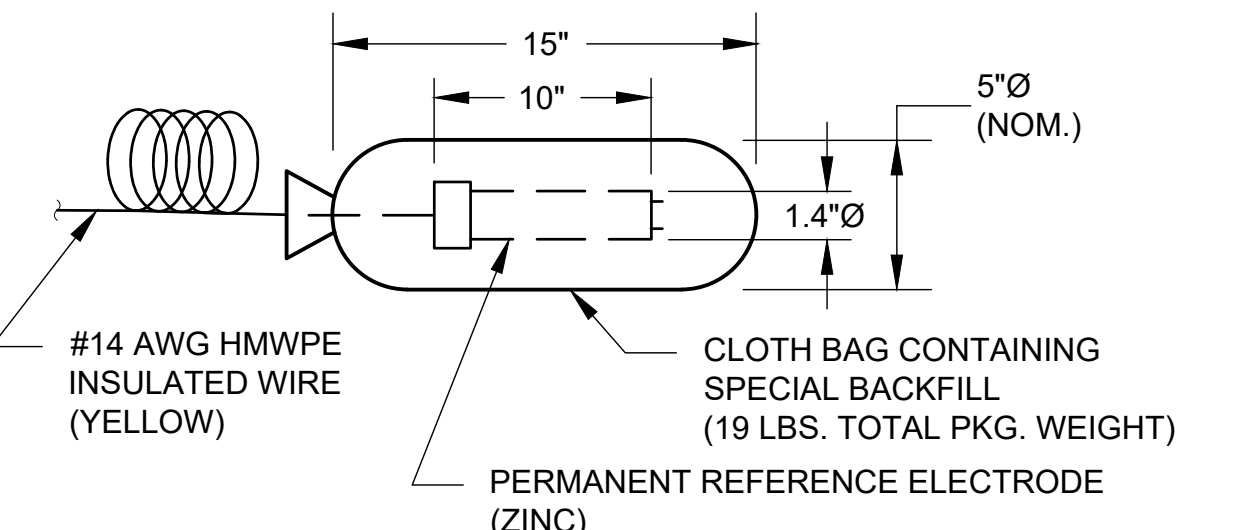


**1** INSULATING FLANGE JOINT TEST STATION WITH MAG. ANODES, COUPON & ELECTRODE - TYPICAL  
SCALE: N.T.S.

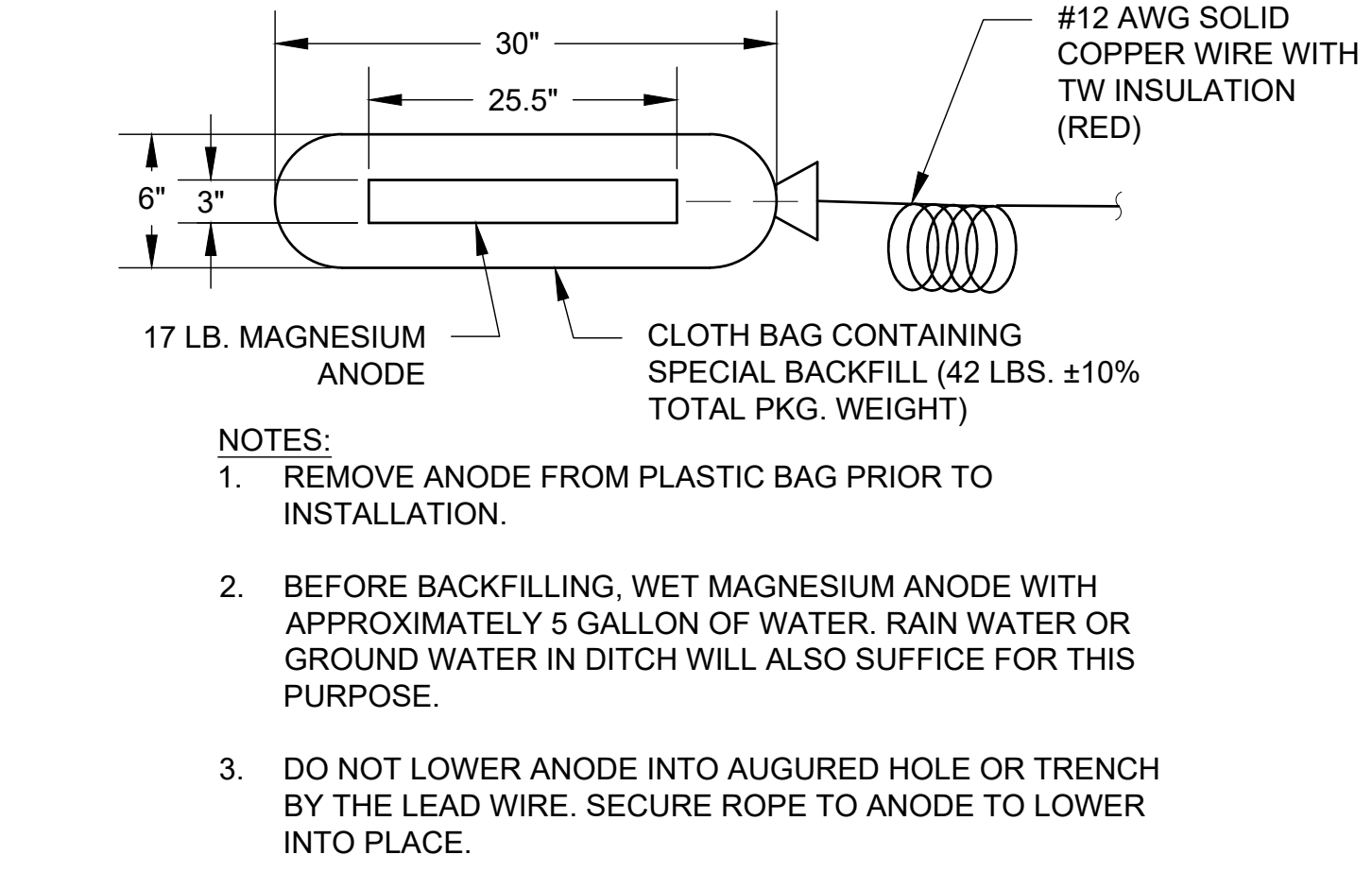


**SECTION A-A**  
NOTES:  
1. ONLY TWO(2) TEST WIRES SHOWN FOR CLARITY.  
2. ANODES, COUPON & ELECTRODE SHALL NOT COME IN CONTACT WITH SAND BACKFILL  
3. LABEL ALL WIRES AS SHOWN IN DETAIL (IF COLORED WIRE NOT USED).  
4. PIPING CONFIGURATION SHOWN IS TYPICAL.  
5. IJ SHOULD BE COVERED BY DENSO TAPE PER DETAIL 4 ON THIS SHEET.  
6. THERMITE WELDS SHOULD BE COATED IN BITUMASTIC.  
7. COATING INSULATING FLANGE PER DETAIL 4  
8. PIPING BONDING PER DETAIL 2, 3 OR 5

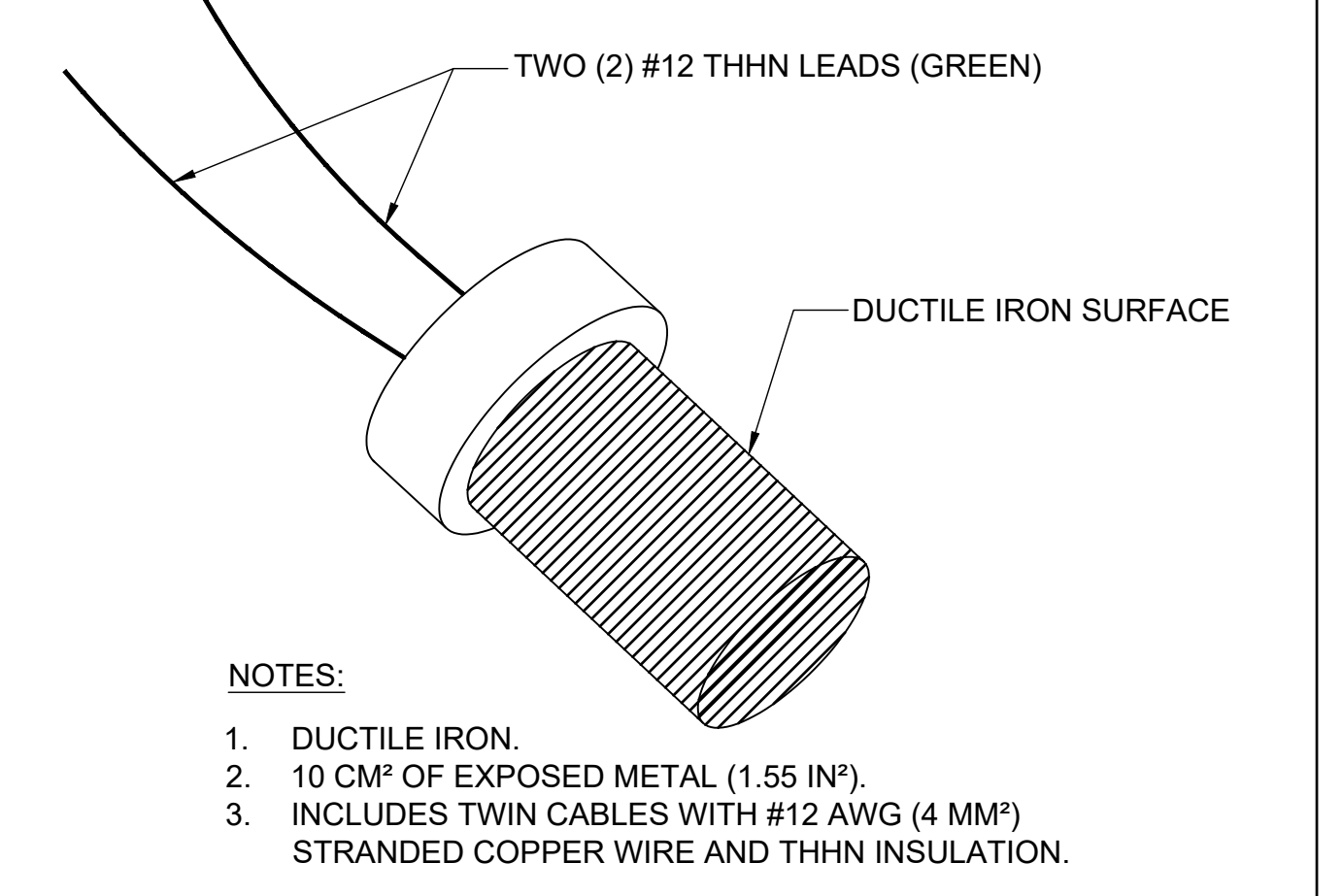
**2** ZINC REFERENCE ELECTRODE (FACTORY MANUFACTURED)  
SCALE: N.T.S.



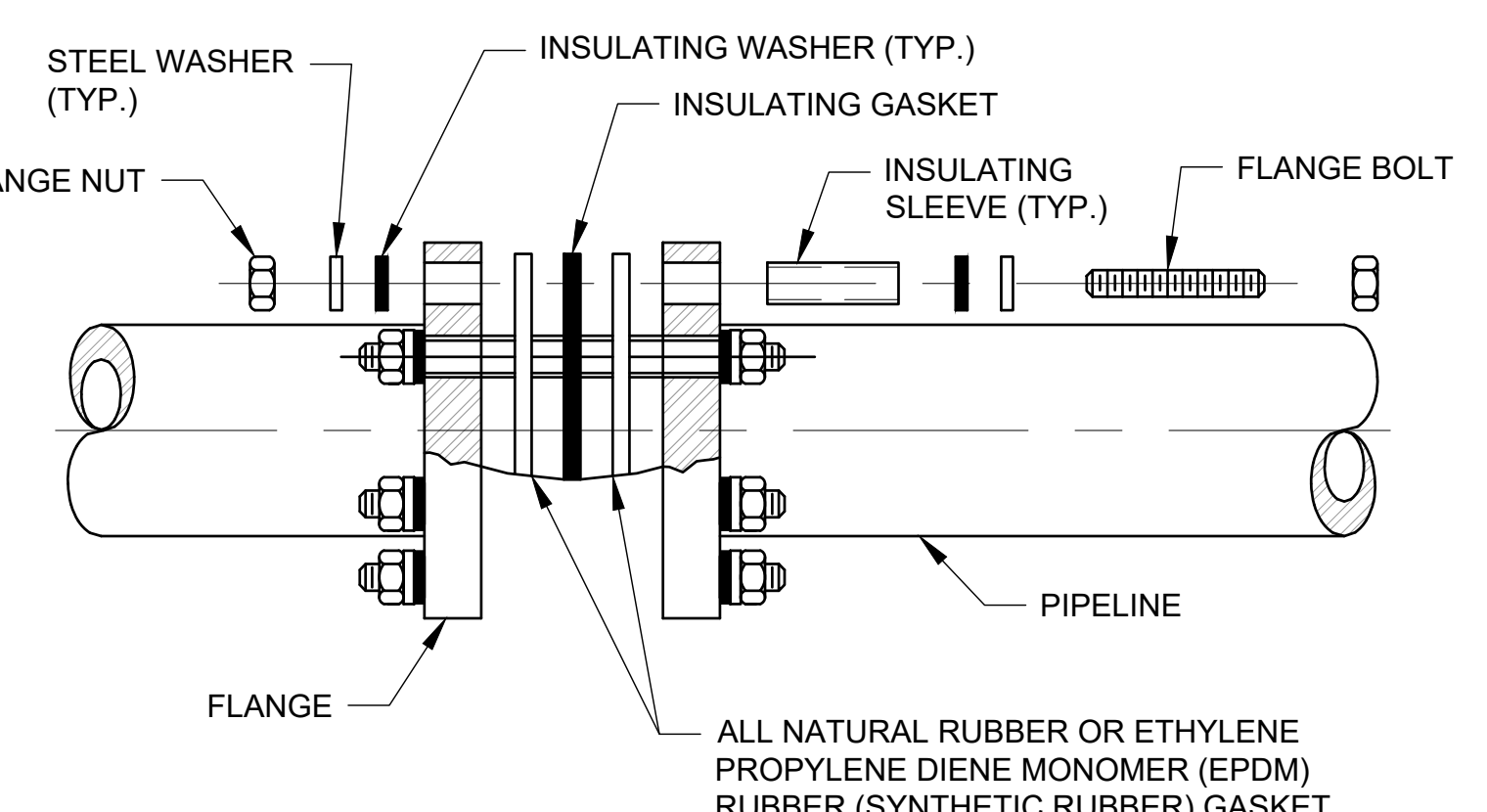
- NOTES:  
1. REMOVE REFERENCE ELECTRODE FROM PLASTIC BAG PRIOR TO INSTALLATION.  
2. BEFORE BACKFILLING, WET REFERENCE ELECTRODE WITH APPROXIMATELY 2 GALLONS OF WATER.



**6** 17 LB. MAGNESIUM ANODE - TYPE 17S3 (FACTORY MANUFACTURED)  
SCALE: N.T.S.

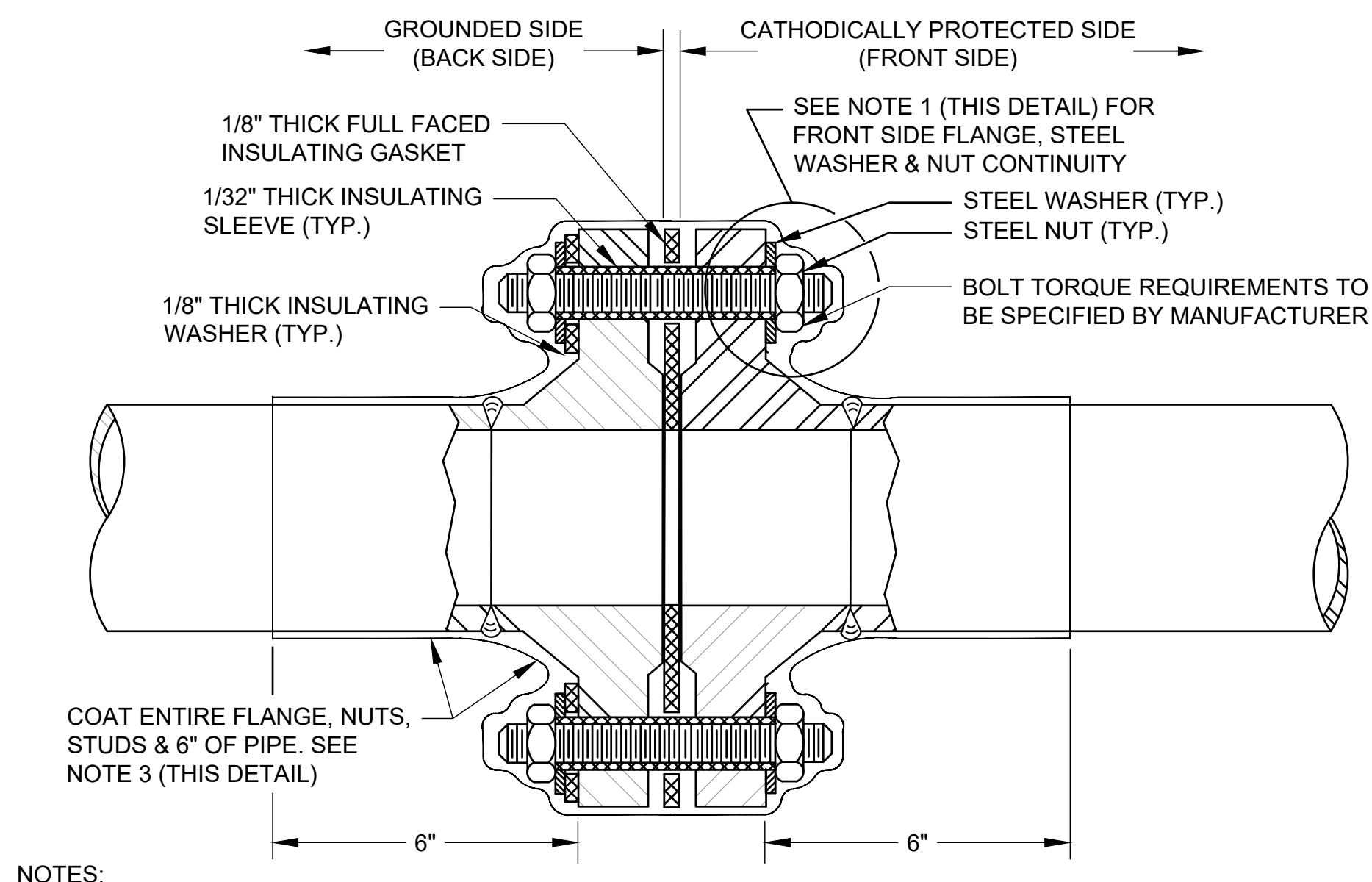


**7** MILLER DUCTILE IRON COUPON MODEL: COU200  
SCALE: N.T.S.



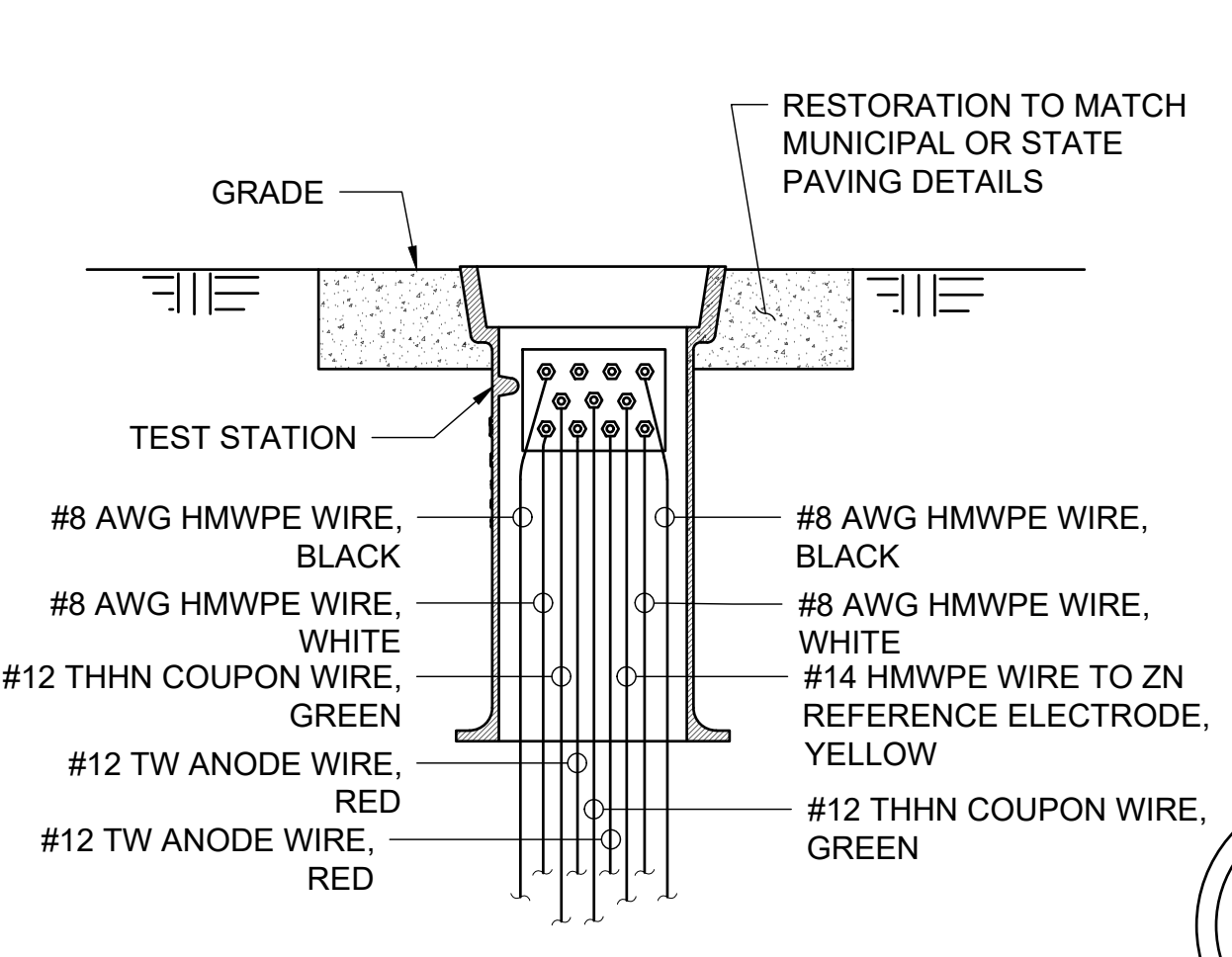
- NOTES:  
1. OBTAIN FLANGE INSULATING KIT FOR CLASS 150, ANSI RATING, DOUBLE PHENOLIC INSULATING WASHERS 1/8\"/>

**3** TYPICAL INSULATING FLANGE COMPONENTS  
NOTE: FLANGE IJ KITS ARE NOT PROVIDED BY CORRPRO  
SCALE: N.T.S.

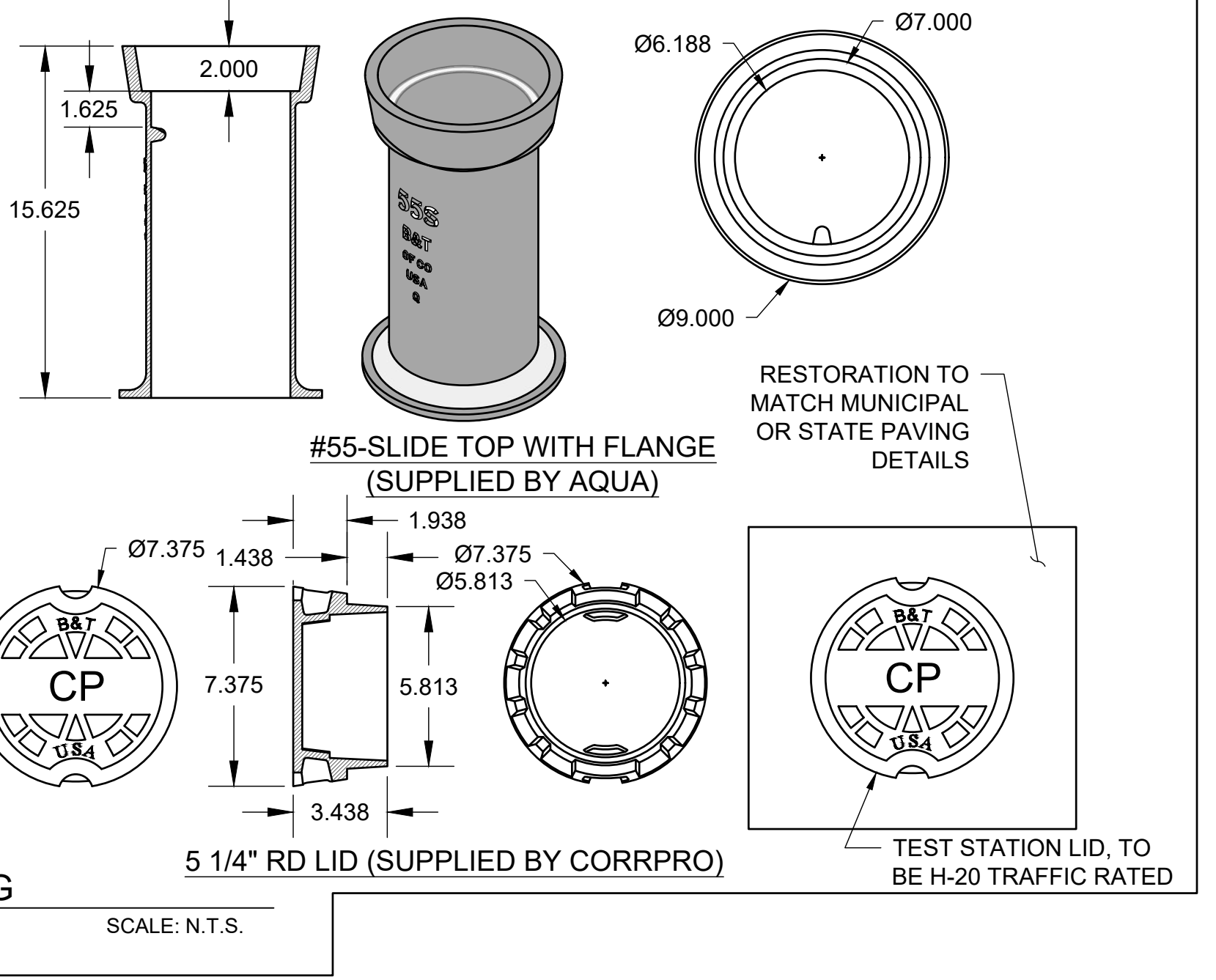


- NOTES:  
1. REMOVE DIRT, GREASE AND OIL INCLUDING VISIBLE MOISTURE AND FROST IN ACCORDANCE WITH THE REQUIREMENT OF SSPC-SP1 \"SOLVENT CLEANING\". REMOVE LOOSE RUST, PAINT AND FOREIGN MATTER BY HANDTOOL CLEANING IN ACCORDANCE WITH SSPC-SP2 OR SP3, \"HAND TOOL CLEANING\" OR \"POWER TOOL CLEANING\". ON THE FRONT SIDE ONLY, ENSURE GOOD ELECTRICAL CONTACT BETWEEN THE FLANGE, STEEL WASHER & NUT.  
2. AFTER ASSEMBLY OF INSULATING COMPONENTS AND PRIOR TO COATING OF THE FLANGE, THE ELECTRICAL PROPERTIES OF THE INSULATING FLANGE MUST BE CHECKED.  
3. COAT ENTIRE FLANGE WITH A WAX-TYPE FILLER AND FIBER TAPE COATING SUCH AS DENSO OR TRENTON OR SHRINK WRAP.  
4. COAT INSIDE OF THE FLANGE/PIPE WITH AN NSF 61 APPROVED EPOXY. THE COATED LENGTH DEPENDS ON THE PIPE DIAMETER. FOR THE PIPE UP TO 12\"/>

**4** TYPICAL INSULATING FLANGE COATING  
SCALE: N.T.S.



**5** TYPICAL 7-INCH VALVE BOX, LID & WIRING INSULATING FLANGE JOINT TEST STATION  
SCALE: N.T.S.



**5 1/4\"/>**

**STANDARD INSULATING FLANGE TEST STATION AND INSULATING FLANGE DETAILS**

Drawing prepared by:

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An Aegion Company

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Malvern, Pennsylvania 19355  
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www.aegion.com

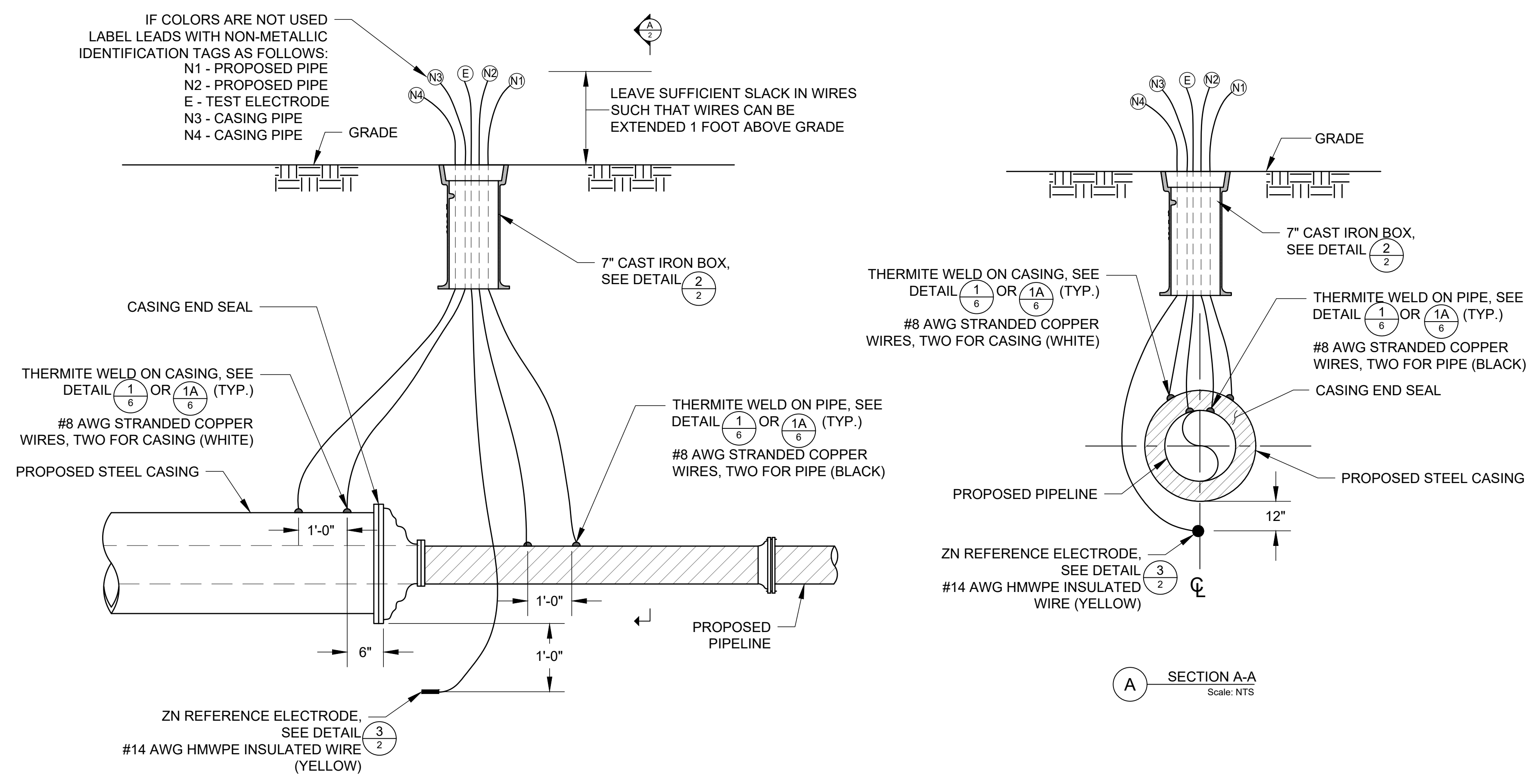
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CCl Dwg. No.: AQUA---

Sht. 1 of 8

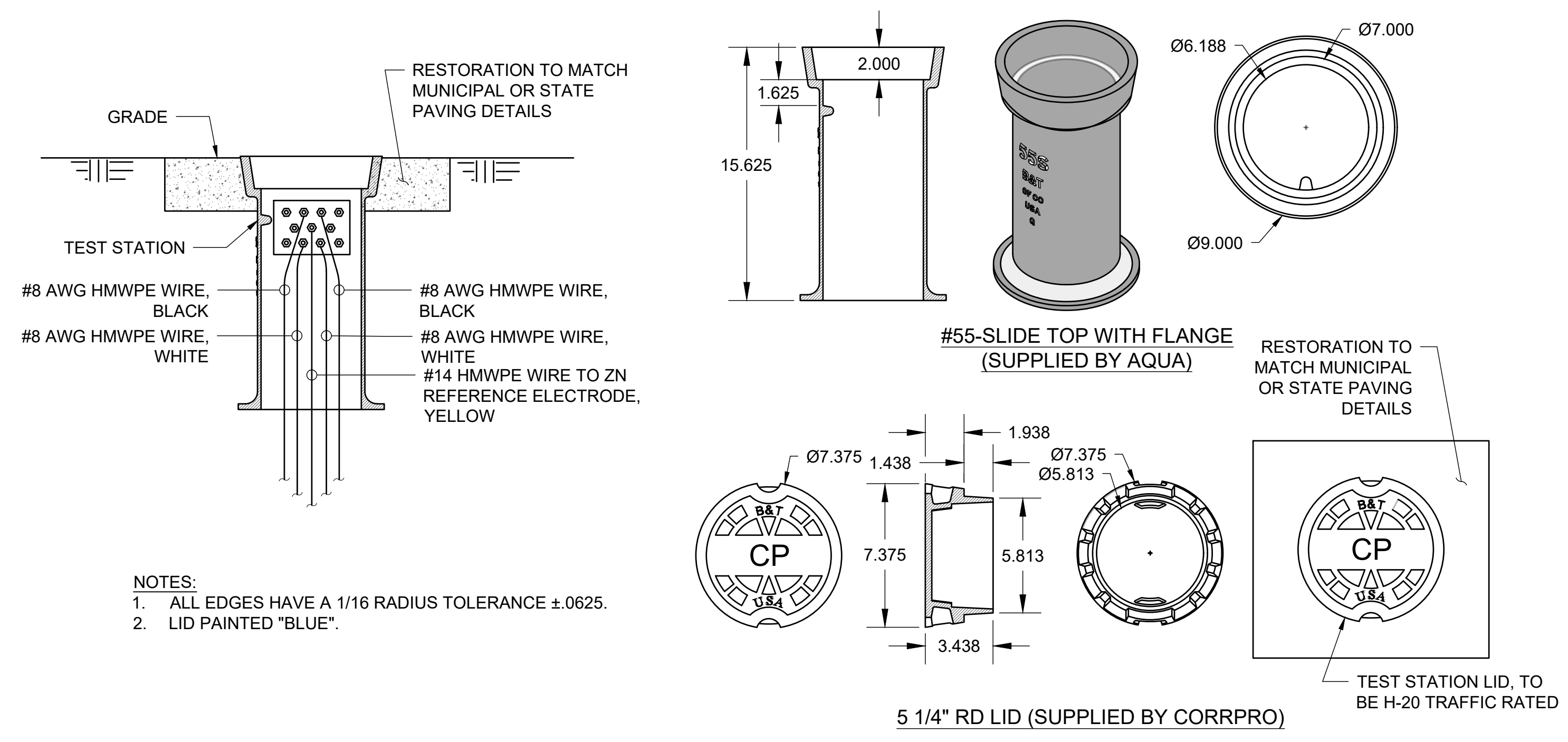


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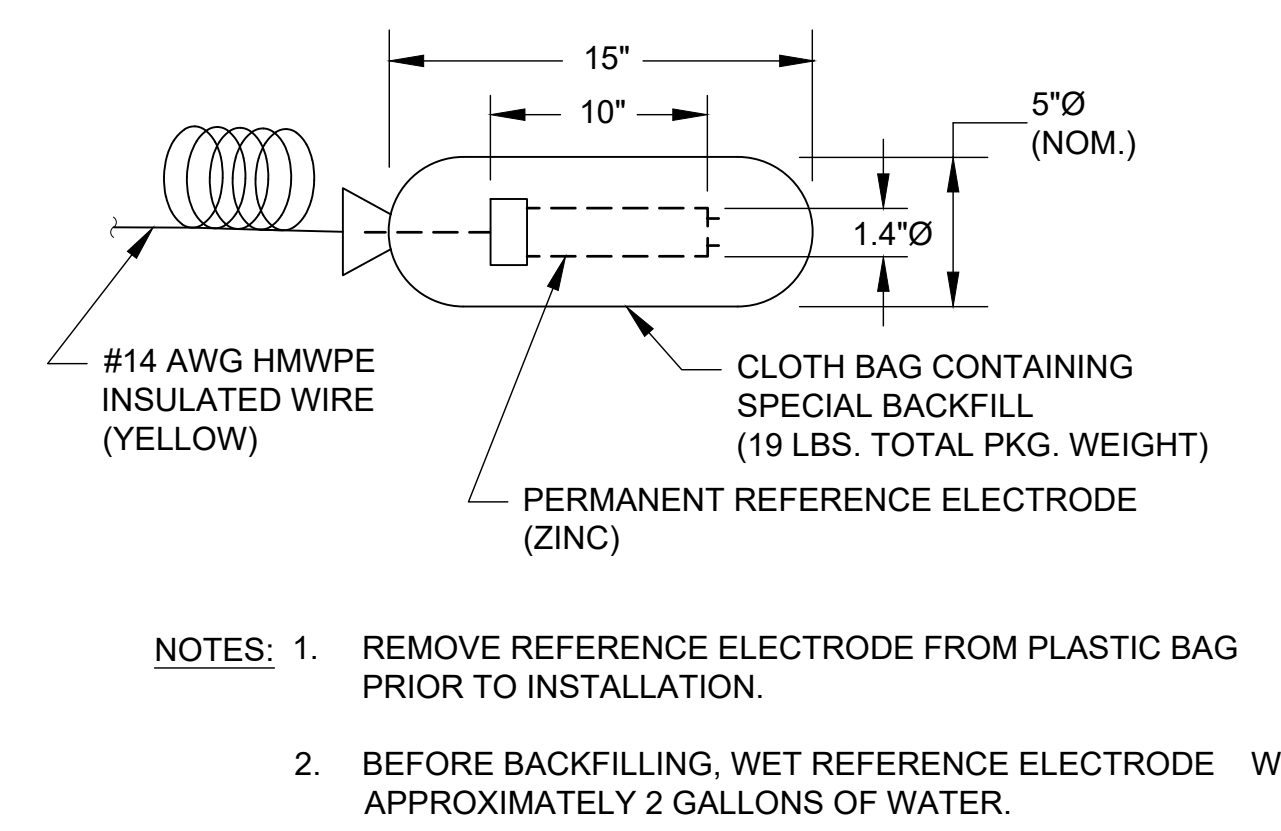
**1** CASING TEST STATION - TYPICAL  
 2

SCALE: N.T.S.



**2** TYPICAL 7-INCH VALVE BOX, LID & WIRING  
 2 CASING TEST STATION

SCALE: N.T.S.



**3** ZINC REFERENCE ELECTRODE  
 2 (FACTORY MANUFACTURED)

SCALE: N.T.S.

**CASING TEST STATION DETAIL**

*Drawing prepared by:*

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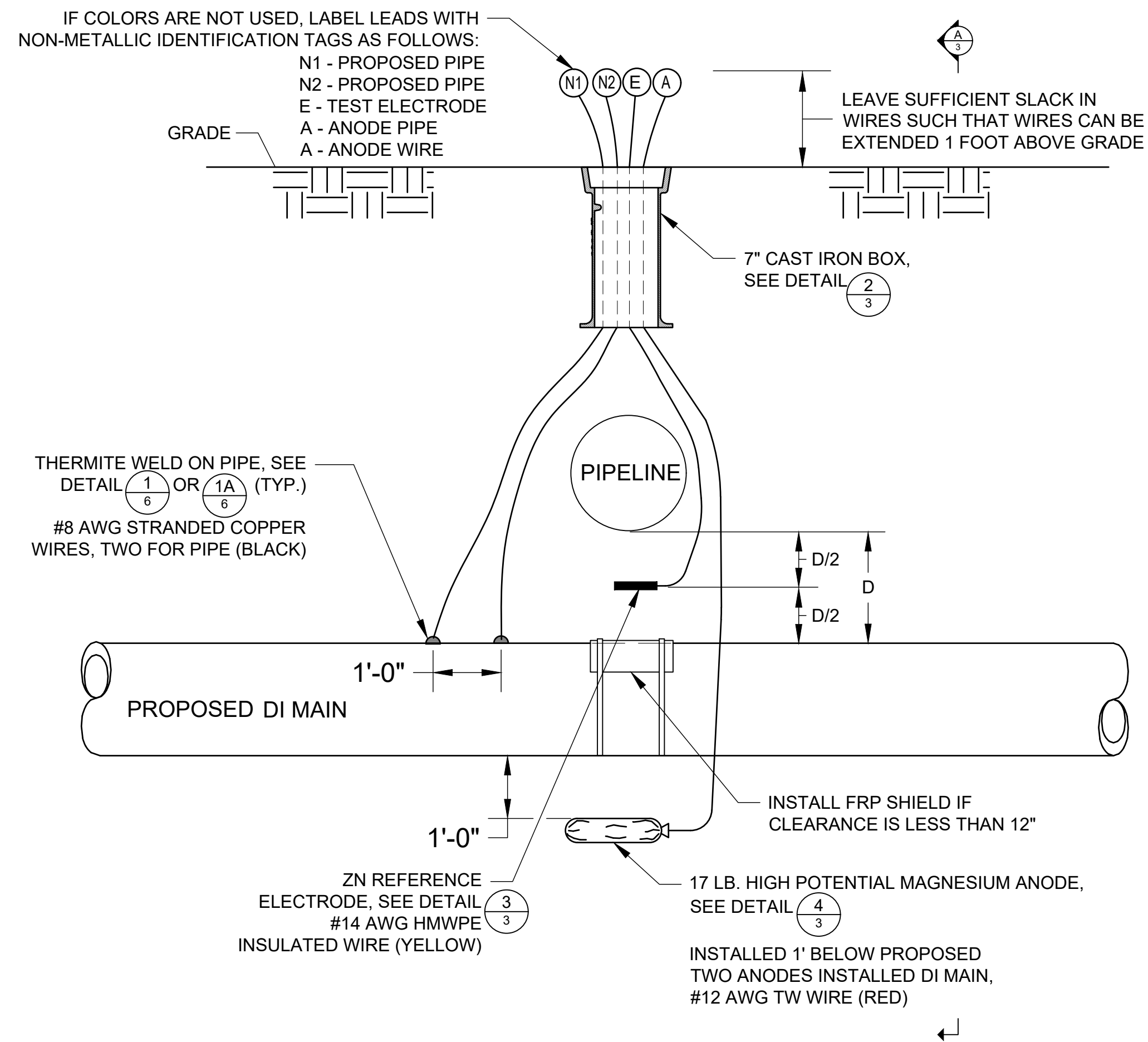
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 CCI Dwg. No.: AQUA---

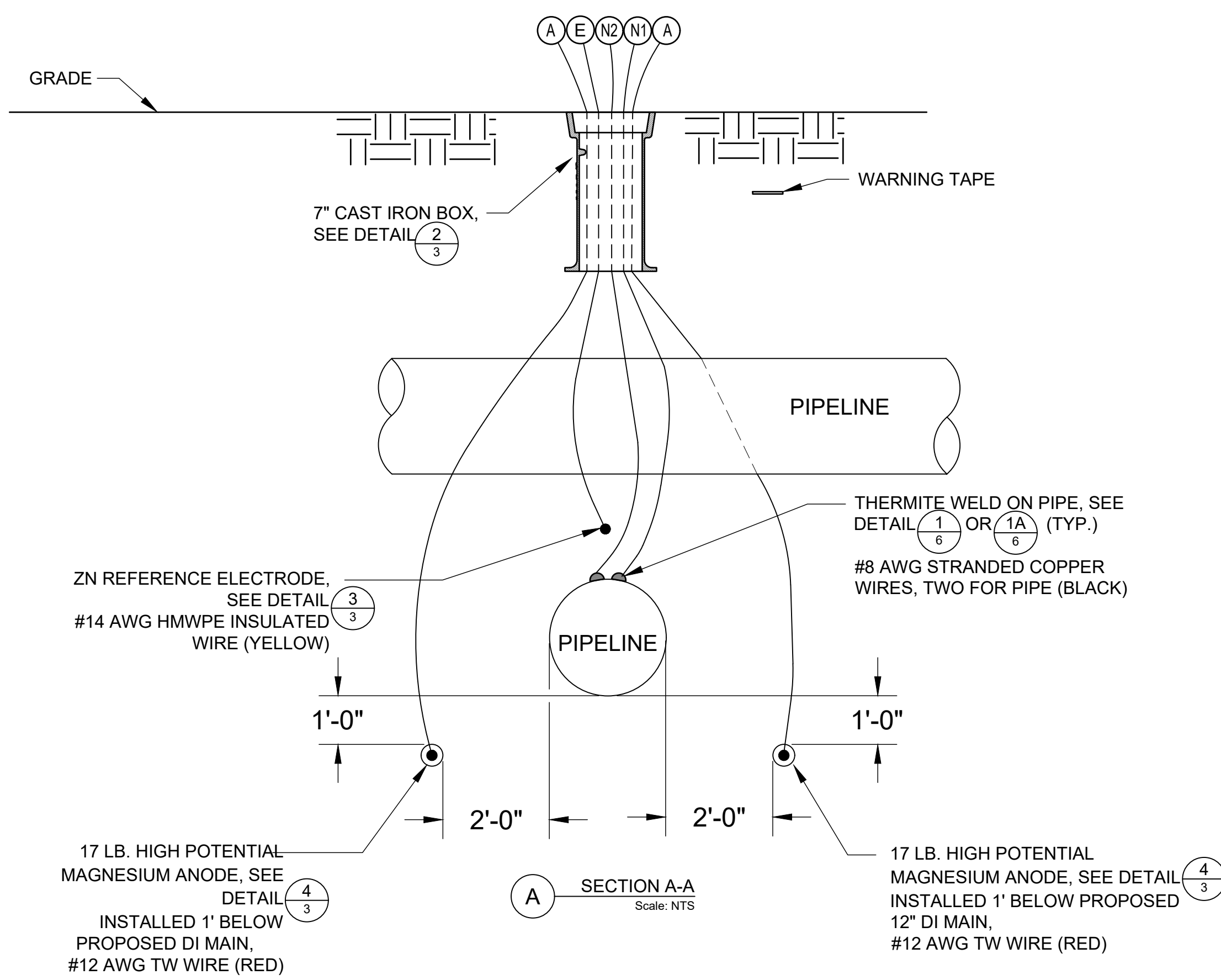
Sht. 2 of 8



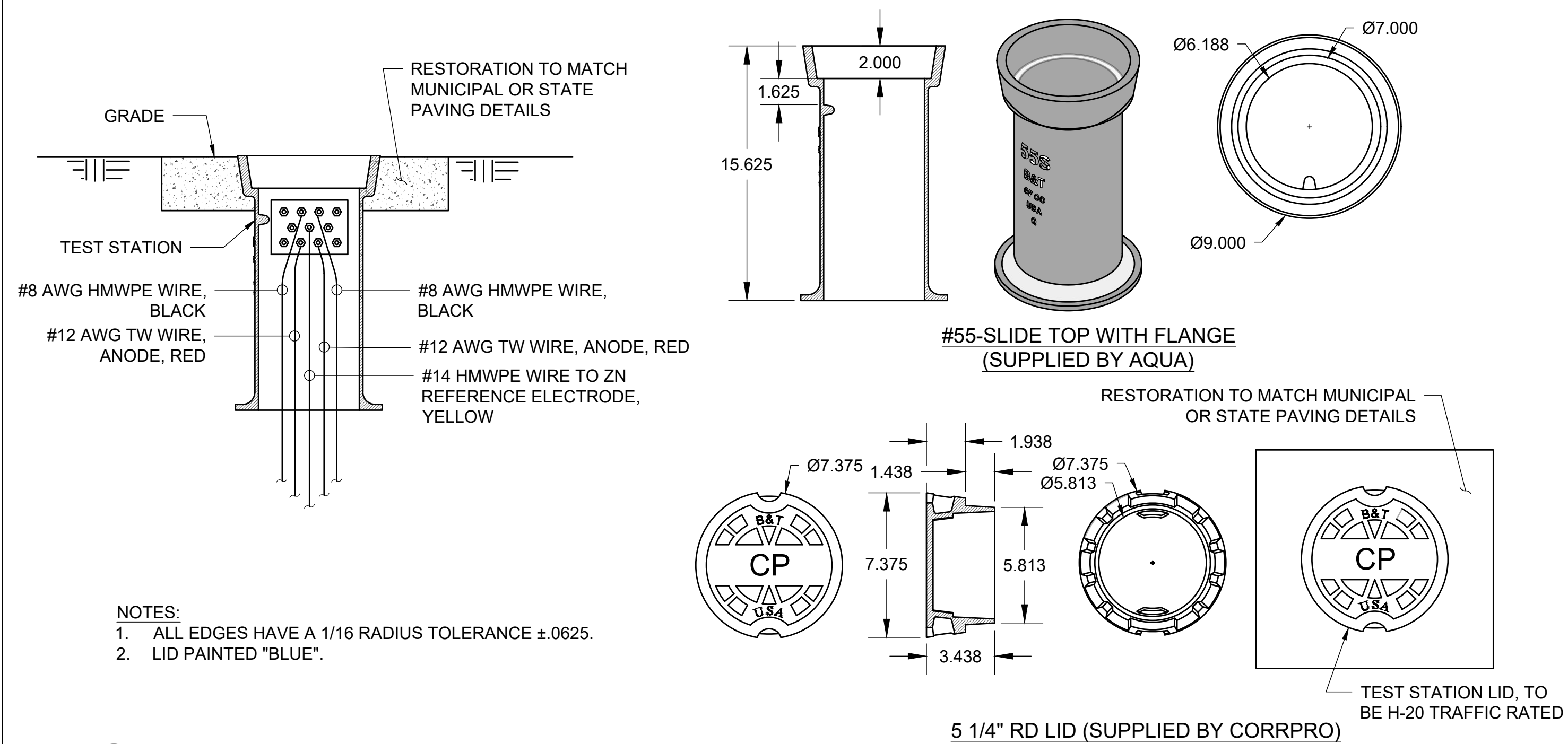
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**1** INTERFERENCE MITIGATION TEST STATION - TYPICAL

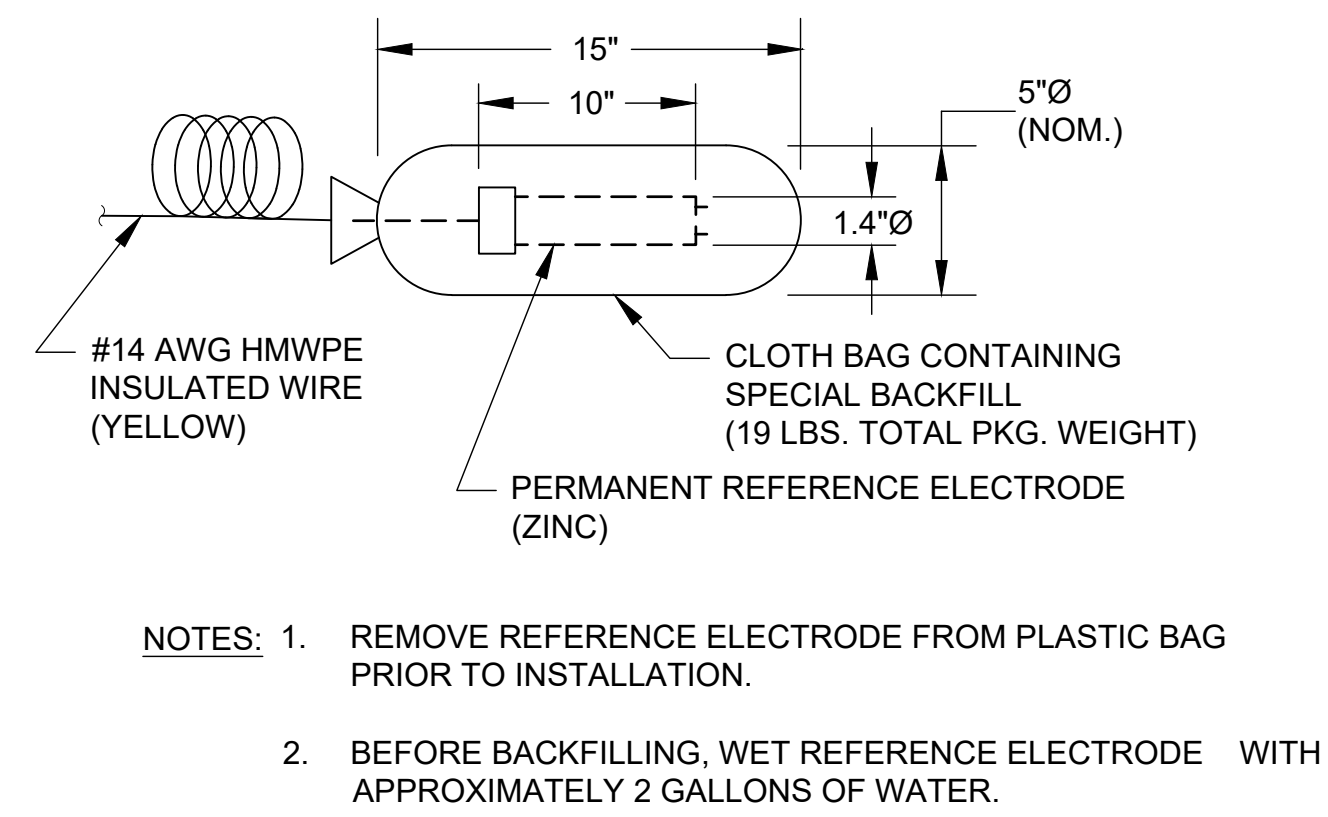


SCALE: N.T.S.



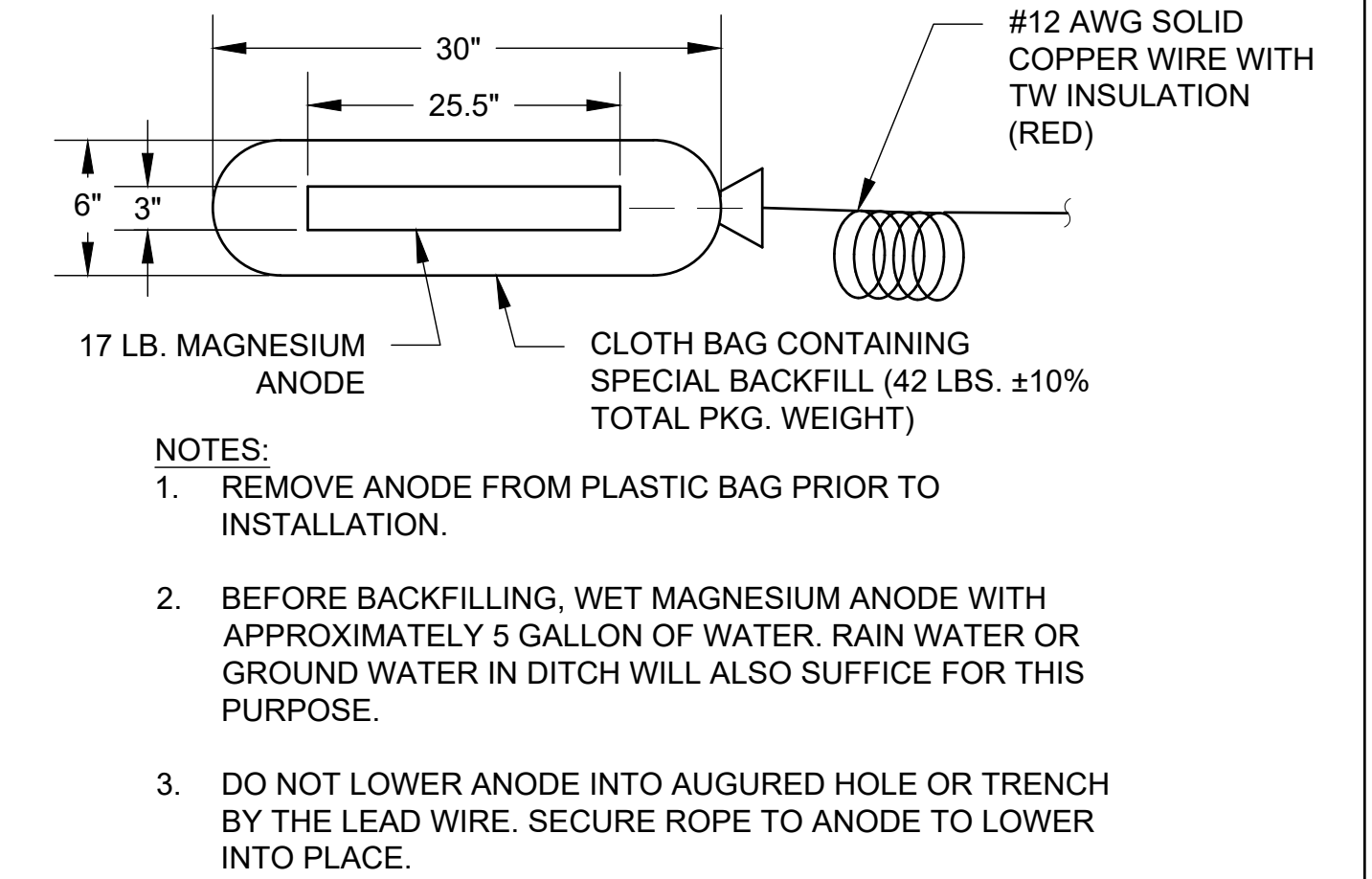
**2** TYPICAL 7-INCH VALVE BOX, LID & WIRING

SCALE: N.T.S.



**3** ZINC REFERENCE ELECTRODE (FACTORY MANUFACTURED)

SCALE: N.T.S.



**4** 17 LB. MAGNESIUM ANODE - TYPE 17S3 (FACTORY MANUFACTURED)

SCALE: N.T.S.

**INTERFERENCE MITIGATION TEST STATION DETAIL**

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NOTICE

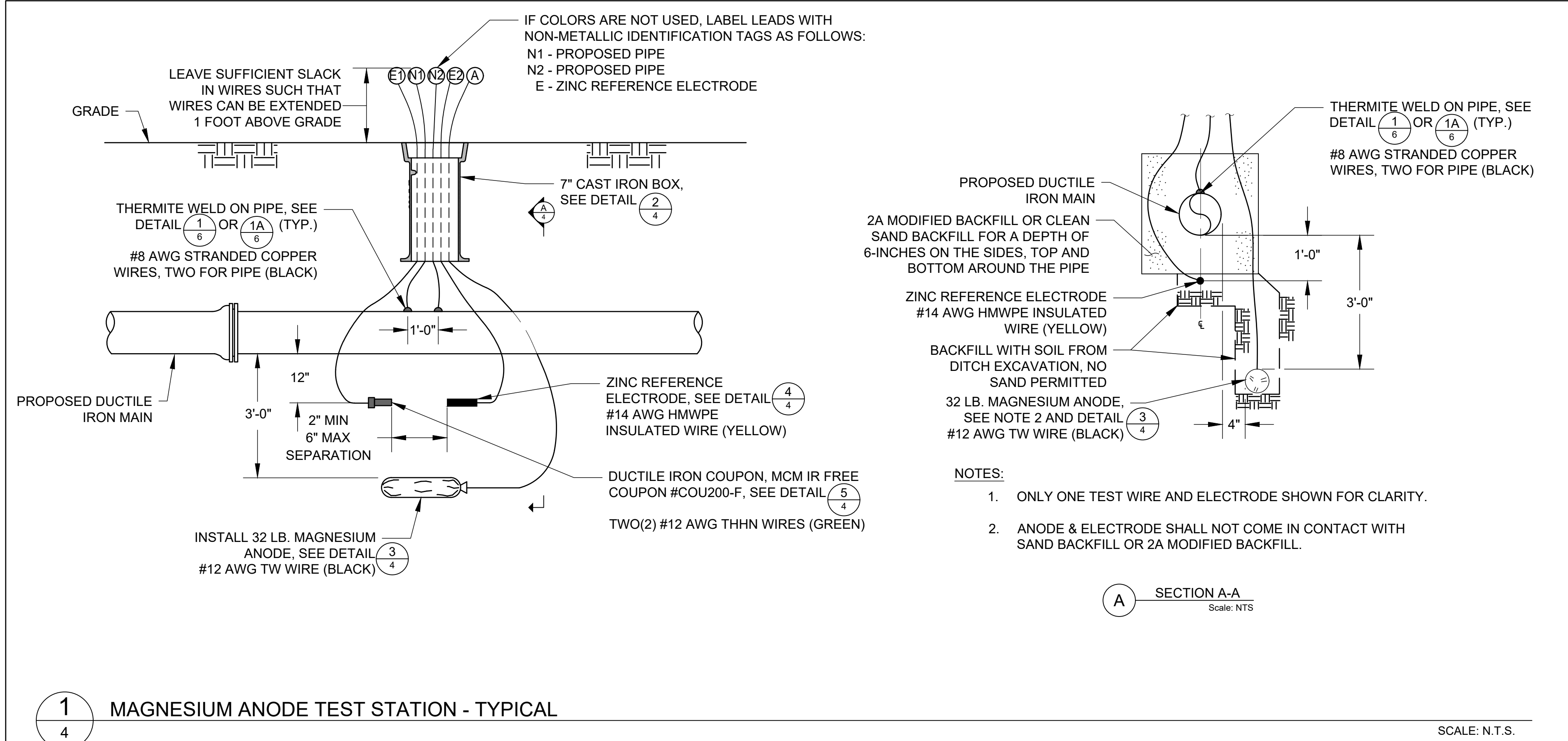
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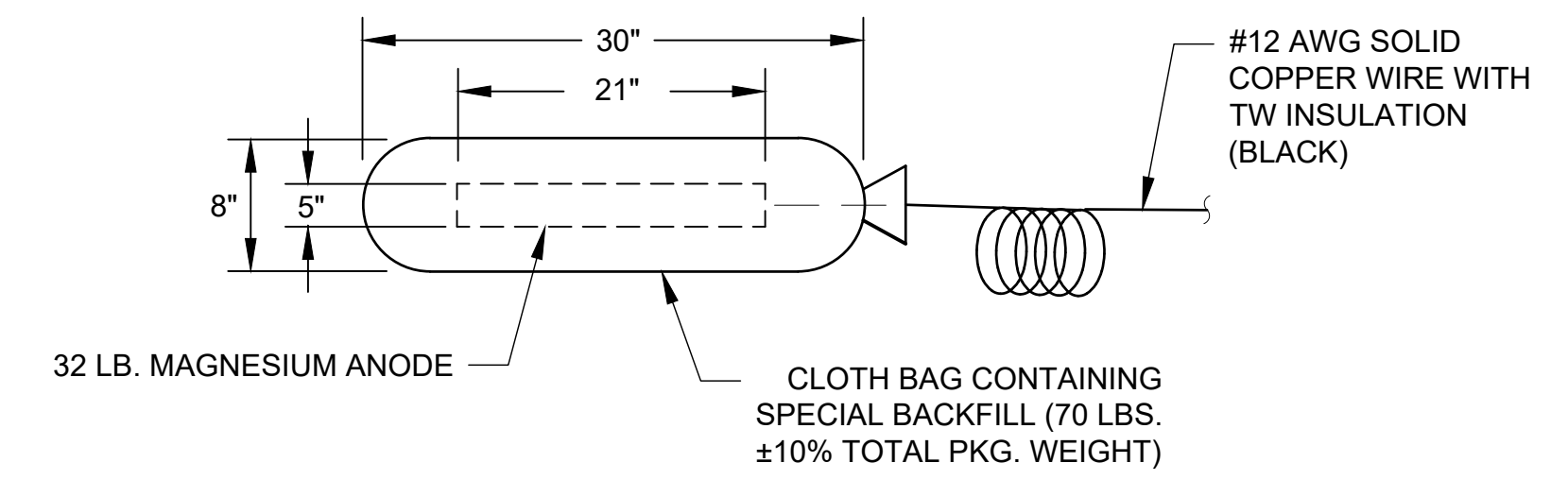


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**1**  
4 MAGNESIUM ANODE TEST STATION - TYPICAL

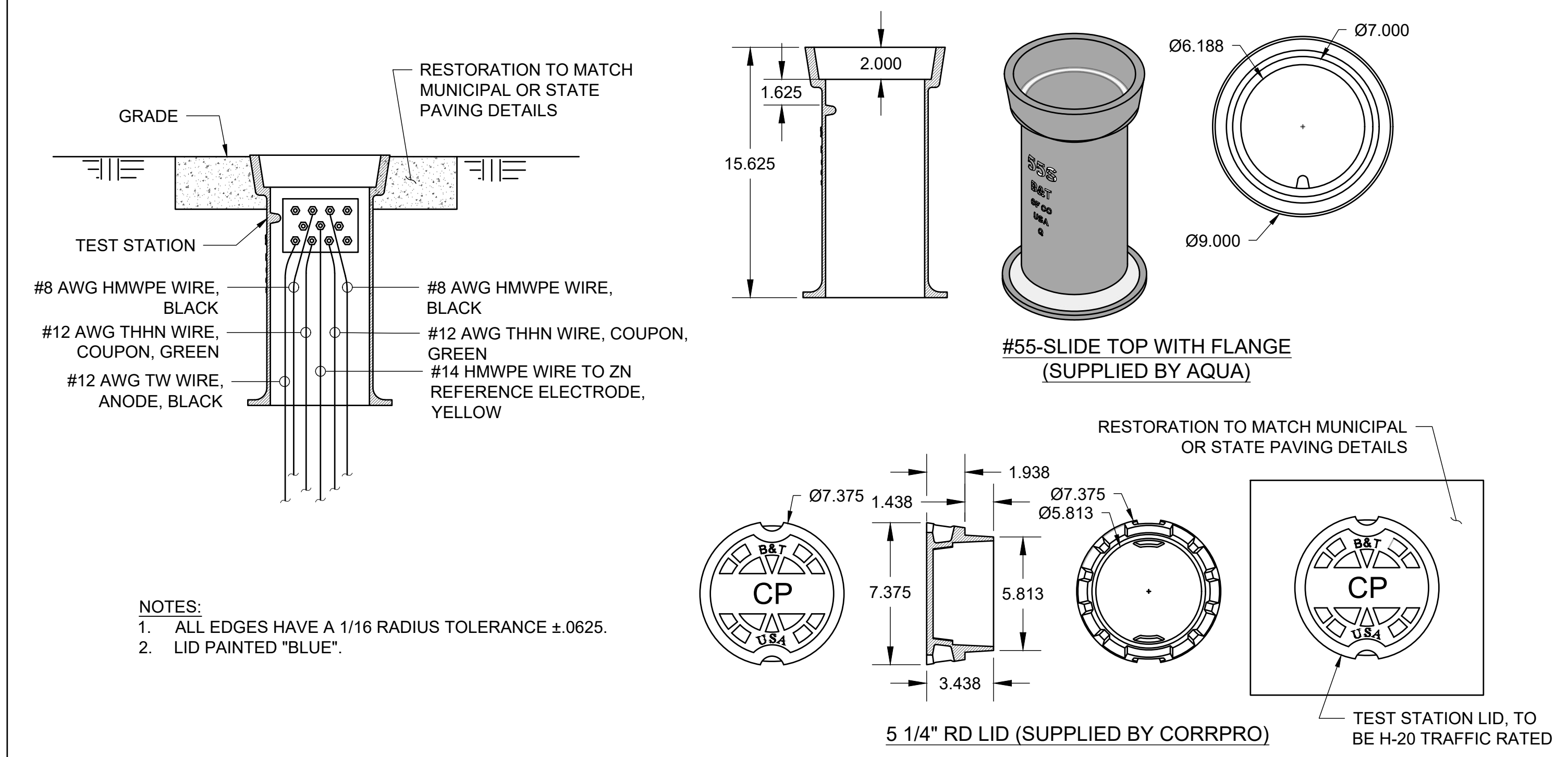
SCALE: N.T.S.



- NOTES:
- REMOVE ANODE FROM PLASTIC BAG PRIOR TO INSTALLATION.
  - BEFORE BACKFILLING, WET MAGNESIUM ANODE WITH APPROXIMATELY 5 GALLON OF WATER. RAIN WATER OR GROUND WATER IN DITCH WILL ALSO SUFFICE FOR THIS PURPOSE.
  - DO NOT LOWER ANODE INTO AUGURED HOLE OR TRENCH BY THE LEAD WIRE. SECURE ROPE TO ANODE TO LOWER INTO PLACE.

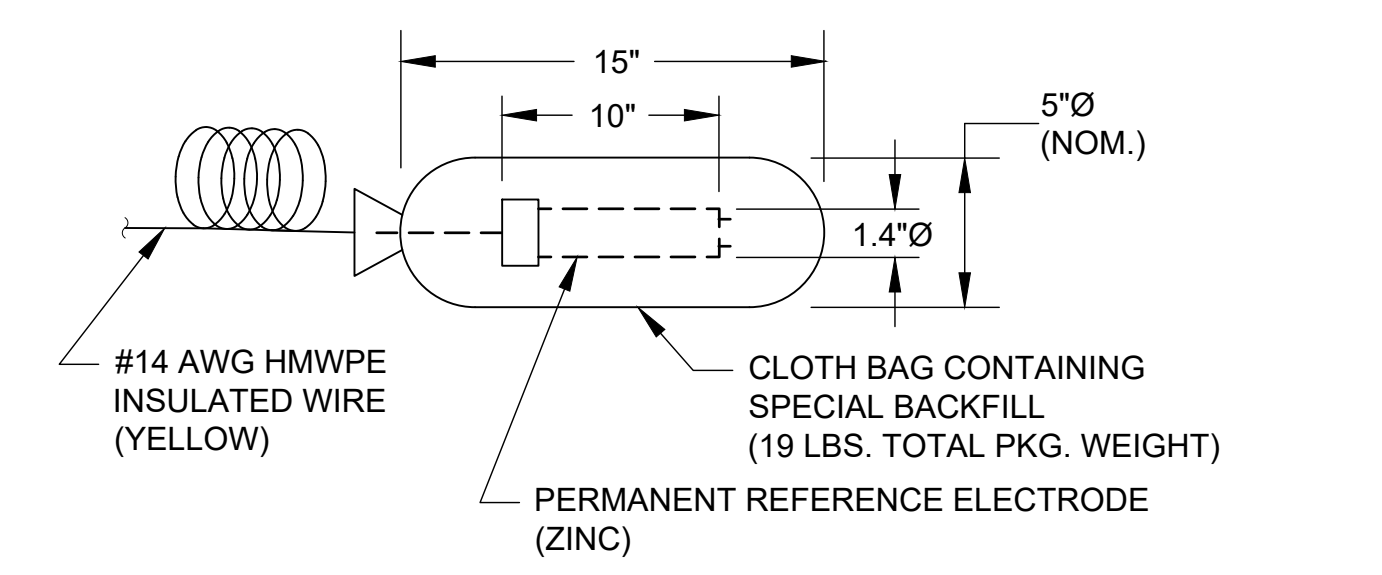
**3**  
4 32 LB. MAGNESIUM ANODE - 32S5 (FACTORY MANUFACTURED)

SCALE: N.T.S.



**2**  
4 TYPICAL 7-INCH VALVE BOX, LID & WIRING

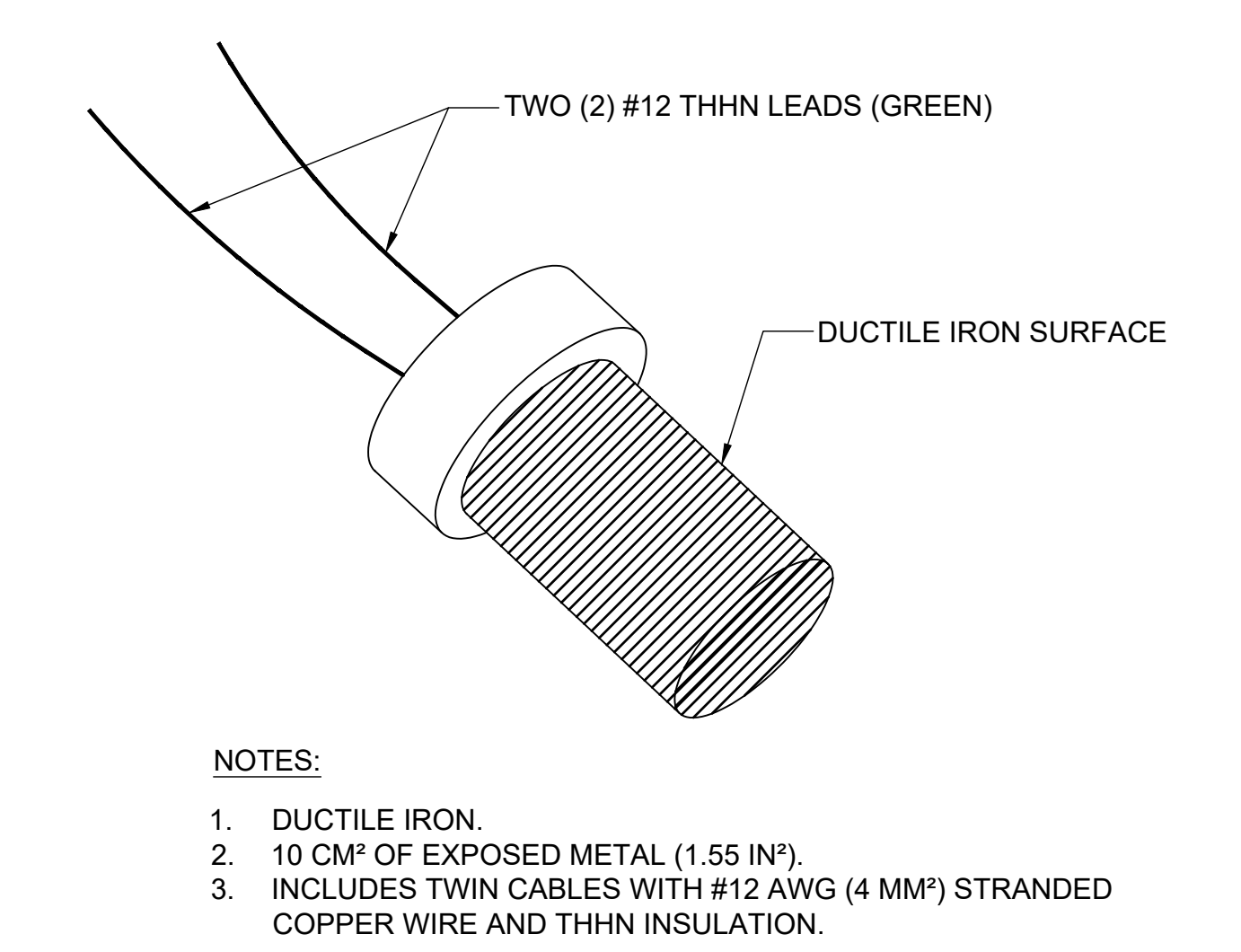
SCALE: N.T.S.



- NOTES:
- REMOVE REFERENCE ELECTRODE FROM PLASTIC BAG PRIOR TO INSTALLATION.
  - BEFORE BACKFILLING, WET REFERENCE ELECTRODE WITH APPROXIMATELY 2 GALLONS OF WATER.

**4**  
4 ZINC REFERENCE ELECTRODE (FACTORY MANUFACTURED)

SCALE: N.T.S.



**5**  
4 MILLER DUCTILE IRON COUPON MODEL: COU200

SCALE: N.T.S.

**MAGNESIUM ANODE TEST STATION DETAIL**

Drawing prepared by:

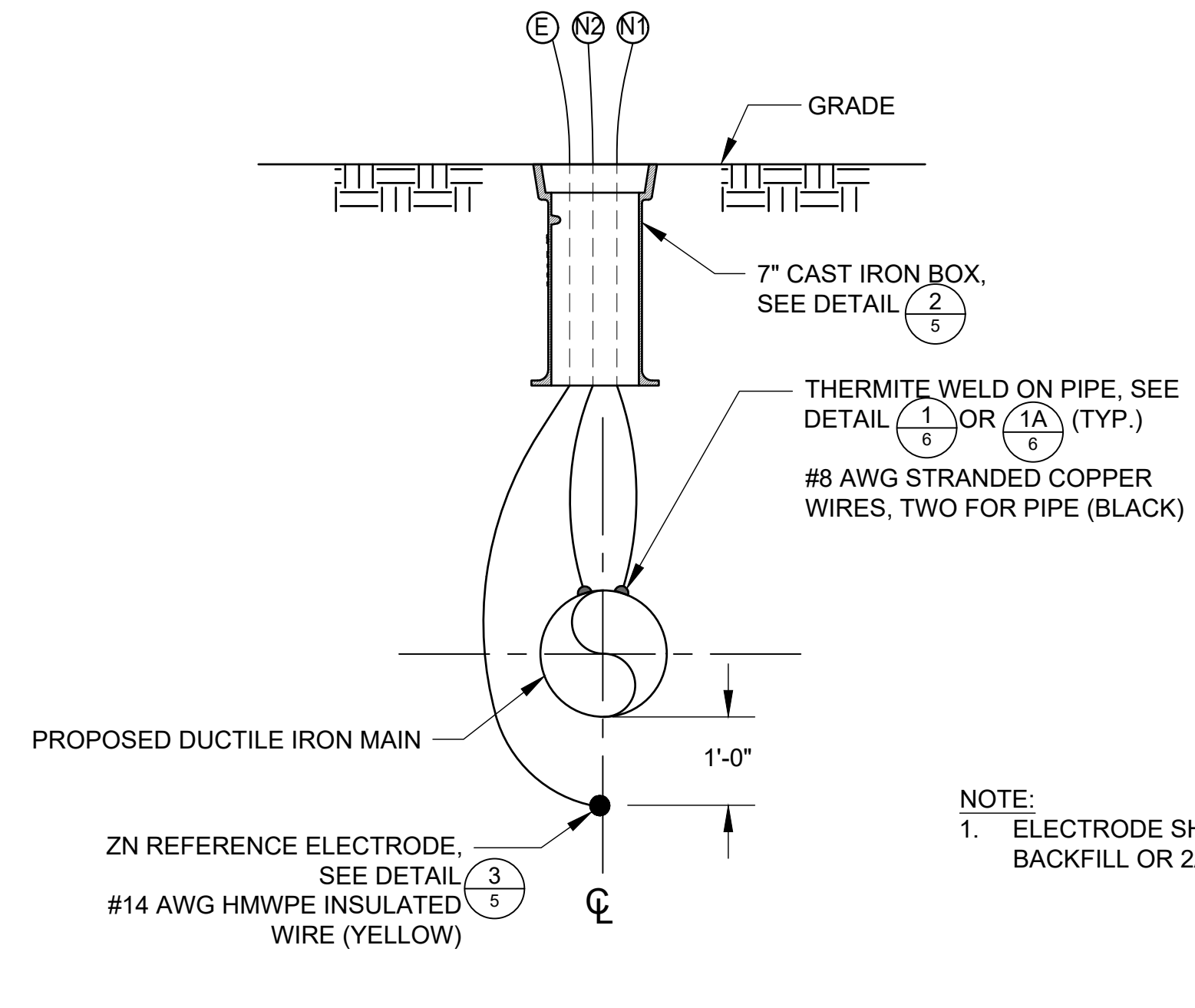
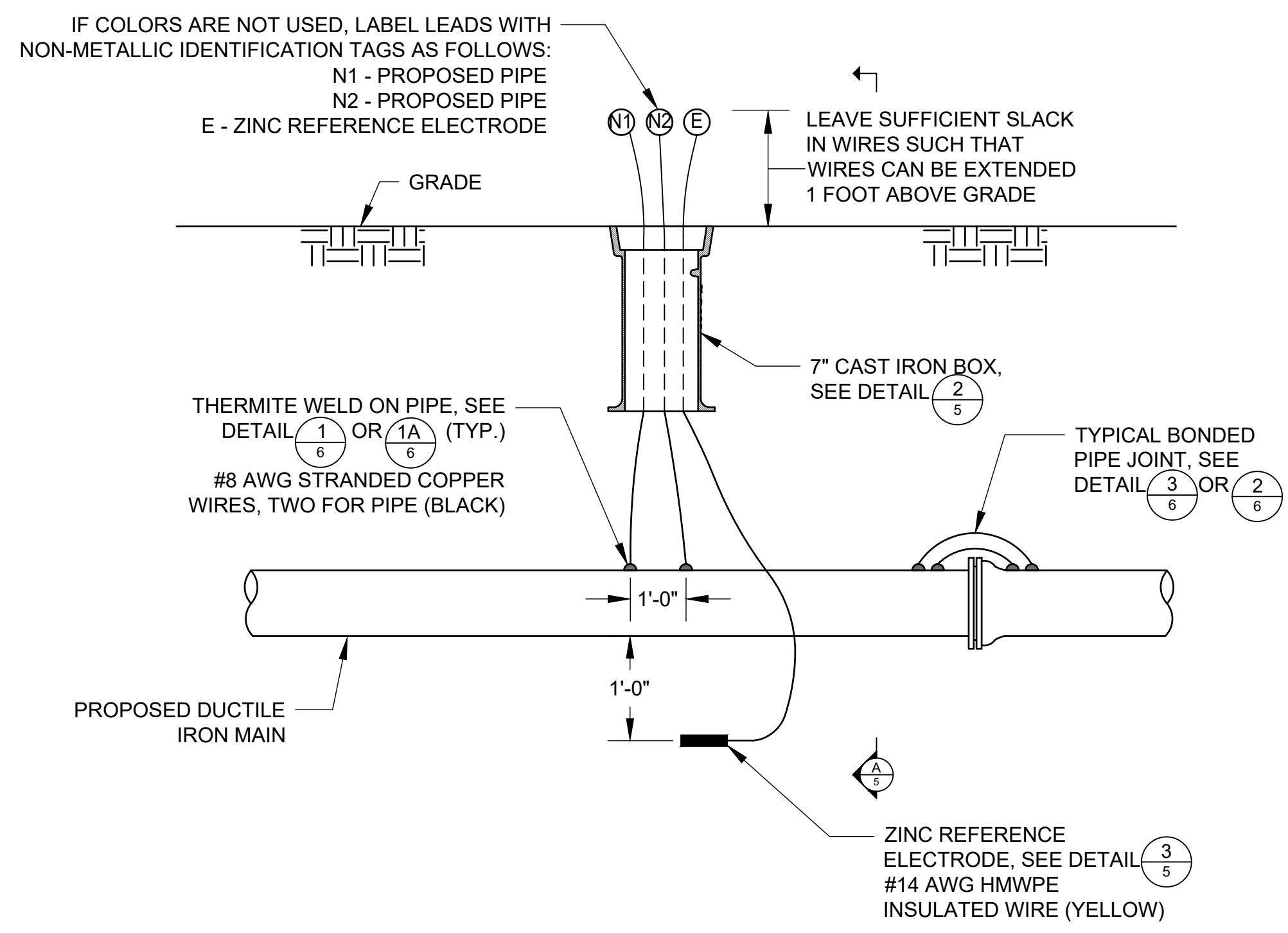
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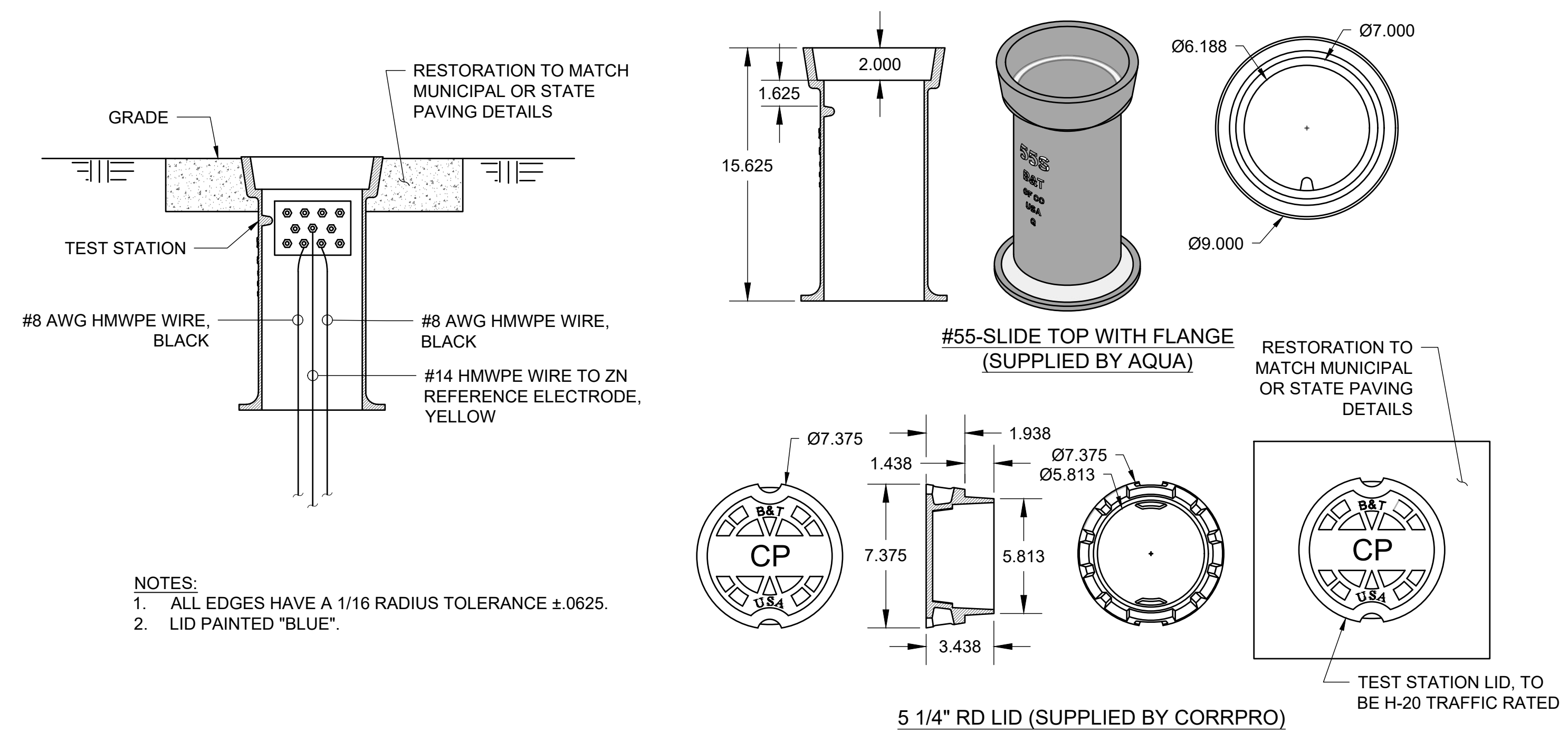


NOTE:  
1. ELECTRODE SHALL NOT COME IN CONTACT WITH SAND BACKFILL OR 2A MODIFIED BACKFILL.

A SECTION A-A  
Scale: N.T.S.

1  
5 THREE WIRE CONTINUITY TEST STATION - TYPICAL

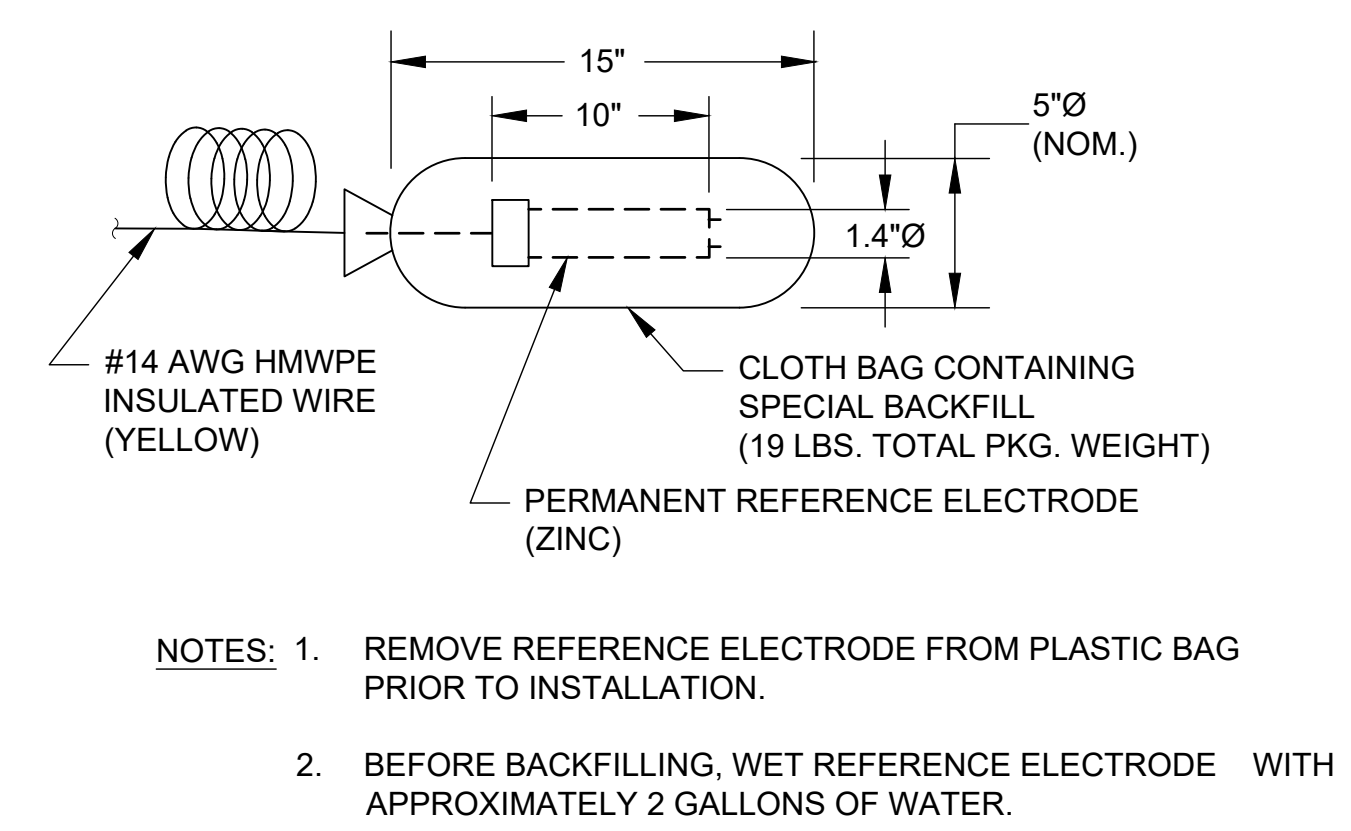
SCALE: N.T.S.



NOTES:  
1. ALL EDGES HAVE A 1/16 RADIUS TOLERANCE ±.0625.  
2. LID PAINTED "BLUE".

2  
5 TYPICAL 7-INCH VALVE BOX, LID & WIRING  
THREE WIRE CONTINUITY TEST STATION

SCALE: N.T.S.



NOTES: 1. REMOVE REFERENCE ELECTRODE FROM PLASTIC BAG PRIOR TO INSTALLATION.  
2. BEFORE BACKFILLING, WET REFERENCE ELECTRODE WITH APPROXIMATELY 2 GALLONS OF WATER.

3  
5 ZINC REFERENCE ELECTRODE  
(FACTORY MANUFACTURED)

SCALE: N.T.S.

THREE WIRE TEST STATION DETAIL

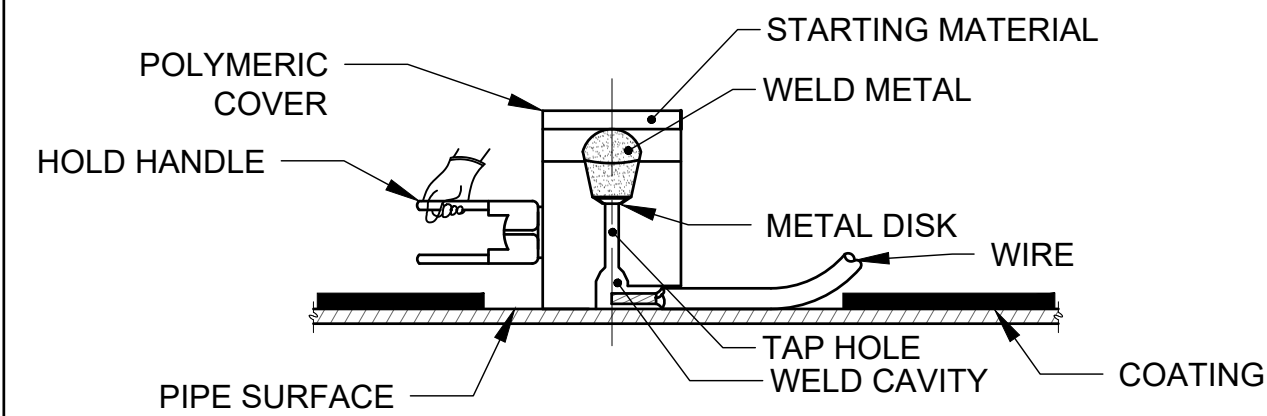
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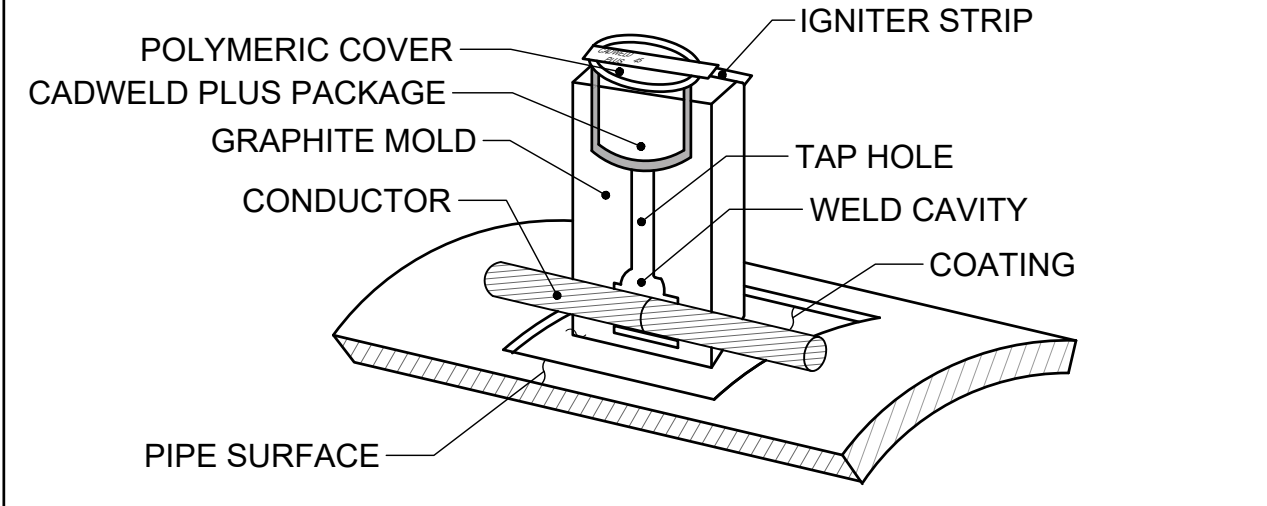
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STEP 1. GRIND STRUCTURE CONNECTION AREA (3"x3") TO BARE SHINY METAL AND CLEAN.



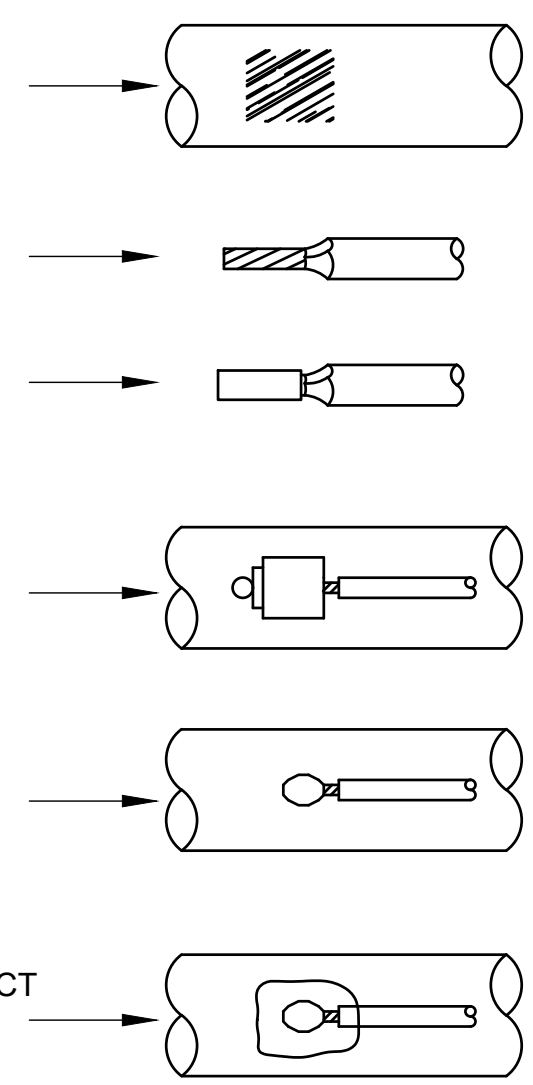
STEP 2. STRIP INSULATION FROM WIRE.

STEP 3. INSTALL COPPER SLEEVE OVER BARE SECTION OF WIRE WHEN REQUIRED.

STEP 4. HOLD MOLD FIRMLY WITH FROM OPERATOR & IGNITE WITH FLINT GUN.

STEP 5. REMOVE SLAG FROM CONNECTION AND PEEN WELD FOR SOUNDNESS.

STEP 6. COVER CONNECTION AND EXPOSED STRUCTURE SURFACE WITH BITUMASTIC COATING PER PROJECT SPECIFICATIONS.



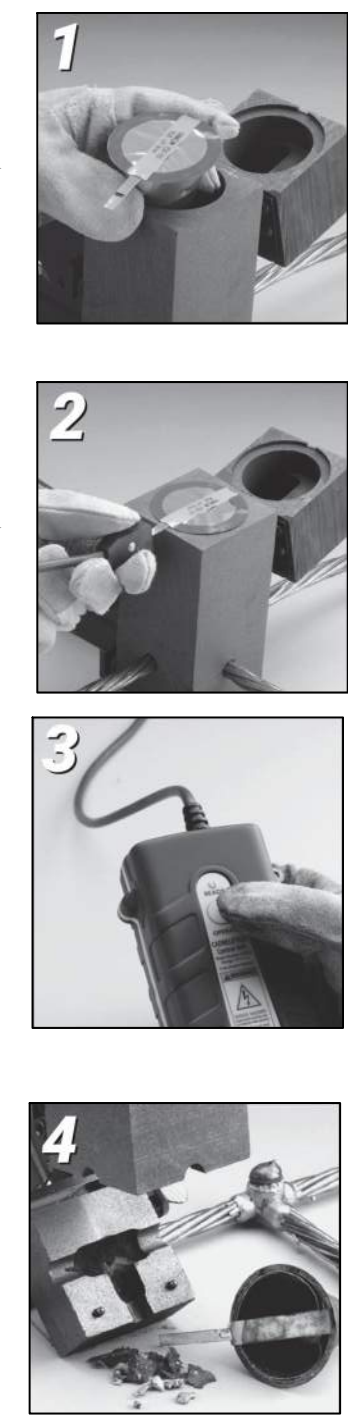
- NOTES:**
1. THE CADWELD PLUS CONTROL UNIT INITIATES THE REACTION OF THE METAL CRUCIBLE.
  2. THE STANDARD UNIT INCLUDES A 1.8 METER (6-FOOT) HIGH TEMPERATURE CONTROL UNIT LEAD.
  3. THE LEAD ATTACHES TO THE IGNITION STRIP USING A CUSTOM MADE, PURPOSE-DESIGNED TERMINATION CLIP.
  4. AFTER THE TERMINATION CLIP IS INSTALLED ON THE IGNITION STRIP, THE INSTALLER PUSHES AND HOLDS THE IGNITION BUTTON TO START A CHARGING AND DISCHARGING SEQUENCE. WITHIN A FEW SECONDS THE CONTROL UNIT SENDS A PREDETERMINED VOLTAGE TO THE IGNITION STRIP AND THE REACTION IS INITIATED.
  5. PROCEDURE SHOWN ABOVE IS TO BE USED AS A GENERAL GUIDE ONLY. CONSULT MANUFACTURER'S LITERATURE FOR SPECIFIC INSTALLATION INSTRUCTIONS.

### CONNECTION TO DUCTILE IRON PIPELINE (TYPE CAHB OR CAHE)

TYPE CAHB TAP CONDUCTOR TO TOP OF HORIZONTAL DUCTILE IRON PIPE OR FLAT SURFACE				TYPE CAHE THROUGH CONDUCTOR TO TOP OF HORIZONTAL DUCTILE IRON PIPE OR FLAT SURFACE			
Welder Part No.1	Welder Price	Weld Metal	Conductor Size	Surface	Welder Part No.1	Welder Price	Weld Metal
CAHBA-1G CAHBA-1G-P.S.*	CAA CAA	CA25XF-19 CA25XF-19	#14 to #10 Solid (use sleeve CAB-133-1H)** or #8 Solid or Stranded, or #6 Solid	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1G CAHEA-1G-P.S.*	CAA CAA	CA32XF-19 CA32XF-19
CAHBA-1H CAHBA-1H-P.S.*	CAA CAA	CA25XF-19 CA25XF-19	6 Stranded	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1H CAHEA-1H-P.S.*	CAA CAA	CA32XF-19 CA32XF-19
CAHBA-1K CAHBA-1K-P.S.*	CAA CAA	CA45XF-19 CA45XF-19	4 Solid	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1K CAHEA-1K-P.S.*	CAA CAA	CA45XF-19 CA45XF-19
CAHBA-1L CAHBA-1L-P.S.*	CAA CAA	CA45XF-19 CA45XF-19	4 Stranded	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1L CAHEA-1L-P.S.*	CAA CAA	CA45XF-19 CA45XF-19
CAHBA-1T CAHBA-1T-P.S.*	CAA CAA	CA45XF-19 CA45XF-19	2 Solid	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1T CAHEA-1T-P.S.*	CAA CAA	CA45XF-19 CA45XF-19
CAHBA-1V CAHBA-1V-P.S.*	CAA CAA	CA45XF-19 CA45XF-19	2 Stranded	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1V CAHEA-1V-P.S.*	CAA CAA	CA45XF-19 CA45XF-19
CAHBA-1Y CAHBA-1Y-P.S.*	CAA CAA	CA65XF-19 CA65XF-19	1 Stranded	Flat (30" & larger pipe) 4" to 24" pipe	CAHEA-1Y CAHEA-1Y-P.S.*	CAA CAA	CA65XF-19 CA65XF-19

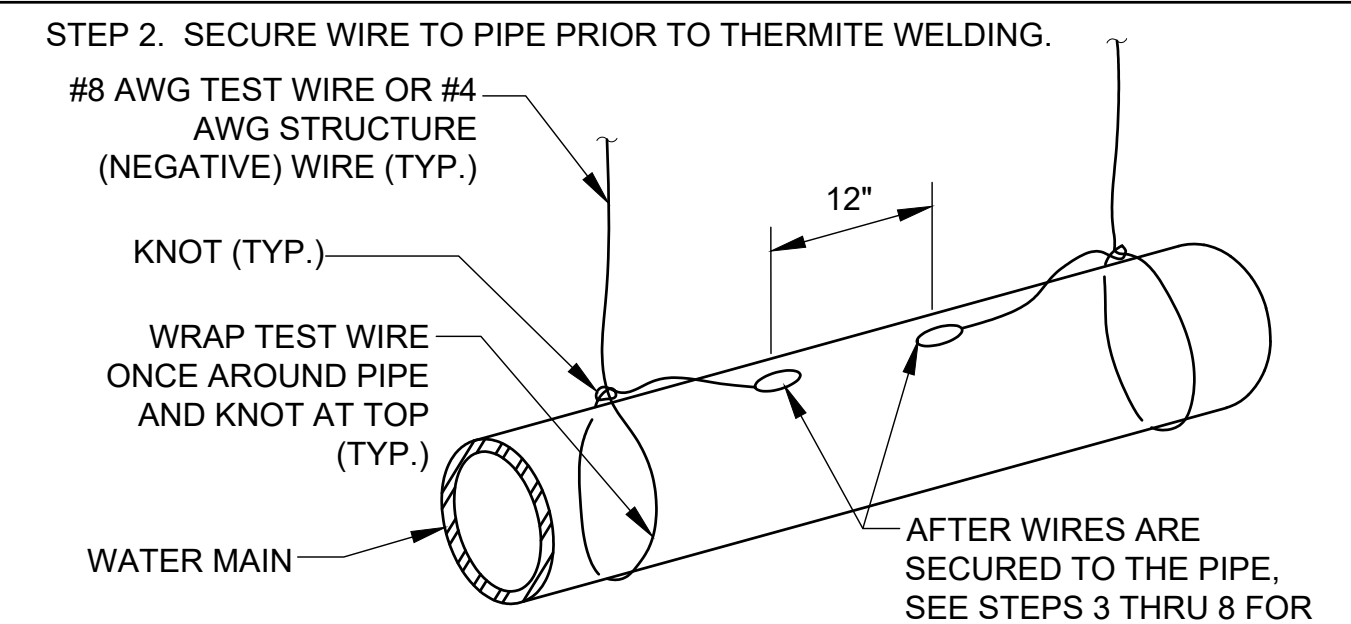
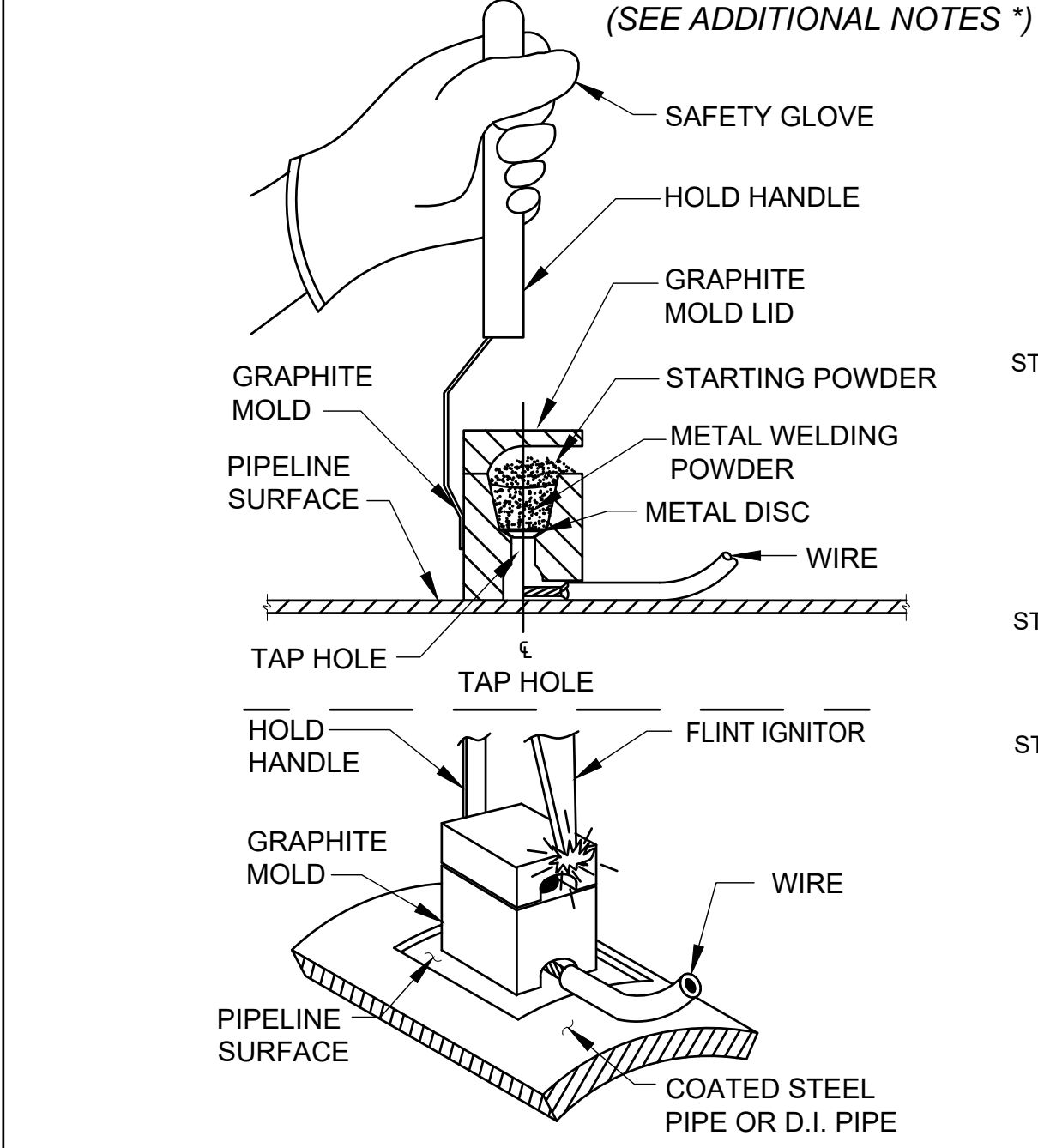
\* Specify pipe size. Example: For #2 stranded to 6" pipe (Type CAHB) CAHBA-1V-6. (Type CAHE) CAHEA-1V-6.  
\*\* 1 Sleeve per connection for Type CAHB. 2 Sleeves per connection for Type CAHE.  
† Welder Part No. includes mold frame. If mold only (less frame) is required, order - Welder Part No. - 'M'.  
Do not use Types CAHB, CAHE or CAH on soil pipe (ASTM A74-R2).  
A test weld should be made on a section of the pipe being used to determine possibility of detrimental metallurgical effects. For DUCTILE IRON, see page 17.

- INSTALLATION STEPS:**
1. INSERT CADWELD PLUS PACKAGE INTO MOLD (MAY REQUIRE USE OF A COVER/BAFFLE).
  2. PRESS AND HOLD CONTROL UNIT SWITCH AND WAIT FOR THE IGNITION.
  3. ATTACH CONTROL UNIT TERMINATION CLIP TO IGNITION STRIP.
  4. OPEN THE MOLD AND REMOVE THE EXPANDED STEEL CUP - NO SPECIAL DISPOSAL REQUIRED.



### 1 CADWELD PLUS EXOTHERMIC WELDING PROCEDURES - TYPICAL SEE ALTERNATE OPTION DETAIL 1A SCALE: N.T.S.

STEP 1. WEAR PROPER CLOTHING, SAFETY GLASSES AND GLOVES WHEN THERMITE WELDING. AVOID BREATHING CONCENTRATIONS OF SMOKE, AS IT MAY BE HAZARDOUS TO YOUR HEALTH. REMOVE OR PROTECT FIRE HAZARDS IN THE WELDING AREA. FAILURE TO ABIDE BY THESE SAFETY PROCEDURES MAY RESULT IN HAZARDOUS SITUATIONS TO THE INDIVIDUAL AND BYSTANDERS.



STEP 3. REMOVE PIPE COATING AREA (3"x3") & GRIND STRUCTURE CONNECTION AREA TO BARE SHINY METAL AND CLEAN. SURFACE TO BE WELDED MUST BE BRIGHT CLEAN WITH FILE OR WIRE BRUSH AND DRY. UNDER SOME CONDITIONS OF TEMPERATURE AND HUMIDITY, THE SURFACE TO BE WELDED WILL SWEAT CAUSING POROUS WELDS. THIS CAN BE ELIMINATED WITH A HAND TORCH PRIOR TO WELDING.

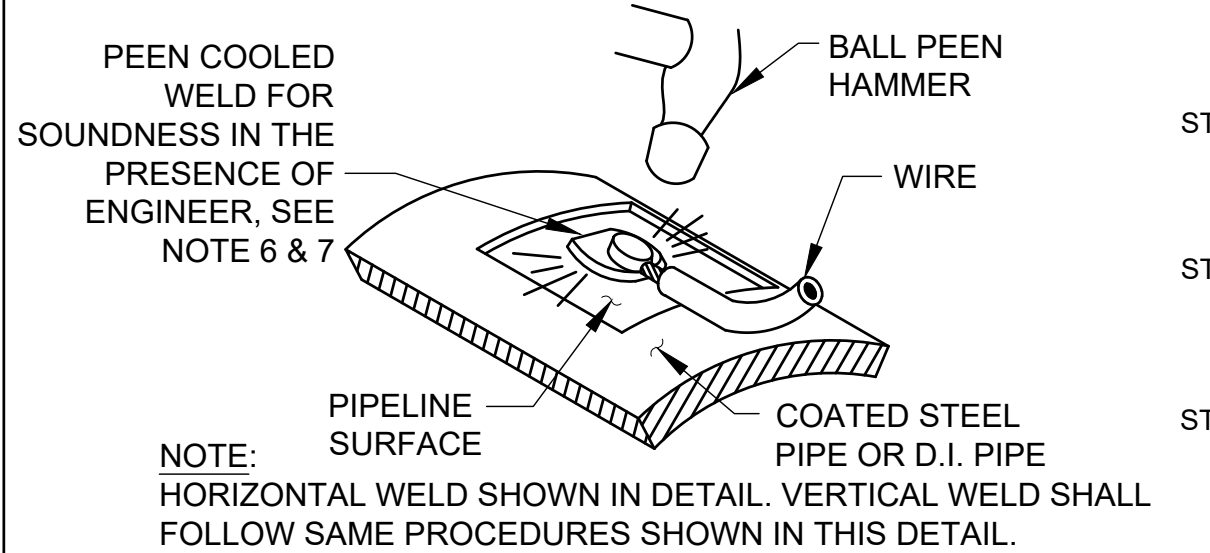
STEP 4. STRIP INSULATION FROM WIRE. EXPOSED CONDUCTORS MUST BE BRIGHT, CLEAN AND DRY. WET CABLES CAN BE DRIED OUT USING A HAND TORCH.

STEP 5. CHECK MOLD TAG FOR MATERIAL TO BE WELDED AND PROPER CARTRIDGE SIZE TO BE USED. MOLD CAN BE DRIED USING A HAND TORCH. PLACE END OF CABLE TO THE CENTER LINE OF THE TAP HOLE. INSERT STEEL DISK BEING SURE IT IS CENTERED OVER THE TAP HOLE. POUR PROPER METAL WELDING POWDER INTO THE CRUCIBLE. CLOSE THE MOLD LID. PLACE SMALL AMOUNT OF STARTING POWDER IN THE IGNITION POCKET. HOLD MOLD FIRMLY BY HANDLE WITH OPENING AWAY FROM INDIVIDUAL AND IGNITE WITH FLINT GUN (NOTE: INDIVIDUAL MUST NOT PLACE EXPOSED BODY PART DIRECTLY OVER LID OR IN FRONT OF LID OPENING TO AVOID INJURY). WAIT 15 SECONDS BEFORE OPENING THE MOLD TO ALLOW WELD METAL TO COOL. FAILURE TO FOLLOW WELDING PROCEDURES MAY RESULT IN IMPROPER WELDS AND DAMAGE TO THE MATERIAL BEING WELDED.

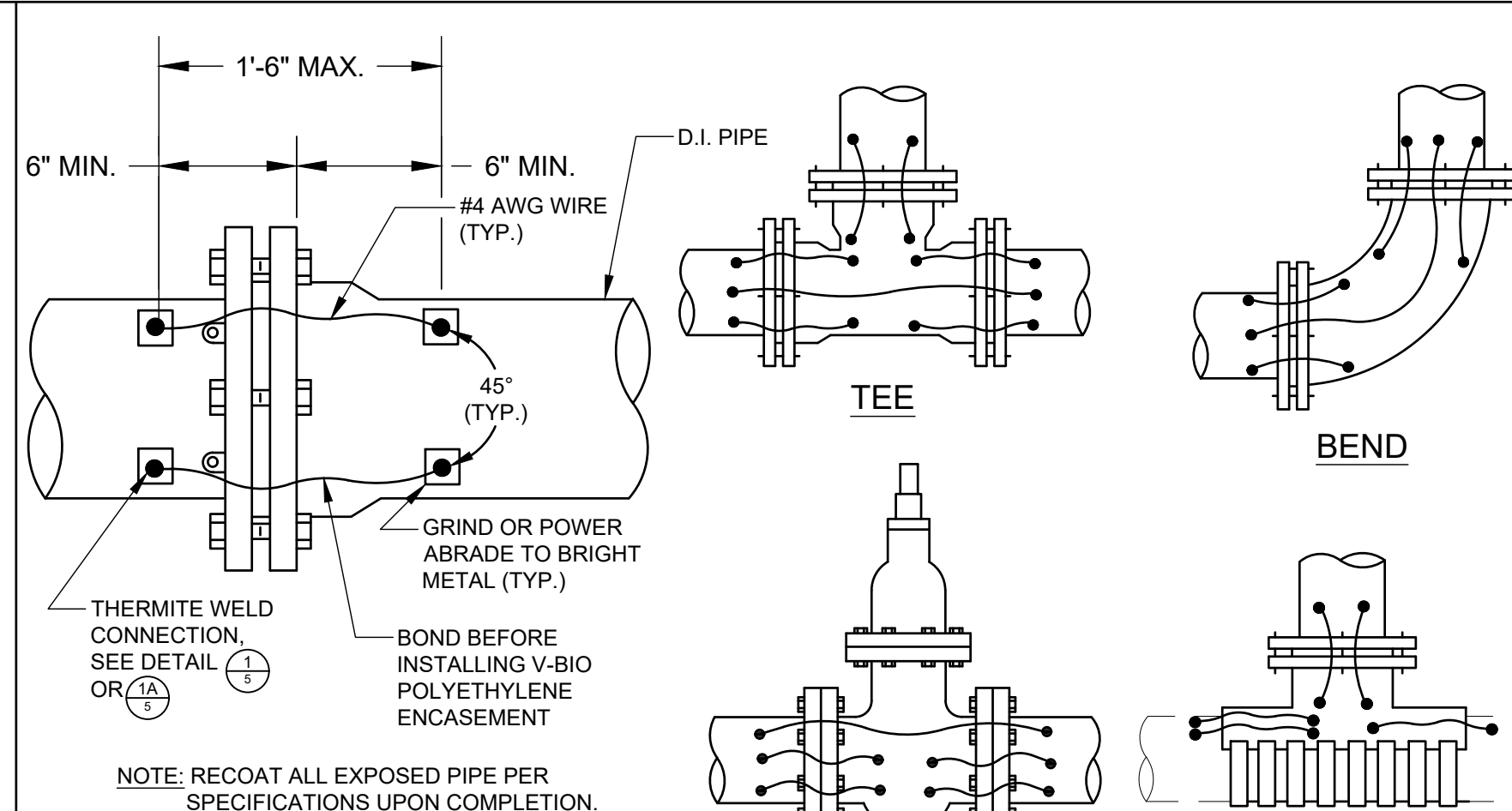
STEP 6. AFTER WELD HAS COOLED, REMOVE SLAG FROM CONNECTION AND PEEN WELD IN THE PRESENCE OF ENGINEER TO DEMONSTRATE SOUNDNESS.

STEP 7. IF WELD BECAME LOOSE DURING PEENING, A NEW WELD MUST BE MADE NOT LESS THAN 6" FROM THE FAILED WELD.

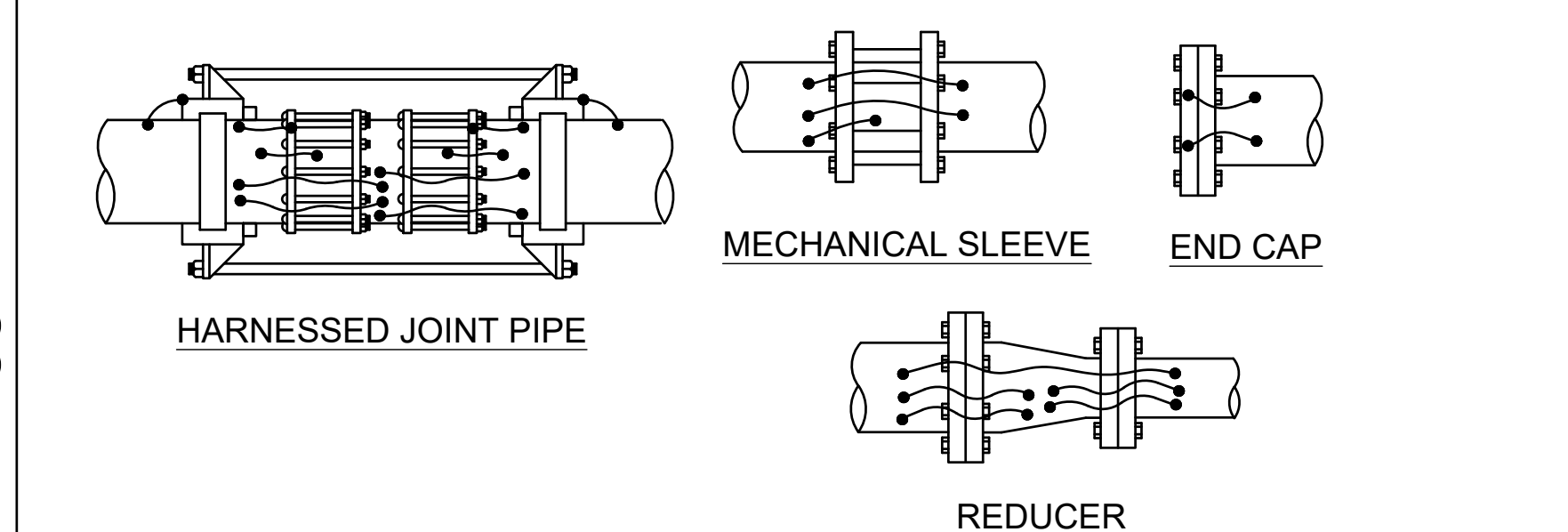
STEP 8. APPLY COATING OVER COMPLETED WELD CONNECTION.



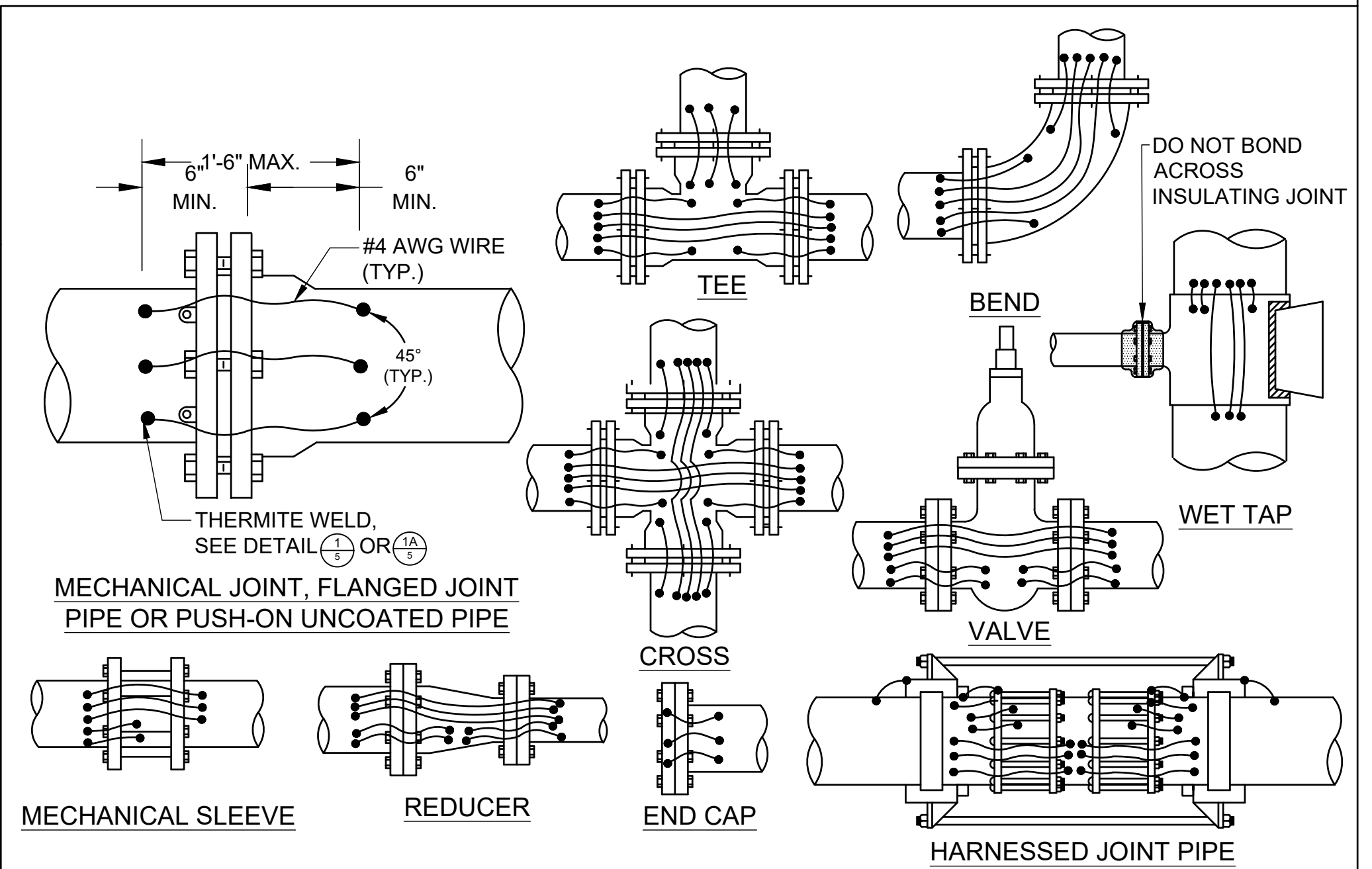
### 1A TYPICAL THERMITE WELD PROCEDURES FOR #8 AWG WIRE AND LARGER SCALE: N.T.S.



### 2 JOINT BONDING CONFIGURATIONS (UP TO 36" PIPE) SCALE: N.T.S.



**\* ADDITIONAL NOTES:**  
Prior to starting any exothermic welding activities, you must have a 20lb. (9kg) class ABC fire extinguisher and must be wearing non-synthetic long sleeve shirt or elbow-length gloves to eliminate slag from coming in contact with bare skin. Ensure that the surface below exothermic process is non-flammable. If needed, utilize a fire blanket or other non-flammable as a barrier.



### 3 JOINT BONDING CONFIGURATIONS (38" PIPE AND LARGER) SCALE: N.T.S.

- NOTES (FOR DETAILS 2 & 3 ON THIS SHEET):**
1. COATING OF BELL & SPIGOT JOINT MUST BE COATED PRIOR TO INSTALLING BOND WIRES.
  2. THERMITE WELD BONDING WIRES TO TOP OF PIPE OF FITTING.
  3. BOND WIRE LENGTH SHALL BE KEPT TO A MINIMUM OF 1'-6" UNLESS APPROVED BY THE ENGINEER. LEAVE SLACK IN ALL CABLES.
  4. TWO BOND WIRES SHALL BE USED ACROSS EACH PIPE JOINT.
  5. COAT ALL THERMITE WELDS AND EXPOSED COPPER WITH A PREFABRICATED ONE PIECE, ELASTOMERIC FILLED PLASTIC CAP (ROYSTON HANDI-CAP OR APPROVED EQUAL).
  6. ON EXTERNALLY COATED PIPE, REPAIR PIPE COATING IN ACCORDANCE WITH THE COATING MANUFACTURER'S RECOMMENDATIONS.
  7. WIRE SIZE FOR BONDING JOINTS SHALL BE AS FOLLOWS:
- | PIPE SIZE       | WIRE SIZE    |
|-----------------|--------------|
| LARGER THAN 30" | #2 AWG HMWPE |
| 6" TO 30"       | #4 AWG HMWPE |
| 4" & SMALLER    | #6 AWG HMWPE |

- Required Minimum Personal Protective Equipment:**  
ANSI Z-89.1 Hard hat  
ANSI Z-41.1 Safety glasses  
ANSI Z-41.1 Safety boot  
ANSI approved gloves  
Non-synthetic long sleeve shirt OR elbow length gloves  
Calibrated Gas Monitor  
20 lb. (9kg) Class ABC Fire Extinguisher
- Optional Personal Protective Equipment:**  
ANSI approved Flame-Resistant Clothing (FRC)  
Face shield  
Fire blanket  
Respirator (appropriate for work environment)

### CADWELD & THERMITE WELDING PROCEDURES AND JOINT BONDING CONFIGURATION DETAILS

Drawing prepared by:

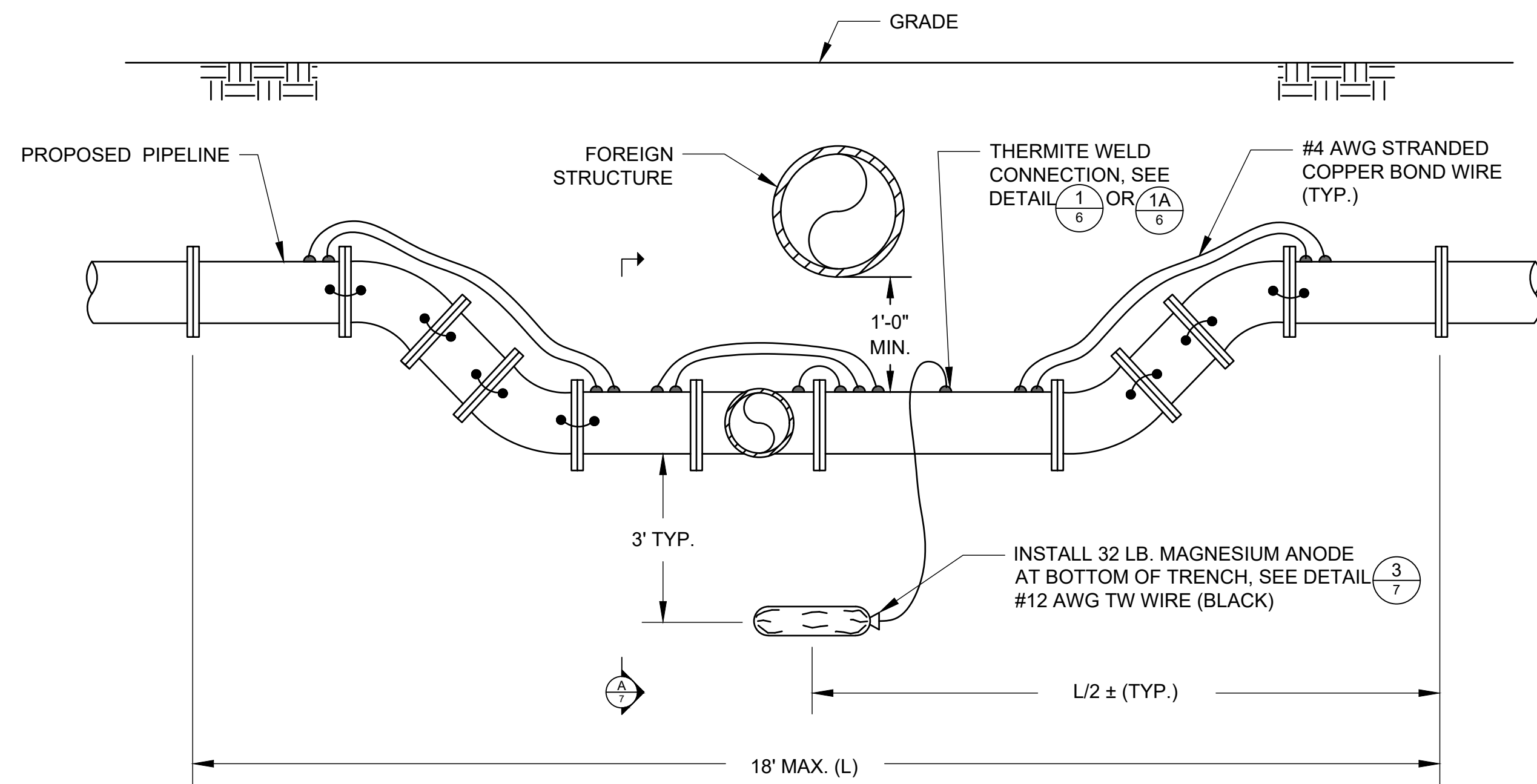
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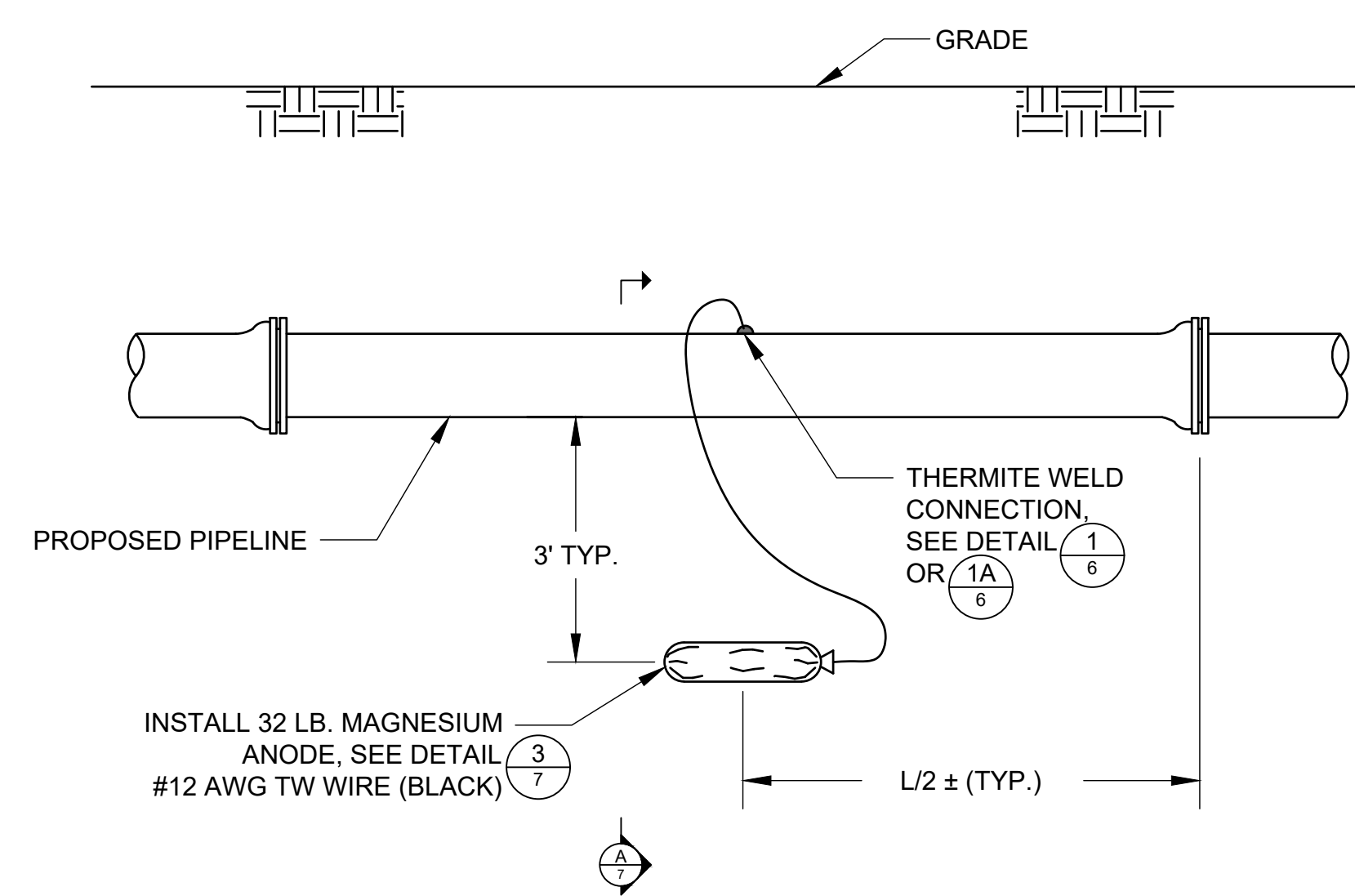
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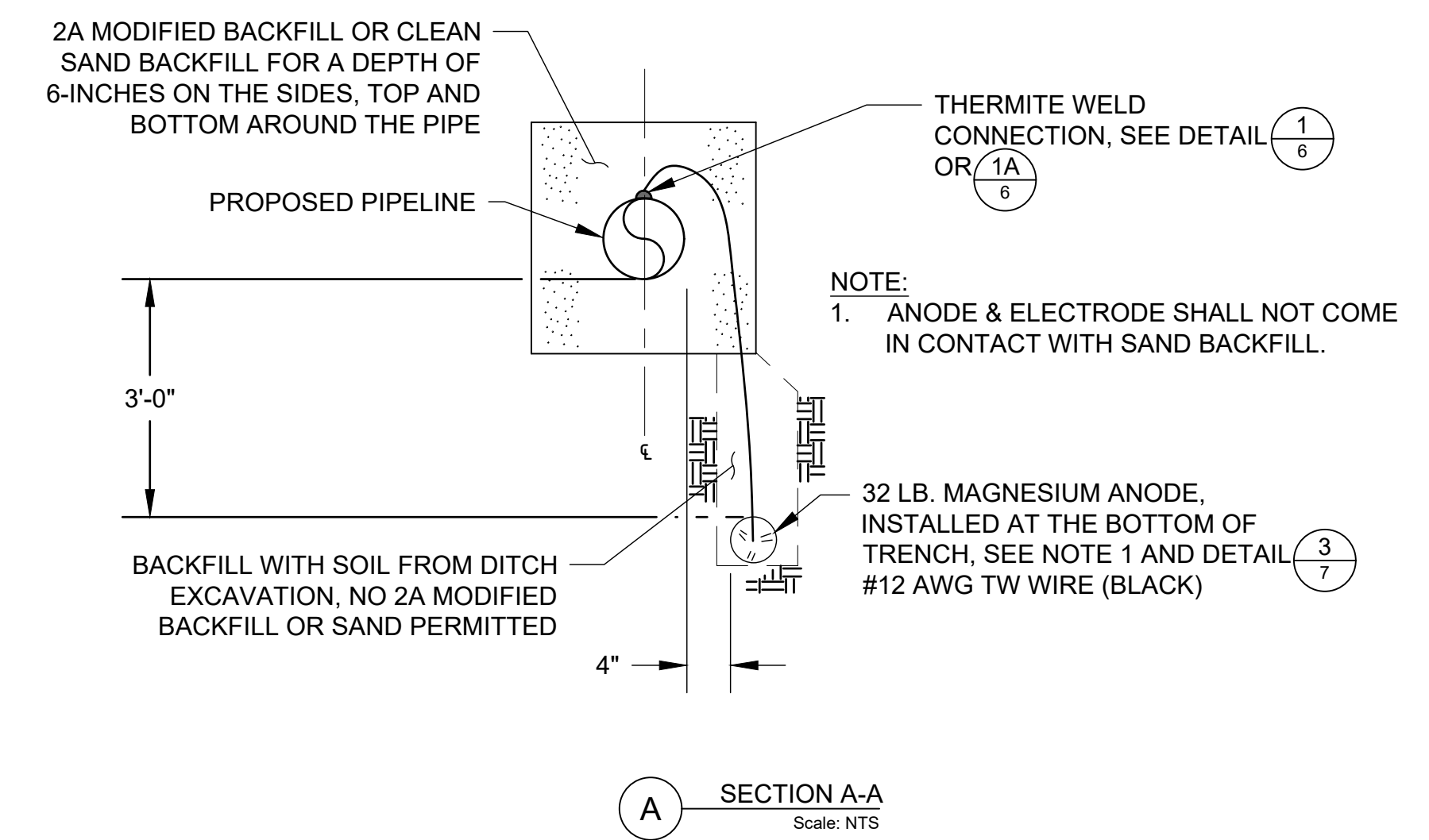


- NOTES:
- WHERE A SINGLE FITTING IS INVOLVED, IT SHOULD BE BONDED TO ONE OF THE CONNECTING PIPES TO WHICH AN ANODE HAS BEEN ATTACHED. A SEPARATE ANODE FOR THE FITTING IS NOT REQUIRED.
  - INSTALL ANODE AT THE BOTTOM OF TRENCH AND DIRECTLY CONNECTED TO PIPE.
  - ANODE ONLY SHOWN HORIZONTALLY INSTALLED; AND ANODE CAN BE INSTALLED VERTICALLY PER FIELD CONDITIONS.

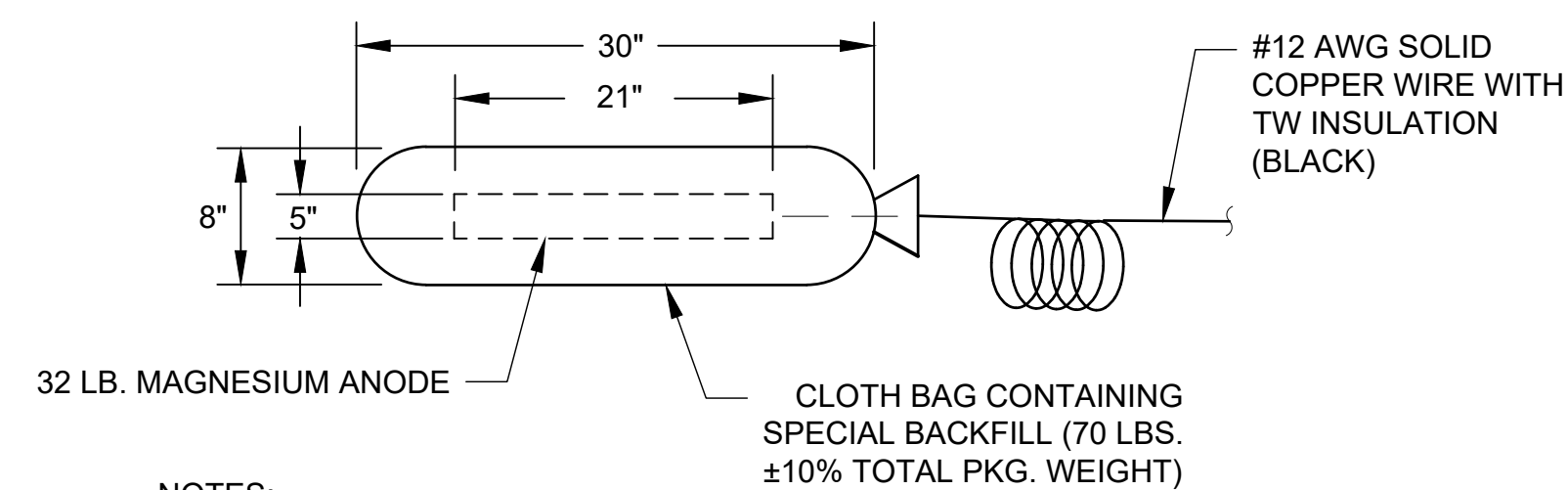
**1** GROUPING OF FITTINGS FOR ANODE INSTALLATION - TYPICAL  
SCALE: N.T.S.



**2** MAGNESIUM ANODE INSTALLATION (STRAIGHT PIPE SEGMENT)  
SCALE: N.T.S.

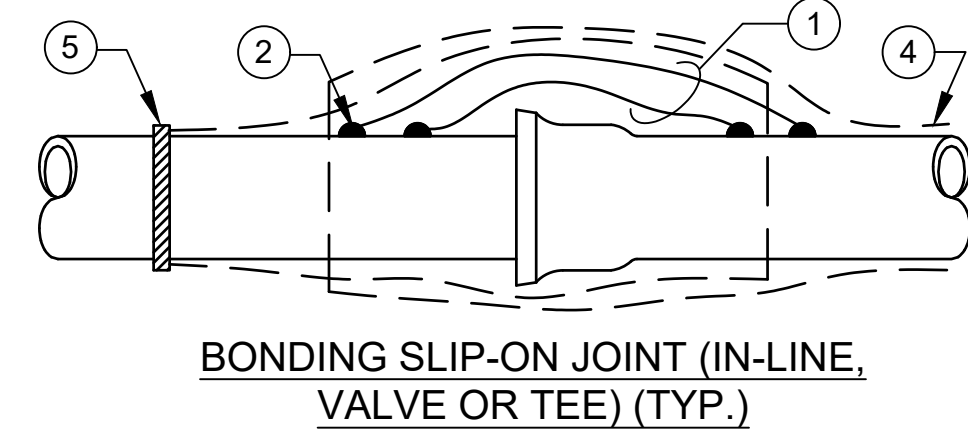


**A** SECTION A-A  
Scale: NTS

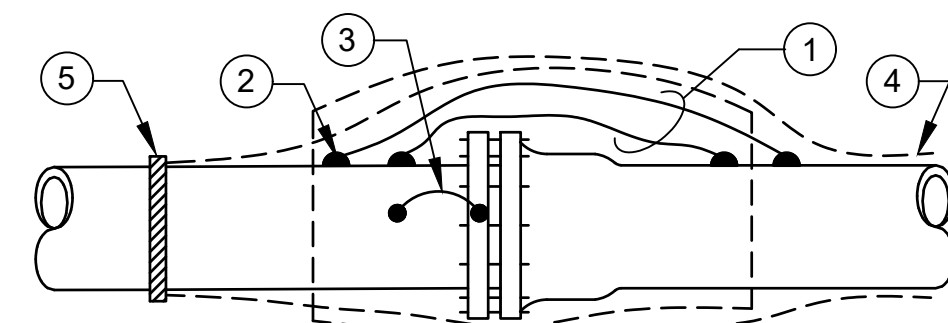


- NOTES:
- REMOVE ANODE FROM PLASTIC BAG PRIOR TO INSTALLATION.
  - BEFORE BACKFILLING, WET MAGNESIUM ANODE WITH APPROXIMATELY 5 GALLON OF WATER. RAIN WATER OR GROUND WATER IN DITCH WILL ALSO SUFFICE FOR THIS PURPOSE.
  - DO NOT LOWER ANODE INTO AUGURED HOLE OR TRENCH BY THE LEAD WIRE. SECURE ROPE TO ANODE TO LOWER INTO PLACE.

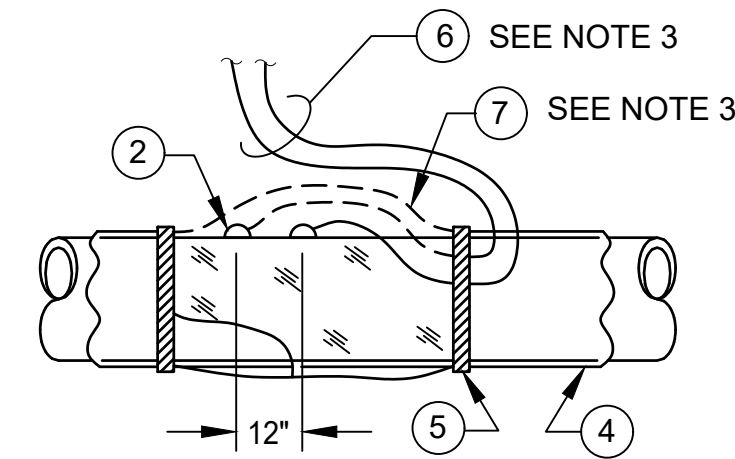
**3** 32 LB. MAGNESIUM ANODE - 32S5  
(FACTORY MANUFACTURED)  
SCALE: N.T.S.



BONDING SLIP-ON JOINT (IN-LINE, VALVE OR TEE) (TYP.)



BONDING RESTRAINED JOINT (IN-LINE, VALVE OR TEE) (TYP.)



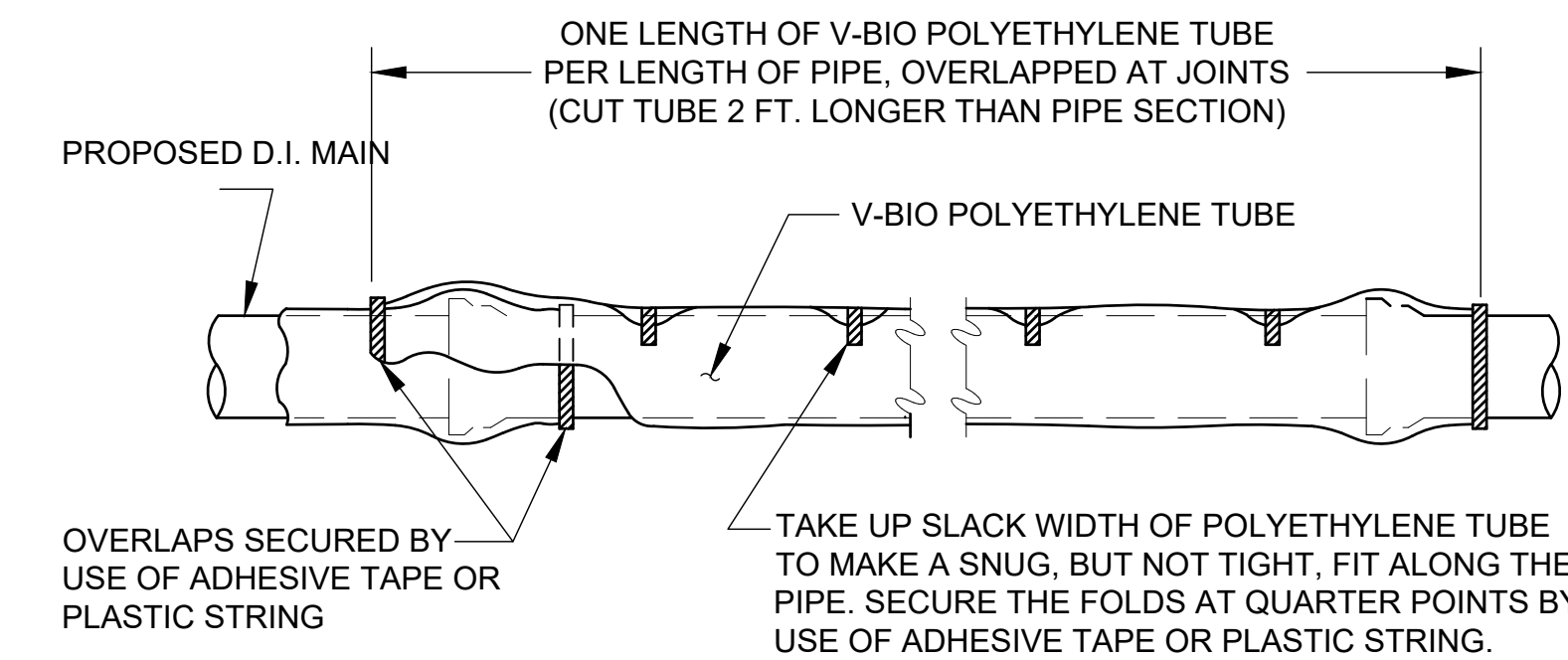
PIPE TEST WIRES - TYP.

**5** PIPE JOINT BONDING & TEST WIRES (UNDER POLYWRAP)  
SCALE: N.T.S.

- KEY
- FOR BOND WIRE INSTALLATION, SEE DETAILS **2** & **3**
  - THERMITE WELD, SEE DETAIL **1** OR **1A**
  - ONE (1) #2 AWG HMWPE BOND CABLE
  - V-BIO POLYETHYLENE ENCASUREMENT, SEE DETAIL **6**
  - SECURE END OF V-BIO POLYETHYLENE ENCASUREMENT OR REPAIR PIECE BY USE OF ADHESIVE TAPE OR PLASTIC STRING.
  - TWO (2) #8 AWG TEST WIRES
  - POLYETHYLENE TUBE REPAIR PIECE

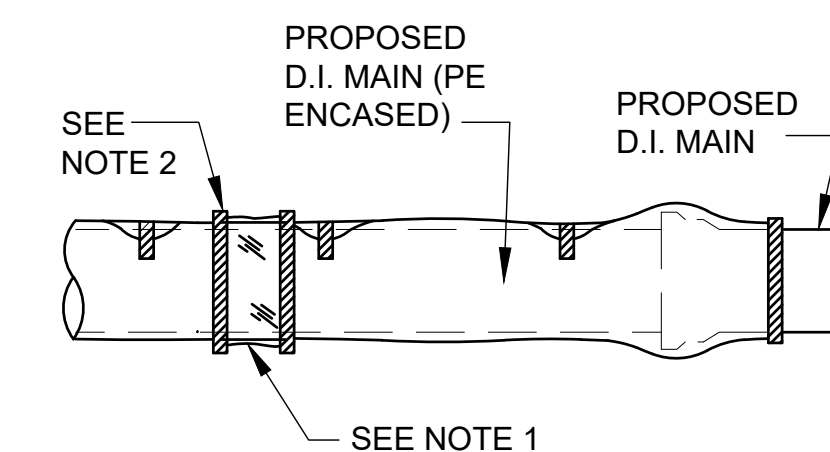
NOTES: (FOR PIPE TEST WIRES)

- INSTALL POLYETHYLENE TUBE OVER PIPE PRIOR TO INSTALLING TEST WIRES.
- SLIT POLYETHYLENE TUBE AT LENGTH REQUIRED TO THERMITE WELD WIRES TO THE PIPE.
- ROUTE TEST WIRES AS SHOWN ALONG TOP OF PIPE AND INSTALL POLYETHYLENE TUBE REPAIR PIECE PER DETAIL **7**



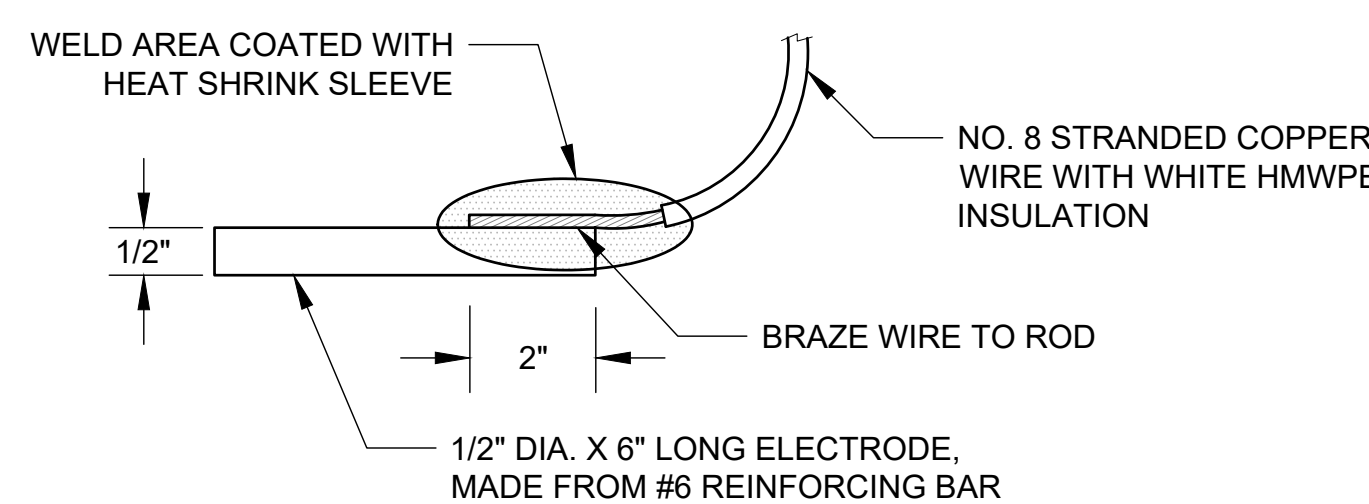
- NOTES:
- WRAP POLYETHYLENE TUBE OVER BOND WIRES (WIRES & PROBE NOT SHOWN FOR CLARITY)
  - REPAIR RIPS, PUNCTURES, OR OTHER DAMAGE TO POLYETHYLENE TUBE PER DETAIL **7**

**6** LOOSE POLYETHYLENE WRAP INSTALLATION - TYPICAL  
SCALE: N.T.S.



- NOTES:
- REPAIR RIPS, PUNCTURES, OR OTHER DAMAGE TO POLYETHYLENE TUBE WITH ADHESIVE TAPE OR SHORT LENGTH OF POLYETHYLENE TUBE CUT OPEN AND WRAPPED AROUND PIPE.
  - SECURE EDGES POLYETHYLENE REPAIR PIECE BY USE OF ADHESIVE TAPE OR PLASTIC STRING.

**7** POLYETHYLENE WRAP REPAIR - TYPICAL  
SCALE: N.T.S.



**4** STEEL REBAR TEST ELECTRODE  
(IF APPLICABLE)  
SCALE: N.T.S.

STANDARD STRAIGHT PIPE MAGNESIUM ANODE INSTALLATION AND POLYETHYLENE WRAP DETAILS

Drawing prepared by:

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