



PERKASIE REGIONAL AUTHORITY

PERKASIE REGIONAL AUTHORITY
BUCKS COUNTY, PENNSYLVANIA

STANDARD CONSTRUCTION DETAILS

PREPARED BY:

PENNONI ASSOCIATES INC.



150 Ridge Road, Suite 2
Sellersville, PA 18960
T 215-257-5711
F 215-257-5766

PERKASIE REGIONAL AUTHORITY

STANDARD WATER DETAILS

Water Supply System Details

Drawing No.

Fire Hydrant	PRA-W01
Standard Blow-Off	PRA-W02
Yard Hydrant	PRA-W03
Air Release Manhole	PRA-W04
Horizontal Reaction Backing	PRA-W05
Downward Thrust Block	PRA-W06
Upward Thrust Block	PRA-W07
Tapping Sleeve and Valve	PRA-W08
Residential Service Line	PRA-W09
Residential Meter Setting	PRA-W10
Non-Residential Meter Setting	PRA-W11
Pressure Test Schematic	PRA-W12
Residential Service/Sprinkler Line	PRA-W13
Residential Service/Sprinkler Line	PRA-W14
Boxlok Valve Box Alignment Device	PRA-W15
Residential Meterpit	PRA-W16

Standard Materials Lists

Appendix A

PERKASIE REGIONAL AUTHORITY

STANDARD SEWER DETAILS

Sanitary Sewer System Details

Drawing No.

Type "A" Standard Manhole	PRA-S01
Type "A" Drop Manhole	PRA-S02
Type "B" Standard Manhole	PRA-S03
Precast Base	PRA-S04
Standard Manhole Frame & Cover	PRA-S05
Waterproof Manhole Frame & Cover	PRA-S06
Precast Manhole Step	PRA-S07
Drop Manhole Collar	PRA-S08
Precast Doghouse Manhole	PRA-S09
Sanitary Lateral – Shallow Sewer	PRA-S10
Sanitary Lateral – Deep Sewer	PRA-S11
Existing House Connection	PRA-S12
Existing House Connection with Trap	PRA-S13
New House Connection	PRA-S14
Typical Connection to Sewer Main	PRA-S15
Pressure Sewer Grinder Pump Station	PRA-S16
Duplex Grinder Pump Station	PRA-S17
Sewer Saddle	PRA-S18
Concrete Encasement & Pedestal	PRA-S19
Pipe Bedding and Envelope Detail	PRA-S20
Trench Backfill	PRA-S21
Flexible Pavement Restoration:	
Township/Borough	PRA-S22A
PennDot	PRA-S22B
Rigid Pavement Restoration	PRA-S23
Temporary Pavement Restoration	PRA-S24
Stream Crossing:	
Plan View	PRA-S25
Cross Section	PRA-S26
Standard Materials List	Appendix A



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BUCKS COUNTY, PENNSYLVANIA

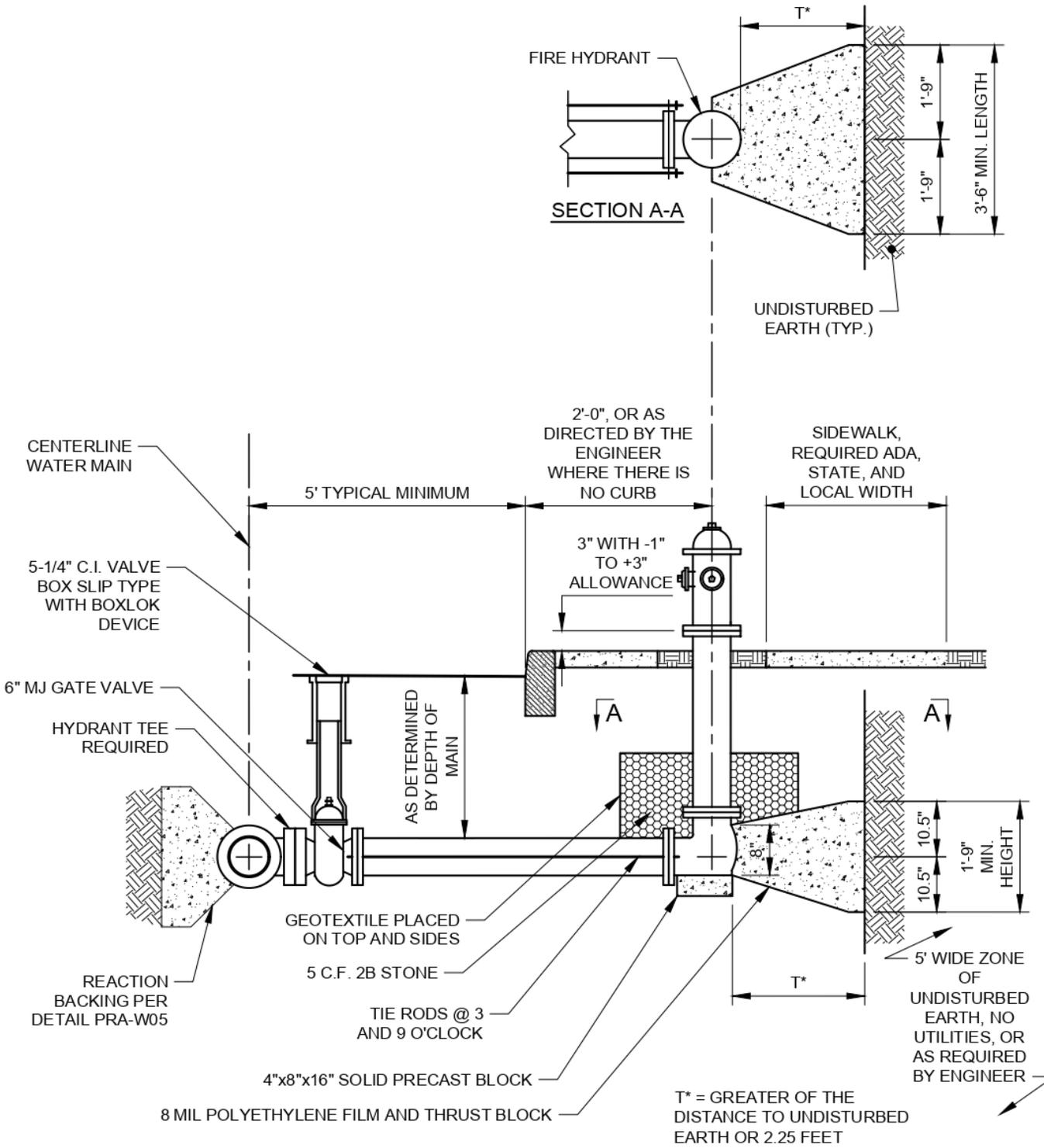
WATER SUPPLY SYSTEM DETAILS

PREPARED BY:

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STANDARD FIRE HYDRANT DETAIL
NOT TO SCALE

REVISED 5/13/2025

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FIRE HYDRANT
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/08/96
DRAWING NO.	PRA-W01 1 OF 2

M:\AUTHORITY CLIENTS\PERKASIE\WATER DETAILS\ALL PRA WATER DETAILS 2025.DWG
 PLOTTED: 7/19/2025 9:40:17 AM BY: TINA CARTER PLOTSTYLE: PENNONI NCS.STB PROJECT STATUS: ---

FIRE HYDRANT DESIGN, PURCHASE, AND INSTALLATION GENERAL NOTES:

1. DESIGN OF THE THRUST BLOCKS ARE BASED ON THE WATER TABLE BEING BELOW THE BLOCK. THE HORIZONTAL BEARING STRENGTH CHOSEN FOR DESIGN IS 2,000 PSF AND REPRESENTS A CONSERVATIVE VALUE FOR SANDY SILT SOILS. CONTACT THE AUTHORITY ENGINEER FOR A SPECIAL DESIGN IF THE WATER TABLE IS HIGHER, OR THE SOILS ARE SILT, SOFT CLAY, OR MUCK.
2. THE SOIL (ZONE OF INFLUENCE) BEHIND THE HYDRANT THRUST BLOCK IS TO REMAIN UNDISTURBED AND FREE OF OTHER UTILITIES. CONTACT PRA'S ENGINEER FOR GUIDANCE.
3. FOR PIPE BEDDING AND ENVELOPE DETAILS, REFER TO DETAIL PRA-S020. FOR TRENCH BACKFILL DETAILS, REFER TO DETAIL PRA-S021.
4. HYDRANTS SHALL MEET AWWA STANDARD C502 AND SHALL BE EITHER:
 - A. KENNEDY GUARDIAN MODEL K81D WITH STANDARD UPPER BARREL CONFIGURATION AND OPTIONAL 6" MECHANICAL JOINT INLET CONNECTION.
 - B. AMERICAN FLOW CONTROL 5-1/4 AMERICAN-DARLING B-62-B-5 TRAFFIC MODEL HYDRANT, OPEN DIRECTION IS LEFT (C.C.W.).
5. HYDRANTS SHALL BE ORDERED TO THE DEPTH OF BURY REQUIRED AT THE PROPOSED LOCATIONS BASED ON THE WATER MAIN DEPTH AND THE FINISHED GRADE ELEVATION. EXTENSIONS ARE NOT PERMITTED.
6. THE ABOVE GROUND FINISH EXTERIOR COATING SHALL BE YELLOW. CAP CHAINS ARE NOT REQUIRED.
7. THE PIPE TO THE HYDRANT SHALL BE 6" DIP WITH NO BENDS. THE HYDRANT SHALL BE INSTALLED IN THE TRUE VERTICAL POSITION. THE PUMPER NOZZLE SHALL FACE THE STREET.
8. TIE RODS SHALL BE 3/4" ASTM A307 STEEL WITH DUCT LUGS, A563 HEX OR HEAVY HEX NUTS AND F844 WASHERS. COAT ALL COMPONENTS WITH TWO COATS (8 MILS EACH, DMT) OF RUST-OLEUM C9578 SYSTEM COAL TAR EPOXY. FOLLOW MANUFACTURER'S REQUIREMENTS, INCLUDING A RECOAT TIME OF 16-25 HOURS, AND A HANDLE TIME OF 18-36 HOURS. ASTM F2329 HOT DIPPED GALVANIZED RODS AND COMPONENTS MAY BE USED IN PLACE OF COATED RODS AND COMPONENTS.
9. IF MORE THAN ONE SECTION OF PIPE IS INSTALLED BETWEEN THE HYDRANT VALVE AND THE HYDRANT, THEN ALL PIPE SLIP-ON JOINTS SHALL BE RESTRAINED WITH EBAA IRON SERIES 1700 RESTRAINT HARNESSSES. TIE RODS WILL NOT BE REQUIRED.
10. EIGHT MIL POLYETHYLENE FILM SHALL BE INSTALLED TO PROTECT COMPONENTS FROM THE CONCRETE AND TO PROTECT THE DRAIN PORTS.
11. CONCRETE SHALL BE CLASS A, 3,300 PSI. GEOTEXTILE SHALL BE PENNDOT NON-WOVEN, CLASS 4, TYPE A.

STANDARD FIRE HYDRANT DETAIL
NOT TO SCALE

REVISED 5/13/2025

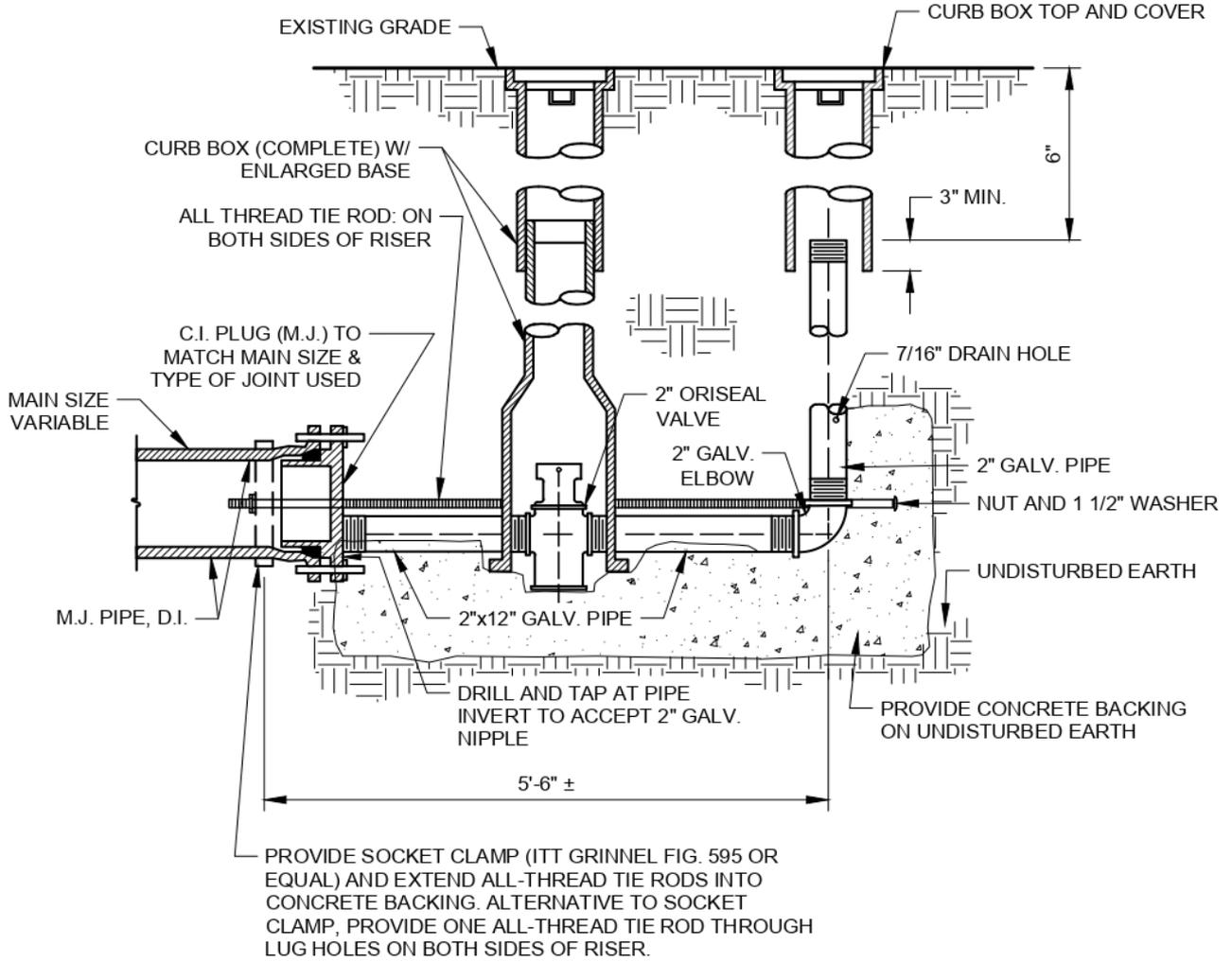


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FIRE HYDRANT
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DESIGNED BY:	JAR
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DATE:	4/08/96
DRAWING NO.	PRA-W01 2 OF 2

NOTE:
 VALVE AND VALVE
 BOXES TO BE SET
 ON 4" 2A MODIFIED
 AND BACKFILL AT
 LEAST 4" ABOVE
 TOP OF WATER MAIN



STANDARD BLOW-OFF DETAIL
 NOT TO SCALE

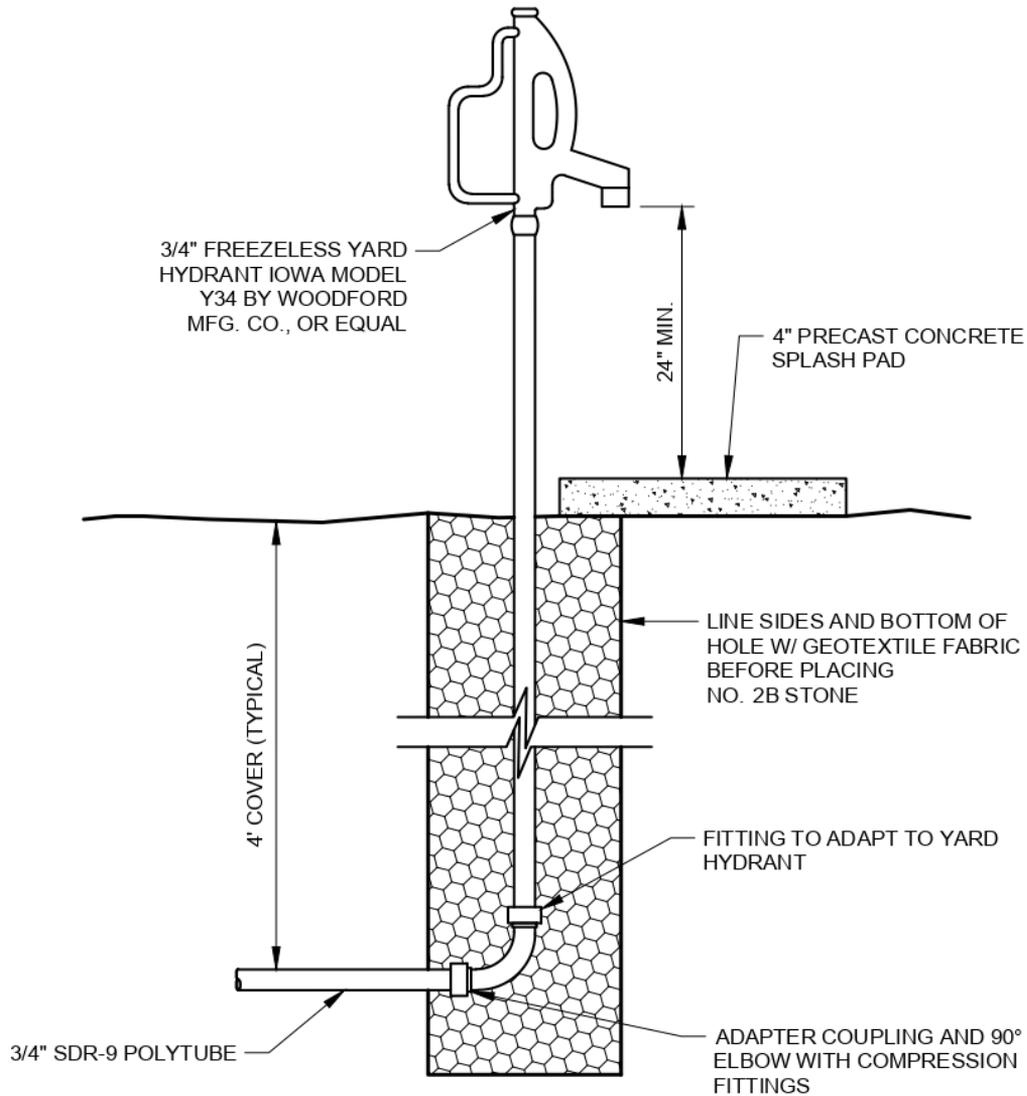
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STANDARD BLOW-OFF
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YARD HYDRANT DETAIL
NOT TO SCALE

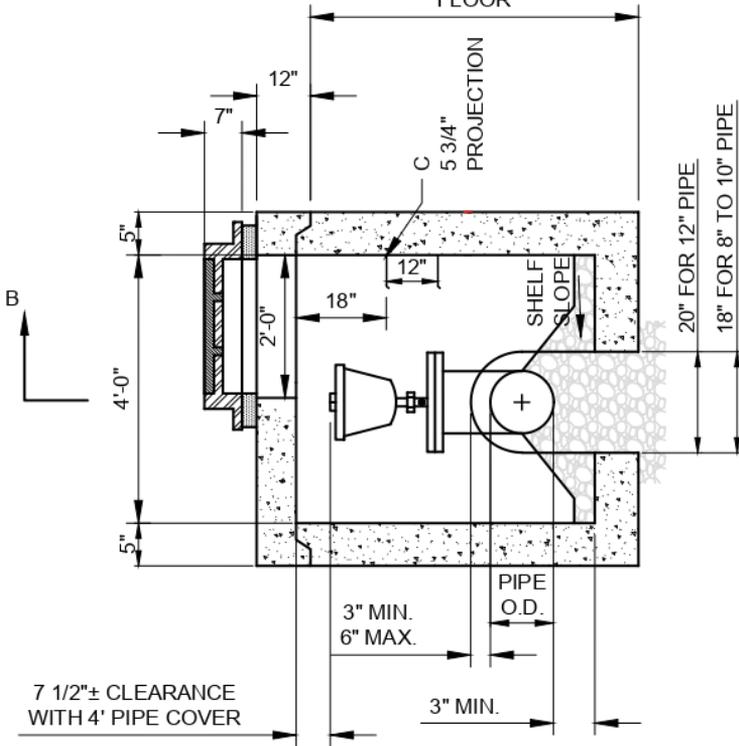
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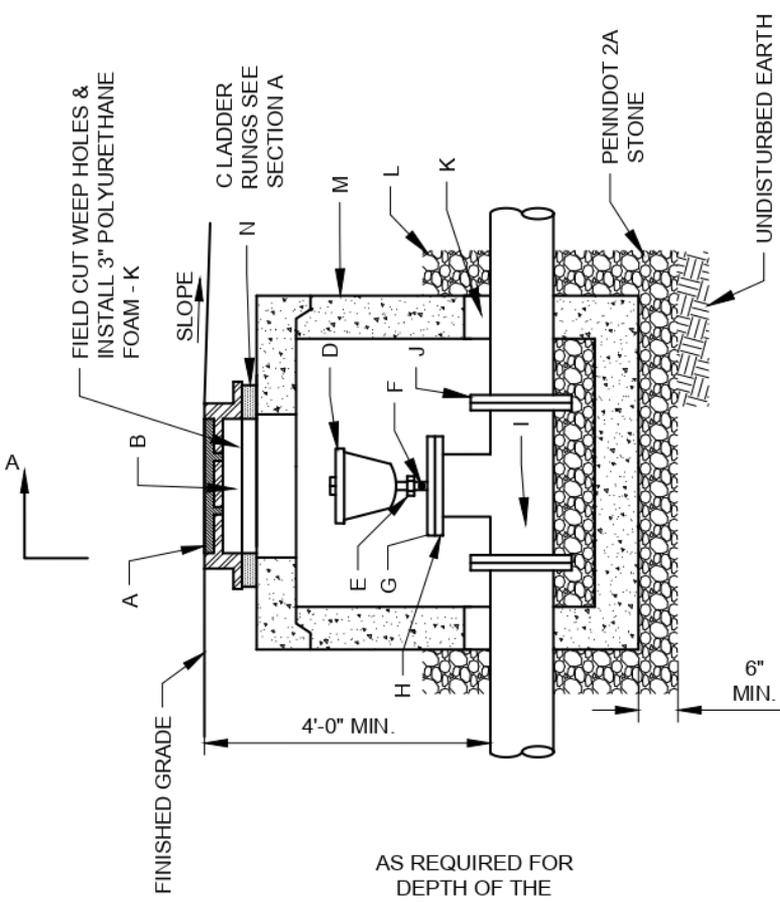
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YARD HYDRANT DETAIL
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CHECKED BY:	SRT
DATE:	3/7/96
DRAWING NO.	PRA-W03



SECTION A



SECTION B

AS REQUIRED FOR DEPTH OF THE PIPE AND 3" CLEARANCE FROM FLOOR

TYPICAL AIR RELEASE VALVE AND DOGHOUSE MANHOLE - OFF ROAD

NOT TO SCALE

- A - STANDARD MANHOLE FRAME AND COVER (SEE PRA DETAIL)
- B - SEALING SYSTEMS, INC. MANHOLE INSERT, 5" DEEP FOR INSULATION
- C - LADDER RUNG, M.A. INDUSTRIES PS4-B
- D - AIR RELEASE VALVE - CRISPIN UL20 WITH PROTECTOP
- E - 2" HEX NIPPLE 3" LONG, 304 OR 316 STAINLESS STEEL
- F - 2" BALL CORPORATION STOP M x FM
- G - TAPPED (2") FLANGE
- H - 1/8" GASKET
- I - COMPACT MJ x FE DUCTILE IRON TEE
- J - EBAA MEGALUG (2)
- K - POLYURETHANE FOAM INSULATION (ANNULAR OPENING & MANHOLE INSERT)
- L - 2A COARSE AGGREGATE
- M - 4'-0" DOGHOUSE MANHOLE
- N - 24" I.D. MINIMUM GRADE RING IF NEEDED

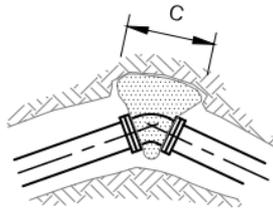
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AIR RELEASE MANHOLE

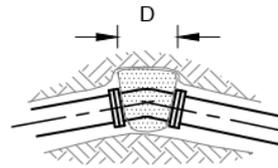
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DATE:	3/8/96
DRAWING NO.	PRA-W04

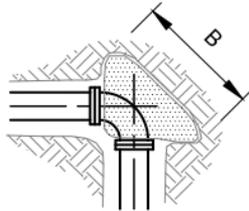
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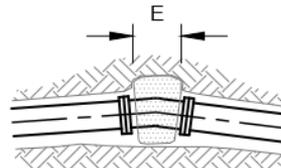
PLAN 45° BEND



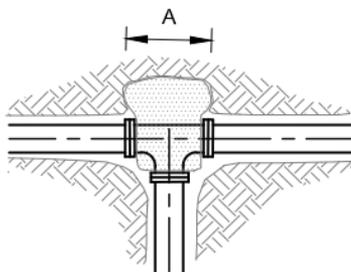
PLAN 22 1/2° BEND



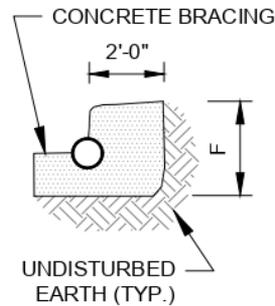
PLAN 90° BEND



PLAN 11 1/4° BEND



PLAN TEE



SECTION

NOTE: PROVIDE PLASTIC COVERING TO PROTECT PIPE JOINTS FROM CONCRETE.

DESIGN PRESSURE	PIPE DIAMETER	REACTION BACKING DIMENSIONS					
		A	B	C	D	E	F
150 PSI	16	5'-6"	7'-9"	4'-2"	2'-2"	----	3'-4"
	12	4'-2"	5'-11"	3'-3"	1'-8"	----	2'-6"
	8	3'-0"	4'-3"	2'-4"	1'-2"	----	1'-8"
	6	2'-2"	3'-4"	1'-10"	0'-11"	----	1'-3"
200 PSI	16	7'-3"	10'-3"	5'-7"	2'-10"	1'-6"	3'-4"
	12	5'-7"	7'-11"	4'-3"	2'-2"	1'-2"	2'-6"
	8	4'-0"	5'-7"	3'-1"	1'-7"	0'-10"	1'-8"
	6	3'-1"	4'-5"	2'-5"	1'-3"	0'-8"	1'-3"
250 PSI	16	9'-3"	13'-2"	7'-1"	3'-6"	2'-3"	3'-4"
	12	6'-4"	8'-11"	5'-4"	3'-5"	1'-9"	2'-6"
	8	5'-0"	6'-11"	3'-10"	1'-11"	1'-3"	1'-8"
	6	3'-10"	5'-6"	3'-9"	1'-10"	1'-1"	1'-3"

HORIZONTAL REACTION BACKING

NOT TO SCALE

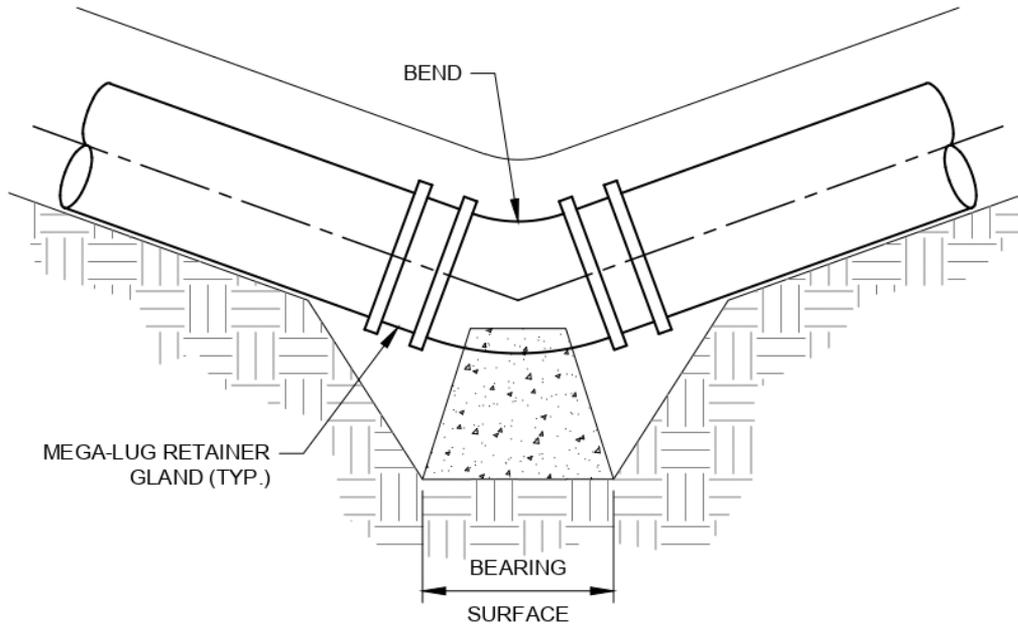
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HORIZONTAL REACTION BACKING
PREPARED FOR:
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CHECKED BY:	SRT
DATE:	4/08/96
DRAWING NO.	PRA-W05



NOTES:

1. ALL CONCRETE SHALL HAVE A MIN. COMPRESSIVE STRENGTH OF 2500 P.S.I.
2. ALL FITTINGS AND JOINTS SHALL BE COVERED WITH POLYETHYLENE FILM BEFORE PLACING CONCRETE.
3. PAINT ALL EXPOSED STEEL WITH TWO COATS OF VALDURA PAINT OR APPROVED EQUAL.
4. FOR THE REQUIRED BEARING SURFACE SEE STANDARD DETAIL.

BEARING SURFACE REQUIRED - SQ. FT. HORIZONTAL THRUST BLOCKING AND VERTICAL THRUST DOWNWARD 100 P.S.I. WORKING PRESSURE																
PIPE SIZE	6" & 8"				10" & 12"				16" 18" 20"				24"			
	DEGREE OF BEND OR DEFLECTION															
TYPE OF BEARING MATERIAL AND ALLOWABLE LOAD	22.5°	45°	90°	D.E.	22.5°	45°	90°	D.E.	22.5°	45°	90°	D.E.	22.5°	45°	90°	D.E.
	SAND 0.75 TON/SQ. FT.	3.4	6.0	11.0	6.4	6.7	12.8	23.4	14.2	14.8	28.8	52.9	34.4	26.1	48.3	89.7
SOFT CLAY 1 TON/SQ. FT.	2.6	4.6	8.2	4.8	5.0	9.6	17.5	10.7	11.2	21.7	39.7	28.2	19.6	36.3	67.3	48.0
SAND & GRAVEL 2 TON/SQ. FT.	1.3	2.3	4.1	2.4	2.5	4.8	8.8	5.3	5.6	10.8	20.0	14.1	9.8	13.1	33.6	24.0
CLAY 4 TON/SQ. FT.	1.0	1.2	2.1	1.3	1.3	2.4	4.4	2.7	2.8	5.4	10.0	7.2	4.9	9.1	16.8	12.0
SOFT ROCK 5 TON/SQ. FT.	1.0	1.0	1.6	1.0	1.0	1.9	3.5	2.2	1.6	4.4	8.0	5.7	3.9	7.3	13.5	9.6
ROCK 15 TON/SQ. FT.	-	-	1.0	0.4	-	1.0	1.2	0.8	1.0	1.4	2.6	1.9	1.3	2.4	4.5	3.2

TYPICAL SECTION
VERTICAL THRUST DOWNWARD
NOT TO SCALE

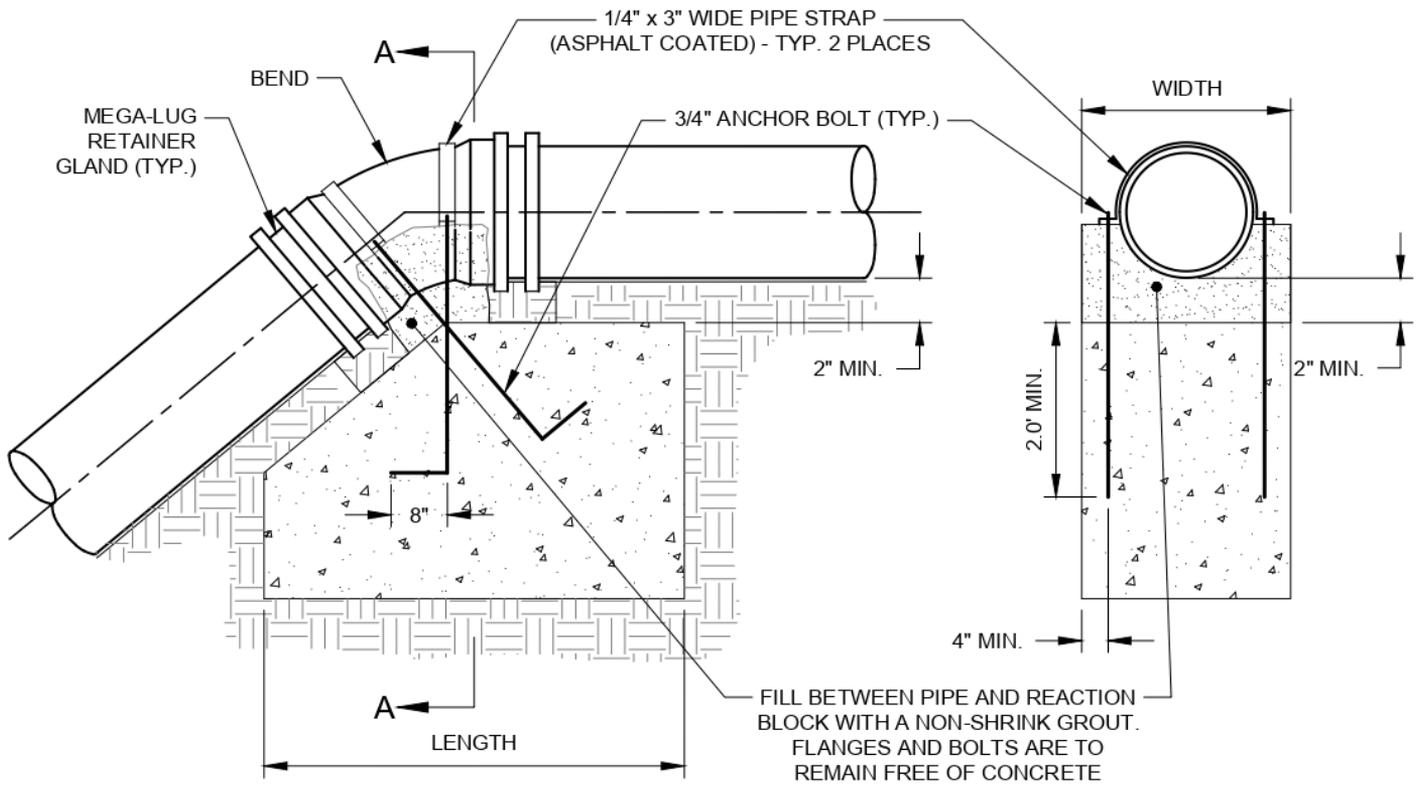
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DOWNWARD THRUST BLOCK
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/08/96
DRAWING NO.	PRA-W06



SECTION A-A

NOTES:

1. ALL CONCRETE SHALL BE PENNDOT CLASS A.
2. ALL REINFORCING STEEL SHALL BE DEFORMED BARS U-SHAPED AROUND PIPE.
3. ALL FITTINGS AND JOINTS SHALL BE COVERED WITH POLYETHYLENE FILM BEFORE PLACING CONCRETE.
4. PAINT ALL EXPOSED STEEL WITH TWO COATS OF VALDURA PAINT OR APPROVED EQUAL.

CONCRETE BLOCKING DIMENSIONS, VERTICAL THRUST UPWARD - 100 P.S.I. WORKING PRESSURE									
PIPE SIZE	LENGTH			WIDTH			DEPTH		
	11.25°	22.5°	45°	11.25°	22.5°	45°	11.25°	22.5°	45°
6" & 8"	3'	4'	6'	3'	4'	6'	3'	4'	6'
10" & 12"	3.5'	4'	7'	3.5'	4'	7'	3.5'	4'	7'
14" & 16"	4'	6'	9'	4'	6'	9'	4'	6'	9'
18" & 20"	5'	6.5'	11.5'	5'	6.5'	11.5'	5'	6.5'	11.5'
24"	5'	9'	12.5'	5'	9'	12.5'	5'	9'	12.5'

**TYPICAL SECTION
VERTICAL THRUST UPWARD
NOT TO SCALE**

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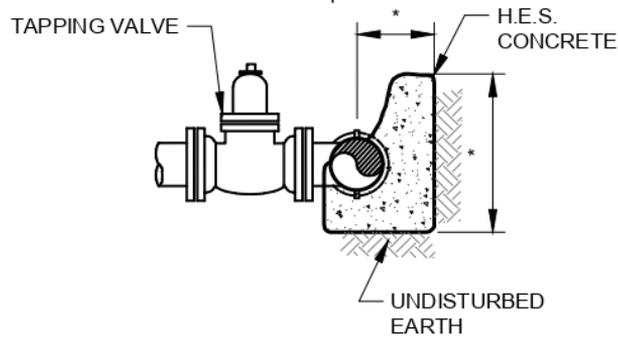
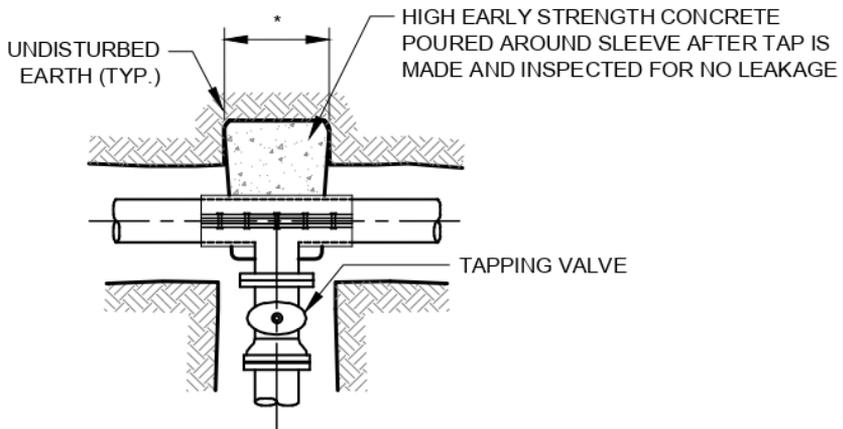


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UPWARD THRUST BLOCK
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PLOTTED: 7/22/2025 9:15:08 AM BY: TINA CARTER PLOTSTYLE: PENNONI NCS.STB PROJECT STATUS: ---



* SIZE IN FIELD, MIN. OF 4 SF. BEARING AREA

TAPPING SLEEVE & VALVE
NOT TO SCALE

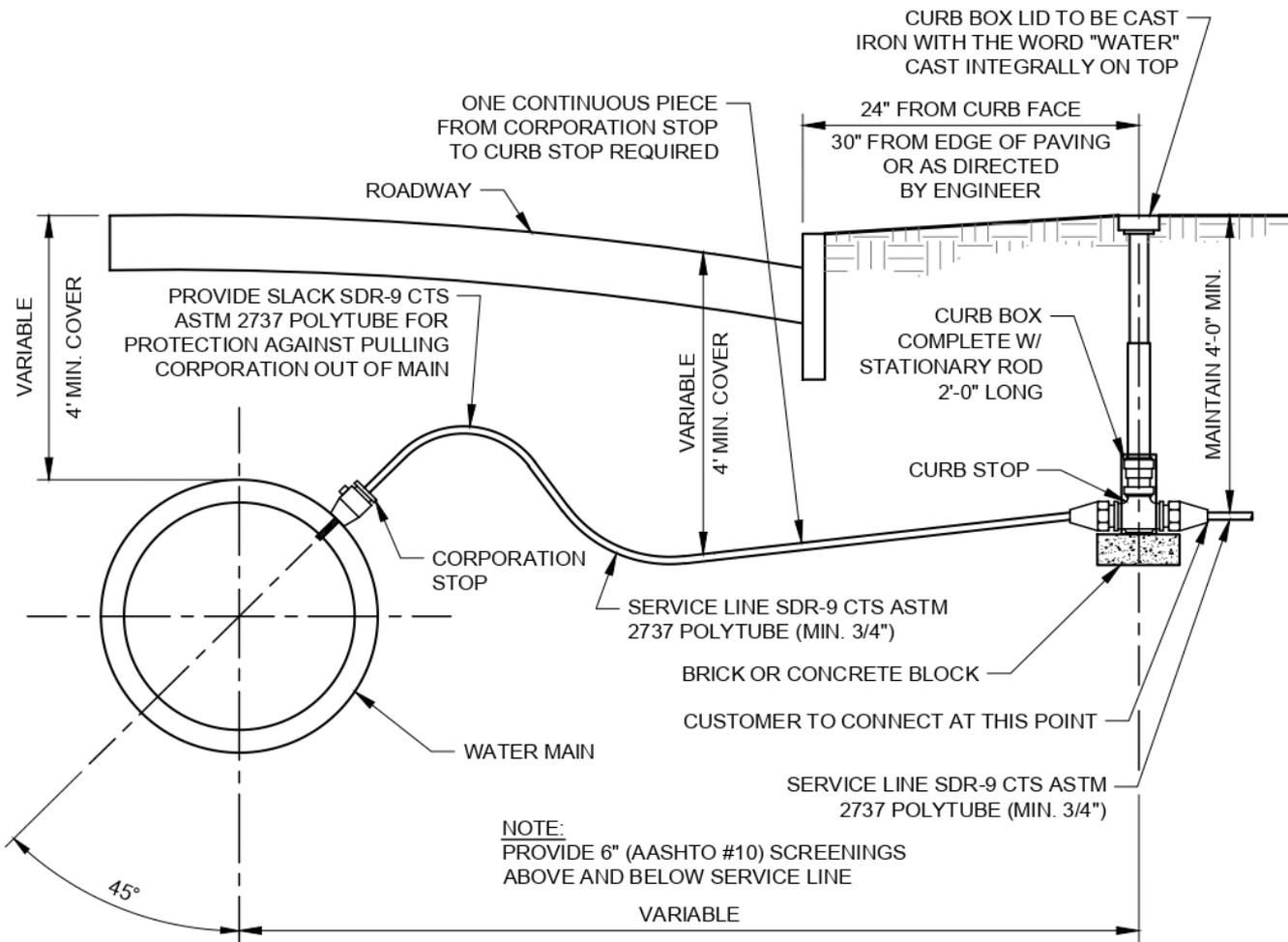
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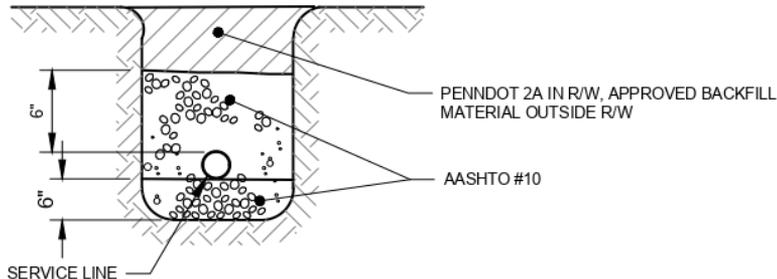
TAPPING SLEEVE & VALVE
PREPARED FOR:
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DESIGNED BY:	JAR
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DRAWING NO.	PRA-W08



NOTES :

1. WET TAPPING UNDER NORMAL LINE PRESSURE IS REQUIRED. THERE ARE TO BE NO SPLICES IN THE SERVICE LINE.
2. CORPORATION STOPS: MULLER B-25008, OR McDONALD 4701B-22, WITH INSERT-51-Q SOLID TUBULAR 304 SS INSERT STIFFENERS, OR APPROVED EQUAL.
3. CURB STOPS: MULLER B-25209, OR McDONALD 6100-22, WITH INSERT-51-Q SOLID TUBULAR 304 SS INSERT STIFFENERS, OR APPROVED EQUAL.
4. CURB BOX: MUELLER H-10306, OR McDONALD 5604, OR FORD EA2-45-50, OR EQUAL.
5. LID WITH CENTER, REMOVABLE, PENTAGONAL PLUG: MUELLER 89375, OR McDONALD 5614L.
6. CORPORATION STOP AND CURB STOP TO HAVE COMPRESSION FITTINGS. FLARE FITTINGS NOT PERMITTED.
7. IF THE TOTAL LENGTH OF THE POLYTUBE SERVICE LINE FROM THE WATER MAIN TO JUST INSIDE THE RESIDENCE IS MORE THAN 80 FEET, OR THE PRA AVAILABLE SERVICE PRESSURE IS LESS THAN 45 PSI, THEN THE AUTHORITY ENGINEER MUST REVIEW.



TYPICAL RESIDENTIAL SERVICE LINE CONNECTION

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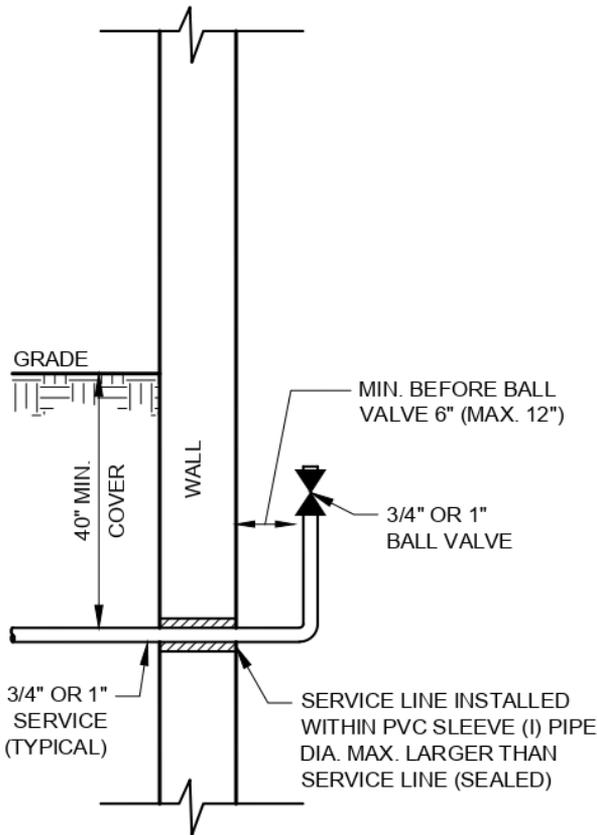
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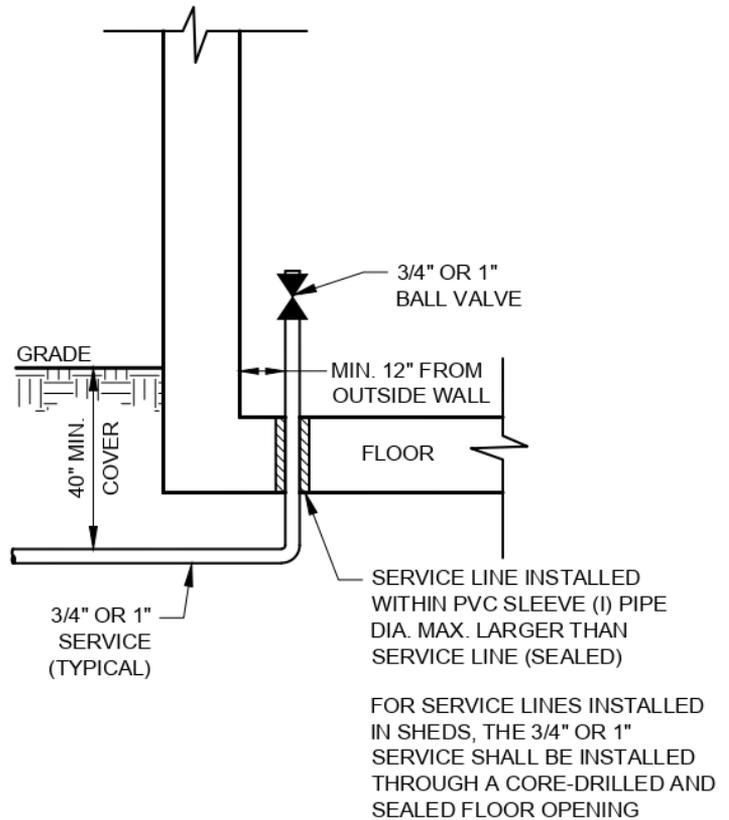
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TYPICAL RESIDENTIAL SERVICE LINE CONNECTION
PREPARED FOR:
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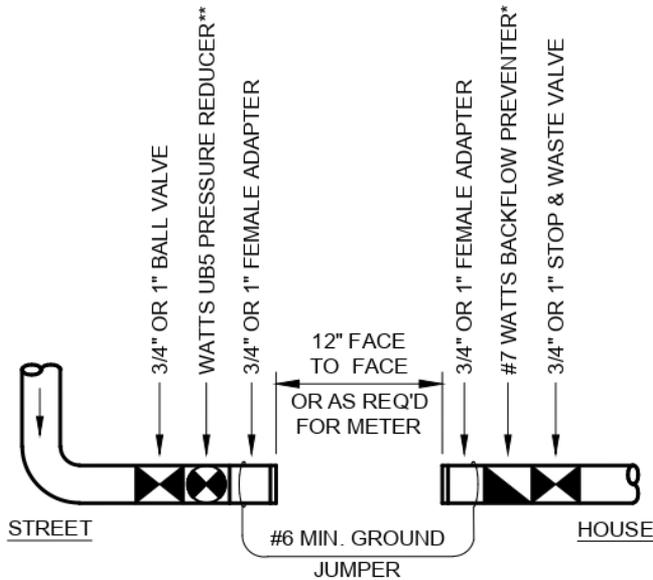
BASEMENT SERVICE



THROUGH FLOOR SERVICE

GENERAL NOTES:

1. NOTIFY AUTHORITY AT 215-257-3654 WHEN WATER SERVICE IS READY FOR INSPECTION AND TESTING. DO NOT BACKFILL ANY PORTION OF TRENCH PRIOR TO APPROVAL. 24 HOURS NOTICE REQUIRED.
2. WATER AUTHORITY WILL SUPPLY 5/8"x5/8" SR BRONZE REMOTE TYPE METER AND REMOTE METER READING.
3. PRESSURE REDUCING VALVE IS REQUIRED WHERE PRESSURE IS GREATER THAN 65 PSI. OWNER/DEVELOPER SHALL PROVIDE THE PRESSURE REDUCING VALVE.
4. METER LOCATION MUST BE APPROVED BY THE AUTHORITY.
5. ALL SERVICE LINES ARE TO BE SDR-9 ASTM 2737 POLYTUBING WITH NO SWEAT JOINTS OR COUPLINGS UNDERGROUND.
- *6. WATTS NUMBER 007 (LEAD FREE) BACKFLOW PREVENTER SHALL BE PROVIDED BY THE OWNER/ DEVELOPER WHEN REQUIRED BY PRA.
- **7. PRESSURE REDUCER VALVE TO BE WATTS UB5 - LEAD FREE



FRONT VIEW OF SETTING

RESIDENTIAL METER SETTING REQUIREMENTS

NOT TO SCALE

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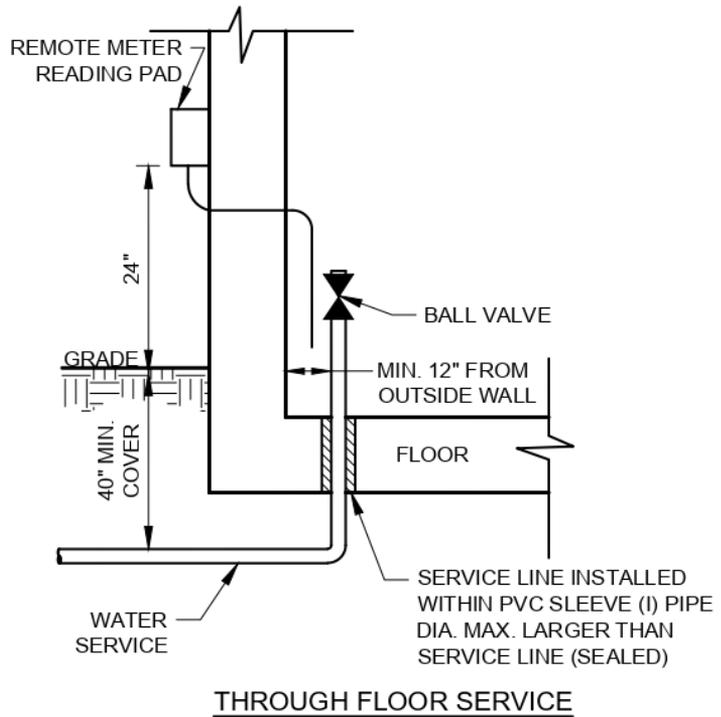
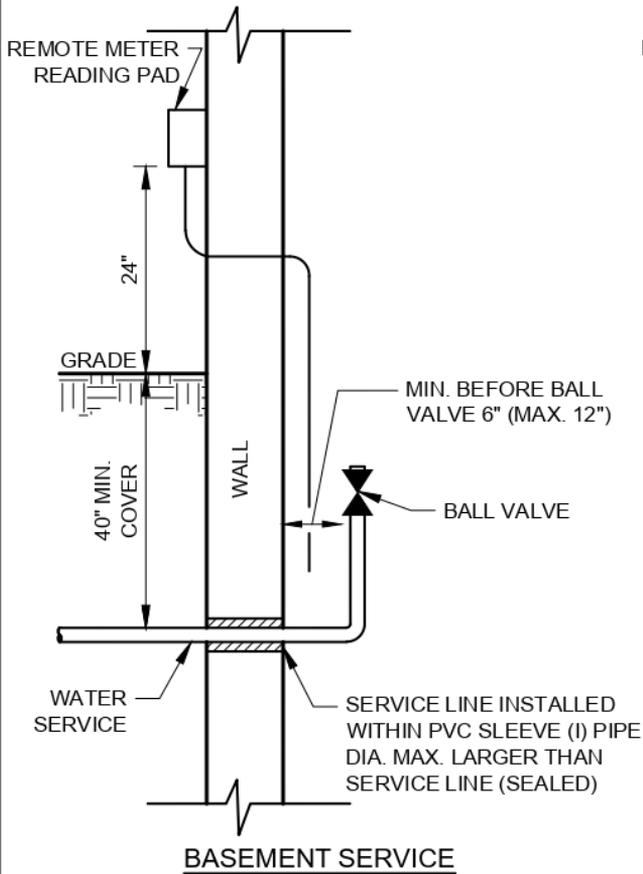
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RESIDENTIAL METER SETTING REQUIREMENTS

PREPARED FOR:

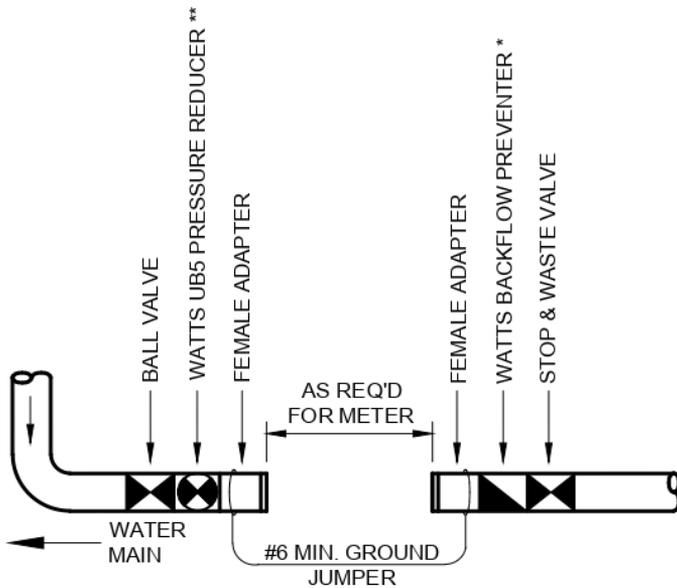
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/08/96
DRAWING NO.	PRA-W10



GENERAL NOTES:

1. NOTIFY AUTHORITY AT 257-3654 WHEN WATER SERVICE IS READY FOR INSPECTION AND TESTING. DO NOT BACKFILL ANY PORTION OF TRENCH PRIOR TO APPROVAL.
2. WATER AUTHORITY WILL SUPPLY METER AND REMOTE METER READING PAD AND THE BACKFLOW PREVENTER FOR ALL SIZES UP TO AND INCLUDING 1".
3. PRESSURE REDUCING VALVE IS REQUIRED WHERE PRESSURE IS GREATER THAN 75 PSI.
4. METER LOCATION MUST BE APPROVED BY THE AUTHORITY.
5. ALL SERVICE LINES ARE TO BE SDR-9 ASTM 2737 POLYTUBING WITH NO SWEAT JOINTS OR COUPLINGS UNDERGROUND.
- *6. WATTS BACKFLOW PREVENTER SHALL BE PROVIDED ON ALL NON-RESIDENTIAL, MULTI-FAMILY, OR MULTI-STORY SERVICES IF REQUIRED BY PRA. IF THE METER SIZE IS OVER 1" THE OWNER, NOT THE AUTHORITY, SHALL PROVIDE THE BACKFLOW PREVENTER.
- **7. PRESSURE REDUCER VALVE TO BE WATTS UB5 (IF REQUIRED) - OR APPROPRIATE MODEL CORRESPONDING TO METER SIZE.
8. SIZE OF SERVICE AND METER TO BE APPROVED BY AUTHORITY.
9. SIZE OF VALVES, ADAPTERS, PRESSURE REDUCING VALVES AND BACKFLOW PREVENTERS TO BE SAME AS METER SIZE.



FRONT VIEW OF SETTING

NON-RESIDENTIAL METER SETTING REQUIREMENTS

NOT TO SCALE

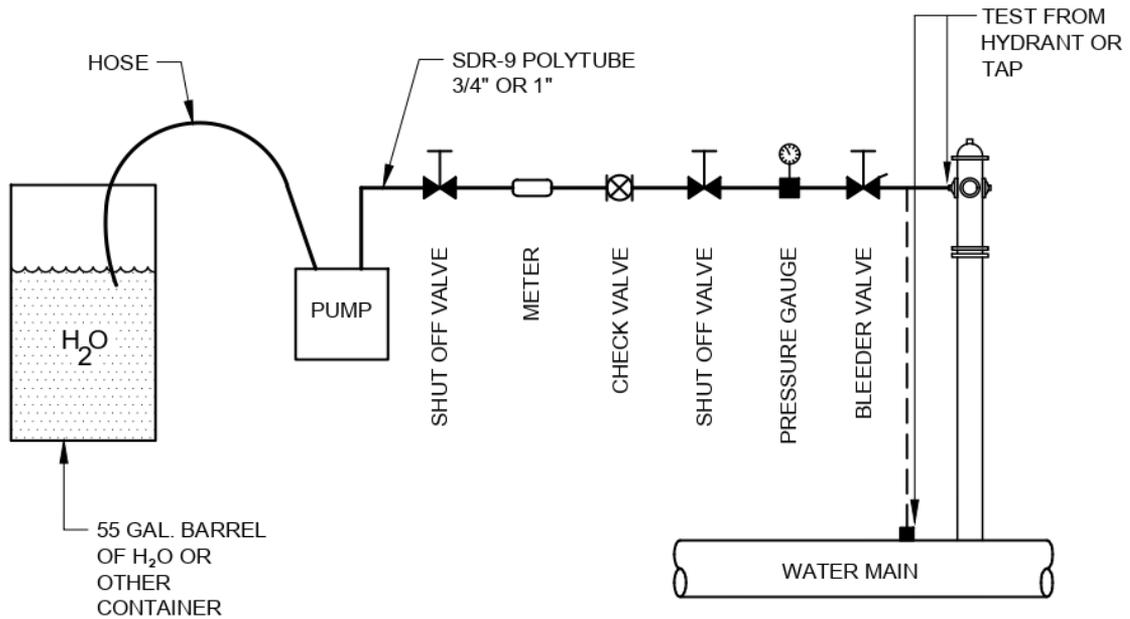
REVISED 7/30/2025



PENNONI ASSOCIATES INC.
150 Ridge Road, Suite 2
Sellersville, PA 18960
T 215-257-5711 F 215-257-5766

NON-RESIDENTIAL METER SETTING REQUIREMENTS
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/08/96
DRAWING NO.	PRA-W11



NOTES:
 ALL TESTING EQUIPMENT AND FITTINGS MUST BE DISINFECTED IN ACCORDANCE WITH PRA SPECIFICATIONS PRIOR TO TESTING.

HYDROSTATIC PRESSURE TEST CONFIGURATION
 NOT TO SCALE

REVISED 7/30/2025

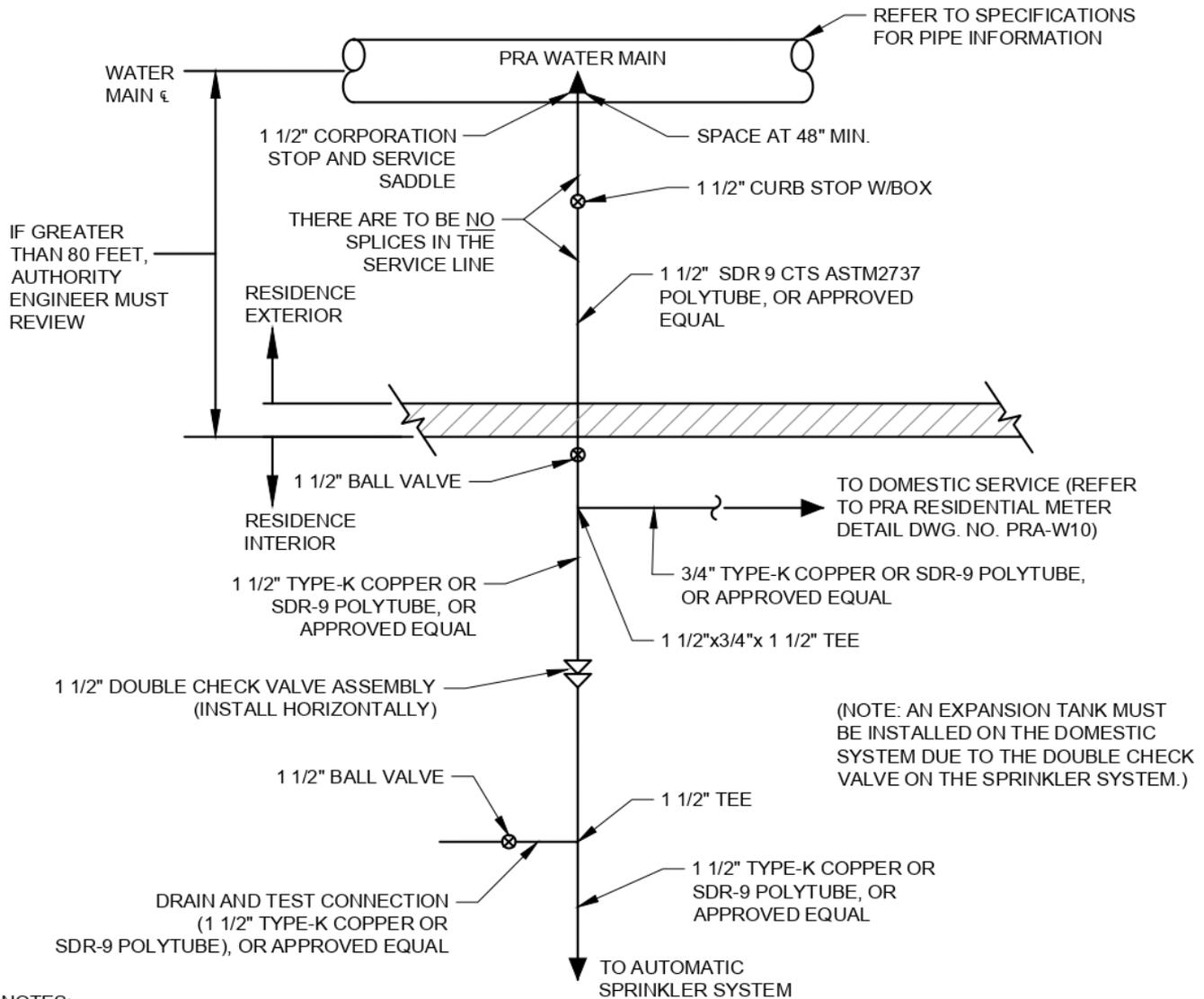


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PRESSURE TEST SCHEMATIC
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/08/96
DRAWING NO.	PRA-W12

NOTE: IF THE PRA AVAILABLE SERVICE PRESSURE IS LESS THAN 45 PSI, AUTHORITY ENGINEER MUST REVIEW.



NOTES:

1. REFER TO THE PRA RESIDENTIAL SERVICE/SPRINKLER LINE DETAIL DWG. NO. PRA-W14.
2. REFER TO THE PRA RESIDENTIAL METER DETAIL DWG. NO. PRA-W10.
3. SERVICE SADDLE: ROMAC INDUSTRIES 202U OR APPROVED EQUAL.
4. BALL VALVE: 1 1/2" WATTS LFF BV-3C; OR APPROVED EQUAL, THREADED BOTH ENDS. FOR POLYTUBE CONNECTIONS, INSTALL 1 1/2" FORD QUICK JOINT COUPLING WITH INSERT-54-Q SOLID TUBULAR 304SS INSERT STIFFENER, OR APPROVED EQUAL.
5. DOUBLE CHECK VALVE ASSEMBLY: 1 1/2" WATTS LFU007M2QT, OR APPROVED EQUAL, WITH UNIONS, TWO RESILIENT SEATED ISOLATION VALVES, AND FOUR TOP MOUNTED RESILIENT SEATED TEST COCKS. INSTALL ASSEMBLY HORIZONTALLY.
6. SINGLE SPRINKLER OPERATION DESIGN FIRE SPRINKLER NOZZLES MUST HAVE A MINIMUM K FACTOR OF 7.4 (107) AND MUST PROVIDE A MINIMUM FLOW OF 24 GPM AT A MAXIMUM HEAD OF 10.5 PSI.
7. DUAL SPRINKLER OPERATION DESIGN FIRE SPRINKLER NOZZLES MUST HAVE A MINIMUM K FACTOR OF 4.9 (71) AND MUST PROVIDE A MINIMUM FLOW OF 13 GPM EACH AT A MAXIMUM HEAD OF 7.0 PSI. (TOTAL MIN. FLOW FOR DUAL SPRINKLERS = 26 GPM)
8. METHODS AND MATERIALS ARE TO BE PER THE MUNICIPALITY PLUMBING CODE AND PRA REQUIREMENTS

1 1/2" RESIDENTIAL SERVICE/SPRINKLER LINE CONNECTION

NOT TO SCALE

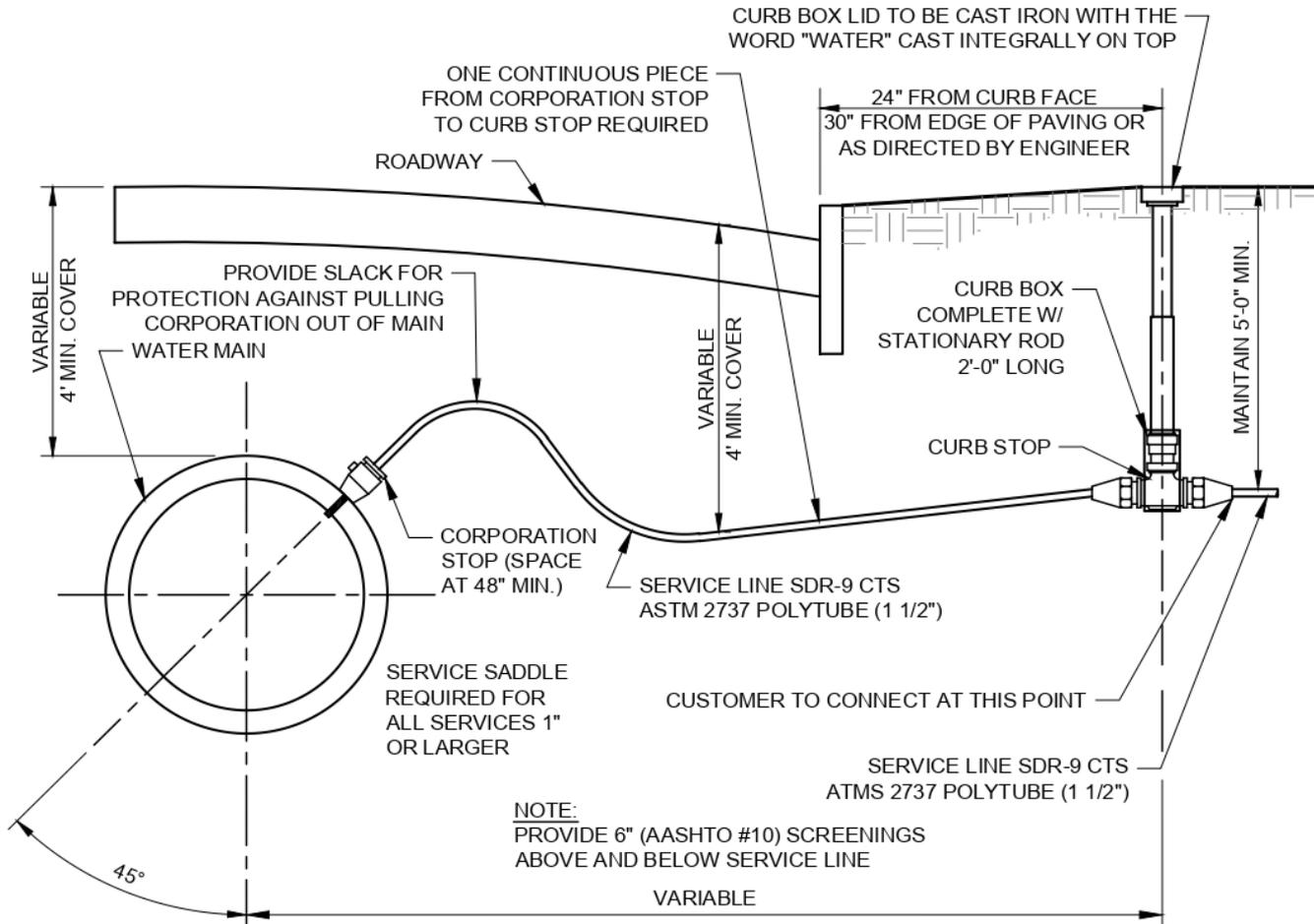
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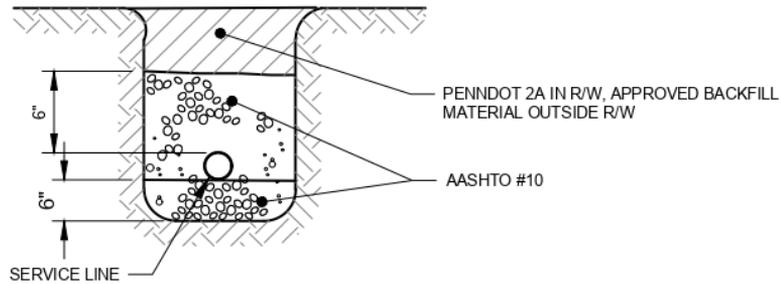
RESIDENTIAL SERVICE/SPRINKLER LINE
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	5/11/15
DRAWING NO.	PRA-W13



NOTES:

1. WET TAPPING UNDER NORMAL LINE PRESSURE IS REQUIRED. THERE ARE TO BE NO SPLICES IN THE SERVICE LINE.
2. SERVICE SADDLE: ROMAC INDUSTRIES 202U OR APPROVED EQUAL.
3. CORPORATION STOPS: 1 1/2" FORD FB 1000-6-Q-NL WITH INSERT-54-Q SOLID TUBULAR 304 SS INSERT STIFFENERS, OR APPROVED EQUAL.
4. CURB STOPS: 1 1/2" FORD B44-666-Q-NL WITH INSERT-54-Q SOLID TUBULAR 304 SS INSERT STIFFENERS, OR APPROVED EQUAL.
5. CURB BOX: FORD EA2-45-50 WITH A CURB BOX BASE FOR 1 1/2" CURB STOP AND 2'-0" LONG STATIONARY OPERATING ROD, OR APPROVED EQUAL. THE CURB BOX LID IS TO BE CAST IRON WITH THE WORD "WATER" CAST INTEGRALLY ON TOP.
6. IF THE TOTAL LENGTH OF THE POLYTUBE SERVICE LINE FROM THE WATER MAIN TO JUST INSIDE THE RESIDENCE IS MORE THAN 80 FEET, OR THE PRA AVAILABLE SERVICE PRESSURE IS LESS THAN 45 PSI, THEN THE AUTHORITY ENGINEER MUST REVIEW.
7. IF USING NON-METALLIC PIPING UTILIZE LOCATING TAPE.



1 1/2" RESIDENTIAL SERVICE/SPRINKLER LINE CONNECTION

NOT TO SCALE

REVISED 7/30/2025



PENNONI ASSOCIATES INC.
 150 Ridge Road, Suite 2
 Sellersville, PA 18960
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RESIDENTIAL SERVICE/SPRINKLER LINE
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	5/11/15
DRAWING NO.	PRA-W14



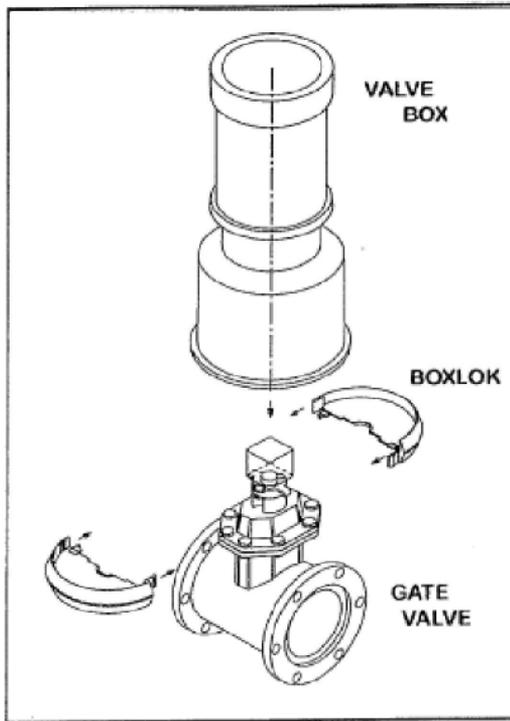
BOXLOK

The Valve Box Alignment Device

The BOXLOK is a valve box centering device designed to eliminate the shifting of the valve box against the operating nut of the valve.

To determine the right unit for your application, match the size and brand of the valve to the BOXLOK Model Number.

FOR USE WITH STANDARD 5 1/2" TWO PIECE CAST IRON VALVE BOXES



US PATENT NO. 7575018

BOXLOK Model Number

VALVE	2"	3"	4"	6"	8"	10"	12"
AFC	2	2	2	2	2	1	1
AVK	1	1	1	1	1	1	1
Clow	2	2	2	2	2	K1	K1
East Jordan	2	2	2	2	2	2	1
J&S Valve	2	2	2	2	2	1	1
Kennedy	2	2	2	2	2	K1	K1
M&H	2	2	2	2	2	K1	K1
Mueller	2	2	2	2	2	2	1
NAPAC	2	2	2	2	2	2	2
US Pipe	2	2	2	2	2	2	2

MODEL K1 IS A SPECIAL ORDER PLEASE
CALL 615-210-9141

NOW AVAILABLE THROUGH YOUR LOCAL WATERWORKS SUPPLIER.

VISIT US AT WWW.BOXLOK.COM

BOXLOK VALVE BOX ALIGNMENT DEVICE

NOT TO SCALE

REVISED 5/13/2025



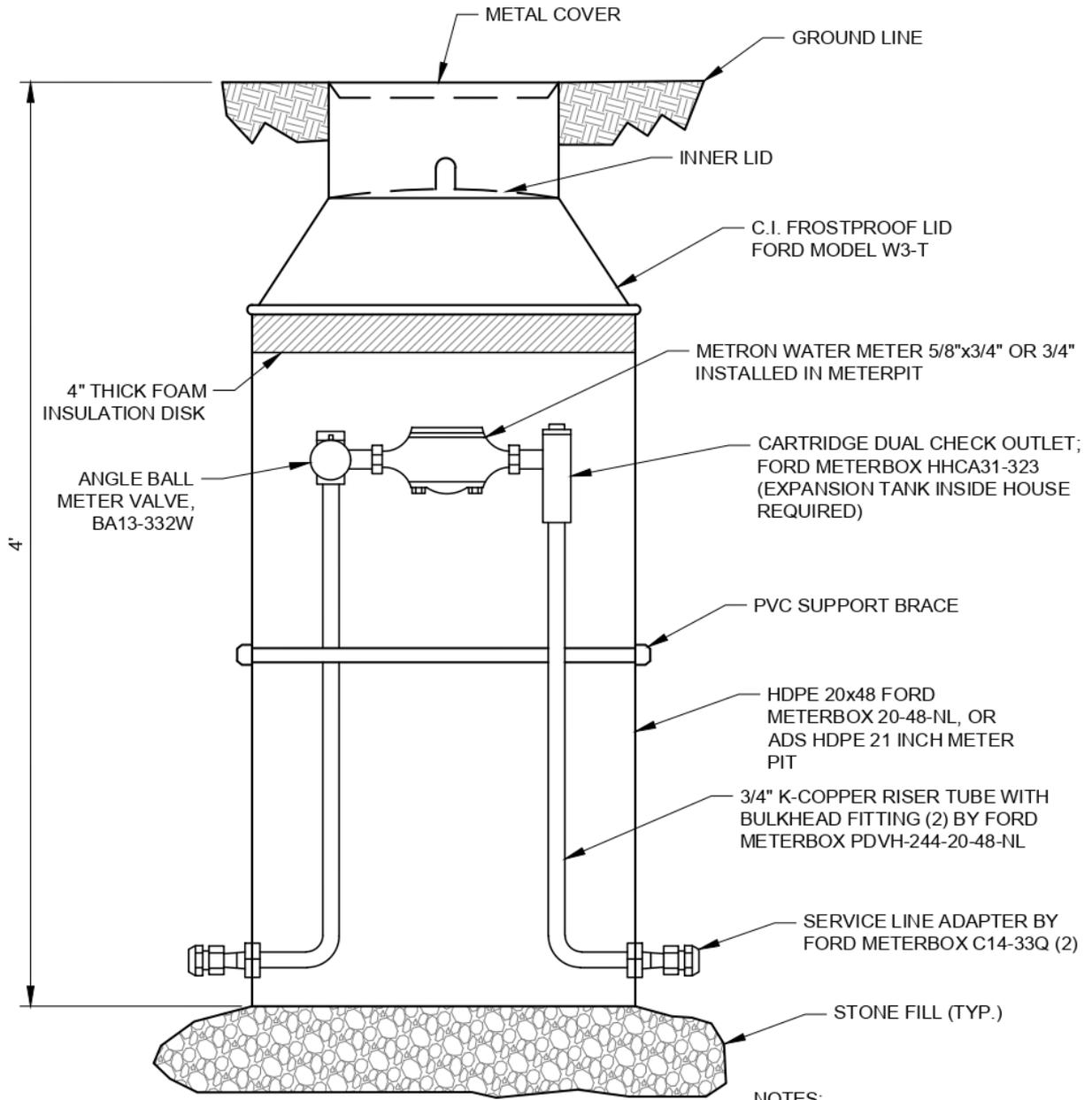
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Sellersville, PA 18960
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BOXLOK VALVE BOX ALIGNMENT DEVICE

PREPARED FOR:

PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	1/24/19
DRAWING NO.	PRA-W15



- NOTES:
1. METERPIT TO BE INSTALLED JUST OUTSIDE OF THE RIGHT-OF-WAY, ON THE PRIVATE PROPERTY.
 2. AN EXT-2 EXTENSION RING SHALL BE USED WHEN BACKFLOW PREVENTORS ARE NECESSARY.

RESIDENTIAL METERPIT
NOT TO SCALE

REVISED 02/24/2026



PENNONI ASSOCIATES INC.
150 Ridge Road, Suite 2
Sellersville, PA 18960
T 215-257-5711 F 215-257-5766

RESIDENTIAL METERPIT
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	12/12/19
DRAWING NO.	PRA-W16

U:\ADMIN\SELLERSVILLE\CAD DESIGN\AUTHORITY CLIENTS\PERKASIE\WATER DETAILS\WALL PRA WATER DETAILS 2025.DWG
PLOTTED: 2/24/2026 11:36:53 AM BY: TINA CARTER PLOTSTYLE: PENNONI.NCS SBT, PROJECT STATUS: ...



PERKASIE REGIONAL AUTHORITY

PERKASIE REGIONAL AUTHORITY
BUCKS COUNTY, PENNSYLVANIA

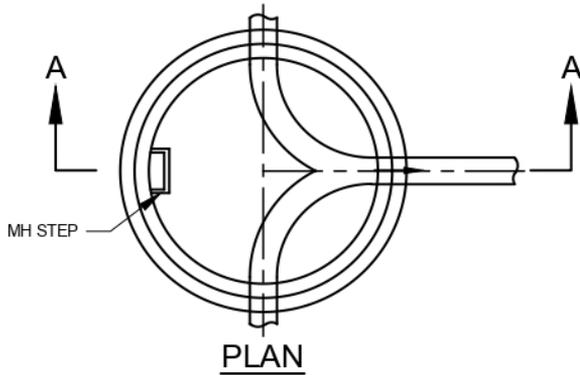
SEWER SUPPLY SYSTEM DETAILS

PREPARED BY:

PENNONI ASSOCIATES INC.

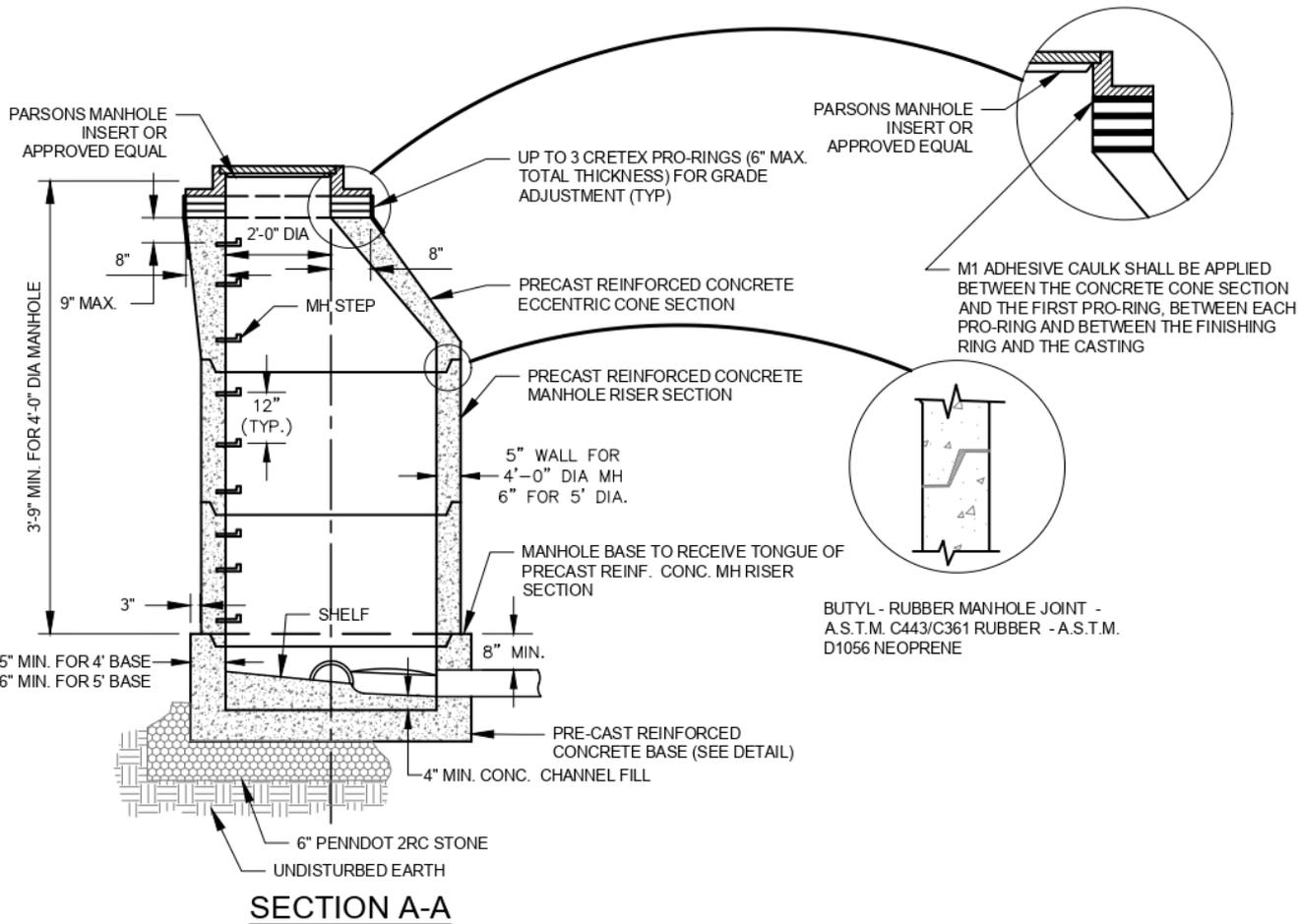


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T 215-257-5711
F 215-257-5766



NOTES:

1. THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 3/4 OF THE DIAMETER OF THE SEWER.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A RATE OF 1" PER FOOT.
3. TYPE "B" MANHOLES (SHALLOW TYPE) TO BE PROVIDED WHERE REQUIRED BY DEPTH CONDITIONS. ALL OTHER MANHOLES TO BE TYPE "A".
4. THE WALL THICKNESS IN A 4'-0" DIA. PRECAST BASE SHALL BE AS FOLLOWS FOR PIPES 16" AND SMALLER, 5" WALL; FOR PIPES 18" AND LARGER, 8" WALL.
5. ALL MANHOLE FRAMES FOR "OFF THE ROAD" MANHOLES SHALL BE BOLTED TO THE CONE SECTION OR CONCRETE SLAB WITH 2'-3/4" DIA. BOLTS WITH WASHERS AND NUTS; BOLTS TO BE AT 180 ON A 36" DIA. BOLT CIRCLE.
6. FOR MANHOLES HAVING 5'-0" DIA AND 6'-0" BASES REDUCTION IN DIAMETER TO 4'-0" SHALL START AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL, WHERE DEPTH IS SUFFICIENT.
7. ENTIRE PERIMETER OF MANHOLE SHALL BE BACKFILLED WITH 2A MODIFIED STONE TO A POINT NO LESS THAN 1 FT. ABOVE THE TOP OF PIPE CONNECTING AT THE HIGHEST ELEVATION.
8. BUTYL RUBBER ADHESIVE SHALL BE CUT FLUSH WITH THE INTERIOR OF THE MANHOLE.



TYPE "A" STANDARD MANHOLE DETAIL
NOT TO SCALE

REVISED 02/24/2026



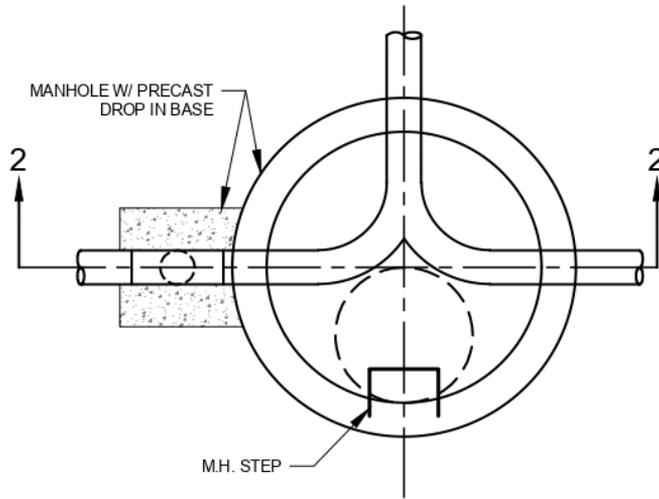
PENNONI ASSOCIATES INC.
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Sellersville, PA 18960
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TYPE "A" STANDARD MANHOLE
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

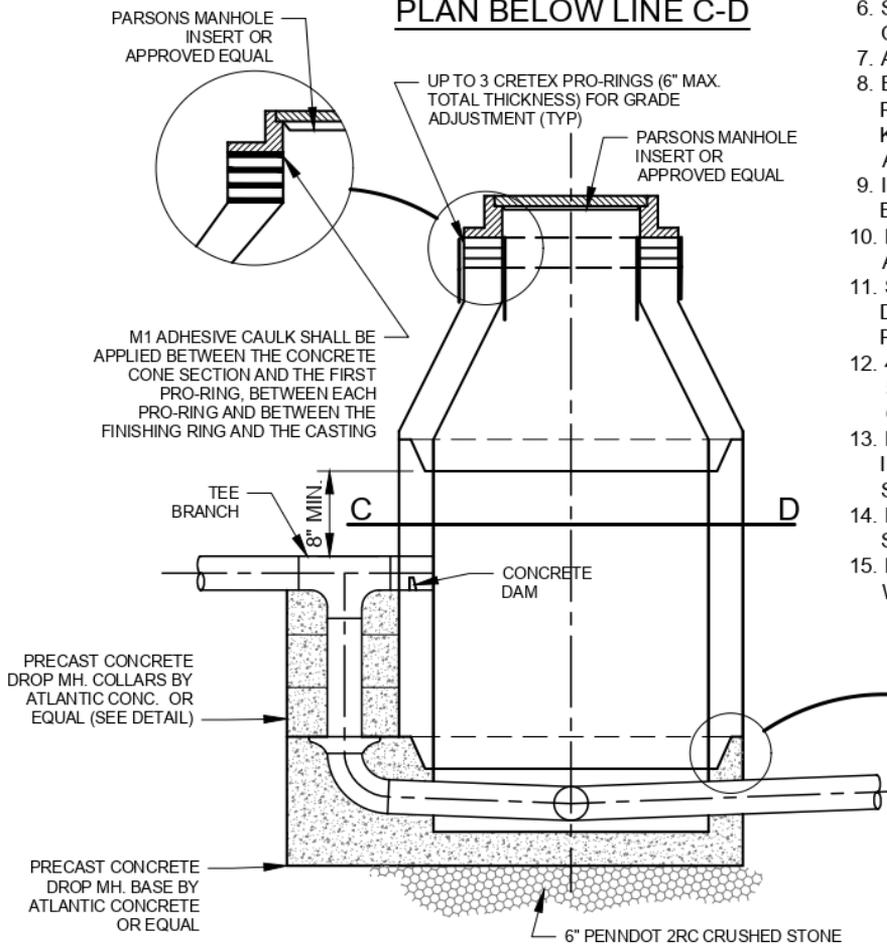
DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/15/96
DRAWING NO.	PRA-S01

NOTES:

1. THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 3/4 OF THE DIAMETER OF THE SEWER.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A RATE OF 1" PER FOOT.
3. TYPE "B" MANHOLES (SHALLOW TYPE) TO BE PROVIDED WHERE REQUIRED BY DEPTH CONDITIONS. ALL OTHER MANHOLES TO BE TYPE "A". REFERENCE IS MADE TO THE STANDARD DETAILS FOR TYPE A & TYPE B MANHOLES.
4. FOR MANHOLES HAVING 5' DIA. AND 6' DIA. BASE REDUCTION IN DIAMETER TO 4' SHALL START AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL, WHERE DEPTH IS SUFFICIENT.
5. ALL MANHOLE FRAMES FOR "OFF THE ROAD" MANHOLES SHALL BE BOLTED TO THE CONE SECTION OR CONCRETE SLAB WITH 2-3/4" DIA. BOLTS WITH WASHERS AND NUTS. BOLTS TO BE AT 180 DEGREES OR 90 DEGREES ON THE BOLT CIRCLE. FOR WATERTIGHT COVERS USE 4-3/4" BOLTS AT 90 DEGREES ON THE BOLT CIRCLE.
6. SEE THE SPECIFICATIONS FOR LENGTH OF PIPE CONNECTIONS TO MANHOLES.
7. ALL CONCRETE SHALL BE 4000 PSI MINIMUM.
8. ENTIRE OUTSIDE SURFACE OF MANHOLE SHALL RECEIVE TWO COATS OF BITUMINOUS COATING, KOPPERS 300M, PENNOXY TAR 32-B-4, OR APPROVED EQUAL.
9. INSTALL PLASTIC PREFORMED JOINT SEALANT BETWEEN ALL SECTIONS AND UNDER FRAME.
10. MANHOLE CONSTRUCTION SHALL BE IN ACCORDANCE WITH ASTM C478.
11. STEPS TO BE ALUMINUM ALLOY WITH DEPRESSED TREAD, STEEL REINFORCED POLYPROPYLENE IS OPTIONAL.
12. 4' DIA. MANHOLE - 8" TO 15" PIPES.
5' DIA. MANHOLE - 18" TO 27" PIPES.
6' DIA. MANHOLE - 30" TO 48" PIPES.
13. FOR INSIDE DROP PIPE TYPE MANHOLES INCREASE DIAMETER BY 1'-0" OVER THOSE SHOWN ABOVE.
14. REFERENCE IS MADE TO THE DETAIL FOR STANDARD TYPE "A" MANHOLE.
15. BUTYL RUBBER ADHESIVE SHALL BE CUT FLUSH WITH THE INTERIOR OF THE MANHOLE.



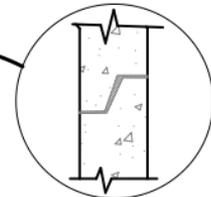
PLAN BELOW LINE C-D



SECTION 2-2

TYPE "A" DROP MANHOLE DETAIL

NOT TO SCALE



BUTYL - RUBBER MANHOLE JOINT
- A.S.T.M. C443/C361 RUBBER
- A.S.T.M. D1056 NEOPRENE

REVISED 02/24/2026



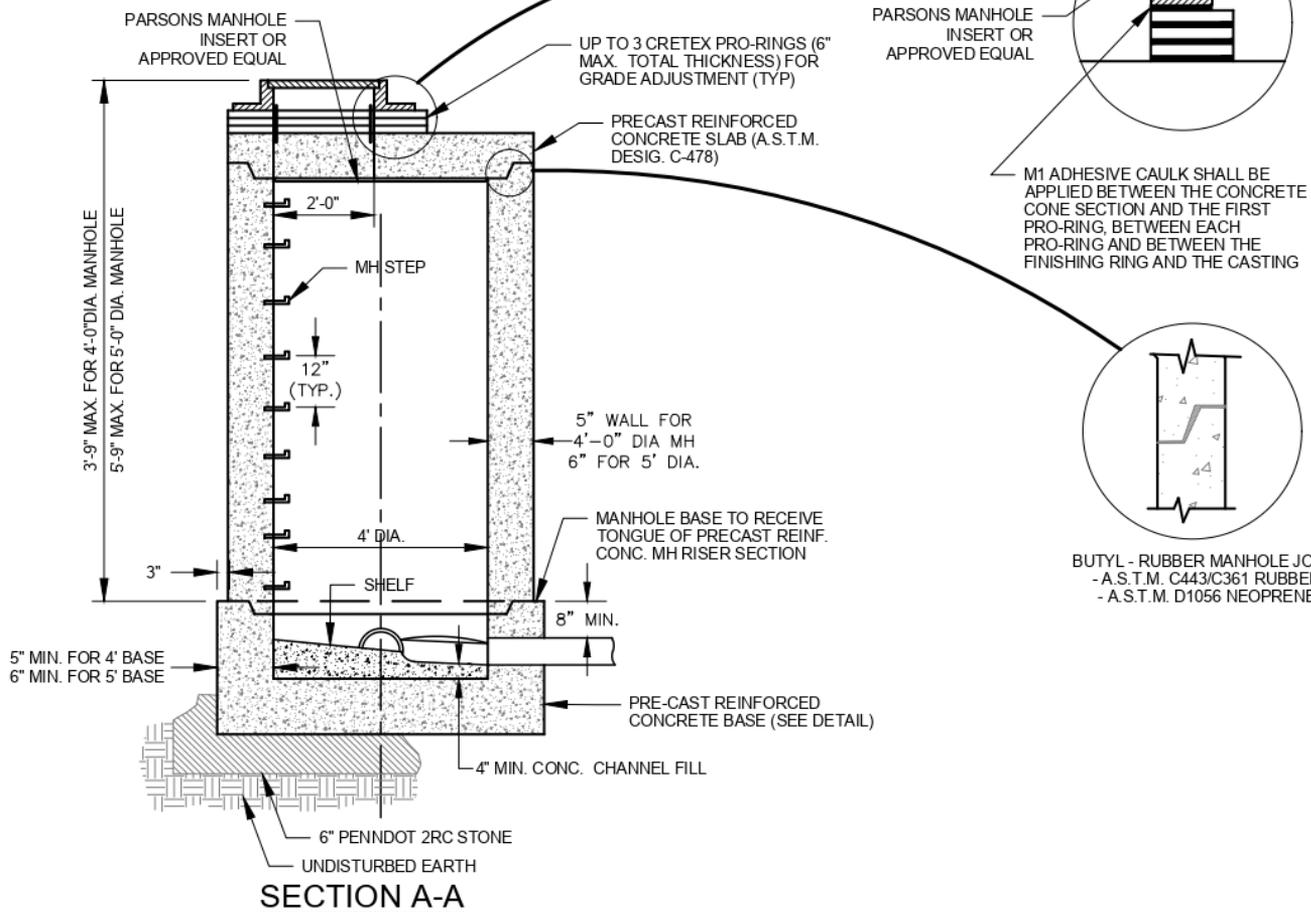
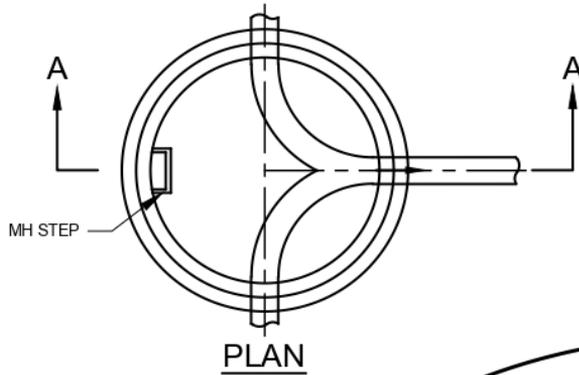
PENNONI ASSOCIATES INC.
150 Ridge Road, Suite 2
Sellersville, PA 18960
T 215-257-5711 F 215-257-5766

TYPE "A" DROP MANHOLE
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/15/96
DRAWING NO.	PRA-S02

NOTES:

1. THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 3/4 OF THE DIAMETER OF THE SEWER.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A RATE OF 1" PER FOOT.
3. TYPE "B" MANHOLES (SHALLOW TYPE) TO BE PROVIDED WHERE REQUIRED BY DEPTH CONDITIONS. ALL OTHER MANHOLES TO BE TYPE "A".
4. THE WALL THICKNESS IN A 4'-0" DIA. PRECAST BASE SHALL BE AS FOLLOWS: FOR PIPES 16" AND SMALLER, 5" WALL, FOR PIPES 18" AND LARGER, 8" WALL.
5. ALL MANHOLE FRAMES FOR "OFF THE ROAD" MANHOLES SHALL BE BOLTED TO THE CONE SECTION OR CONCRETE SLAB WITH 2 3/4" DIA. BOLTS WITH WASHERS AND NUTS. BOLTS TO BE AT 180° ON A 36" DIA. BOLT CIRCLE.
6. FOR MANHOLES HAVING A 5'-0" OR 6'-0" DIA. BASES REDUCTION IN DIAMETER TO 4'-0" SHALL START AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL, WHERE DEPTH IS SUFFICIENT.
7. BUTYL RUBBER ADHESIVE SHALL BE CUT FLUSH WITH THE INTERIOR OF THE MANHOLE.



TYPE "B" STANDARD MANHOLE DETAIL
NOT TO SCALE

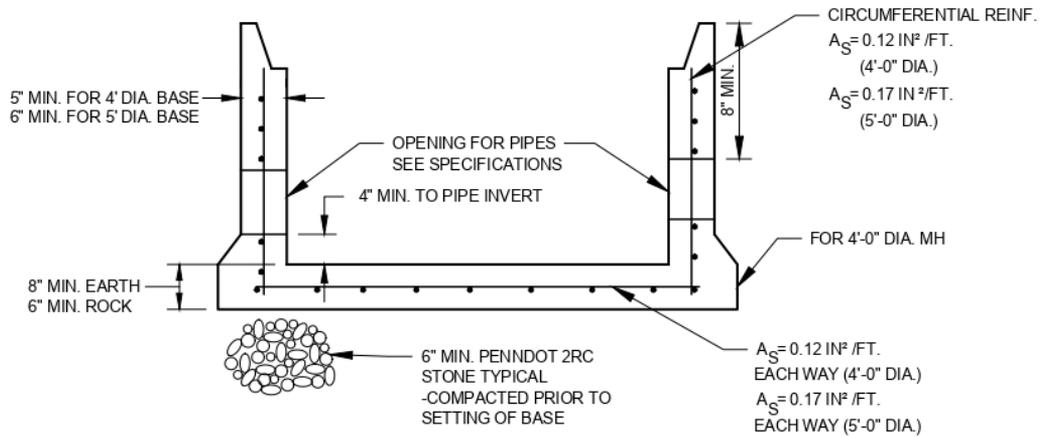
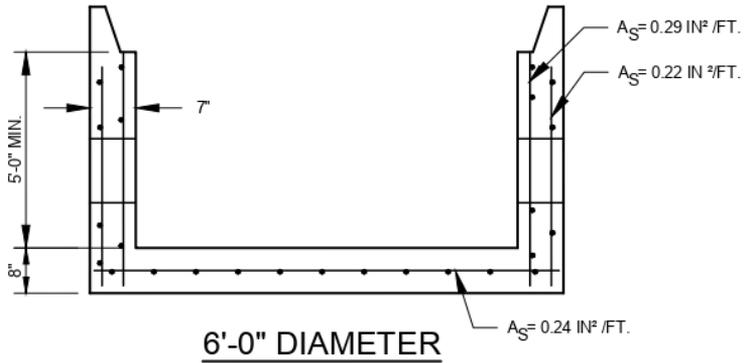
REVISED 02/24/2026



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Sellersville, PA 18960
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TYPE "B" STANDARD MANHOLE
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/18/96
DRAWING NO.	PRA-S03



4'-0" & 5'-0" DIAMETER

PRECAST DETAIL

NOT TO SCALE

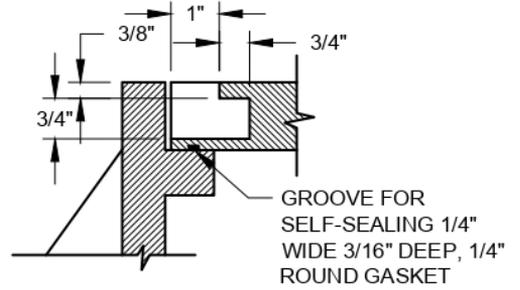
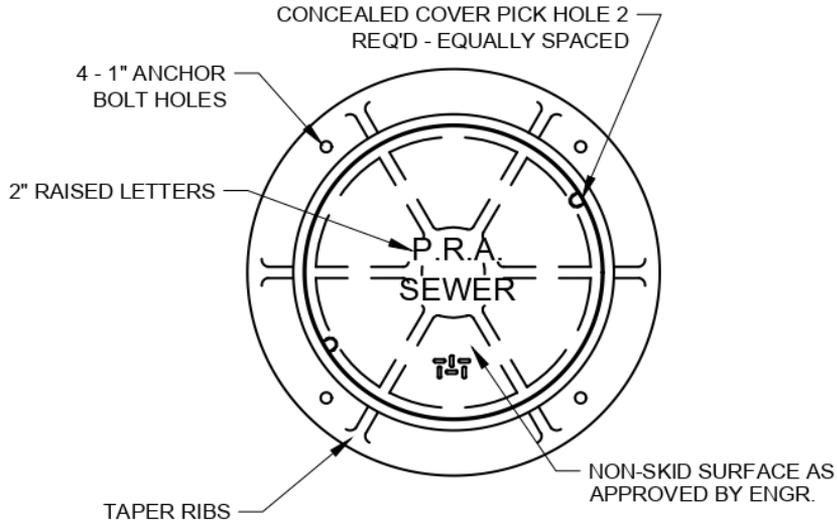
REVISED 5/13/2025



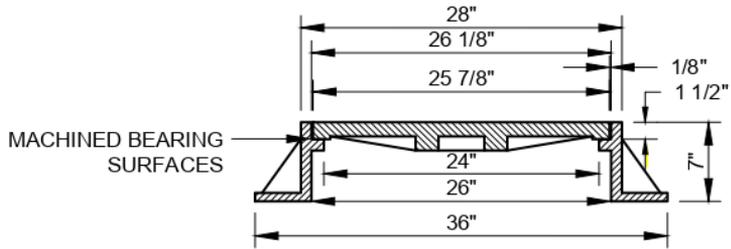
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PRECAST BASE
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/15/96
DRAWING NO.	PRA-S04

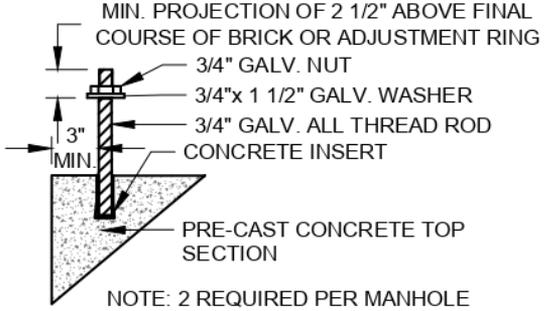


PICK HOLE
SELF-SEALING GROOVE



- NOTE:**
- CASTINGS TO BE GRAY IRON
 - CAST IRON ASTM SPECS. A-48
 - H-20 LOADING
 - LETTERING AS SPECIFIED BY ENGINEER
 - PAINT: 1 COAT BLACK ASPHALTUM

STANDARD MANHOLE FRAME & COVER
NOT TO SCALE



PRE-CAST MANHOLE

M.H. ANCHOR BOLT
NOT TO SCALE

REVISED 5/13/2025



PENNONI ASSOCIATES INC.
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STANDARD MANHOLE FRAME AND COVER
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

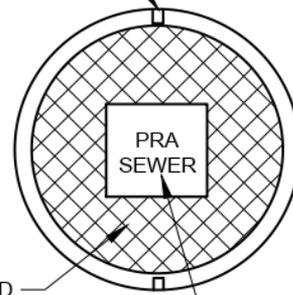
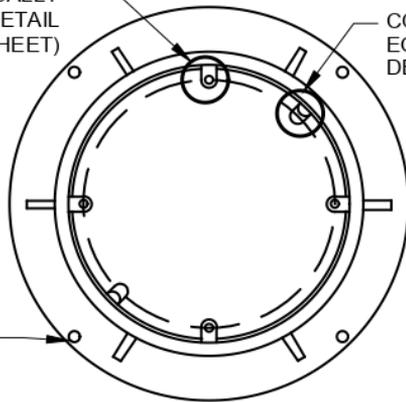
DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/15/96
DRAWING NO.	PRA-S05

M:\AUTHORITY CLIENTS\PERKASIE\SANITARY DETAILS\ALL PRA SANITARY DETAILS 2025.DWG
 PLOTTED: 7/19/2025 9:58:31 AM BY: TINA CARTER PLOTSTYLE: PENNONI NCS.STB PROJECT STATUS: ---

COVER BOLT HOLE-4
REQ'D EQUALLY
SPACED (SEE DETAIL
THIS SHEET)

COVER PICK HOLE-2 REQ'D
EQUALLY SPACED (SEE
DETAIL THIS SHEET)

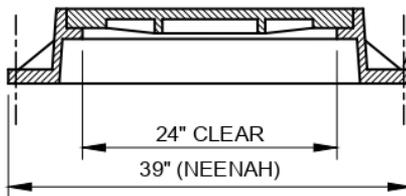
2 PICK HOLES



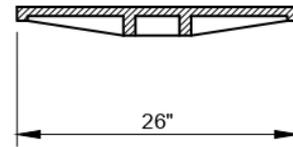
MFG. STANDARD
NON-SKID SURFACE AS
APPROVED BY ENGINEER

CAST-IN LETTERS
AS SPECIFIED

FRAME BOLT
HOLE 1" DIA.
CORED HOLE 4
REQ'D-EQUALLY
SPACED ON 32"
DIA BOLT CIRCLE



PROVIDE 4 - 1" DIA.
HOLES IN FRAME



FRAME

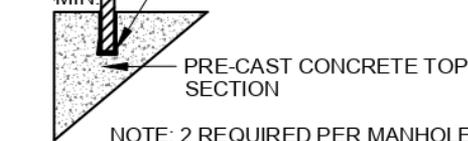
COVER

1/2" DIAMETER BRONZE
OR STAINLESS STEEL
HEX HEAD BOLT

5/8" DIA. BOLT CLEARANCE
HOLE THRU COVER

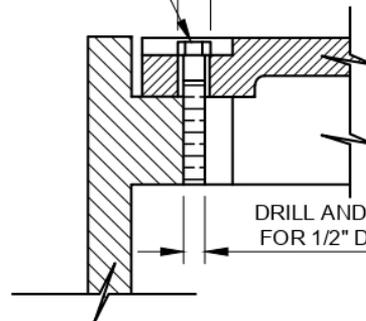
MIN. PROJECTION OF 2 1/2" ABOVE FINAL
COURSE OF BRICK OR ADJUSTMENT RING

3/4" GALV. NUT
3/4"x 1 1/2" GALV. WASHER
3/4" GALV. ALL THREAD ROD
CONCRETE INSERT



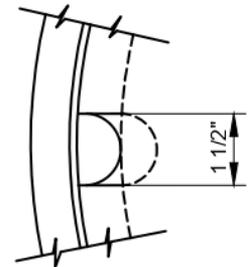
NOTE: 2 REQUIRED PER MANHOLE

PRE-CAST MANHOLE

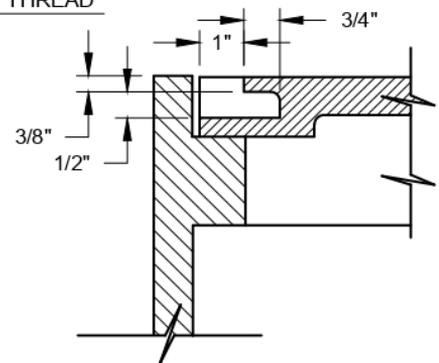


DRILL AND TAP FRAME
FOR 1/2" DIA. THREAD

COVER BOLT HOLE



PLAN



COVER PICK HOLE

M.H. ANCHOR BOLT

NOT TO SCALE

SPECIFICATIONS :

ALL MATERIAL GRAY CAST IRON, A.S.T.M. A-48, CL30 SUITABLE FOR HIGHWAY
LOADING ALL FRAMES & COVERS SHALL BE COATED WITH COAL TAR PITCH VARNISH
COVER SHALL HAVE THE WORDS "PRA SEWER" CAST THEREON FRAMES SHALL BE
WATERPROOF AND COVER SHALL BE BOLTED WITH FOUR (4) 1/2" COUNTERSUNK
STAINLESS STEEL BOLTS MAKING A SEAL WITH A RUBBER "O" RING GASKET, OR
EQUAL. PROVIDE FOUR (4) ANCHOR BOLT HOLES, 1" DIA. MIN.

REVISED 5/13/2025



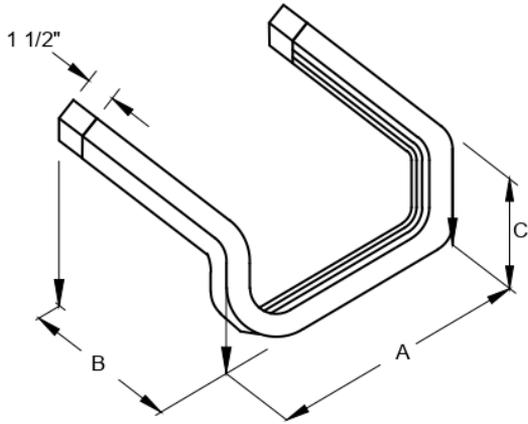
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WATERPROOF MANHOLE FRAME & COVER

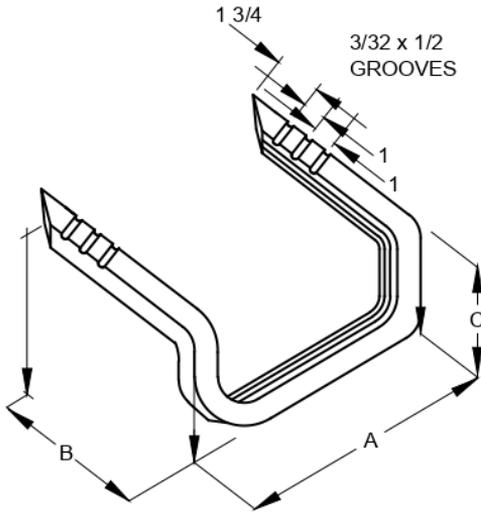
PREPARED FOR:

PERKASIE REGIONAL AUTHORITY

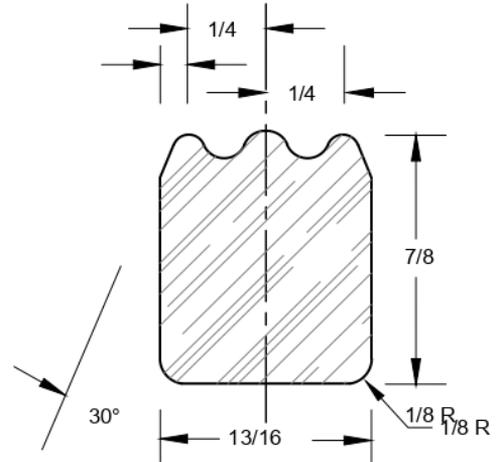
DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/03/96
DRAWING NO.	PRA-S06



PRECAST MANHOLE (TYPE #1)



PRECAST MANHOLE (TYPE #2)



TYP. CROSS SECTION ON ALL STEPS

APPLICATION	DIMENSION (IN.)			
	A	B	C	D
PRECAST M.H. (TYPE 1)	13 ^{3/4}	10	3 ^{3/4}	—
PRECAST M.H. (TYPE 2)	13 ^{3/4}	11	3 ^{3/4}	—

PRECAST MANHOLE STEPS DETAILS
NOT TO SCALE

REVISED 5/13/2025

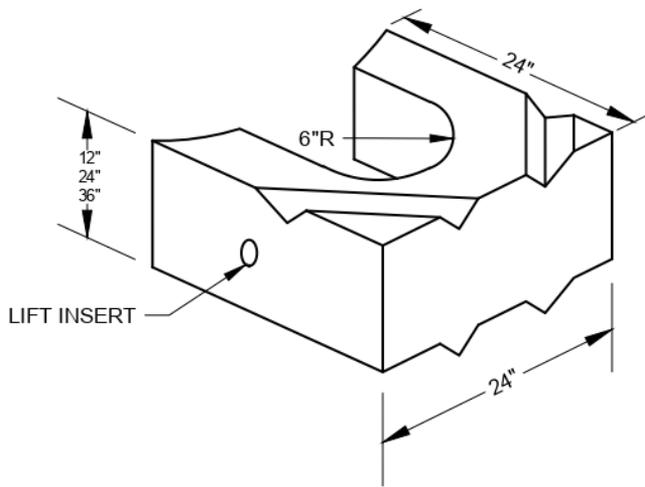


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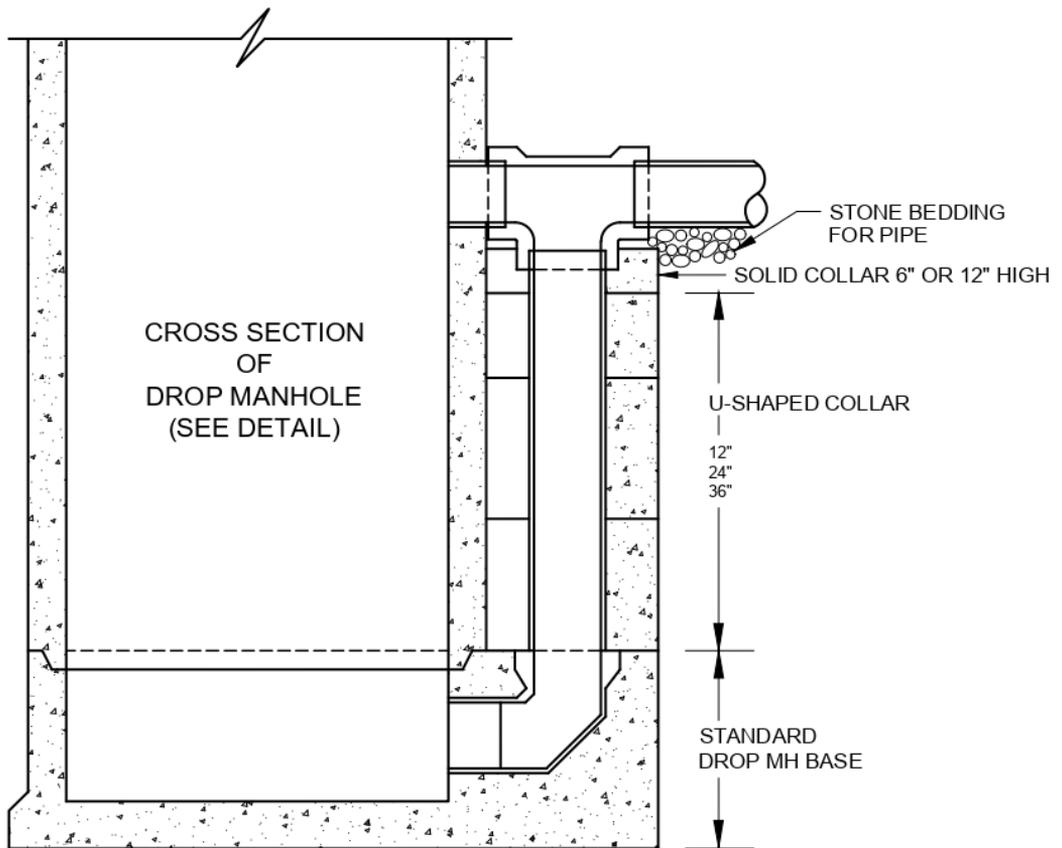
PRECAST MANHOLE STEP
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/15/96
DRAWING NO.	PRA-S07

M:\AUTHORITY CLIENTS\PERKASIE\SANITARY DETAILS\ALL PRA SANITARY DETAILS 2025.DWG
 PLOTTED: 7/19/2025 9:59:07 AM BY: TINA CARTER PLOTSTYLE: PENNONI NCS.STB PROJECT STATUS: ---



U-SHAPED COLLAR



DROP MANHOLE COLLARS
NOT TO SCALE

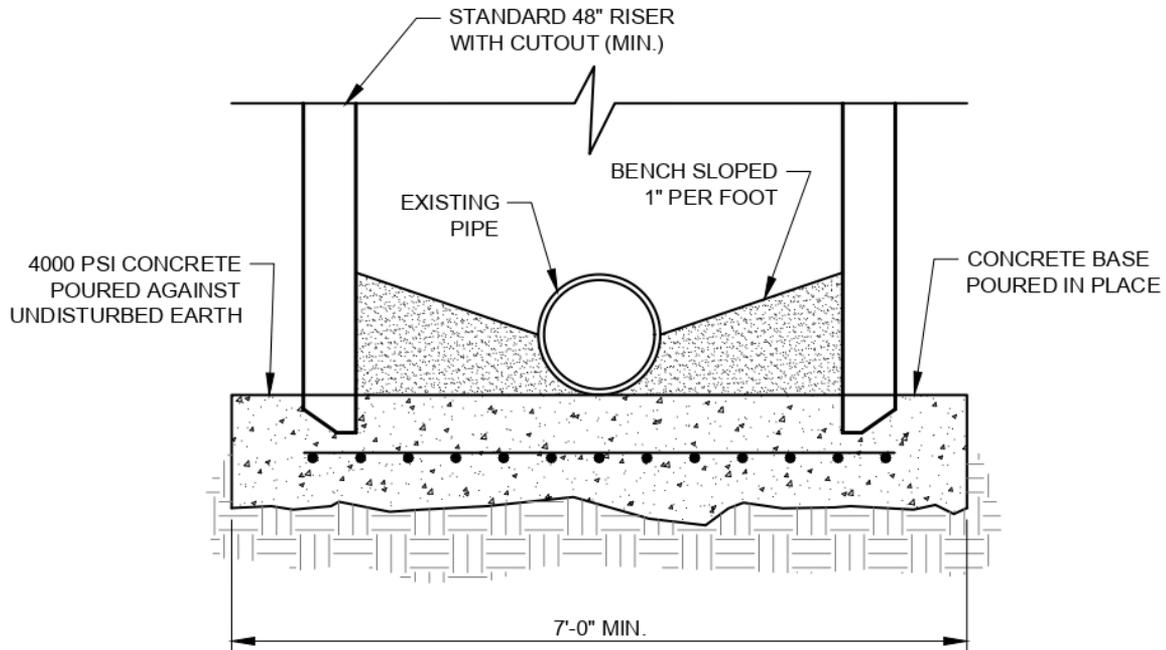
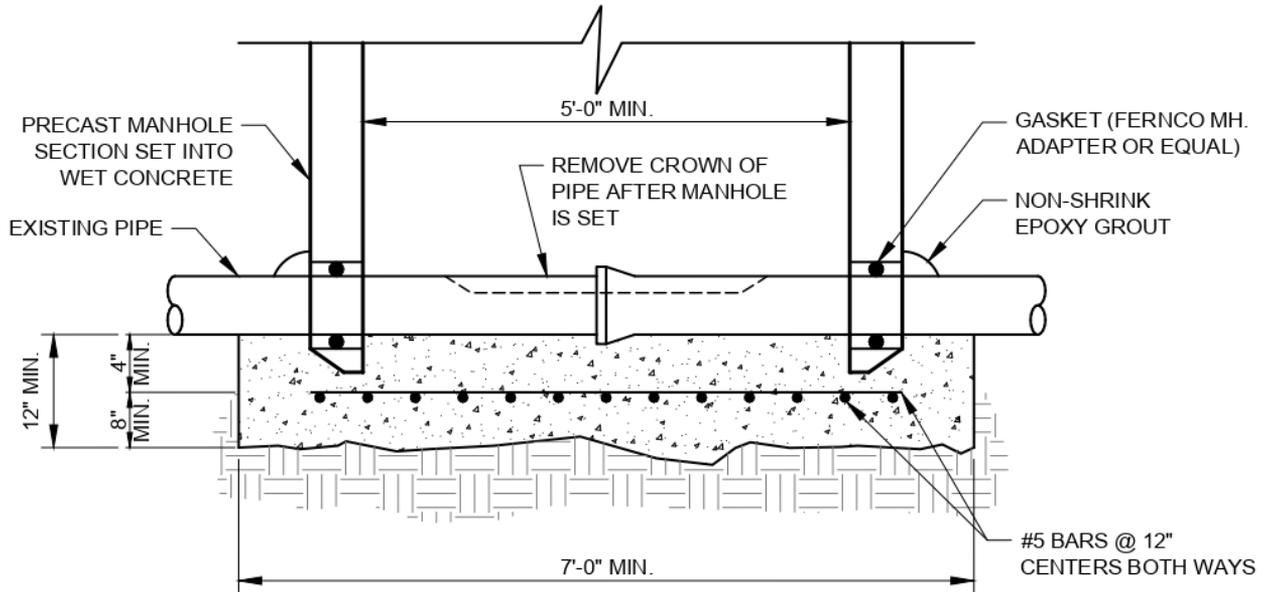
REVISED 7/30/2025



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DROP MANHOLE COLLAR
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
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DRAWING NO.	PRA-S08



NOTE:
 EXISTING PIPE TO REMAIN UNTIL EXFILTRATION OR VACUUM TEST ON MANHOLE IS ACCEPTABLE TO AUTHORITY.

DOGHOUSE MANHOLE DETAIL

NOT TO SCALE

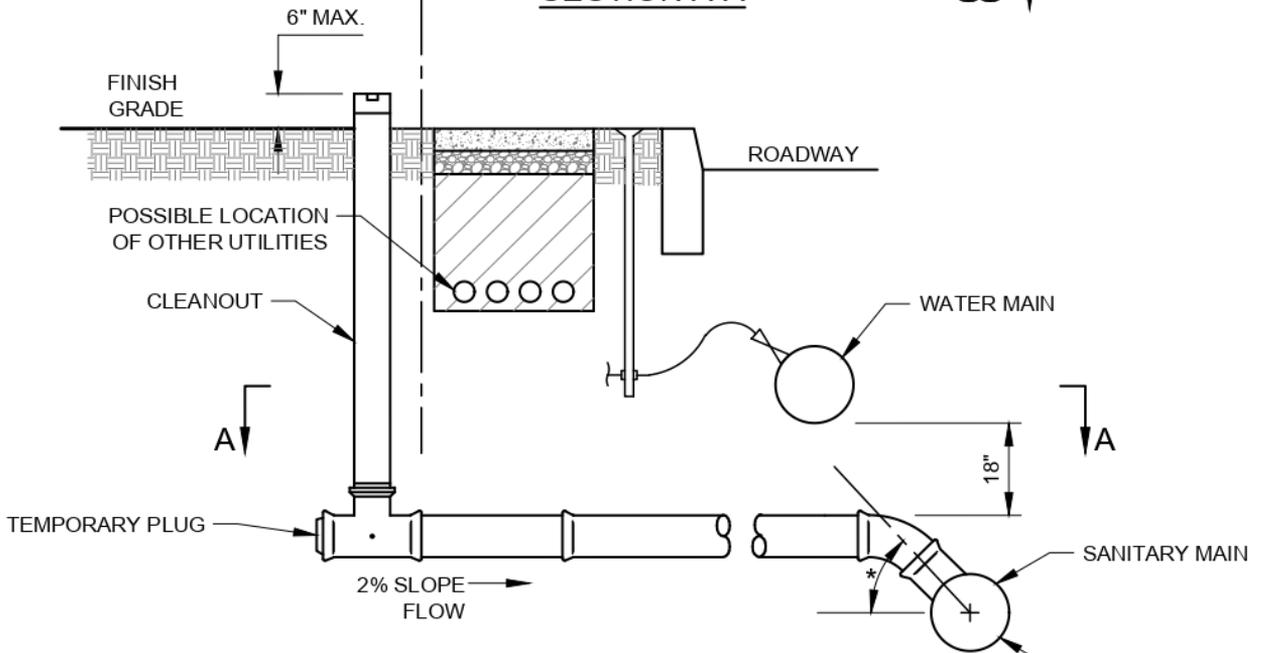
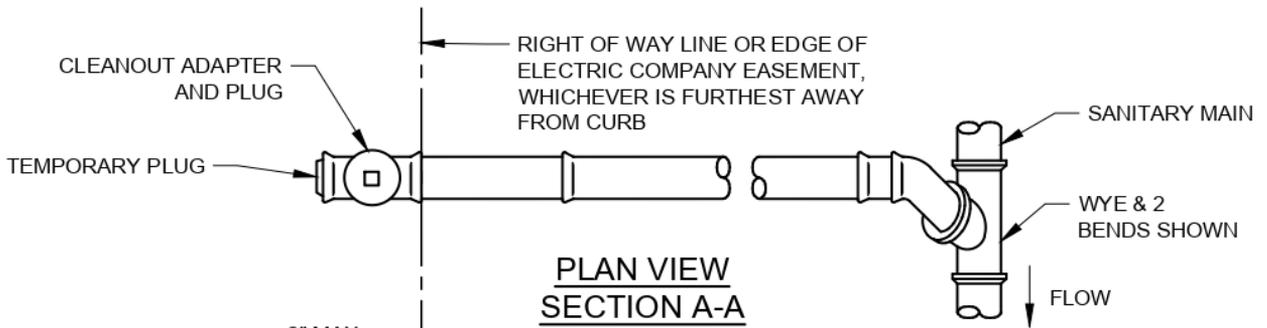
REVISED 7/30/2025



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PRECAST DOGHOUSE MANHOLE
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

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DATE:	3/15/96
DRAWING NO.	PRA-S09



* ANGLE EQUALS ANGLE OF BEND PLUS 1 DEGREE. OTHER COMBINATIONS SHALL BE DETAILED ON THE PLANS.

- NOTES:**
1. PIPE AND FITTINGS ARE TO BE ASTM D3034, GASKETED 4" SDR 26 PVC UNLESS NOTED.
 2. THE SERVICE SHALL BE INSTALLED PERPENDICULAR BETWEEN THE SEWER MAIN AND THE BUILDING ENTRY POINT WITH A UNIFORM SLOPE OF NOT LESS THAN 1/4" PER FOOT.
 3. REFER TO MANUFACTURER'S SPECIFICATIONS FOR MAXIMUM JOINT DEFLECTION (TYPICALLY ONE DEGREE FOR PVC).
 4. WHEN ABOVE GRADE, CLEAN OUT PLUGS SHALL BE CAST IRON METAL OR APPROVED EQUAL.

AUTHORITY DOES NOT PROVIDE BASEMENT SERVICE

SANITARY LATERAL SHALLOW SEWER DETAIL
NOT TO SCALE

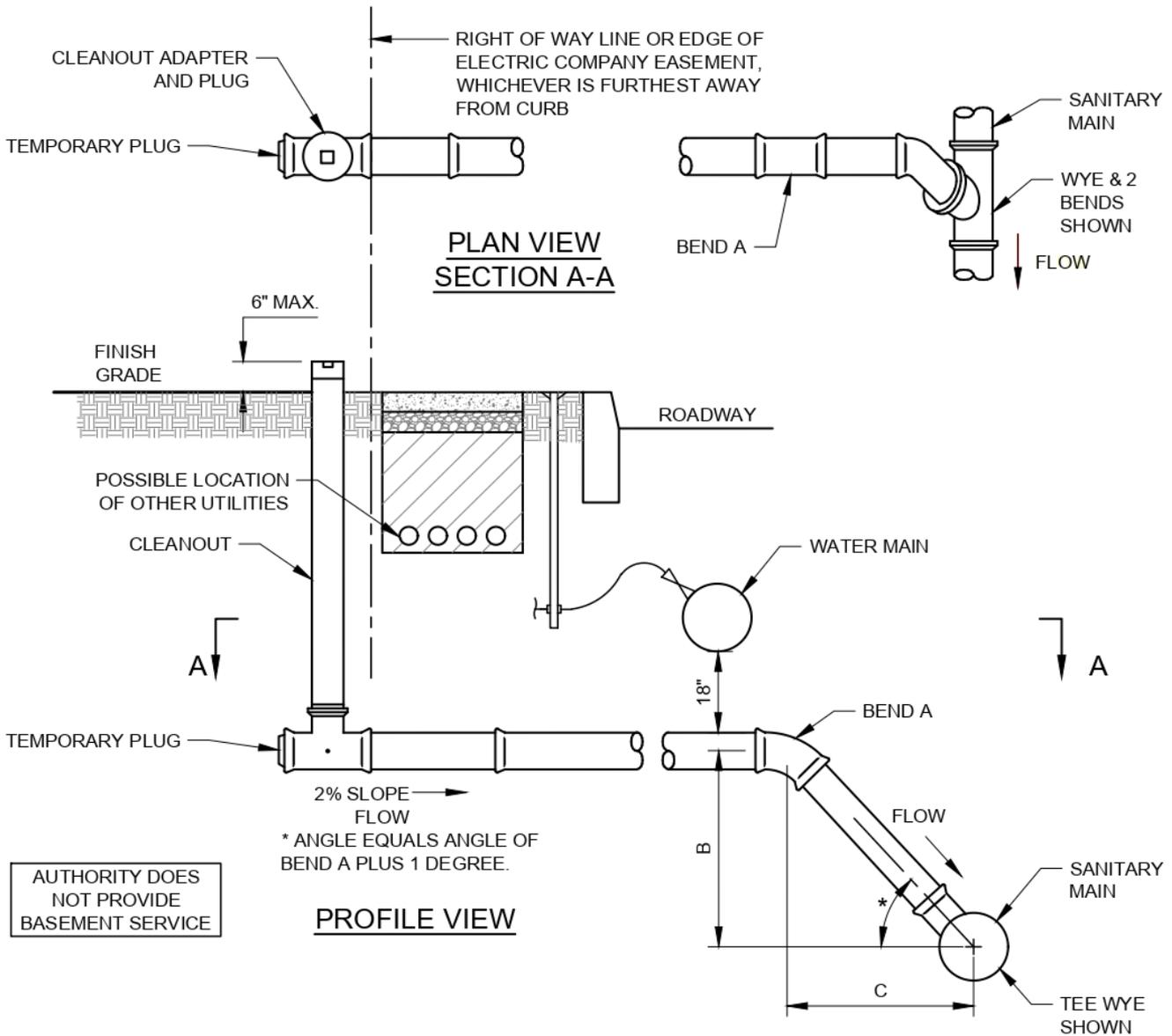
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SANITARY LATERAL-SHALLOW SEWER
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
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DRAWING NO.	PRA-S010

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NOTES:

1. PIPE AND FITTINGS ARE TO BE ASTM D3034, GASKETED 4" SDR 26 PVC UNLESS NOTED.
2. THE SERVICE SHALL BE INSTALLED PERPENDICULAR BETWEEN THE SEWER MAIN AND THE BUILDING ENTRY POINT WITH A UNIFORM SLOPE OF NOT LESS THAN 1/4" PER FOOT.
3. REFER TO MANUFACTURER'S SPECIFICATIONS FOR MAXIMUM JOINT DEFLECTION (TYPICALLY ONE DEGREE FOR PVC).
4. A COMPLETED TABLE SIMILAR TO THE TABLE SHOWN BELOW SHALL BE PLACED ON THE PLANS.
5. WHEN ABOVE GRADE, CLEAN OUT PLUGS SHALL BE CAST IRON METAL OR APPROVED EQUAL.

LOT NO.	INVERT IN AT BUILDING	DEGREE OF BEND A	DIMENSION B	DIMENSION C
1				

SANITARY LATERAL - DEEP SEWER DETAIL

NOT TO SCALE

REVISED 02/24/2026

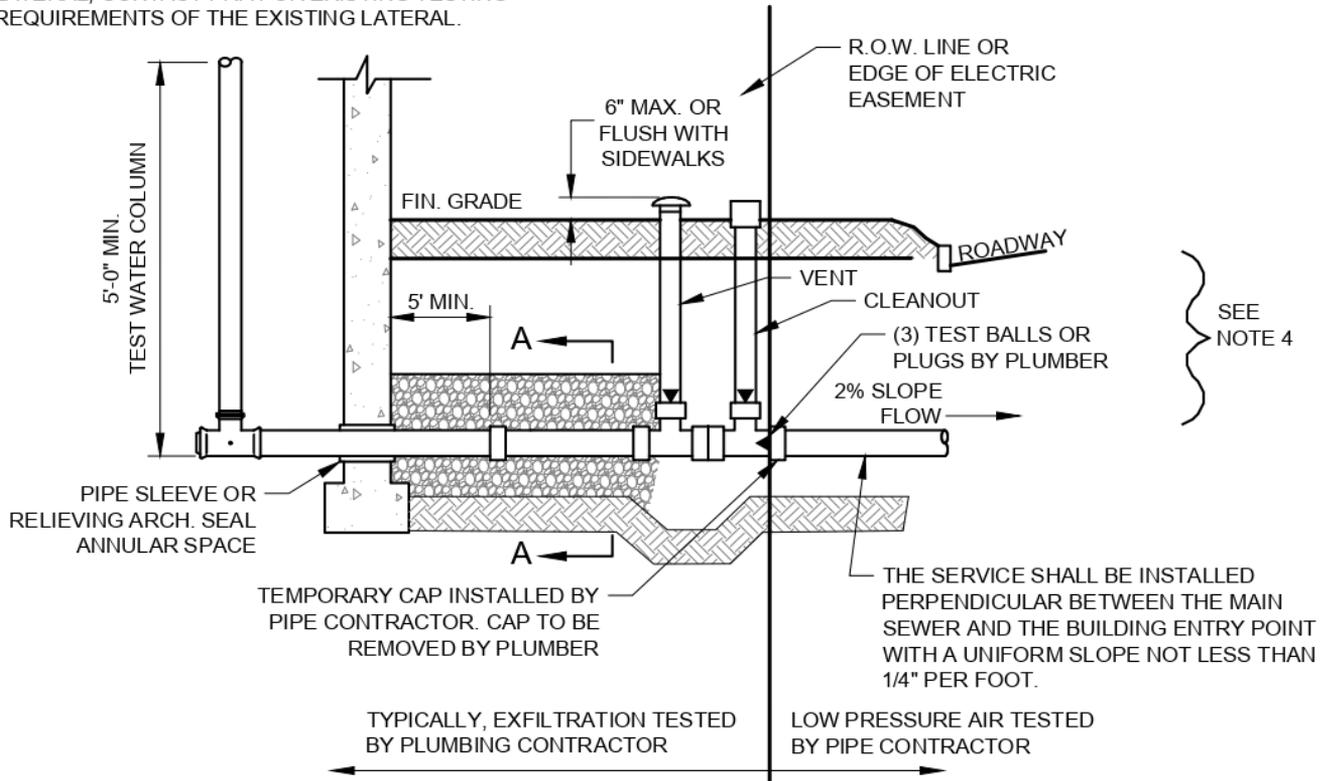


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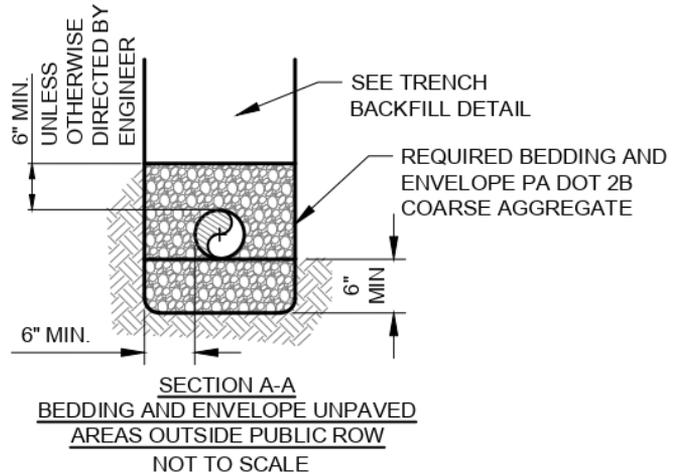
SANITARY SEWER-DEEP SEWER
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/15/96
DRAWING NO.	PRA-S011

THE DETAIL ASSUMES ALL PARTS SHOWN ARE NEW. IF A SEWER MAIN IS TO BE CONNECTED TO AN EXISTING SANITARY LATERAL, CONTACT PRA FOR EXISTING TESTING REQUIREMENTS OF THE EXISTING LATERAL.



AUTHORITY DOES NOT PROVIDE BASEMENT SERVICE



NOTES:

1. IF EXISTING HOUSE HAS APPROVED STACK VENTS, USE DETAIL PRA-S014.
2. NEW PIPE AND FITTINGS ARE TO BE GASKETED 4" SDR 26 PVC UNLESS NOTED. WHEN INSTALLED IN A SIDEWALK THE VENT CAP SHALL BE CI PHILADELPHIA STYLE.
3. REFER TO MANUFACTURER'S SPECIFICATIONS FOR MAXIMUM JOINT DEFLECTION (TYPICALLY ONE DEGREE FOR PVC).
4. REFER TO STANDARD CONSTRUCTION DETAIL PRA-S020 BEDDING AND ENVELOPE AND DETAIL PRA-S021 TRENCH BACKFILL. MATCH DESIGN TO LOCAL/STATE REQUIREMENTS.
5. PIPES PASSING THROUGH FOUNDATION WALLS SHALL HAVE A RELIEVING ARCH, OR A PIPE SLEEVE SHALL BE BUILT ONTO THE FOUNDATION WALL. THE PIPE SLEEVE SHALL BE TWO SIZES GREATER THAN THE PIPE PASSING THROUGH THE WALL.
6. PRIOR TO COVERING THE LATERAL FROM THE CO TO THE HOUSE, THE LATERAL SHALL BE VISUALLY INSPECTED AND TESTED (EXFILTRATION) WITH A COLUMN OF WATER 5 FEET ABOVE THE FIRST INVERT INTO THE HOUSE. LOW PRESSURE AIR TEST MAY BE USED WITH PRA APPROVAL.
7. WHEN ABOVE GRADE, CLEAN OUT PLUGS SHALL BE CAST IRON METAL OR APPROVED EQUAL.

**SEWER LATERAL HOUSED CONNECTION DETAIL AND TESTING
EXISTING HOUSE WITHOUT AN APPROVED STACK VENT**

NOT TO SCALE

REVISED 02/24/2026



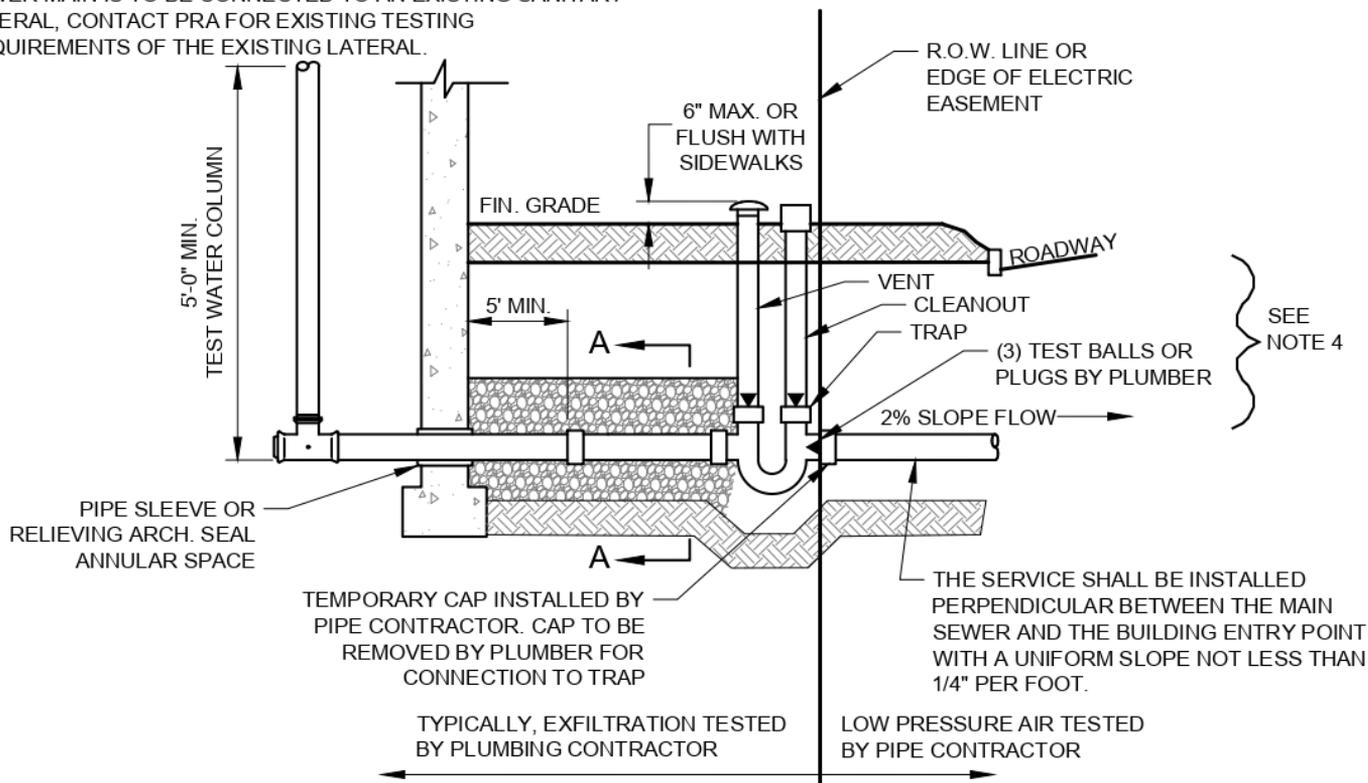
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EXISTING HOUSE CONNECTION
WITHOUT STACK VENT
PREPARED FOR:

PERKASIE REGIONAL AUTHORITY

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DATE:	4/04/96
DRAWING NO.	PRA-S012

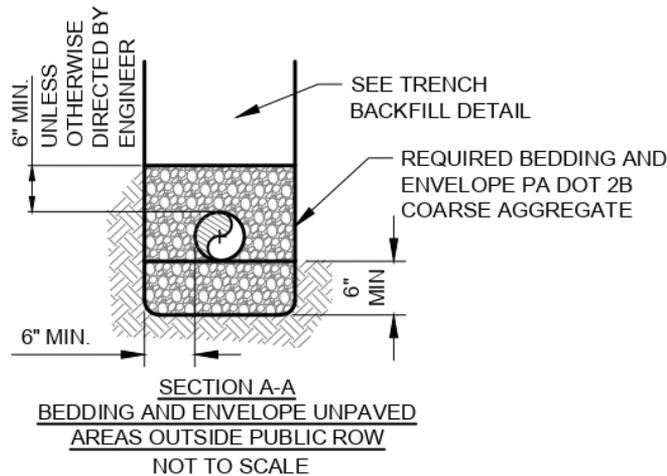
THE DETAIL ASSUMES ALL PARTS SHOWN ARE NEW. IF A SEWER MAIN IS TO BE CONNECTED TO AN EXISTING SANITARY LATERAL, CONTACT PRA FOR EXISTING TESTING REQUIREMENTS OF THE EXISTING LATERAL.



AUTHORITY DOES NOT PROVIDE BASEMENT SERVICE

NOTES:

- IF EXISTING HOUSE HAS APPROVED STACK VENTS, USE DETAIL PRA-S014.
- NEW PIPE AND FITTINGS ARE TO BE GASKETED 4" SDR 26 PVC UNLESS NOTED. THE TRAP MAY BE CAST IRON (CI) WITH GASKETED ADAPTER FITTINGS, MOLDED PVC, OR CONSTRUCTED WITH GASKETED PVC FITTINGS. WHEN INSTALLED IN A SIDEWALK THE VENT CAP SHALL BE CI PHILADELPHIA STYLE.
- REFER TO MANUFACTURER'S SPECIFICATIONS FOR MAXIMUM JOINT DEFLECTION (TYPICALLY ONE DEGREE FOR PVC).
- REFER TO STANDARD CONSTRUCTION DETAIL PRA-S020 BEDDING AND ENVELOPE AND DETAIL PRA-S021 TRENCH BACKFILL. MATCH DESIGN TO LOCAL/STATE REQUIREMENTS.
- PIPES PASSING THROUGH FOUNDATION WALLS SHALL HAVE A RELIEVING ARCH, OR A PIPE SLEEVE SHALL BE BUILT ONTO THE FOUNDATION WALL. THE PIPE SLEEVE SHALL BE TWO SIZES GREATER THAN THE PIPE PASSING THROUGH THE WALL.
- PRIOR TO COVERING THE LATERAL FROM THE CO TO THE HOUSE, THE LATERAL SHALL BE VISUALLY INSPECTED AND TESTED (EXFILTRATION) WITH A COLUMN OF WATER 5 FEET ABOVE THE FIRST INVERT INTO THE HOUSE. LOW PRESSURE AIR TEST MAY BE USED WITH PRA APPROVAL.
- WHEN ABOVE GRADE, CLEAN OUT PLUGS SHALL BE CAST IRON METAL OR APPROVED EQUAL.



**SEWER LATERAL HOUSED CONNECTION DETAIL WITH TRAP AND TESTING
EXISTING HOUSE WITHOUT AN APPROVED STACK VENT**

NOT TO SCALE

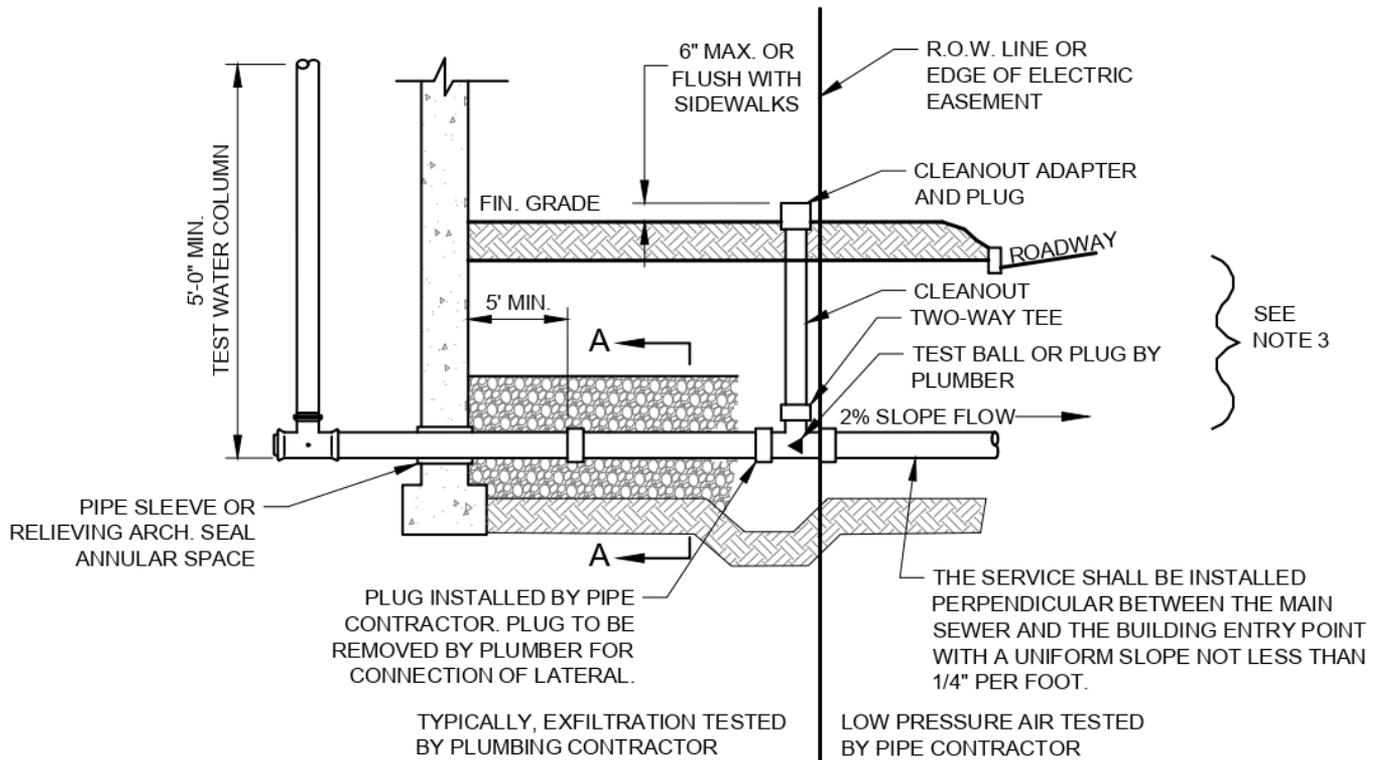
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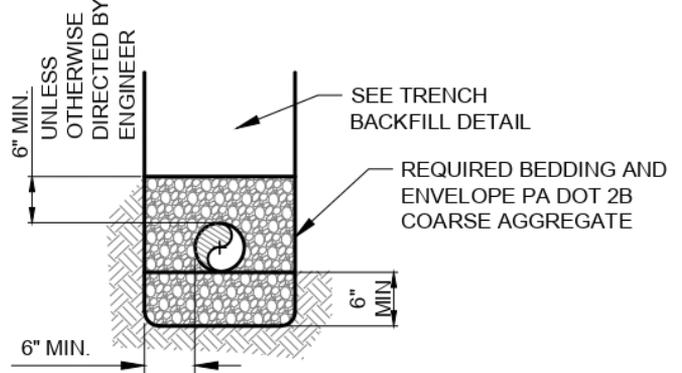
EXISTING HOUSE CONNECTION WITH TRAP
WITHOUT STACK VENT
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
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DATE:	4/04/96
DRAWING NO.	PRA-S013



SEE NOTE 3

AUTHORITY DOES NOT PROVIDE BASEMENT SERVICE



SECTION A-A
BEDDING AND ENVELOPE UNPAVED AREAS
OUTSIDE PUBLIC ROW
NOT TO SCALE

- NOTES:
1. PIPE AND FITTINGS ARE TO BE GASKETED 4" SDR 26 PVC UNLESS NOTED.
 2. REFER TO MANUFACTURER'S SPECIFICATIONS FOR MAXIMUM JOINT DEFLECTION (TYPICALLY ONE DEGREE FOR PVC).
 3. REFER TO STANDARD CONSTRUCTION DETAIL PRA-S020 BEDDING AND ENVELOPE AND DETAIL PRA-S021 TRENCH BACKFILL. MATCH DESIGN TO LOCAL/STATE REQUIREMENTS.
 4. PIPES PASSING THROUGH FOUNDATION WALLS SHALL HAVE A RELIEVING ARCH, OR A PIPE SLEEVE SHALL BE BUILT ONTO THE FOUNDATION WALL. THE PIPE SLEEVE SHALL BE TWO SIZES GREATER THAN THE PIPE PASSING THROUGH THE WALL.
 5. PRIOR TO COVERING THE LATERAL FROM THE CO TO THE HOUSE, THE LATERAL SHALL BE VISUALLY INSPECTED AND TESTED (EXFILTRATION) WITH A COLUMN OF WATER 5 FEET ABOVE THE FIRST INVERT INTO THE HOUSE. LOW PRESSURE AIR TEST MAY BE USED WITH PRA APPROVAL.
 6. WHEN ABOVE GRADE, CLEAN OUT PLUGS SHALL BE CAST IRON METAL OR APPROVED EQUAL.

SEWER LATERAL HOUSED CONNECTION DETAIL AND TESTING
NEW HOUSE WITH AN APPROVED STACK VENT

NOT TO SCALE

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NEW HOUSE CONNECTION
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

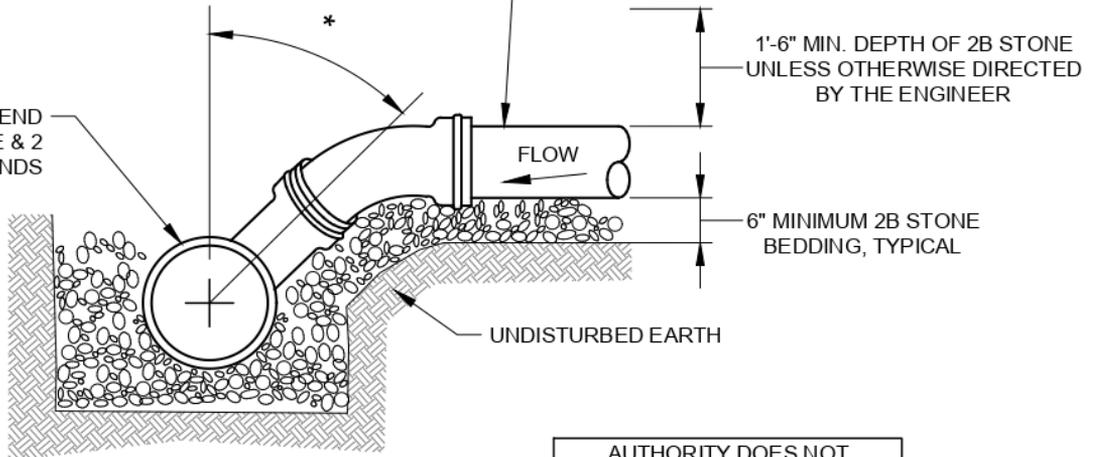
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DATE:	4/04/96
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PLOTTED: 2/24/2026 11:41:38 AM BY: TINA CARTER PLOTSTYLE: PENNONI.NCS SIB, PROJECT STATUS: ...

* ANGLE EQUALS ANGLE OF BEND MINUS 1 DEGREE. OTHER COMBINATIONS SHALL BE DETAILED ON THE PLANS.

THE SERVICE SHALL BE INSTALLED PERPENDICULAR BETWEEN THE MAIN SEWER AND THE BUILDING ENTRY POINT WITH A UNIFORM SLOPE NOT LESS THAN 1/4" PER FOOT

TEE WYE & BEND SHOWN OR WYE & 2 BENDS



AUTHORITY DOES NOT PROVIDE BASEMENT SERVICE

NOTES:

1. LATERALS ARE TO BE 4" SDR 26 PVC PIPE UNLESS OTHERWISE NOTED.
2. ENSURE SUPPORT OF PIPE AND FITTINGS BY UNIFORM COMPACTION ALL AROUND AND UP SIDES OF THE PIPE, APPROXIMATELY 95 PERCENT STANDARD PROCTOR, AASHTO T-99.
3. REFER TO STANDARD SPECIFICATIONS PERKASIE REGIONAL AUTHORITY FOR ADDITIONAL TRENCHING AND INSTALLATION REQUIREMENTS.
4. REFER TO MANUFACTURER'S SPECIFICATIONS FOR MAXIMUM JOINT DEFLECTION FOR PVC PIPE (TYPICALLY ONE DEGREE FOR PVC).
5. BENDS SHALL BE GASKET BY SPIGOT.

TYPICAL CONNECTION
FOR SANITARY LATERAL -
SHALLOW SEWER
 NOT TO SCALE

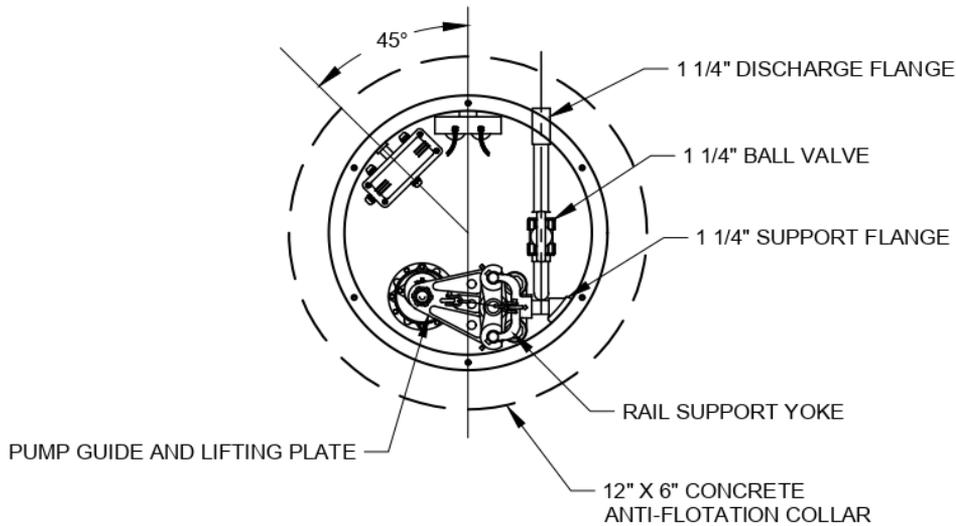
REVISED 5/13/2025



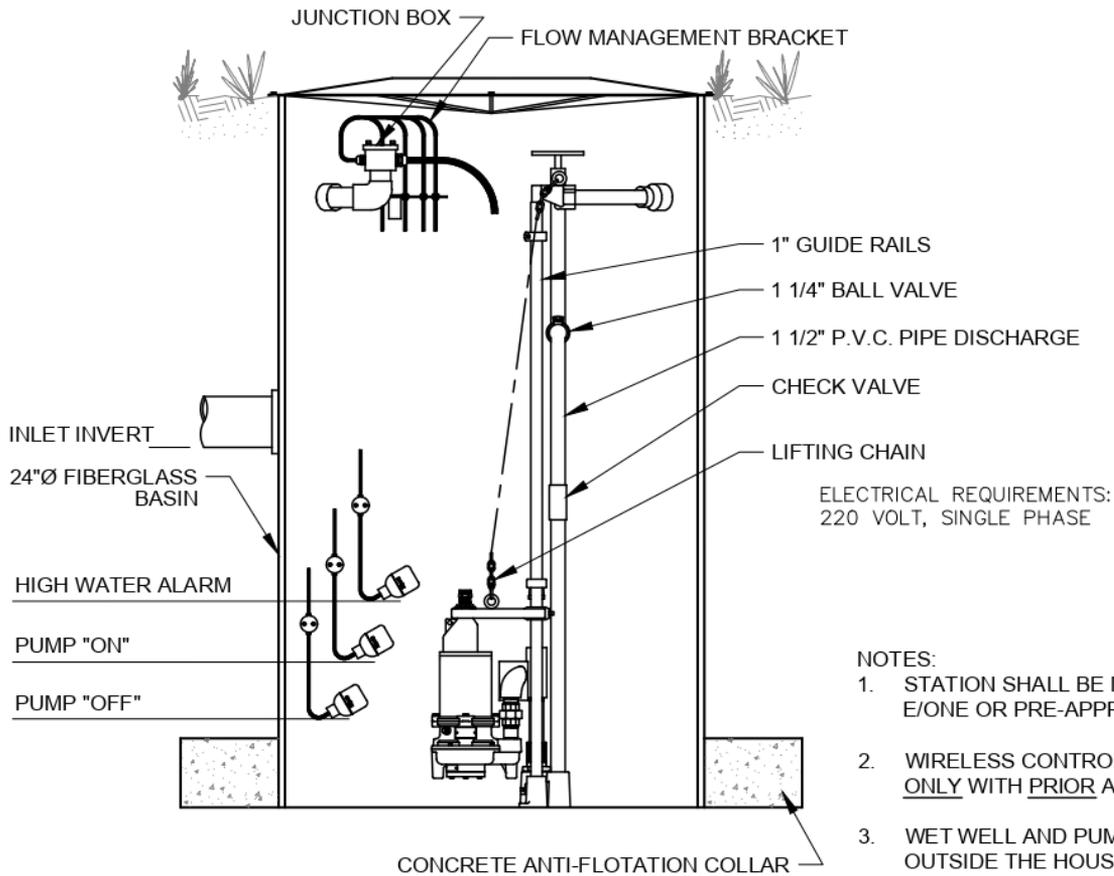
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TYPICAL CONNECTION TO SEWER MAIN
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

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DRAWING NO.	PRA-S015



BASIN ASSEMBLY TOP VIEW



BASIN ASSEMBLY SIDE VIEW

**PRESSURE SEWER GRINDER
PUMP STATION DETAIL**

NOT TO SCALE

ELECTRICAL REQUIREMENTS:
220 VOLT, SINGLE PHASE

NOTES:

1. STATION SHALL BE MANUFACTURED BY E/ONE OR PRE-APPROVED EQUAL.
2. WIRELESS CONTROLS MAY BE UTILIZED ONLY WITH PRIOR AUTHORITY APPROVAL.
3. WET WELL AND PUMP MUST BE INSTALLED OUTSIDE THE HOUSE.
4. INSTALL ELECTRIC DISCONNECT ON OUTSIDE OF HOUSE.

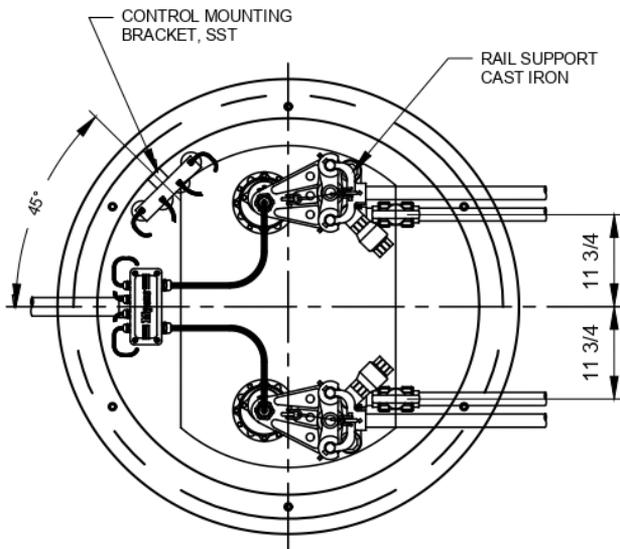
REVISED 5/13/2025



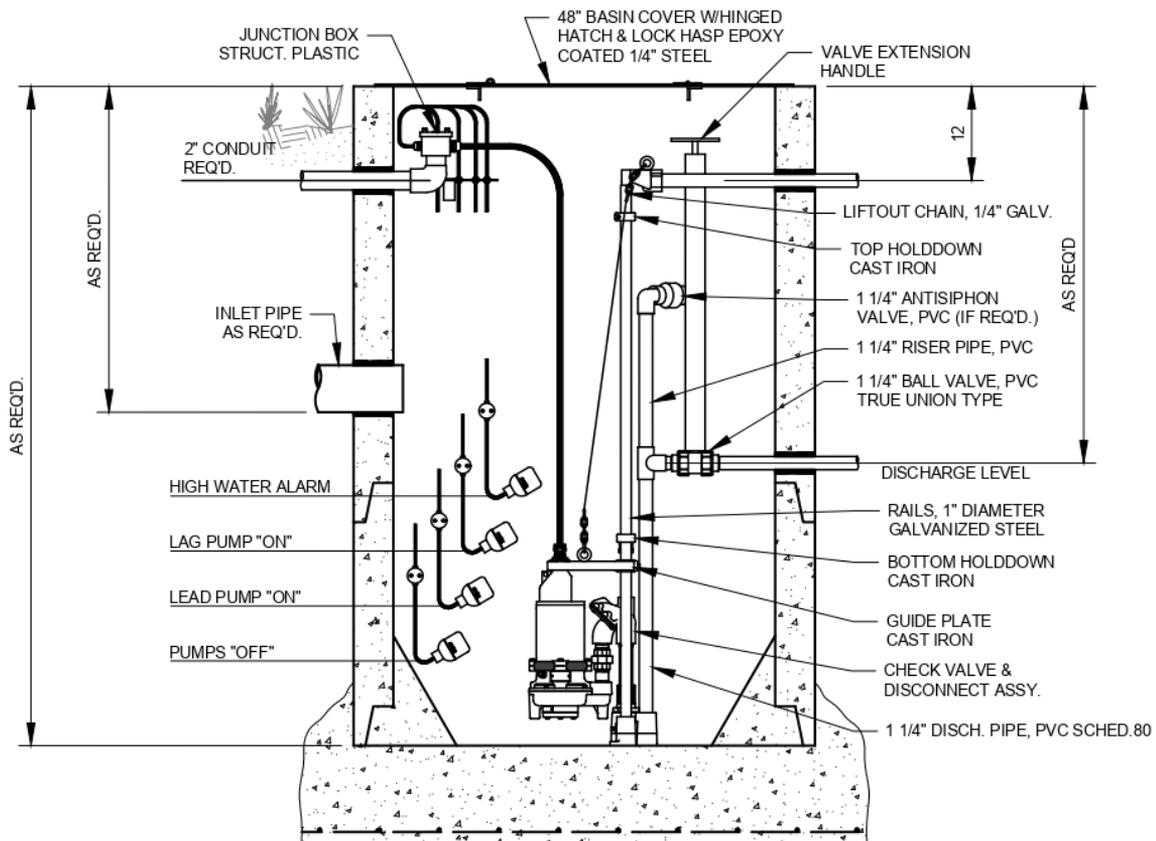
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PRESSURE SEWER GRINDER PUMP STATION
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

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DATE:	4/09/97
DRAWING NO.	PRA-S016



PLAN VIEW



DUPLEX GRINDER PUMP STATION
NOT TO SCALE

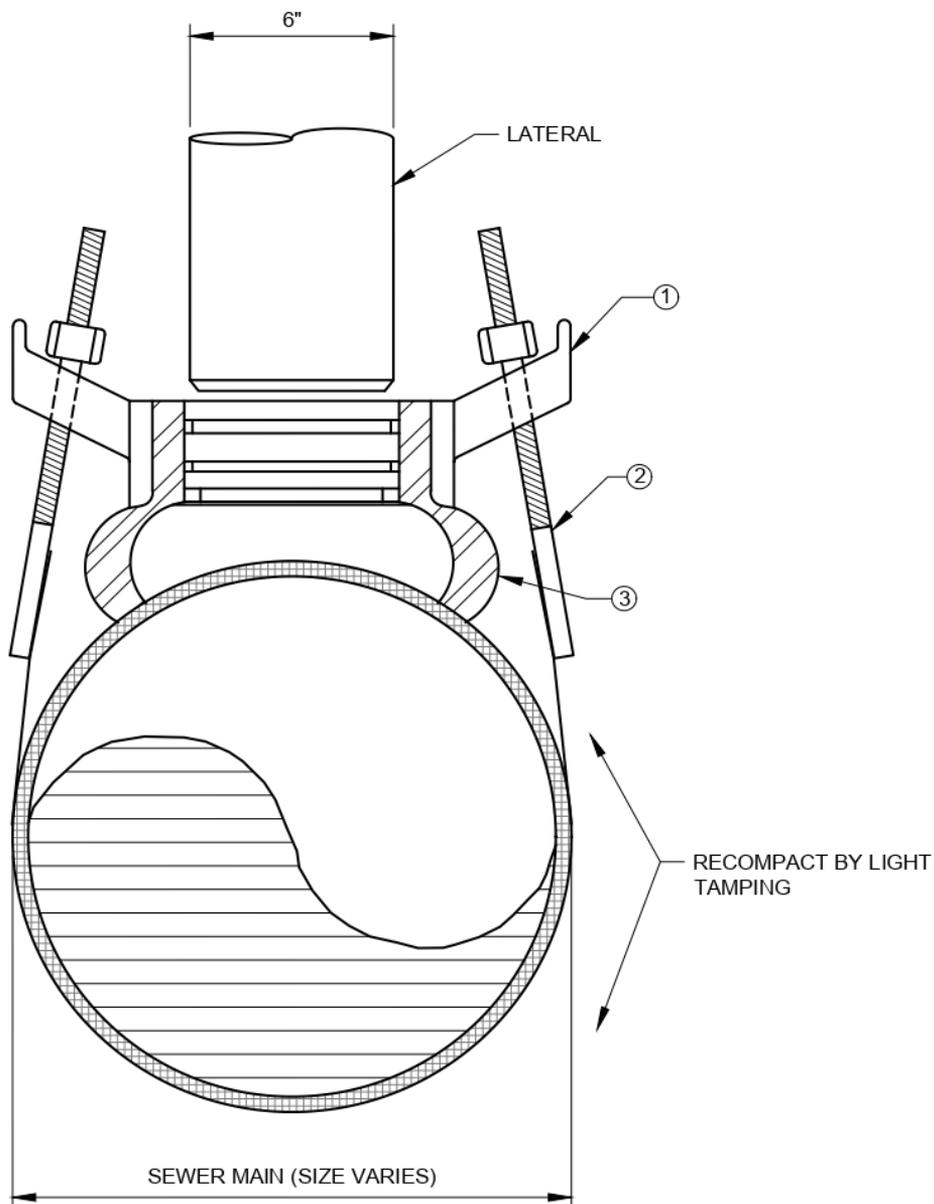
REVISED 02/24/2026



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DUPLEX GRINDER PUMP STATION
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/08/97
DRAWING NO.	PRA-S017



NOTES :

MATERIALS :

1. SADDLE CASTING: DUCTILE IRON ASTM 536-80 GRADE 65-45-12 PROTECTED WITH CORROSION RESISTANT PAINT.
2. STAINLESS STEEL 304 ADJUSTABLE STRAP : BOLTS, NUTS AND WASHERS 1/2" N.C. ROLL THREAD TEFLON COATED. 3 1/2" WIDE BAND TO SPREAD CLAMP FORCE OUT ON PIPE.
3. GASKET : VIRGIN SBR COMPOUND FOR SEWER SERVICE. MEETS ASTM D-2000 3 BA715.
STYLE CB SEWER SADDLE MANUFACTURED BY ROMAC INDUSTRIES, INC.

SEWER SADDLE

NOT TO SCALE

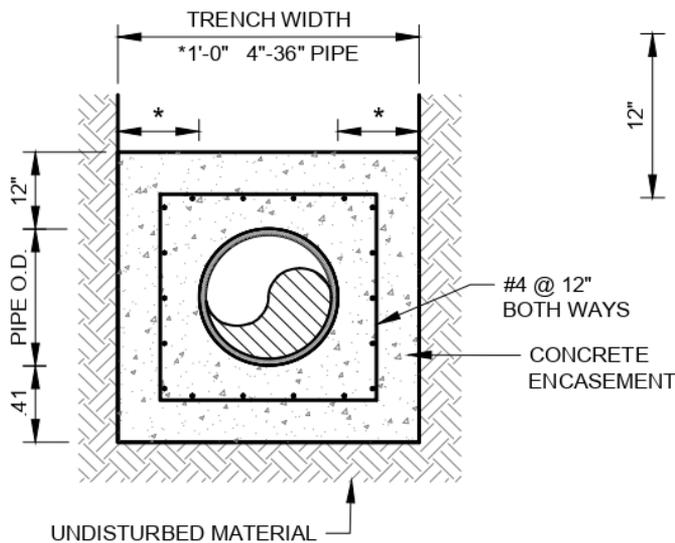
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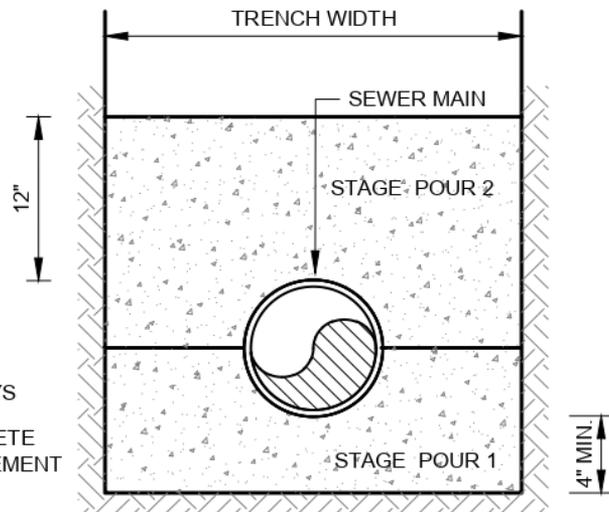
SEWER SADDLE
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
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DATE:	4/08/96
DRAWING NO.	PRA-S018



**REINFORCE
CONCRETE ENCASEMENT**

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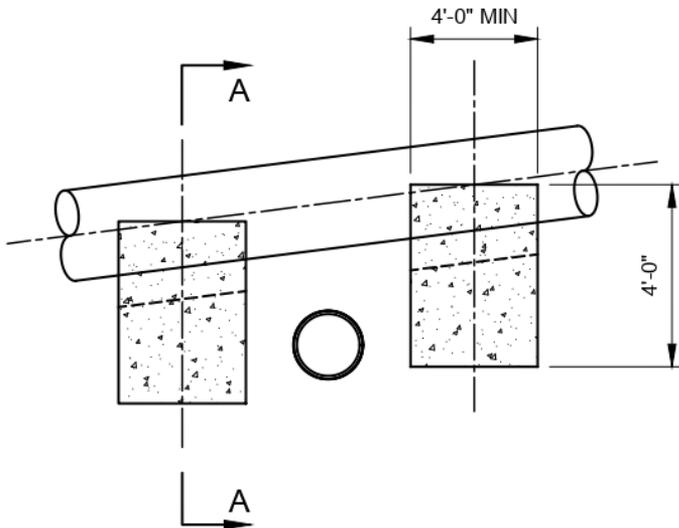


UNDISTURBED MATERIAL

STAGE 1-INSTALL CONCRETE FROM BOTTOM OF TRENCH TO CENTERLINE OF PIPE
STAGE 2-AFTER 24 hr. PERIOD INSTALL CONCRETE FROM CENTERLINE OF PIPE TO 12" ABOVE BARREL OF PIPE.

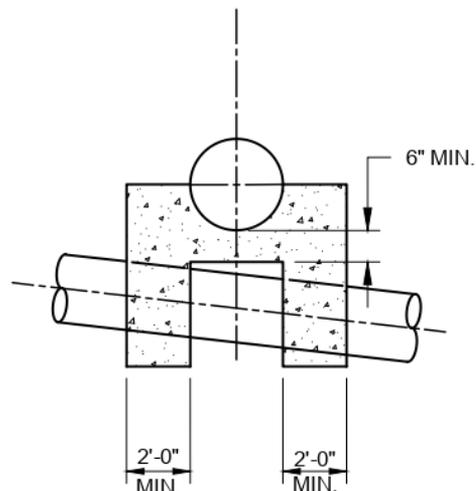
CONCRETE ENCASEMENT

NOT TO SCALE



CONCRETE PEDESTAL

NOT TO SCALE



SECTION A-A

NOT TO SCALE

CONCRETE ENCASEMENT & PEDESTAL

NOT TO SCALE

REVISED 5/13/2025



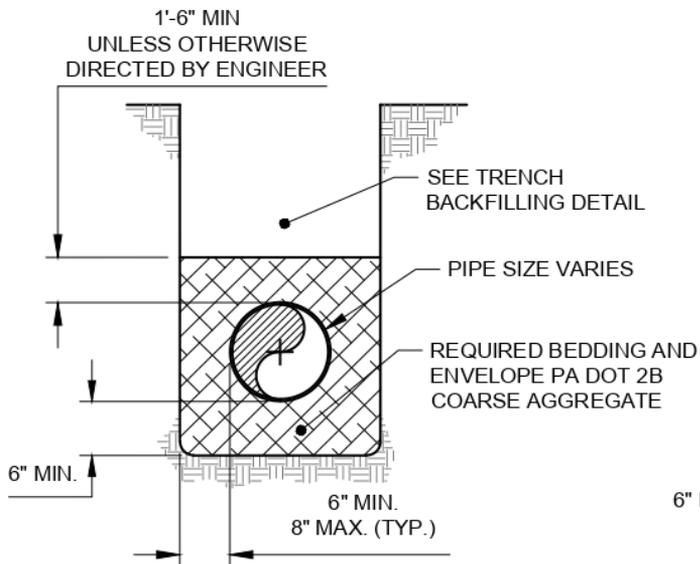
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CONCRETE ENCASEMENT & PEDESTAL

PREPARED FOR:

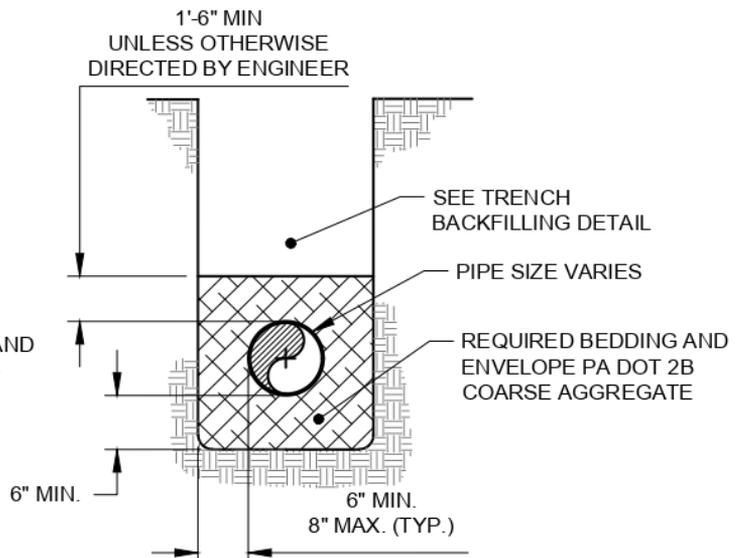
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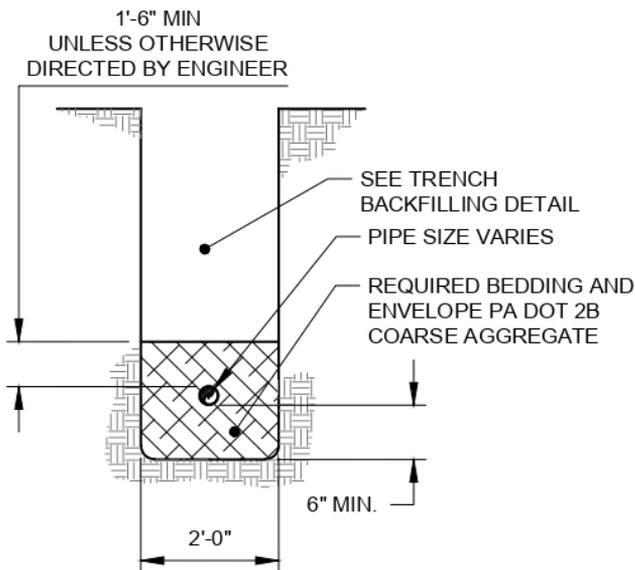
STANDARD PIPE BEDDING - WATER MAIN

NOT TO SCALE



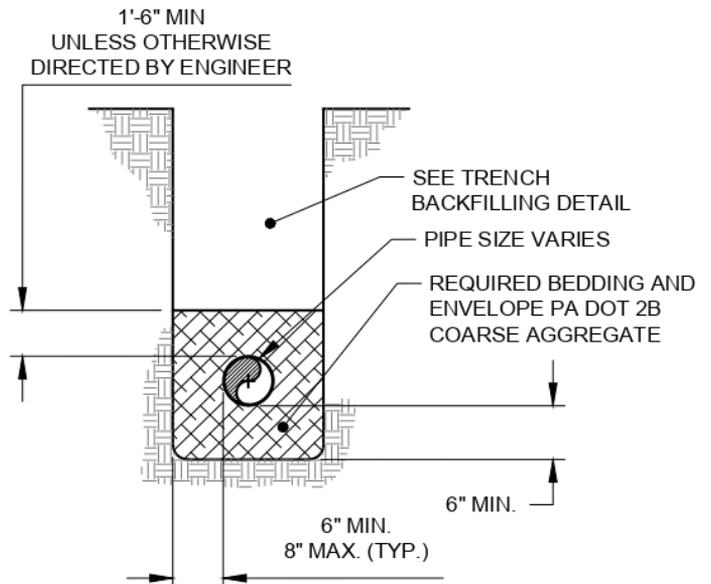
STANDARD PIPE BEDDING - SANITARY MAIN

NOT TO SCALE



STANDARD PIPE BEDDING - WATER SERVICE

NOT TO SCALE



STANDARD PIPE BEDDING - SANITARY LATERAL

NOT TO SCALE

PIPE BEDDING AND ENVELOPE DETAIL

NOT TO SCALE

REVISED 5/13/2025



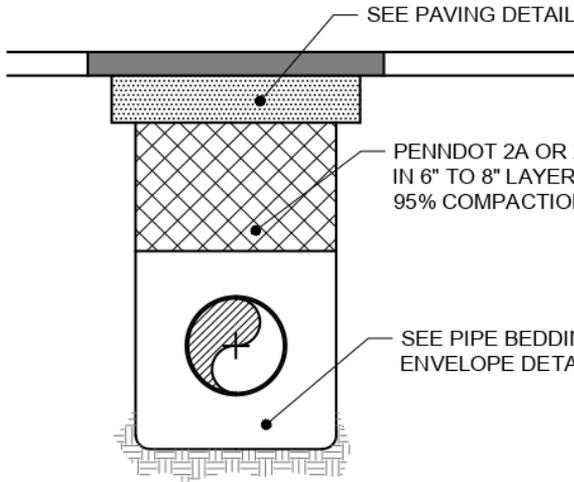
PENNONI ASSOCIATES INC.
150 Ridge Road, Suite 2
Sellersville, PA 18960
T 215-257-5711 F 215-257-5766

PIPE BEDDING AND ENVELOPE

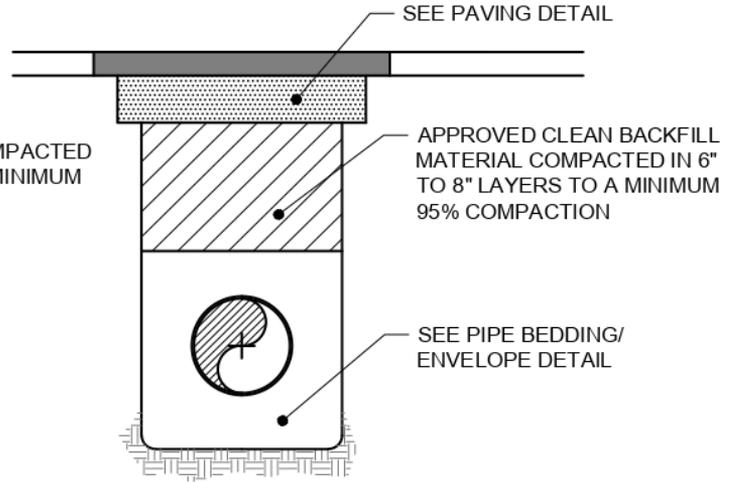
PREPARED FOR:

PERKASIE REGIONAL AUTHORITY

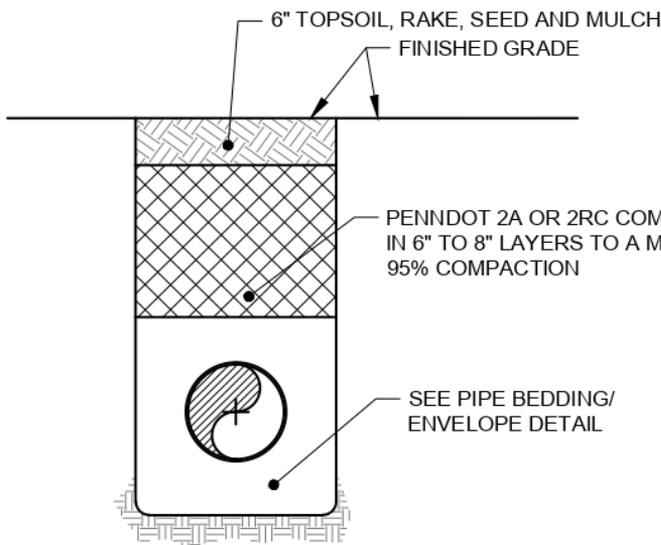
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CHECKED BY:	SRT
DATE:	4/04/96
DRAWING NO.	PRA-S020



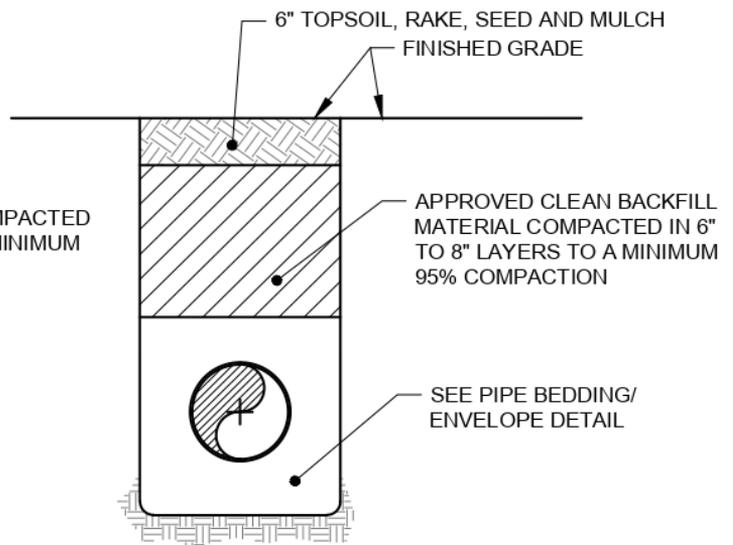
EXISTING ROADS
PENNDOT R/W-BOROUGH R/W
 NOT TO SCALE



BOROUGH R/W
NEW SUBDIVISIONS OR LAND DEVELOPMENT
 NOT TO SCALE



UNPAVED AREAS
WITHIN PUBLIC R/W
 NOT TO SCALE



UNPAVED AREAS
OUTSIDE PUBLIC R/W
 NOT TO SCALE

NOTES:

1. TRENCH COMPACTION TO BE TESTED, AT THE DEVELOPERS EXPENSE, IN ACCORDANCE WITH PENNDOT PUB 408, AS REQUIRED BY THE AUTHORITY'S ENGINEER.
2. CLEAN FILL MUST BE APPROVED BY THE AUTHORITY'S ENGINEER PRIOR TO PLACEMENT IN THE TRENCH.
3. AREAS AROUND MANHOLES AND OTHER APPURTENANCES SHALL BE HAND COMPACTED AS DIRECTED BY THE AUTHORITY'S ENGINEER.
4. SPECIAL CONDITIONS OF HIGHWAY OCCUPANCY PERMIT MAY SUPERCEDE THIS DETAIL.

TRENCH BACKFILL DETAIL
 NOT TO SCALE

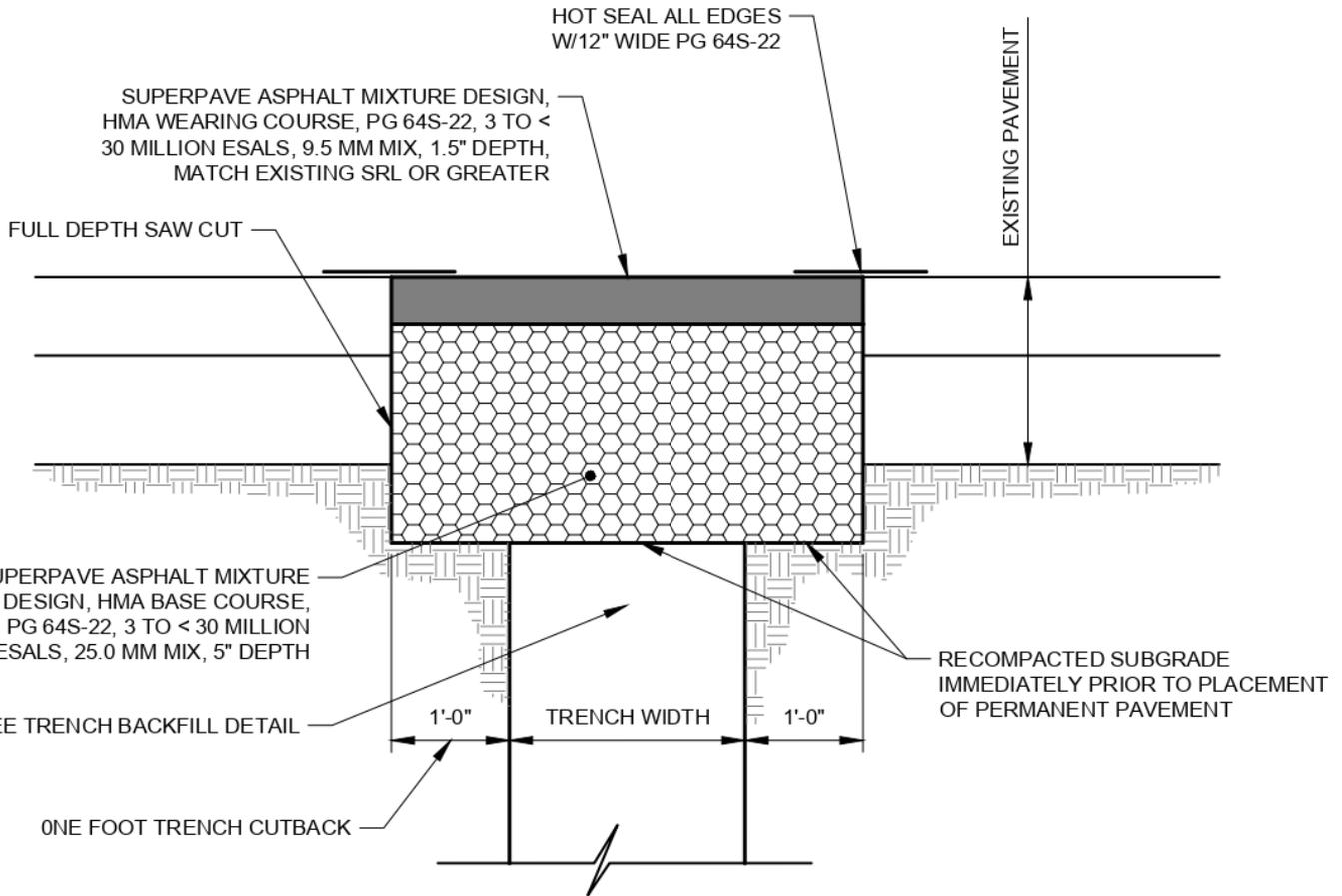
REVISED 5/13/2025



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TRENCH BACKFILL
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/04/96
DRAWING NO.	PRA-S021



NOTE:
MATCH EXISTING
DEPTHS IF GREATER

NOTE :
EXPOSED VERTICAL AND HORIZONTAL SURFACES
SHALL BE PREPARED AS STATED IN PENNDOT PUB
408, SECT. 413.3(g).

TOWNSHIP/BOROUGH FLEXIBLE PAVEMENT RESTORATION
NOT TO SCALE

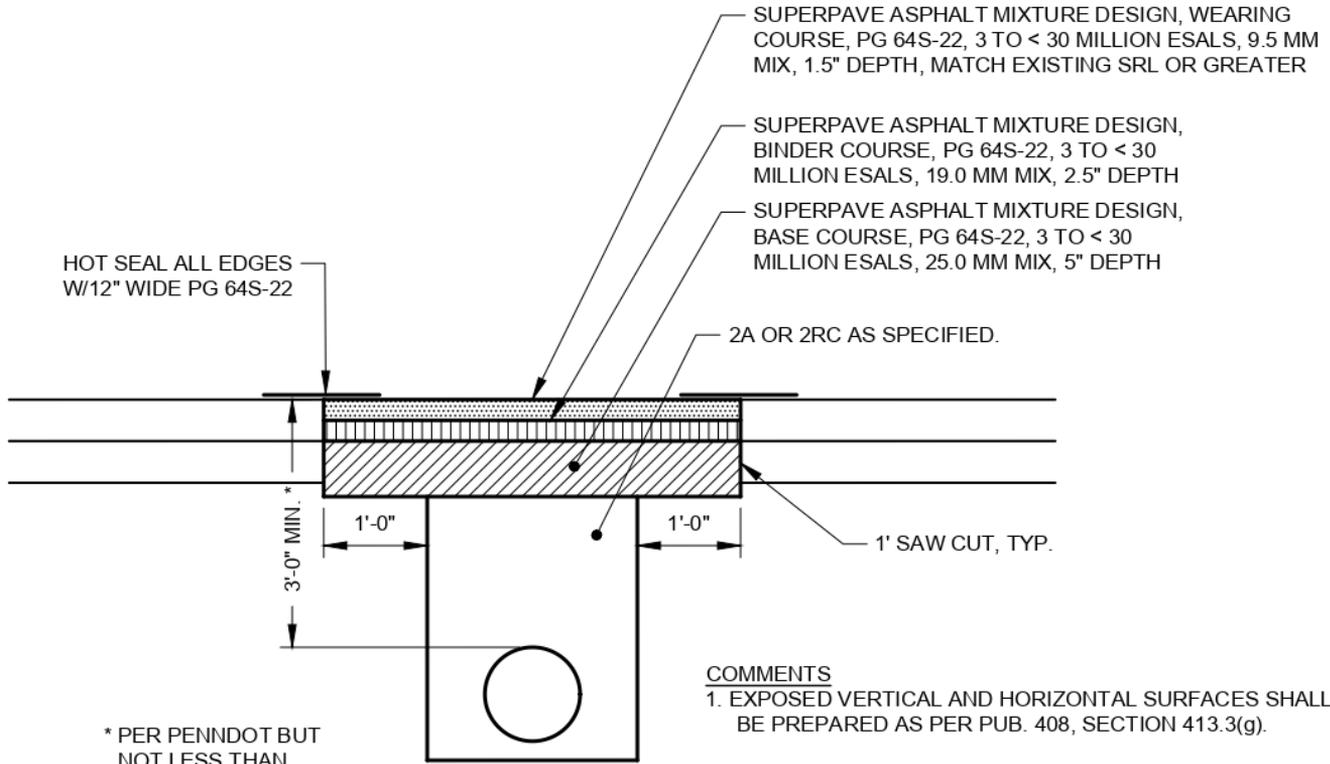
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FLEXIBLE PAVEMENT RESTORATION
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	5/21/12
DRAWING NO.	PRA-S022A



* PER PENNDOT BUT NOT LESS THAN SHOWN ON PLANS

COMMENTS

1. EXPOSED VERTICAL AND HORIZONTAL SURFACES SHALL BE PREPARED AS PER PUB. 408, SECTION 413.3(g).
2. MINIMUM 1' PAVEMENT CUTBACK, EXCAVATE OLD AND TEMPORARY MATERIAL. RECOMPACT SUB-GRADE. TACK COAT ALL VERTICAL EDGES. INSTALL ONLY BASE COURSE AND BINDER COURSE IN ONE DAY, OR AS DIRECTED.
3. PERMANENT RESTORATION TO BE MINIMUM 90 DAYS UNLESS FLOWABLE FILL IS USED, OR AS DIRECTED.

NOTES:

1. MATCH EXISTING DEPTHS IF GREATER.
2. RESTORE PAVEMENT MARKINGS WITH APPROVED THERMOPLASTIC PAINT.

PENNDOT FLEXIBLE TRENCH RESTORATION
NOT TO SCALE

REVISED 5/13/2025



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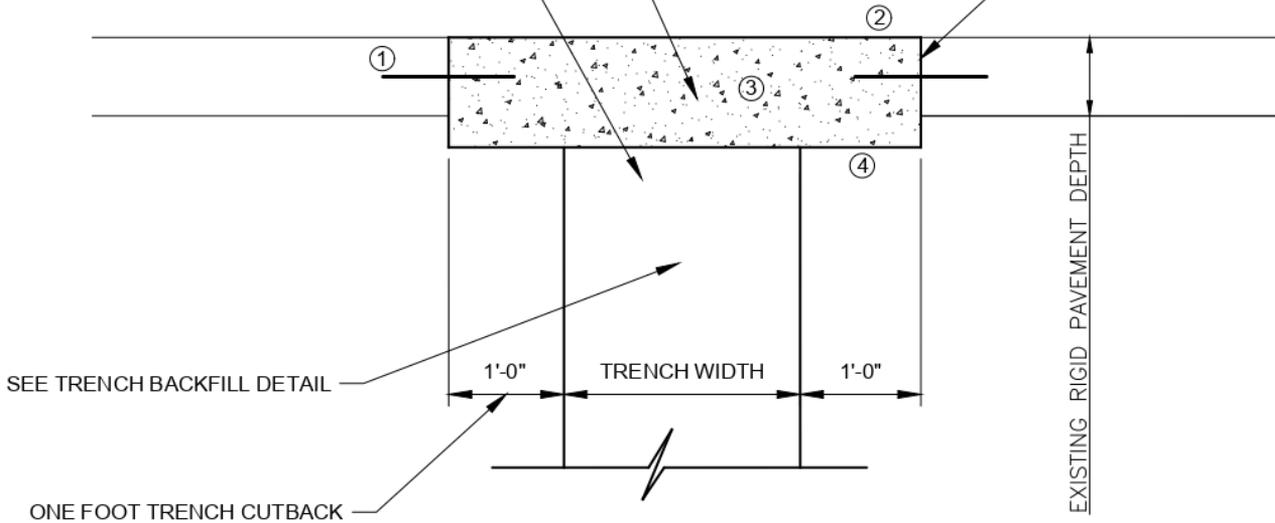
FLEXIBLE PAVEMENT RESTORATION
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	5/21/12
DRAWING NO.	PRA-S022B

8" MIN. CLASS AA OR CLASS AA ACCELERATED CONCRETE OR DEPTH EQUAL TO EXISTING PAVEMENT (WHICHEVER IS GREATER)

2A OR 2RC AS SPECIFIED IN PERMIT

FULL DEPTH SAW CUT



NOTES :

1. FOLLOW PROCEDURES NOTED IN PUB 72M, SECTIONS RC-25M AND RC-26M, INCLUDING INSTRUCTION FOR PLACING REINFORCING STEEL, TIE BOLTS, AND LOAD TRANSFER DEVICES.
2. FOLLOW PROCEDURES NOTED IN PUB 408, SECTION 516 - CONCRETE PAVEMENT PATCHING.
3. SURFACE TEXTURE AS PER PUB. 408, SECT. 501.3(K).
4. FOR LIMITS OF CONCRETE REPLACEMENT SEE DEPT. REG. 459, SECT. 459.8(i)(4).
5. CUT BACK IS NOT REQUIRED BEYOND A TRANSVERSE OR LONGITUDINAL JOINT OR CURB.
6. SPECIAL CONDITIONS OF OCCUPANCY PERMIT MAY SUPERCEDE THIS DETAIL.

PENNDOT RIGID PAVEMENT RESTORATION

NOT TO SCALE

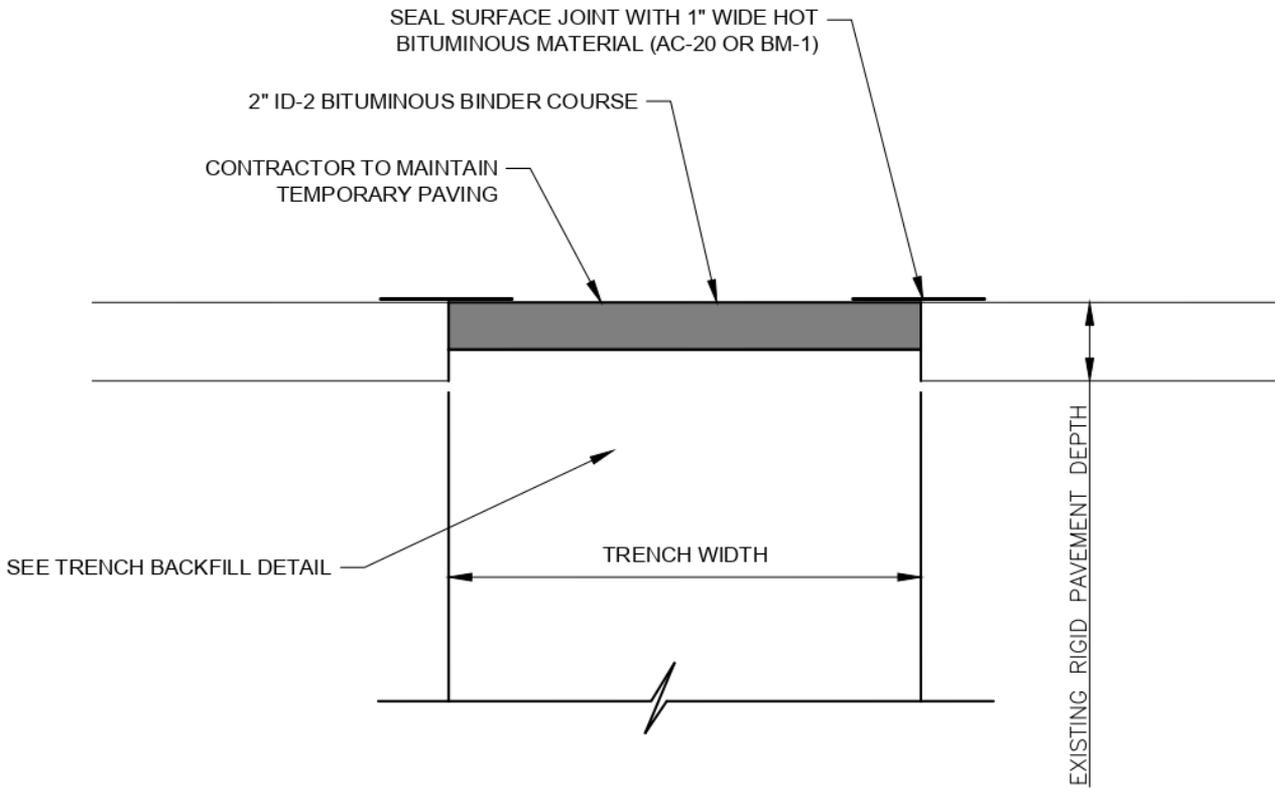
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RIGID PAVEMENT RESTORATION
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/04/96
DRAWING NO.	PRA-S023



TEMPORARY TRENCH RESTORATION
 NOT TO SCALE

REVISED 5/13/2025

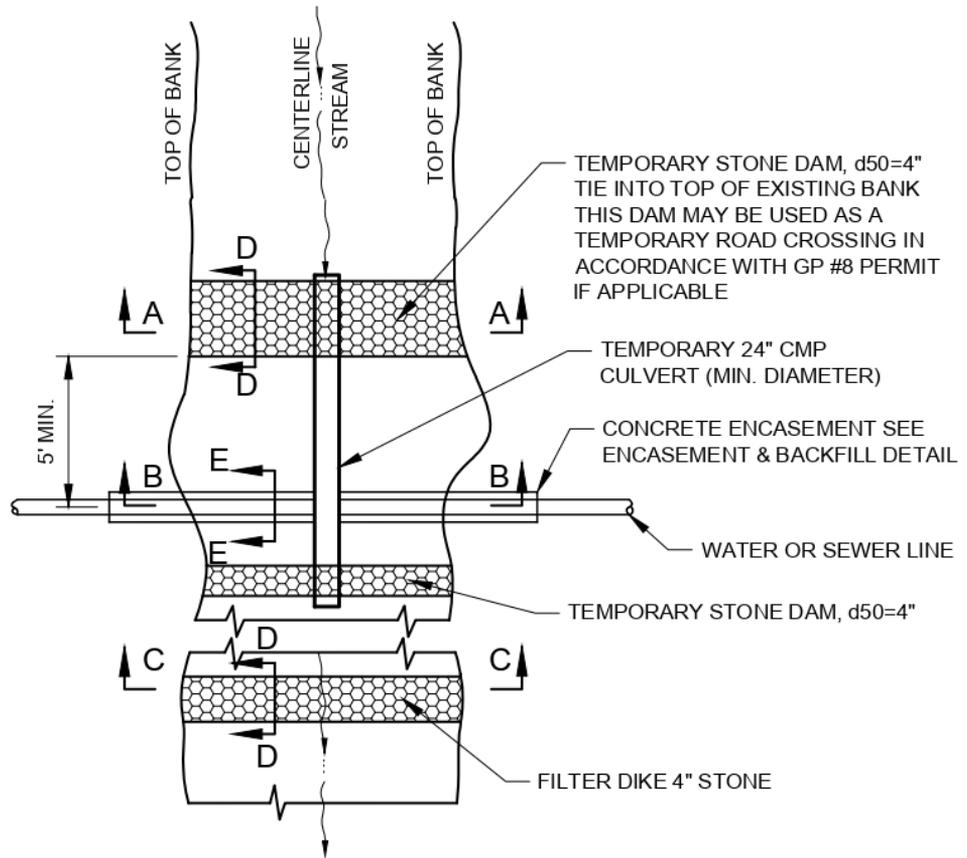


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TEMPORARY PAVEMENT RESTORATION
 PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/04/96
DRAWING NO.	PRA-S024

M:\AUTHORITY CLIENTS\PERKASIE\SANITARY DETAILS\ALL PRA SANITARY DETAILS 2025.DWG
 PLOTTED: 7/19/2025 10:08:28 AM BY: TINA CARTER PLOTSTYLE: PENNONI NCS S1B PROJECT STATUS: ----



NOTE :
SEE DRAWING PBA-S026, STREAM CROSSING - SECTIONS.

PLAN - PIPELINE STREAM CROSSING
NOT TO SCALE

REVISED 5/13/2025

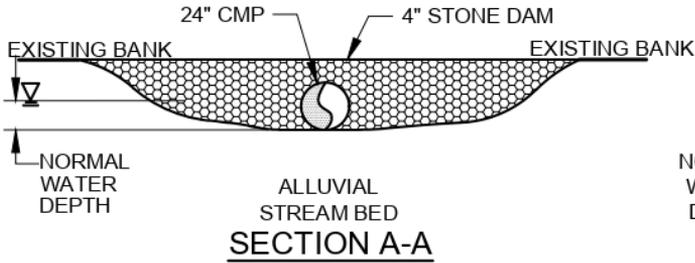


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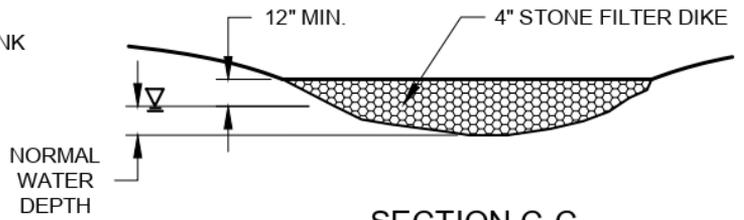
STREAM CROSSING PLAN
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	4/04/96
DRAWING NO.	PRA-S025

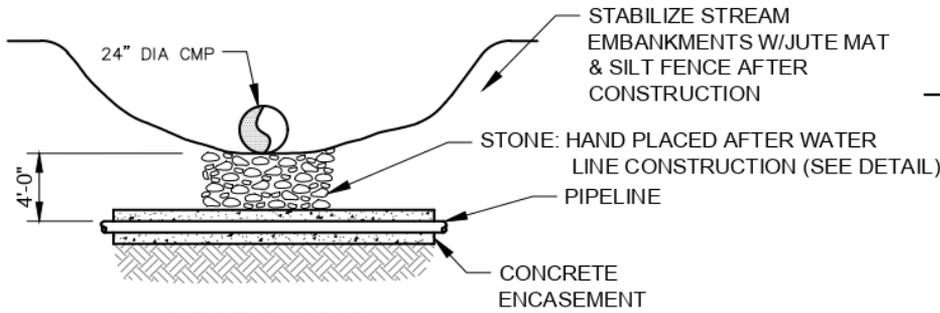
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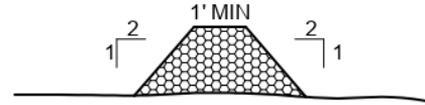
SECTION A-A



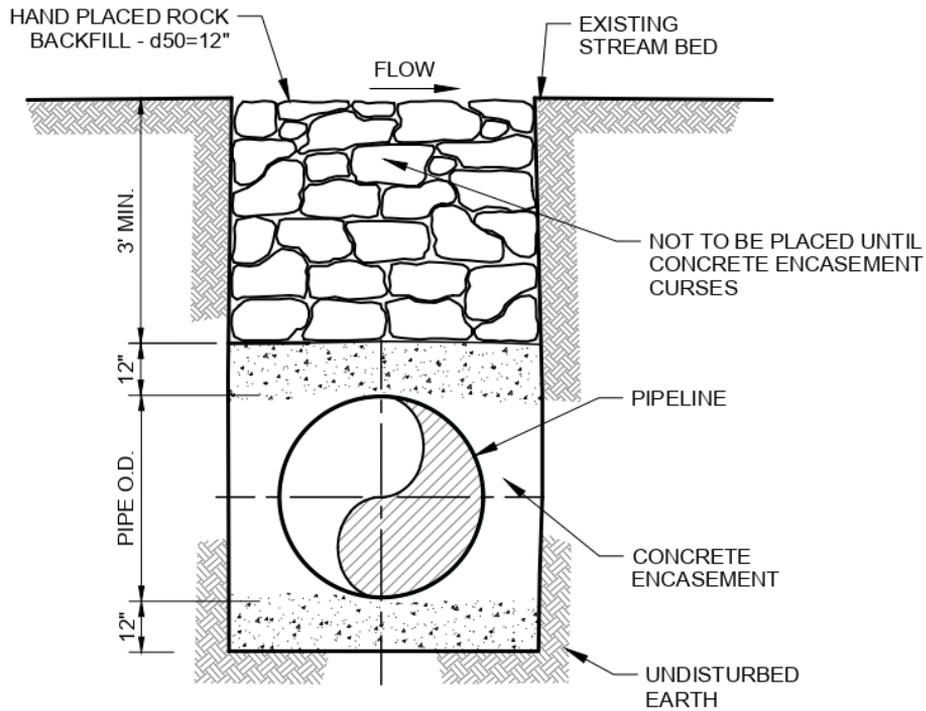
SECTION C-C



SECTION B-B



SECTION D-D



**SECTION E-E
ENCASEMENT AND BACKFILL DETAIL**

**STREAM CROSSING - SECTIONS
NOT TO SCALE**

REVISED 5/13/2025



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STREAM CROSSING - SECTIONS
PREPARED FOR:
PERKASIE REGIONAL AUTHORITY

DESIGNED BY:	JAR
CHECKED BY:	SRT
DATE:	3/13/96
DRAWING NO.	PRA-S026

MAUTHORITY CLIENTS/PERKASIE/SANITARY DETAILS/SALL PRA/SANITARY DETAILS 2025.DWG
 PLOTTED: 7/22/2025 8:59:34 AM BY: TINA CARTER PLOTSTYLE: PENNONI NCS.STB PROJECT STATUS: ---

APPENDIX A

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
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1. Water Main:

Ductile Iron Pipe, Thickness Class 52, 4" through 16" Diameter

Push on Joint	Griffin US Pipe Atlantic States Clow	Super Bell-Tite® Tyton Joint®
Restrained Joint	Griffin Griffin Griffin Griffin US Pipe US Pipe McWane Clow	Rigid-Lok™ Bolt-Lok™ Mech-Lok™ Snap-Lok™ USIFLEX® TRFlex® Restrained Joint Super Lock
Flanged & Mechanical Joint	Griffin Clow US Pipe Atlantic States	

2. Ductile Iron Fittings

Pressure Class 350, Mechanical Joint, Compact or Full Size

	Tyler Pipe Griffin Pipe Union Foundry US Pipe Clow	Union Tite Trim Tyte®
3. <u>DIP Mechanical Joint Retaining Gland</u>	EBAA Iron Sales	MegaLug® 1100 Series
4. <u>DIP Bell Joint Repair Clamps</u>	Smith-Blair Ford Romac Mueller	274 Bell Jt. Repair Clamp Style 516 H-771

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
5. <u>Steel Couplings for DIP and CI Pipe</u>	Smith-Blair Ford Dresser Romac	400 Series 501
6. <u>Flanged Coupling Adaptors</u>	Smith-Blair Ford Romac	900 Series
7. <u>CI and DIP Repair Clamps/Couplings</u>	Smith-Blair Ford Mueller® Romac	200 Series 510,520,530,500 Series
8. <u>Tapped Repair Clamp</u>	Smith-Blair Mueller Mueller Romac	200 Series Servi-Seal® Xtra-Range® Servi-Seal® CL1, CL2, 306
9. <u>D.I. M.J. Split Repair Sleeve for CI & DIP</u>	Mueller Clow	H-785
10. <u>Tapping Sleeve</u>	American Darling Mueller Mueller US Pipe Clow	 H-615 H-616
11. <u>Tapping Valve</u>	Mueller US Pipe Clow American Darling	Super Seat Resilient Seat

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
-----------------	---------------------	----------------------------

12. Gate Valves

Resilient Seat, Non-Rising Stem, Open Left, Mechanical Joint Ends, and Flanged Ends, 3" through 12".

Waterous	Series 500
American Darling	CRS
M & H	
Clow	R/W
Kennedy Valve	Kenseal II
US Pipe	MetroSeal® 250
Tyler Pipe	DRS 250 Dual Res. Seat
Mueller	Super Seal™ Res. Seat
	Valve: MJ: A-2370-23
	Flanged: A-2370-6

13. Butterfly Valves

Resilient Seat, Open Left, 14" and Larger.

American Darling	
M & H	
Clow	
Kennedy Valve	
Mueller	Lineaseal III®
Mueller	Class 250B
Mueller	MJ Ends B-5227-23
Mueller	Fl. Ends B-5227-D6

14. Air/Vacuum/Pressure Release Valves, Universal or Combination Type

Crispin	UL-20
Val-Matic	
Golden Anderson	

15. Fire Hydrants

Regular
(Post Type, Dry Barrel)
Open Left

Kennedy Valve	K-81A
American Darling	B-62-B

Flush Type
2" to 3" Barrel

Mueller	2 1/8" Flush
M & H	Style 333 2 1/4" Flush

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
16. <u>Indicator Posts</u>	American Darling Kennedy Clow	
17. <u>Meter Box</u>	McDonald Mueller Mueller	Mueller®/McCulloch Thermal-Coil®
18. <u>Cover for Meter Box</u>	Ford	W2,W32, or W3 Type "W" Wabash Double Lid Cover with 10" Depth
19. <u>Valve Box</u> Slip two Piece, Cast Iron Lid Says "Water"	Tyler Pipe Bingham and Taylor	Slip: 6855 Series Slip: Fig. #4908
20. <u>Curb Boxes and Lids</u>	Mueller 1 ¼" ID McDonald 1 ¼" ID Ford 1 ¼" ID Bingham and Taylor 1 ¼" ID	Box: H-10306 Lid: 89375 Box: 5604 Lid: 5614L EA2-45-50 Box: Fig. No. E-125 Type A-1
21. <u>Curb Stops</u> Compression type only	Mueller Mueller McDonald	300™ Ball: B-25209 Oriseal Mk II H-15209 6100-22 Ball Type
22. <u>Corporation Stops</u> Compression type only	Mueller McDonald	B-25008 4701B-22
23. <u>AWWA C900 PVC Pressure Pipe</u>	Certainteed Cresline UTI Or equal	
24. <u>Gasketed PVC Fittings for C-900 Pipe</u>	Harco or Equal	

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
25. <u>M.J. DIP Fittings for C-900 pipe</u>	US Pipe Co.	Protecto 401 Ceramic Epoxy Lined
	US Pipe Co.	Polythane® Lined
	US Pipe Co.	Lined with Koppers Bitumastic 300-M
	Tyler Pipe	Lined with Koppers Bitumastic 300-M
	Griffin	Lined with Koppers Bitumastic 300-M
26. <u>Retaining Gland for M.J. DIP Fittings on C-900 PVC Pipe</u>	EBA Iron Sales Romac	2000 PV series Mega-Lug Grip Ring™
27. <u>PVC Sewer Pipe (PSM) ASTM D-3034 SDR 26</u>	Scepter Mfg.	
	National	
	Bristol Pipe	
	Canron	
	Carlson	
	Contech Const. Prod.	
	Cresline	
	J-M Mfg.	
	Loc-Pipe	
	ETI	
28. <u>PVC Gasketed SDR 26 Heavy Walled Sewer Fittings(PSM) ASTM D-3034</u>	Harco	
	Cresline	
	GPK	
	JM	
	Certainteed	
29. <u>Saddle Wye for D-3034 SDR-26 PVC Pipe</u>	Cresline	SM 95
	Genco	
	Harco	255 Series
30. <u>Saddle Tee for D-3034 SDR-26 PVC Pipe</u>	Cresline	SM 92
	Harco	256 Series
	Genco	
	Romac	CB™

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
31. <u>Manhole Precast Cone, Riser, Base sections</u>	Atlantic	
	Continental Modern Monarch Rahns	
32. <u>Drop MH Precast Base Section</u>	Atlantic	Outside Drop
33. <u>Drop MH Collars</u>	Atlantic	
34. <u>Butyl Rubber Section Joint Material</u>	K.T. Snyder Co.	Ram-Nek
	K.T. Snyder Co. or Equal	RUB'R-NEK
	Hamilton Kent Mfg. Co.	Kent-Seal
35. <u>Waterstops: Factory installed for MH Base Pipe Insertion Joint</u>	Atlantic	A-Lok®
	Interpace Dura-Tech or Equal	Lock Joint Dura-Seal III
36. <u>Rubber Chimney Seal</u>	Cretex Specialty Products or Equal	
37. <u>Manhole Steps</u>	Alcoa M.A. Industries	Stock #12653A PolyPropoylene Step #PS4B
38. <u>Exterior Manhole Coatings</u>	Koppers Co.	Bitumastic Nol 300-M
	Koppers Co. Pennsbury Coating Corp.	Super Service Black Bitu-Chem No. 32-B-4
	Pennsbury Coating Corp.	Pennoxy-Tar
	Con-Lux Coatings Coopers Creek Chemical Or equal	Epolon 22 Black Mastic Sealer "SP" Masonry Waterproofer

<u>Material</u>	<u>Manufacturer</u>	<u>Brand Name or Model</u>
39. <u>Interior Manhole Coatings</u>	Con-Lux Coating Inc.	Epoxide 33 Ceramic Buff
40. <u>Interior Manhole PVC Liner</u>	A-Lok® Products Continental	Dura Plate 100
41. <u>Frame and Cover</u>	Neenah Foundry Co. Washington Street Foundry	See 15262-15
42. <u>Cored MH Waterstop</u>	NPC, Inc.	Kor-N-Seal® 1
43. <u>Field Installed Waterstops</u>	Harco Linkseal Fernco Or equal	Sand Collar Type CMA Concrete MH Adapter CMA Concrete MH Adapter
44. <u>Bonding Agents for Concrete</u>	Larsen Products Corp.	Weld-Crete