EAST COCALICO TOWNSHIP AUTHORITY

Lancaster County, Pennsylvania

SPECIFICATIONS FOR WATER SYSTEM CONSTRUCTION

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Recipients of this document must keep themselves informed of any revisions which may be made to the Specifications.

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SECTION 1 – GENERAL REQUIREMENTS

A. GENERAL

1. Applicant/Owner

    a. All references to the "Applicant or Owner" in these specifications pertain to the individual, organization, company or developer who makes application to construct or install water lines, water systems and water services in the East Cocalico Township Authority's Water Service area.

2. Submittals

    a. The Applicant shall provide shop drawings of all materials and equipment proposed for Authority approval prior to construction.

3. Authority's Right of Inspection

    a. The Authority shall have the right to inspect any water system construction being carried out by the Applicant. Should the inspected work prove to be unsatisfactory, the cost of removing and replacing, renewing and making good the unsatisfactory work shall be borne by the Applicant. No water service facility shall be placed in service until it has been successfully tested in the presence of an authorized Authority representative.

4. Working Conditions

    a. Night, Saturday, Sunday or National Holiday work subject to Authority inspection will be permitted only with written consent of the Authority. No work shall be done when, in the opinion of the Authority, the weather is unsuitable.

5. Standard Specifications

    a. Standard specifications of societies, associations, institutes, etc., referred to in these Specifications, shall be the latest edition of such Specifications unless otherwise noted.

6. Work Area Traffic Control and Maintenance

    a. Traffic in work areas shall be controlled to protect the public and workmen, while minimizing the inconvenience to the public. Traffic control devices shall conform to PennDOT Publication 213 and be consistent with the general provisions of *67 Pa. Code, Chapter 212, Official Traffic Control Devices* and the national *Manual on Uniform Traffic Control Devices* as issued by the Federal Highway Administration. Traffic control measures shall be coordinated with East Cocalico Township.

    b. When vehicles must be stopped for short periods, work shall be performed during other than peak traffic periods. Access to residential and business establishments

shall be maintained, except when work is actually being performed in the area. Trenches across driveways, side streets, alleys and entrances shall be maintained after backfilling.

7. Compliance with Provisions of Pennsylvania Act No. 287/187 of 1996

   a. Pennsylvania General Assembly Act No. 287/187 sets forth requirements designed to protect underground utility lines from damage during excavation. Generally, the Act requires that the location and type of utility lines at the work site be ascertained and detailed information from each user (utility owner or operator) not less than three working days before beginning work, be requested. In Pennsylvania, the organization to contact is Pennsylvania One-Call. The telephone number is 1-800-242-1776.

8. Permits and Approvals

   a. The Applicant shall secure, in the name of the Authority, all permits that are required from the Department of Environmental Protection, Conrail, PennDOT, Turnpike Commission or any other applicable agency. The Applicant shall secure, in his own name, all required construction permits such as local street opening permits. Any existing street, highway or other improvements disturbed during construction shall be restored to the satisfaction of the Authority before the facilities will be accepted for final acceptance by the Authority. All costs of such permits, including any and all bonds required, shall be the sole expense of the Applicant.

   b. Approval by the East Cocalico Township Authority inspector of all or part of any work performed under permit issued by an independent agency, shall not constitute acknowledgement that the work was performed in accordance with such permit; nor shall such approval by the inspector be construed as a release of the applicant from his obligations to meet the requirements of the permit, or that such approval be a waiver of East Cocalico Township Authority's right to seek enforcement from the permitting agency.

   c. Separate from the Authority, the applicant shall satisfy all requirements of East Cocalico Township.

9. Special Requirements

   a. All water lines shall be extended to the furthest property lines or corners of the development under consideration. The exception shall be where lines cannot be further extended at the sole discretion of the Authority. The size and location of the water mains, pumping stations, pressure boosting stations, pressure reducing stations, water storage tanks, fire hydrants, valves and other appurtenances shall be determined or approved by the Authority's Engineer so as to comply with the Authority's long-range facilities planning.

   b. All water mains to be dedicated to the Authority shall have a minimum 20' right-of-way. The maximum slope of final grade for the full width of the right-of-way (new or existing) shall be 10:1 (horizontal:vertical), which includes all non-paved areas. All rights-of-way must be accessible for maintenance.

c. Gas utility mains shall be shown on water and sewer plan and profile sheets during the design phase of the project for Authority approval prior to construction.

d. Construction of water mains and appurtenances shall conform to the requirements of the Occupational Safety and Health Act (OSHA).

e. All equipment used on roadways shall be equipped with rubber tires or treads. If other than rubber tires or treads are used, the pavement shall be protected by heavy rubber belting. If pavement, curb and/or sidewalk is damaged or marked by construction equipment, the areas shall be restored at no cost to the Authority.

f. The work shall be protected from damage during storms.

g. A competent person shall be identified and made available within 2 hours in case emergency situations arise during non-working hours.

h. The local Police and Fire Departments shall be informed of the work schedule and of possible street obstructions.

i. Blasting for excavation shall be permitted only after securing approval(s) and establishing the hours of blasting. The blasting procedure, including protection of persons and property, shall be in strict accordance with federal, state and local regulations.

j. Water mains, laterals, service lines, water meters and appurtenances shall be designed and constructed to prevent freezing.

k. All water service lines shall be metered. All new non-residential accounts shall propose the anticipated range of flow prior to connection to the public water system.

l. For projects that require additional valves on fire protection systems: During construction/start-up, ECTA and its engineer, as well as the valve manufacturer's representative, must be present to observe the initial setup and confirm proper functionality of the suction control valve or combination altitude and back pressure valves. Following construction completion, annual suction control valve inspections shall be conducted in the presence of ECTA staff to confirm continued proper functionality and verify valve setpoints. No adjustments to the valve shall be made without the knowledge of—and in the presence of—both the manufacturer’s representative and ECTA staff.

END OF SECTION

SECTION 2 – SERVICE LINES

A. GENERAL

1. Each Improved Property shall have its own individual service line. A service line consists of all piping, meter and other appurtenances between the house or building to the receiving end of the Authority's water lateral at the curb stop. The service line may also include a meter pit. Each water service line shall be metered. All new non-residential accounts shall propose the anticipated range of flow in units of gallons per minute (gpm) prior to connection to the public water system.

2. Maintenance and Repair of Service Lines

    a. All service lines shall be maintained and repaired by the Owner at the cost of the Owner of the improved property. Such repairs shall be subject to the approval and inspection of the Authority. If the service line repair is in between the curb stop and the meter, the repaired service line shall be pressure tested, unless the repair is located within the building. Refer to E.3 of this section for testing requirements.

3. Existing Service Lines

    a. Only existing service lines downstream of the backflow prevention device may be reutilized provided they have been inspected by the Authority and found to be in good condition and alignment for the purpose of conveying potable water and have tight joints of approved materials. The integrity of the existing line shall be determined by performing the pressure and disinfection tests described herein. If the existing line does not conform to these requirements, the line shall be corrected or a new line shall be laid at the expense of the Owner in accordance with the specifications contained herein. All testing required by the Authority shall be at the expense of the Owner.

4. Supervision and Inspection

    a. The construction of service lines shall at all times be subject to the supervision and inspection by the Authority or its duly authorized representative and shall conform to the Authority's specifications. No owner shall permit service connections to be covered or backfilled until authorized by the Authority to do so.

5. Basements

    a. The Authority will not be responsible for any damage that may result from basements being flooded by a leak in the service line.

6. Service Lines Under Buildings

    a. Service line entry to building interior spaces shall be immediately after passing beyond the foundation wall.

7. Cross Connections With Private Water Systems

    a. Private water supply connections to the service line providing water from ECTA's public supply shall be prohibited in accordance with the International Plumbing Code 608-7-1 Private Water Supplies, and the PA DEP's Public Water Supply Manual, Part VII – Cross Connection Control.

8. Disconnection of Service Lines

    a. The disconnection of a service line shall be at the edge of the right-of-way and shall be capped or plugged with a lateral pipe type cap or plug. In the case of a copper service line, the service line shall be severed at approximately one foot from the curb valve and capped with a compression coupling female NPT adaptor and a brass male plug. Disconnection of 3/4-inch and 1-inch copper service lines at the property side of sidewalk may be considered on an individual case basis. In order for this to be considered, the service line shall be in good condition, without signs of corrosion and six (6) feet or less from curb valve.

B. DESIGN CRITERIA

1. Size of Lines

    a. The sizing of customer service lines shall be in accordance with AWWA Manual of Water Supply Practice M22 *Sizing of Water Service Lines and Meters* and is subject to Authority approval. The Applicant shall provide justification for water service line and meter sizing for Authority review and approval. Residential service lines shall normally be 3/4 inches in size.

2. Depth of Lines

    a. The minimum depth of backfill over pipes shall be 3 feet – 6 inches (42 inches).

3. Location of Service Lines and Meters

    a. Service lines shall be installed a minimum of 18 inches above, measured vertically, and a minimum of 18 inches away, measured horizontally from sewer utilities. If the vertical separation requirement cannot be met, the service line shall be installed at least 5 feet away, measured horizontally, from sewer utilities.

    b. Service lines shall be installed at least 5 feet away, measured horizontally, from other utilities.

    c. Refer to Section 4 – WATER MAINS for additional requirements on utility separation.

    d. The curb stop shall be installed as close to the right-of-way line as possible.

    e. All meters shall be installed in below grade meter pits just beyond the curb stop.

    f. Locate service lines at least 10 feet away, measured horizontally, from trees.

4. Underground Pipe and Fittings

    a. Service lines from the curb valve (end of lateral) to meter shall be Type K copper water tubing or ductile iron pipe. Only compression fittings shall be used for buried copper pipe and only mechanical joint fittings shall be used for buried ductile iron pipe.

5. Non-Buried Pipe and Fittings

    a. Service lines from the curb valve (end of lateral) to meter that are either inside a building (existing meters only) or inside a meter pit may be NPT iron pipe, NPT iron pipe fittings, NPT brass pipe, NPT brass pipe fittings, flanged ductile iron pipe, flanged ductile iron fittings, brass flanged pipe, brass pipe flanged fittings, steel pipe with Victaulic grooved fittings, or copper pipe with compression fittings.

6. Protective Sleeve

    a. At the entry of the service line into the building a protective sleeve shall be provided through the foundation wall(s) of the building. The sleeve shall extend underneath all slabs, porches, etc. to the exterior face of the structure. The sleeve shall span across the excavated area outside the wall and at least 2 feet of the end of the sleeve shall rest on virgin soil.

    b. For service lines less than or equal to 2 inches, the service line pipe shall be threaded through the sleeve and the annular space at the interior end of the sleeve sealed with non-corrosive sealant, non-corrosive expandable foam, or Fernco adapter. The casing pipe shall be sloped towards the exterior, non-level, and lower on the outside.

    c. The casing pipe shall be two pipe sizes larger than the service line. A Schedule 40 PVC casing pipe shall be used to protect service lines that are 2 inches or smaller; a seamless black steel or ductile iron pipe shall be used to protect service lines larger than 2 inches.

    d. In the case of service lines that are larger than 2 inches, the service line shall be threaded through the wall sleeve as specified above. However, the annular space between the service line and the sleeve shall be filled with sand as pipe bedding or another means of pipe support as approved by the Authority. Both ends of the sleeve shall be sealed with non-corrosive sealant, non-corrosive expandable foam, or Fernco adapter.

    e. Whenever possible, service lines shall not be installed beneath slabs on grade. If a service line must be installed beneath and then penetrate a slab to enter the building, it shall be installed in a protective sleeve with a sweeping 90-degree bend, if applicable, to facilitate future removal of the service line.

7. Backflow Prevention Device

    a. For each connection a backflow prevention device must be installed adjacent to and downstream of the water meter meeting PA DEP requirements for intended service type.

8. Backflow Prevention Devices for Existing Water Service Lines

    a. Existing water service lines over 100 feet long shall be required to install a backflow prevention device not more than 5 feet from the curb valve at a location approved by the Authority. The backflow prevention device shall meet the PA DEP requirements for the existing service type. Below grade installations will require a pit or vault for installation of the backflow prevention device. While the customer may not be required to install a new water meter at this time, the pit or vault should generally conform to specifications as outlined below in Section C, paragraph 3 defining the requirements for meter pits and as depicted in Details No. 11 through 15. The pit or vault shall at a minimum provide provisions to allow for maintenance of the backflow prevention device and for larger line sizes, the pit or vault shall provide adequate space for a man to enter the pit to service the device. Plans of the pit or vault must be submitted to the Authority for review and approval.

9. Pressure Reducing/Regulating Valve

    a. When pressures exceed 60 psi, the Applicant shall, at his own expense, install on the house side of the meters, pressure regulating valves (not applicable to fire protection service). The pressure regulating valves shall be maintained by the Applicant or subsequent property owner.

10. Booster Pumps

    a. In areas where the static water pressure in the distribution system is less than 40 psi, booster pumps will be required. The provision of booster pumps is the Applicant's responsibility. Connections will not be permitted if distribution system static pressure in the area is less than 20 psi.

11. Cross Connections With Private Water Systems

    a. Private water supply connections to the service line providing water from ECTA's public supply shall be prohibited in accordance with the International Plumbing Code 608-7-1 Private Water Supplies, and the PA DEP's Public Water Supply Manual, Part VII – Cross Connection Control.

C. MATERIALS AND EQUIPMENT

1. Pipes

    a. Copper Tube and Fittings

        (1) Copper tube shall conform to the requirements of ASTM B88, with Type K for underground installations and Type L in exposed locations.

        (2) The water service copper tubing must be one continuous piece with no fittings or splices in lengths less than 100 feet.

        (3) Fittings for Copper Tubing

Fittings for copper tubing shall be the compression type conforming to AWWA C800 with a pressure class of 150 psi. All service fittings shall be compression connections manufactured by Mueller Company or Quick Joint manufactured by Ford.

b. Ductile Iron Pipe and Fittings

(1) Refer to Section 4 – WATER MAINS for these requirements.

c. HDPE Pipe

(1) Service lines with a diameter of 3 inches or smaller on the service side of the meter pit may be high density polyethylene (HDPE) conforming to AWWA C901. Pipe shall meet the requirements of dimension ratio 9 (DR 9) with a minimum pressure rating of 250 psi. The pipe shall be NSF certified. Pipe resins shall be high molecular weight, high density polyethylene with cell classification number of 345464C (or higher cell classification) in accordance with ASTM D3350.

(2) The pipe shall be joined with butt, heat fusion joints. All joints shall be made in strict compliance with the manufacturer’s recommendations and ASTM 2657.

(3) 3-inch fittings may be joined with butt, heat fusion joints, and consistent with the performance requirements of the service line piping.

(4) 2-inch or smaller fittings shall be compression type, compatible with HDPE pipe, and as detailed in C.1.a(3) above.

(5) The water service HDPE tubing must be one continuous piece with no fittings or splices in lengths less than 100 feet.

d. Pressure PVC Pipe

(1) Service lines with a diameter 4 inches or larger on the service side of the meter pit may be pressure rated polyvinyl chloride pipe (PVC) conforming to AWWA C900, for sizes 4 inches through 12 inches. The pipe shall be PVC 1120 made from PVC compounds Class 12454-A or 12454-B as defined in ASTM D1784. Each pipe length shall be marked with the manufacturer's name or trademark, size, material code, pressure class, AWWA reference and seal of test agency that verified pipe material for potable-water service. Minimum pressure rating shall be 250 psi.

(2) PVC pipe shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Installation of elastomeric gasketed joints and performance of the joint shall conform to ASTM F477, ASTM D3139. Joint lubricants shall be as recommended by the manufacturer and meet all requirements of NSF61.

(3) All fittings for water services shall be cast or ductile iron conforming to AWWA C110 for mechanical joints. All adaptors, fittings and transition gaskets necessary to connect cast or ductile iron fittings to PVC shall be furnished.

e. Detectable Warning Tape

(1) Detectable warning tape shall be polyethylene film encasing a metallic core, minimum 6 inches wide and 4 mils thick, color-coded blue for water, bearing in black letters the continuous legend – CAUTION – WATER LINE BURIED BELOW.

2. Backflow Prevention Devices

a. General

(1) These devices are required on all service lines. The type to be utilized shall be in accordance with PA DEP's Public Water Supply Manual, Part VII - *Cross Connection Control*.

b. Reduced Pressure Backflow Preventers

(1) This device shall conform to AWWA C511 and ASSE1013, shall be minimum 150 psi design pressure, and shall be equipped with suitable test cocks. The device consists of an automatic pressure differential relief valve located in the zone between two or more independently acting check valves, which in turn are located between two tightly-closing shutoff valves.

(2) Reduced pressure backflow preventers for fire service connections shall be BEECO Model 6-U or approved equal.

(3) All other reduced pressure backflow preventers shall be BEECO Model 12 or 6 C, CLA-VAL Co. Clayton Model RP-2 or RP-1, Watts Regulator Company Series 909, or approved equal.

(4) It is recommended that the reduced pressure backflow preventers have a drain line installed with an air gap.

(5) Reduced pressure zone backflow preventer shall be installed in a structure above grade and shall be provided with adequate space to facilitate maintenance and testing and must be protected from freezing.

c. Double Check Valve Assemblies

(1) This device shall conform to AWWA C510 and ASSE1015, shall withstand a 150-psi design pressure, and shall be equipped with suitable test cocks. The device consists of an assembly of independently acting check valves located between two tightly-closing shutoff valves but without a pressure differential relief valve. Double check valves shall be as manufactured by Watts, Conbraco, Wilkins (Zurn), Ames, Cla-Val, Febco, or approved equal.

(2) Double check valve assemblies in the size range of 1/2-inch to 3 inches shall be Watts Series 7 or approved equal for residential applications.

(3) Connections with private booster systems will typically require double check valve assemblies unless conditions warrant a reduced pressure backflow preventer as determined by the Authority.

(4) Non-residential applications or as other required by the Authority shall utilize Watts Series 007 double check valve assemblies or approved equal.

(5) Backflow prevention for assemblies larger than 2 inches shall be testable.

3. Meters and Meter Pits

a. The Authority installs meters up to and including 1-inch in size, which shall be Neptune T-10.

b. The Owner shall supply and install meters larger than 1-inch in size, which shall be Neptune Mach 10 and be equipped with a Neptune Cellular Meter Interface (CMIU) as the Authority directs and approves. Strainers are not required.

c. All meters shall be installed in an exterior, below grade pit just past the curb stop on the service line.

d. Spacers must be provided to accommodate the water meters. Water meters have male NPT ends. Spacer lengths for 3/4-inch meters must be 13 inches and for 1-inch meters must be 16 inches. All meters shall be properly supported on a shelf or with brackets.

e. Meter pits shall be required for all water service lines.

f. Meter pits shall be located as close to the curb valve as possible and not more than 10 feet from the meter pit, as approved by ECTA. Meter pits shall be installed to manufacturer's recommendations. Backfilling around the meter pit must be done uniformly and with care to prevent distortion of the boxes.

g. Meter pits in non-traffic areas for 5/8-inch to 1-inch meters shall be Mueller/McCullough Thermal Coil system, Ford Coil Pit Setter, or McDonald NL Coil Pit Setter. Box depth shall be minimum 42 inches. The meter inlet type shall be lockwing angle ball valve (full port), and the meter outlet type shall be dual check valve. Pit shall be furnished with 4-inch insulating pad. Lid shall include a ferrous indicator with pentagon key and precast hole for an electronic meter reading antenna. Lid diameter shall be 15 inches for 5/8-inch meters and 18 inches for 1-inch meters. For non-residential installations, a double check valve assembly may be required by the Authority, in which case the specification of 1-1/2-inch or 2-inch meter pits shall apply.

h. Meter pits in non-traffic areas for 1-1/2-inch or 2-inch meters shall be Ford Plastic Pit Setter. Box depth shall be minimum 42 inches. The meter inlet type shall be lockwing angle ball valve (full port), and the meter outlet type shall be angle dual check valve.

A bypass with lockwing ball valve shall be provided. Pit shall include a ferrous indicator with an inner lid and 20-inch access opening. Lid shall be designed with precast hole for an electronic meter reading antenna.

i. Meters pits in traffic areas or requiring meters larger than 2-inches or where required by the Authority, shall be as depicted in the detail drawings and be approved by the Authority. Meter pits shall be equipped with a sump recess for collection of condensation. Design pit for anti-flotation on dead weight alone.

(1) Meters are required to be tested every few years by ECTA to confirm accuracy.

(2) Provide test ports two pipe diameters upstream and downstream of meters. Test ports shall be 2-inch diameter for up to 6-inch meters.

j. Meter pits and lids located in driveways, parking lots, or where subject to vehicular traffic shall be precast concrete in accordance with ASTM C478 and designed for H-20 wheel loading.

k. All meter pit lids shall have ferrous components to facilitate detection in the field and precast hole for an electronic meter reading antenna.

l. External installation of a radio read transmitter may be required to accommodate radio read capability. In some cases, Touch Read may also be required.

4. Small Valves

a. General

(1) Small valves are defined as 3-inch or smaller valves and shall be ball valves or gate valves, unless specified otherwise.

b. Ball Valves

(1) Ball valves shall be the 600-psi heavy brass or bronze type with NPT threaded ends. Ball valves shall be Conbraco Apollo or approved equal. The meter stop valve shall be a ball angle meter valve with compression ends. Ball angle meter valves shall be Mueller or Ford.

c. Gate Valves

(1) Gate valves 2-1/2 inches in diameter and smaller shall have flanged or screwed ends as required and shall be brass or bronze, solid wedge, union bonnet, rising-stem, Fig. 47 or 48 as manufactured by Jenkins Brothers or similar products as manufactured by Crane, Fairbanks, or Lukenheimer.

(2) All gate valves 2-1/2 and 3 inches in diameter, unless otherwise noted, shall be brass body gates and shall be Jenkins No. 1240, Hammond 1B-647 or approved equal. Valves shall open to the left (counter-clockwise).

(3) Operating nuts or wheels shall have cast thereon, an arrow and the word "open" indicating the direction of opening.

(4) Gate valves within large meter pits shall be OS&Y rising stem valves.

5. Pressure Regulating Valves

   a. The installation of pressure regulating valves may be required by the Authority to prevent excessive pressures at customer services or other locations. Pressure regulating valves required at customer services are to be installed and maintained by the customer.

   b. Pressure regulating valves 2 inches and smaller shall be diaphragm-type with cast-bronze body and galvanized iron strainer. They shall be manufactured by Mueller Co. or Watts Regulator Co.

   c. Pressure regulating valves 2-1/2 inches and larger shall be manufactured by Cla-Val, Watts or Val-Matic.

6. Valve Boxes

   a. Refer to Section 3 – WATER LAERALS for these requirements.

7. Clamping Devices

   a. Socket clamps, anchor, straps, and tie rods, used to anchor pipe fittings, shall be as manufactured by the Grinnell Company, Inc., Stellar Corporation, or approved equal.

8. Encasement Pipe and Protective Sleeve

   a. Encasement pipes and protective sleeves shall be welded and seamless black steel pipe, ductile iron pipe or Schedule 40 PVC pipe. Encasement pipe shall be two pipe sizes larger than the service line it protects.

D. INSTALLATION

1. Refer to the applicable parts of Section 4 for open cut installation requirements.

   a. Service line repairs between the meter pit and the building may be installed by directional boring or pulling methods.

   b. Service line installations between the meter pit and the building may be installed by directional boring.

2. Service tubing shall be installed as a continuous length of pipe and shall have a minimum cover of 3 feet – 6 inches (42 inches).

3. Copper and HDPE service lines shall be bedded in sand (free of limestone or wrapped with plastic sheeting protection for copper tubing). Select fill (native soil with no rocks and minimal stones with no materials larger than 1/2-inch in largest dimension) may also

be used as bedding material as approved by the Authority. A minimum of 6 inches of bedding material shall be provided around the pipe in all directions.

4. Install detectable warning tape above all plastic service lines a minimum of 18 inches below grade but no less than 18 inches above the pipe.

5. Service lines at meters shall be installed in areas not subject to freezing.

6. Install isolation valves before and after meter. The isolation valve after the meter may be installed after the backflow preventer.

7. The curb box shall be positioned so that it is centered over the curb stop valve. Align to provide unobstructed access to the valve.

E. TESTING AND INSPECTION

1. Notification

   a. It is incumbent upon the Applicant to notify the Authority a minimum of 24 hours in advance of when the work will be ready for inspection.

2. Before backfilling the trench or covering any work, an inspection by the Authority from the curb valve to the interior of the building foundation sleeve must be performed.

3. Pressure Test

   a. Each service line shall be subjected to a pressure test prior to approval by the Authority. The test shall be witnessed by an agent of the Authority and the service line shall not be deemed acceptable until said service line has satisfactorily passed the test hereinafter described. All costs of testing and any subsequent test(s), including equipment, material, or labor required shall be the responsibility of the Applicant.

   b. Service Lines 2 inches and Smaller

      (1) A test pressure of 100 psi shall be applied to the service line. There shall be no drop in pressure for a period of 15 minutes.

   c. Pressure test all underground repairs of services between the curb stop and building shall be pressure tested.

   d. Service Lines Larger than 2 inches

      (1) Refer to Section 4 – WATER MAINS for the testing requirements.

4. Disinfection

   a. Service connections shall be part of the testing and disinfection program specified in Section 4 per AWWA standards. The chlorine from the service connections shall be flushed and drained. If necessary, the Applicant shall request service customers to

run spigots in the dwelling to remove chlorine from the lines. The Authority shall not be responsible for any damage to customer service lines.

F. DETAIL DRAWINGS

Relevant Detail Drawings are:

8 Typical Service Line – Plan
11 Typical Meter Pit for 5/8" - 1" Service (Not in Traffic Area)
12 Typical Meter Pit for 1 1/2" - 2" Service (Not in Traffic Area)
13 Typical Meter Pit for 5/8" - 2" Service (In Traffic Area)
14 Typical Meter Pit for Large Meters (Plan)
15 Typical Meter Pit for Large Meters (Elevation)

END OF SECTION

SECTION 3 – WATER LATERALS

A. GENERAL

1. A water lateral is that section of a water line that extends from the water main to the curb stop, which shall be located at the property line or right-of-way line of the property which it serves.

2. All water laterals constructed within the service area of the East Cocalico Township Authority shall meet the requirements of this specification.

3. Water lateral pipe and fittings shall be furnished and installed in strict accordance with these specifications, and any and all practices and precautions required for the water mains specified in Section 4 of these specifications are equally applicable to the water laterals.

4. Each Improved Property shall have its own individual lateral. The water lateral shall normally consist of a corporation stop, pipe, and curb stop and box.

5. Only one lateral shall be installed to serve any property parcel.

6. Supervision and Inspection

    a. The construction of laterals shall at all times be subject to the supervision and inspection by the Authority or its duly authorized representative and shall conform to the Authority's specifications. No owner shall permit water laterals to be covered or backfilled until authorized by the Authority to do so.

B. DESIGN CRITERIA

1. Size of Lines

    a. The sizing of laterals shall be in accordance with AWWA Manual of Water Supply Practice M22 *Sizing of Water Service Lines and Meters* and is subject to Authority approval. The Applicant shall provide justification for lateral sizing for Authority review and approval. Single unit residential laterals shall normally be 3/4 inches in size.

2. Depth of Lines

    a. The minimum depth of backfill over pipes shall be 3 feet – 6 inches (42 inches).

3. Location of Laterals

    a. Laterals shall be installed at least 5 feet away, measured horizontally, from other utilities. Laterals shall also be installed above sewer utilities. If these minimum distances cannot be achieved, alternative methods for protecting the water utilities, as approved by the Authority, shall be used.

b. Refer to Section 4 for additional requirements on utility separation.

c. Locate laterals at least 10 feet away, measured horizontally, from trees.

4. Underground Pipe and Fittings

a. Laterals from the water main to the curb stop valve and box (beginning of service line) shall be Type K copper water tubing or ductile iron pipe.

5. Laterals that are installed within protective sleeves shall adhere to the requirements outlined in Section 2 – Service Lines 2.B.6

C. MATERIALS AND EQUIPMENT

1. Pipes

a. Copper Tube and Fittings

(1) Copper tube shall conform to the requirements of ASTM B88, with Type K for underground installations and Type L in exposed locations.

(2) The water lateral copper tubing must be one continuous piece with no fittings or splices.

(3) Fittings for Copper Tubing

Fittings for copper tubing shall be the compression type conforming to AWWA C800 with a pressure class of 150 psi. All lateral fittings shall be compression connection manufactured by Mueller Company or Quick Joint manufactured by Ford.

b. Ductile Iron Pipe and Fittings

(1) Refer to Section 4 – WATER MAINS for these requirements.

2. Corporation Stops

a. Corporation stops shall be Mueller 110 compression connection or Ford Quick Joint. Corporation stops shall be Mueller B-25008, full circle opening or Ford FB1000 Series. Corporations are to have “CC” type threads.

3. Service Saddles

a. Service saddles shall have a nylon-coated casting and double straps of stainless steel. Service saddles shall be Style 202NS by Romac Industries, Inc. or approved equal.

4. Tapping Sleeves

a. For water lateral connections that are 3 inches or larger, tapping sleeves shall be used to connect new laterals to existing water mains. Refer to Section 4 – Water Mains, 4.C.5.

5. Curb Stops and Boxes

a. Curb stops shall be Mueller 110 compression connection or Ford Quick Joint. Curb stops shall be Mueller H-15209, Mueller B-25209, or Ford B44 Series.

b. Curb boxes shall be two-piece, screw type, cast iron and be operable with a 6-foot long wrench. They shall be manufactured by Tyler/Union, Series 6500 or Bingham & Tyler #12B94E (parts compatible with Tyler/Union 6500), new style with flush fit cover with 2-1/2-inch shaft and shall be provided with a lid with the word “WATER” cast in. The standard box number shall be 93-E which has an extension range of 36 inches to 54 inches. Other box numbers shall be used as required if the burial depth is out of the 93-E extension range.

c. For service lines 3 inches and larger, the curb stop valve shall be a gate valve with box meeting the requirements of Section 4 – WATER MAINS.

d. Curb boxes within paved areas are to be 0.5 inches below finished grade.

6. Clamping Devices

a. Socket clamps, anchor, straps, and tie rods, used to anchor pipe fittings, shall be as manufactured by the Grinnell Company, Inc., Stellar Corporation, or approved equal.

D. INSTALLATION

1. Refer to the applicable parts of Section 4 – WATER MAINS for installation requirements.

2. When installing corporation stops, the main shall be tapped at a 45-degree angle from horizontal. Service tubing shall be installed as a continuous length of pipe and shall have a minimum cover of 3 feet – 6 inches (42 inches). Curb stops shall be vertical, with the top of the curb box at finished grade. Curb boxes shall not be located in roadways, driveways or sidewalks. The curb box shall be set on a precast concrete block firmly embedded in virgin soil at a minimum depth of 4 feet but shall not exceed a maximum depth of 5 feet. The curb box shall be positioned so that it is centered over the curb stop valve. Align to provide unobstructed access to the valve. Where grading may still be in progress the curb box shall be marked by a minimum 2-inch x 4-inch pressure treated lumber stake projecting 18 inches above final grade.

3. Copper tubing laterals shall be bedded in sand, free of limestone, or wrapped with plastic sheeting protection. Select fill (native soil with no rocks and minimal stones with no materials larger than 1/2-inch in largest dimension) may also be used as bedding material as approved by the Authority. A minimum of 6 inches of bedding material shall be provided around the pipe in all directions. Copper tubing laterals may be installed via trenchless methods if approved by the Township/PennDOT.

4. Laterals crossing any roadway must either be installed by the open cut method or must be installed within a protective casing that is auger bored or jacked beneath the roadway. Ductile iron pipe to be encased in steel casing pipe. Copper pipe may be within steel, HDPE, or PVC casing pipe. Laterals crossing State highways are subject to State approval and must be installed in accordance with PennDOT requirements and specifications. Laterals crossing Township roads are subject to Township approval and shall be installed in accordance with Township requirements.

5. Special Conditions and Requirements

    a. Trench excavation, in any material, shall extend for 4 feet beyond the end of the lateral for the full depth of the lateral. If the lateral is intended to be used at a later date, then prior to backfilling, a minimum 2-inch x 4-inch treated lumber locator marker shall be placed against the end of each lateral and shall extend a minimum of 12 inches above the ground.

    b. No lateral connection to water main shall be within 18 inches of a joint or fitting.

E. TESTING AND INSPECTION

1. Notification

    a. It is incumbent upon the Applicant to notify the Authority a minimum of 48 hours in advance of when the work will be ready for inspection.

2. Before backfilling the trench or covering any work, an inspection by the Authority from the water main to the curb valve must be performed.

3. Lateral connections which are constructed as part of new water main installations shall be inspected and tested as part of the water main extension as described in Section 4 – WATER MAINS.

4. Lateral connections to existing water mains shall be pressure tested from the curb valve to the corporation stop.

    a. Pressure Test

        (1) Each lateral shall be subjected to a pressure test prior to approval by the Authority. The test shall be witnessed by an agent of the Authority and the service line shall not be deemed acceptable until said lateral has satisfactorily passed the test hereinafter described. All costs of testing and any subsequent test(s), including equipment, material, or labor required shall be the responsibility of the Applicant.

        (2) Laterals 2 inches and Smaller

            (a) All newly laid pipe shall be subjected to a test pressure of 150 psi, or 150% of the normal working pressure, whichever is greater in accordance with AWWA C 600. There shall be no drop in pressure for a period of 15 minutes.

(3) Service Lines Larger than 2 inches

(a) Refer to Section 4 – WATER MAINS for the testing requirements.

b. Lateral Pressure Testing Procedure

(1) For new main and lateral installations done concurrently, the new work is to be all tested together.

(2) Complete installation of water main with corporation stops.

(3) Test the main with corporation stops closed.

(4) Once main is accepted, come back for installation of laterals.

(5) Laterals to be connected to corporation stop and run to property line.

(6) Install curb stops onto lateral.

(7) Install a testing apparatus to the compression curb stop. This apparatus would consist of piece of copper pipe, tee with pressure gauge, ball valve, and connection for hydrostatic pressure pump. A testing specific gasket and nut can be re-used until it no longer passes testing, and a replacement is required.

(8) Test from corporation to the curb stop, then connection may be made to the corporation stop.

(9) After testing, remove test apparatus.

(10) Cut existing pipe and connect curb stop to existing water line.

5. Disinfection

a. Laterals shall be part of the testing and disinfection program specified in Section 4 per AWWA standards. The chlorine from the laterals shall be flushed and drained. If necessary, the Applicant shall request service customers to run spigots in the dwelling to remove chlorine from the lines. The Authority shall not be responsible for any damage to customer service lines.

F. DETAIL DRAWINGS

Relevant Detail Drawings are:

4 Typical Lateral (Up to 2") Using Corporation Stop
5 Typical Lateral (Up to 2") Using Service Saddle
6 New Lateral Connection (Larger than 2") to a New Water Main
7 Typical Lateral Connection (Larger than 2") to an Existing Water Main

END OF SECTION

SECTION 4 – WATER MAINS

A. GENERAL

1. A water main is that portion of the public water system that conveys drinking water from the source of treatment (wellhouse or water treatment facility) to the individual laterals.

2. Supervision and Inspection

   a. The construction of mains shall at all times be subject to the supervision and inspection by the Authority or its duly authorized representative and shall conform to the Authority's specifications. No owner shall permit water mains to be covered or backfilled until authorized by the Authority to do so.

3. Regulatory Agencies

   a. All designs shall conform to good engineering practice and all proposed water construction projects shall meet the requirements of the Pennsylvania Department of Environmental Protection (DEP), OSHA, and the Pennsylvania Department of Labor and Industry, and shall conform to the requirements contained herein.

   b. The design criteria contained herein shall be used unless exceptions are approved in writing by the Authority. Where special design criteria are required, the Applicant must consult the Authority prior to the preparation and submission of plans.

4. Flow Testing and Modeling

   a. Any hydrant test values provided by East Cocalico Township Authority are for informational purposes only and are not to be used for design.

   b. The application shall coordinate with the East Cocalico Township Authority's Engineer for any water system modeling.

B. DESIGN CRITERIA

1. Size of Mains

   a. Adequacy of main sizes shall be determined based on a total flow requirement of fire demand in accordance with ISO methodology plus maximum daily demand plus special requirements. A maximum C value of 120 is permitted for cement-lined ductile iron pipe. Required minimum diameter is 8 inches.

   b. Fire hydrant branches shall be not less than 6-inch diameter and no longer than necessary. The maximum permissible length is 50 feet unless a longer length is approved by the Authority. A gate valve shall be provided on each fire hydrant lateral at the hydrant as depicted in the detailed drawings.

2. Depth of Mains

    a. The minimum depth of backfill over pipes shall be 4 feet (48 inches).
    b. The maximum depth of backfill over pipes shall be 8 feet (96 inches).

3. Location of Mains

    a. General

        (1) Mains shall normally be located within the right-of-way lines of public streets. If it is necessary to locate a main on private property, the Applicant shall provide a water main easement in the name of the Authority. The easement shall consist of a 20-foot-wide permanent easement, normally centered on the pipeline, and an additional 20-foot-wide temporary construction easement.

        (2) Distribution main networks shall be looped and dead-end mains shall be avoided. When dead-end mains cannot be avoided, blow-off connections or hydrants shall be provided at the ends of the mains.

        (3) Distribution mains shall be located not less than 15 feet from buildings, except as approved by the Authority.

        (4) Design of the horizontal and vertical layout of water mains shall follow sound engineering principles. Utility crossings and localized high spots shall be minimized. Maximum horizontal separation of utilities shall be provided for ease of future maintenance and health and safety reasons.

        (5) Water mains shall have a minimum horizontal separation of 5 feet from curbs.

    b. Water Mains Near Sewers

        (1) Water main installation near sewers shall conform to the Pennsylvania Department of Environmental Protection's *Public Water Supply Manual*.

        (2) Parallel Installation: Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain 10 feet of separation, the Authority may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer.

        (3) Crossings: Whenever water mains must cross building drains, storm drains, or sanitary sewers, the water main shall be laid at such an elevation that the bottom of the water main is 18 inches above the top of the drain or sewer. This vertical separation shall be maintained for the portion of the water main located within 10 feet horizontally of any sewer or drain it crosses. The 10 feet is to be measured as a perpendicular distance from the drain or sewer line to the water line.

(4) Exception: When it is impossible to obtain the proper horizontal and vertical separation as stipulated in Items (2) and (3) above, both the water main and sewer line shall be constructed of ductile iron pipe having mechanical joints. Other types of joints of equal or greater integrity may be used at the discretion of the Authority. Where water mains must cross under a sewer, additional protection shall be provided by:

(a) A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line;

(b) Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the water line; and

(c) Centering the length of the water line at the point of the crossing so that the joints are equidistant and as far as possible from the sewer.

(5) The Authority shall be consulted when any of the above conditions cannot be met to discuss the use of possible alternatives. Concrete encasement shall not be permitted.

(6) No water pipe shall pass through, or come into contact with, any part of a sewer manhole.

c. Water Mains Near Gas Mains and Other Utilities

(1) Parallel Installation: Water mains shall be laid at least 6 feet horizontally from any existing or proposed gas main or other utility. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 6-foot separation, the Authority may allow deviation on a case-by-case basis, if supported by data from the design engineer.

(2) Crossings: Whenever water mains must cross gas mains or other utilities, a minimum vertical separation of 18 inches shall be provided measured edge to edge. This vertical separation shall be maintained for the portion of the water main located within 6 feet horizontally of any gas main or other utility it crosses. The 6 feet is to be measured as a perpendicular distance from the gas main or other utility to the water main. Where the water main must cross under a gas main or other utility, adequate structural support for the gas main or other utility shall be provided to prevent excessive deflection of the joints and the settling on and breaking of the water line.

(3) The Authority shall be consulted when any of the above conditions cannot be met, to discuss possible alternatives.

4. Water Pressures

a. General

(1) Water pressure should normally be maintained in the range from 35 psi to 100 psi at ground elevation. The required minimum pressure at ground elevation shall be 30 psi during maximum hourly flows and 20 psi during fire flows.

(2) In areas where the static water pressure in the distribution system is less than 40 psi, booster pumps will be required. The provision of booster pumps is the Applicant's responsibility. Connections will not be permitted if distribution system static pressure in the area is less than 20 psi.

b. Design Pressure

(1) The design pressure for equipment and materials shall be at least equal to 150 psi plus a 100-psi surge allowance.

c. Pressure Reducing/Regulating Valves

(1) A pressure reducing/regulating valve may be required due to excessive pressure and/or to regulate a more uniform pressure in the Authority's system. The Authority must be consulted regarding this requirement.

d. Fire Demands

(1) Where only hose streams are required, fire flow requirements shall be satisfied while maintaining a minimum of 20 psi residual pressure at hydrants in the immediate vicinity of the fire. Where automatic sprinkler systems are involved, residual pressures must be adequate for their proper operation.

(2) For all new developments, the Authority will review the fire flow testing results of its distribution system and the fire protection requirements (flow rate, pressure, and duration) determined by an independent third-party Fire Protection Engineer (FPE) certified in the Commonwealth of Pennsylvania. The Authority will determine, at its sole discretion, whether or not the fire protection requirements can be met by the Authority's water system directly, or if a private water storage tank for fire protection will be required. The Authority will make this determination based on, but not limited to, industry standards, results of hydraulic modeling, including extended period simulation, evaluation of impact to Authority water storage tanks, anticipated pipeline velocities, and any other parameter it views as critical to the well-being of its water system without negatively impacting its existing customers.

(3) All fire lines 3 inch and larger that are served directly from the Authority distribution system and serve as a suction line directly to a fire pump without a storage tank shall be required to install a Pump Suction Control Valve.

(4) All fire lines 3 inch and larger that are served directly from the Authority distribution system and serve as a tank fill line for a private water suction tank for fire protection shall be required to install a Combination Altitude and Back Pressure Valve.

e. Booster Pumping Station

(1) The necessity of, design of, and construction of main line booster pumping stations shall be subject to Authority approval.

5. Cross-Connections

a. No water source of any type, other than the Authority water supply, shall be connected to customer piping served from the Authority water system. All potential cross-connections shall be eliminated. Backflow prevention devices shall be installed on all connections.

6. Location of Valves

a. Generally, a minimum of three valves shall be used at crosses and two valves at tees. The Authority reserves the right, however, to require the installation of four valves at each cross and three valves at each tee. Valves shall be placed at least every 1,000 feet on arterial mains and minor distributors, or at other selected points throughout the distribution system.

b. All water mains shall extend at least 40 feet beyond each valve located on a dead-end main, unless restrained properly and approved otherwise by the Authority.

c. A valve shall be installed on each hydrant branch pipe between the main and the hydrant and near the end of any main which may be extended.

7. Air Release and Vacuum Valves

a. Air release valves shall only be utilized as a last resort. Profile of water main shall be designed to have horizontal or rising slope to high point where a fire hydrant is located. If needed, air release and vacuum valves shall be installed at all high points on supply or transmission mains and on distribution mains as directed by the Authority. Air valves shall be installed in concrete manholes as depicted in the detail drawings.

8. Blow-offs

a. In dead-end mains or where required by the Authority, a blow-off connection or fire hydrant shall be installed for flushing the main. A gate valve shall be installed at the end of all dead-end mains and on the main prior to any blow-offs.

9. Fire Hydrants

a. Fire hydrants are required, and the following hydrant spacing guidelines shall apply:

(1) In residential areas, all parts of any existing or proposed building shall be within 500 feet of a hydrant.

(2) In industrial areas, hydrants should be spaced according to the latest requirements of the Insurance Services Office.

(3) Generally, a hydrant should be placed at each street intersection, and intermediate hydrants shall be installed if the distance between intersections exceeds 500 feet.

(4) In checking distances between hydrants and buildings, measurements should be made along public streets, except where private entrances or parking areas are available for access.

10. Cathodic Protection

a. Water mains installed near utilities having cathodic protection shall themselves be protected. The methods of protection, which may include insulating couplings, polyethylene encasement, electrical connectors, test stations, and other facilities, shall be subject to Authority approval.

11. Customer Metering

a. Each customer shall be metered. The Authority installs and maintains water meters (up to and including 1-inch). See Section 2 – SERVICE LINES.

12. Borings

a. Bored crossings shall be done in accordance with requirements of the Owner of the road, railroad, etc. that will be crossed via boring.

C. MATERIALS AND EQUIPMENT

1. Ductile Iron Pipe and Fittings
(References to ASTM, AWWA and ANSI Specifications imply Latest Edition.)

a. Ductile Iron Pipe

(1) Ductile iron pipe shall be in accordance with the standard specification as set forth in ANSI Specification A21.50 or AWWA Specification C150.

(2) Ductile iron pipe shall be by U.S. Pipe and Foundry Company, American Ductile Iron Pipe Company, or Griffin Pipe Products Company.

b. Joints

(1) Joints shall be of the push-on type or mechanical joint type in full accordance with ANSI A21.11 or AWWA C111 Specifications.

(2) Restrained joints shall be push-on restrained joints (Field Lok 350 Gaskets or approved equal) as manufactured by the pipe supplier or manufacturer subject to the Authority's approval. The restraint provided shall be standard restrained joint or bolt-less, integral restraining system. Restrained joints shall be suitable for the specified test pressure. Mechanical joint retainer glands ("Megalug") as manufactured by EBAA Iron Inc. of Texas can be selected for restraining the mechanical joint of ductile iron pipe for field closures or as approved by the

Authority. The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.

(3) Sleeve type couplings shall be ductile iron mechanical joint solid sleeves.

c. Minimum Thickness

(1) Thickness design shall be per AWWA C150, except provide minimum Class 52.

d. Ductile Iron Fittings

(1) Ductile iron fittings shall be accepted for all ductile iron pipe. Ductile iron fittings shall have a minimum pressure rating of 250 psi, and shall conform to ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) and shall be cement mortar lined as specified above.

(2) Fittings used with ductile iron pipe shall be furnished with mechanical joint ends conforming to ANSI A21.11. Mechanical joint fittings shall be furnished complete with ductile iron glands, carbon steel bolts and nuts as per ASTM A307, and plain rubber gaskets.

(3) Flanged fittings, for exposed piping and/or when specified, shall conform to ANSI A21.10 or ANSI B16.1. All flanges shall be faced and drilled in accordance with ANSI B16.1. Machine bolts and nuts for flanged fittings shall be steel, conforming to ASTM Designation A307, Grade B. Dimensions of bolts and nuts shall conform to ANSI B18.2. Threads of bolts and nuts shall conform to ANSI B1.1, Coarse-Thread Series, Class 2A fit on bolts, and Class 2B fit on nuts. Gasket for flanged connections shall be red sheet rubber or 1/16" thick cloth insertion rubber full face type and shall be the flat ring type. Dimensions of gaskets shall conform to ANSI B16.21.

(4) All fittings shall be cement-mortar lined, paint seal coated inside, and bituminous coated outside, conforming to AWWA C104. Certification from the manufacturer that all fittings comply with the ANSI Standards noted above, shall be submitted to the Authority, in triplicate.

e. Interior Lining

Cement mortar linings shall be in accordance with ANSI Specification A21.4 or AWWA C104, except the thickness of the linings shall not be less than the following:

Pipe Diameter	Thickness
3" through 12"	1/8"
14" through 24	3/16"

f. Exterior Coating

(1) Buried pipe shall be installed with a bituminous coating in accordance with AWWA C151 and C110 respectively.

(2) Buried pipe in corrosive soils shall be installed with polyethylene encasement conforming to AWWA C105, where indicated on the Drawings or as directed by the Authority. The polyethylene sheet shall be 8 mils thick minimum.

2. Mechanical Joint Retainer Glands

a. Retainer glands, when used for restraint, shall be ductile iron with twist-off nuts to insure proper actuating of the restraining devices. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53 of latest revision. Retainer glands shall be manufactured by Megalug or equivalent. The retainer glands shall be installed according to the manufacturer's standard recommendations. Where retainer glands are used, joint deflection shall not exceed 3 degrees. Approval from the Authority for the use of retainer glands must be obtained.

3. Valves and Boxes

a. General

(1) Valves in the size range of 3 inches to 10 inches shall be gate valves. Valves 12 inches or larger shall be butterfly valves provided that design pressures are not exceeded.

b. Gate Valves

(1) Gate valves shall be ductile iron, resilient seated, wedge type and shall conform to AWWA C515. Valves shall be suitable for 200-psi working pressure.

(2) Valves shall be vertical, inside screw, non-rising stem with 2-inch operating nut. Valves shall open anti-clockwise and shall be fitted with double O-ring stem seals and be suitable for buried applications. Valves shall have mechanical joint ends and shall have fusion-bonded epoxy coating inside and outside.

(3) Acceptable manufacturers: Mueller/US Pipe.

c. Butterfly Valves

(1) Butterfly valves shall conform to AWWA C504. Valves shall be tight closing, rubber seated and shall operate satisfactorily after long periods of inactivity.

(2) Acceptable manufacturers: Mueller.

d. Air Release Valves

(1) Air release valves shall conform to AWWA C512 and be combination type. Valves shall be sized according to manufacturer's recommendations based on main size, main capacity, and pressure.

(2) Acceptable manufacturers: Val-Matic

e. Pressure Regulating Valves

(1) The installation of pressure regulating valves may be required by the Authority to prevent excessive pressures at customer services or other locations. Pressure regulating valves required at customer services are to be installed and maintained by the customer.

(2) Pressure regulating valves 2 inches and smaller shall be diaphragm-type with cast-bronze body and galvanized iron strainer. They shall be manufactured by Mueller Co. or Watts Regulator Co.

(3) Pressure regulating valves 2-1/2-inch and larger shall be manufactured by Cla-Val, Watts, or Val-Matic.

f. Control Valves

(1) Pump Suction Control Valve- Manufactured by CLA-VAL, model 50B-5KG, 150 class, to be installed per manufacturer's requirements.

(2) Combination Altitude and Back Pressure Valve – Manufactured by CLA-VAL, model 210-FF, to be installed on the tank fill line per manufacturer's requirements for a private water suction tank.

g. Tapping Valves

(1) Tapping valves per AWWA C509-01/C515-15 standards.

(2) Manufacturers:

(a) Advanced Valve Technologies (AVT), or approved equal.

(3) Description

(a) Comply with AWWA C-509-01/C515-15 standards and UL Classified to NSF/ANSI Standard 61.

(b) Type: Resilient wedge gate valve with non-rising stem.

(c) Pressure Rating: 250 psi, (17 Bar).

(d) Inlet Flanges: Per ASME B16.1, Class 125, and MSS SP-60.

(e) Mechanical Joint Outlets: Per AWWA C111.

(f) Mark manufacturer's name and pressure rating on valve body.

(g) Tapping Valves shall be provided with an oversized opening to permit the use of full-size cutters.

(h) All external ferrous components of the valves, except for stainless steel and finished or bearing surfaces, shall be shop painted with two coats (10 mils min. dry film thickness) of the manufacturer's premium fusion bonded epoxy for corrosion resistance. Epoxy shall be NSF 61 compliant for potable water service valves. Damaged surfaces shall be repaired in accordance with the manufacturer's recommendations.

h. Valve Boxes

(1) Underground valves shall have extension-type, roadway-type valve boxes. Valve boxes shall be cast iron and shall be two-piece telescoping screw-type construction. Valve boxes shall have 5-1/4-inch shafts, shall have covers marked “WATER”, and shall be coated inside and out with a tar or asphalt compound. Valve boxes shall be manufactured by Bingham & Taylor or Tyler Union.

(2) Valve Boxes within paved areas are to include a 1.5- inch steel riser ring manufactured by Bingham & Tylor or Tyler Union. New valve box designs are to incorporate a single 1.5 - inch steel riser installed such that finished height of valve boxes are 0.5 inches below finished grade.

4. Fire Hydrants

a. Fire hydrants shall be compression type with a 5 1/4-inch hydrant seat opening and a 6-inch mechanical joint inlet. The hydrant shall have two 2 1/2-inch hose nozzles with National Standards threading and one 5-inch STORZ nozzle, complete with nozzle caps and chains. The hydrants shall be traffic type with appropriate breakaway flanges.

b. Acceptable manufacturers: Mueller Super Centurion 250 Model No. A-423 or Kennedy Guardian K81D.

c. Hydrants shall also be furnished with a spring-mounted reflective fiberglass rod marker. The hydrant rod marker shall be Hydrofinder by Rodon Corporation.

d. Hydrants to be dedicated to the Authority shall be factory coated with a silver body, dark blue bonnet, and dark blue caps.

5. Tapping Sleeves and Valves

a. Tapping sleeves shall be ductile iron construction meeting ASTM A536 Grade 65-45-12, designated for working pressure not less than 200 psi. Armored end gaskets shall be provided for the full area of the sleeve flanges. Sleeves shall be as manufactured by Mueller. Nuts and bolts shall be Type 304 stainless steel. A test port shall be included to enable testing of the sleeve valve at the time of installation.

(1) Ductile iron tapping sleeves shall be as manufactured by Mueller.

b. Tapping valves shall conform to the requirements specified above for gate valves except that one end shall be flanged and one mechanical. Tapping valves shall be provided with an oversized opening to permit the use of full-size cutters.

6 Steel Casing Pipe

a. The steel casing pipe shall have a minimum yield strength of 35,000 psi, have a thickness as required but not less than 0.375 inches, and conform to AWWA C200 and ASTM A53.

b. Casing exterior shall be painted with bitumastic coating.

c. Pipe cradles or isolators shall be field assembled as shown on the detail drawings, APS casing spacers (Model SSI), CCI Piping Systems Casing Spacers, or approved equal. Manufactured spacers shall be made of stainless steel.

d. Casing end seals shall be APS brand (Model AC) or CCI Piping Systems rubber end seals or approved equal.

e. Minimum casing diameter shall be in accordance with PennDOT or Amtrak requirements as applicable.

7. Wall/Floor Sleeve

a. Wall and/or floor pipe penetrations shall be made by means of a sleeve capable of being bolted directly to the formwork to prevent misalignment. Seal of the annular space between the carrier pipe and the sleeve shall be by means of a confined rubber gasket and capable of withstanding 350 psi. Sleeve shall be manufactured from ductile iron with an integrally cast waterstop of 1/2-inch minimum thickness and 2-1/2-inch minimum height. Wall sleeves shall be Omni Sleeve or approved equal.

8. Blowoffs

a. Blowoffs shall be as depicted on the detail drawing and shall only be used on a temporary basis (e.g. the end of an initial phase of a project that will be extended in the near future) as approved by the Authority. A gate valve will also be required on the water main, or a curb valve may be permitted by the Authority in certain locations.

D. INSTALLATION

1. Connections to Existing System and Interruptions of Service

a. The Authority shall be notified at least 10 working days before installing connections to the existing water system or shutting off a portion of the system. Under no circumstances shall the valves on the existing system be operated, except under the direct supervision of an Authority representative.

b. The Authority reserves the right to designate the day and time when water mains may be shut off and may require that this work be done at night or on a weekend. In addition, the Authority reserves the right to require that, where service to customers is interrupted, work is carried out continuously and expeditiously until water service is restored. The installation schedule and procedure shall be approved by the Authority before the work is started, and all necessary materials, tools, and equipment shall be on hand before work is started. Where required, the new water mains shall be tested, sterilized, and flushed prior to the installation of the connections.

c. Test pits to determine the exact location, elevation, diameter, and type of the existing pipe shall be excavated under the supervision of the Authority.

2. Excavation

a. The trench shall be excavated to a depth of six inches below the outside diameter of the pipe barrel, or deeper if so specified. The width of the trench shall be as shown on the detail drawings. All of this excavation may be done by machine. The resultant subgrade shall be undisturbed or compacted as approved by the Engineer if disturbed.

b. When the pipe is to be laid in fill, bring the fill to two feet above the elevation of the top of pipe to be laid before excavation commences. Compact fill to 95% of the maximum density as determined by ASTM D1557 70 or AASHTO T 180, Method D (Modified Proctor). The bottom of the trench shall be compacted to 95% of maximum density prior to installation of the pipe bedding.

3. Bedding

a. The pipe shall be bedded on 6 inches of AASHTO No. 8 (PennDOT No. 1B) or AASHTO No. 57 (PennDOT No. 2B) stone, the full width of the trench, and shall be covered with AASHTO No. 8 (PennDOT No. 1B) or AASHTO No. 57 (PennDOT No. 2B) stone to a height of 12 inches over the top of the pipe.

b. The bedding shall be thoroughly compacted to 90% Standard Proctor, AASHTO T-99. The bedding shall provide uniform and continuous bearing and support for the pipe at every point between the bells.

c. Unstable Subgrade

(1) Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, any type of refuse, vegetable, or other organic material, or large pieces or fragments of inorganic material, which, in the opinion of the Authority, should be removed, the Applicant shall excavate and remove such unsuitable material to the width and depth recommended by the Authority. Before pipe is laid, the subgrade shall be formed by backfilling with AASHTO No. 8 (or PennDOT No. 1B) stone in 3-inch (uncompacted thickness) layers thoroughly compacted to 95% of maximum density and the bedding prepared as hereinbefore specified.

(2) Flowable Backfill meeting the requirements of PennDOT Form 408 may be used as an alternative to backfilling with stone. Material consists of a mixture of cement and water which shall have a 28-day unconfined minimum compressive strength of 100 psi based on the manufacturer's certification and shall be placed in accordance with the manufacturer's recommendations.

d. If potentially corrosive materials are encountered, polyethylene encasement shall be installed to protect ductile iron pipe in accordance with ANSI/AWWA C105/A21.5.

e. Special Foundations

(1) Where the bottom of the trench at the subgrade is found to consist of material which is unstable to such a degree that, in the opinion of the Authority, it cannot be removed and replaced with an approved material thoroughly compacted in place to support the pipe properly, a suitable foundation for the pipe shall be designed and submitted to the Authority for approval.

4. Pipeline Installation

a. General

This Section covers the installation of the water mains, complete, with all fittings, valves, reaction backings and/or harnessing, connections, and appurtenances. Installation shall be performed as specified in AWWA Standard for Installation of Ductile Iron Water Mains, C600, except where otherwise specified herein.

b. Responsibility for Material

(1) The Authority shall not be responsible for materials, and materials found defective in manufacture or damaged in handling, as determined by the Authority, and shall be replaced at no cost to the Authority. Any materials found defective shall be promptly removed from the site. Defective pipe shall be classified as follows:

(a) Damage to interior or exterior paint seal coats.

(b) Damage to interior cement-mortar lining.

(c) Insufficient cement-mortar lining thickness.

(d) Poor quality interior paint seal coat causing a partial obstruction in the pipe round.

(e) Pipe out of round.

(f) Damaged pipe barrel area causing a reduction in effective pipe thickness.

(g) Any material that is dropped during handling, regardless of its apparent condition.

c. Handling of Material

(1) Pipe shall be so handled that the coating and lining is not damaged. If any part of the coating or lining is damaged, the repair shall be made to the satisfaction of the Authority. Valves and hydrants shall be stored and kept dry before installation. Any material that is dropped during handling is subject to rejection regardless of its apparent condition.

d. Alignment and Grade

(1) Where the proposed pipeline route is on a curve, the pipe may be deflected at the joints to published manufacturer's tolerances. Where underground conditions require a change of alignment or grade, such change shall be made only with the written consent of the Authority. When a change in grade is indicated which will result in the pipe having more cover than originally anticipated, the class of pipe installed at the location shall withstand the new loadings.

(2) Except at predesignated points, no high points shall be established where air can accumulate. If field conditions necessitate a change in the pipe profile and, in the opinion of the Authority, the change requires the installation of an air release valve and manhole, installation of the same shall be ordered at no expense to the Authority.

e. Lowering Water Main Material into Trench

(1) AWWA Specification C600, Section 3.3 shall apply.

f. Cleaning Pipe and Fittings

(1) All lumps, blisters, and excess coating shall be removed from the end of each piece of pipe and fitting. The outside of the spigot, the inside of the bell, and the gasket shall be thoroughly wiped clean and dry before the pipe is installed.

g. Laying Pipe

(1) No pipe shall be laid when, in the opinion of the Authority, trench or weather conditions are unsuitable. No wedging or blocking will be permitted unless permission is obtained from the Authority. When pipelaying is not in progress, the open ends of installed pipe shall be closed by approved means to prevent entrance of trench water and foreign material into the line. Enough backfill shall be placed in the center sections of the pipe to prevent floating. Any pipe that has floated shall be removed from the trench and relaid.

(2) Trenches shall be dewatered prior to laying pipes.

(3) Pipe Clearance in Rock

(a) Ledge rock, boulders and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe and fittings

for pipes 24 inches in diameter or less, and 9 inches for pipes larger than 24 inches in diameter.

(b) The specified minimum clearances are the minimum clear distances which will be permitted between any part of the pipe and/or fitting being laid and any part, projection or point of rock, boulder, or stone.

(4) Joints

All joints shall be made in accordance with the pipe supplier's specifications and in accordance with the following instructions:

(a) Push-on Type Joints

Cleaning and assembly of push-on joints shall conform to AWWA C600, Section 3.4.1.

(b) Mechanical Joints

The cleaning, assembly, and bolting of the mechanical joint shall conform to AWWA C600, Section 3.4.2.

(c) Flanged joints shall not be used for buried service except at a tapping sleeve/valve joint.

(d) Flanges shall be wiped clean with a solvent-soaked rag prior to installation. The gasket shall also be wiped clean.

(e) The pipe, fittings, and valves shall be properly supported during installation.

(f) All flanges shall be properly aligned and checked with a spirit level, both horizontally along the pipe and vertically across the flange faces.

(g) With flanges secured in position, half the bolts shall be inserted at the bottom of the flange, the gasket inserted between the flanges, and the remaining bolts inserted.

(h) The threads of the bolts shall be given a light coating of thread lubricant, and the nuts shall be installed on the bolts and turned up by hand. The nuts shall be tightened with a wrench by the crossover method to load the bolts evenly until the joints are tight.

h. Setting Valves and Valve Boxes

(1) All valves shall be set vertical and shall be provided with a valve box. If the valve is furnished with a bypass, a valve box shall also be furnished for the bypass valve. The tops of boxes shall be set to finished grade, unless directed otherwise by the Authority. Valve and fitting installation shall be in accordance with Section 3.6 of AWWA C600.

i. Setting of Hydrants

(1) Fire hydrants shall be installed as specified in AWWA C600, Section 3.7 at a minimum burial depth of 4 feet, and placement shall comply with the International Fire Code. Where there is curbing, the hydrant shall be a minimum of 2 feet from the edge of curb. Where there is no sidewalk or curb, the hydrant shall be not less than 6 feet from the edge of paved road surface. In no case will hydrants be located closer than 25 feet to a building except where building walls are blank fire walls. Hydrants shall not be located closer than 3 feet to any obstruction, or in front of entrance ways. All hydrants shall stand plumb, with the pumper nozzle facing the curb, and the hose nozzles parallel to the curb as shown on the detail drawings. The vertical variance between the manufacturer's recommended bury grade line and finish grade shall not exceed 4 inches.

j. Anchorage

(1) All plugs, caps, tees, and bends (both horizontal and vertical) shall be provided with concrete reaction backings and approved restrained joint system. Where the water mains must be tested before connections to existing mains can be installed, temporary reaction backings or restrained type plugs shall be installed.

(2) The Authority's approval shall be obtained for the anchorage of the pipe and fittings at each connection, or at any other locations designated by the Authority. The Authority reserves the right to require mechanical joint retainer glands in addition to concrete reaction backings.

(3) Hydrant bases shall be braced against undisturbed earth with reaction backings and shall be restrained with tie rods, clamps, or restrained joints, in a manner approved by the Authority. The approved hydrant installation is shown on the detail drawings.

5. Backfilling

a. The trench may be filled with excavated material above the AASHTO No. 8 (PennDOT No. 1B) or AASHTO No. 57 (PennDOT No. 2B) stone as specified above except that stones larger than 8 inches may not be placed in the trench and the fill shall not contain more than 20% stone in total volume.

b. The trench shall be properly tamped in lifts not to exceed the maximum thickness for the type of tamping equipment being used. The first lift above the bedding material shall be two feet with subsequent lifts not to exceed one foot. All bedding and backfilling shall be compacted to 95% of maximum density as determined by ASTM D1557 70 or AASHTO T 180, Method D (Modified Proctor). Backfilling shall not be done with frozen material. No backfilling shall be done if the material already in the trench is frozen.

c. Utility excavations in areas of streets, access drives, parking areas and loading areas shall be backfilled and compacted in accordance with East Cocalico Township's Subdivision and Land Development Ordinance.

d. In State highways, all backfill and compaction shall be in accordance with the requirements of PennDOT Chapter 459.

6. Surface Restoration

a. In State highways surface restoration shall be in accordance with PennDOT requirements, or as specified in the PennDOT Permit issued for the subject project.

b. In Township Roads, paved areas or other traffic areas surface restoration shall be in accordance with East Cocalico Township's Subdivision and Land Development Ordinance.

7. Bored Crossings

a. Tolerances for installation of the casing pipes shall be as follows:

(1) Elevation: to grade or a maximum of 9 inches below grade.
(2) Plan Location: plus or minus 1 foot.

b. The carrier pipes shall be supported within the casing pipes so that the pipe bells do not rest directly on the casing. The load of the carrier pipes shall be distributed along the casing by the method of support shown on the detail drawings.

c. All work shall be performed in conformance with the requirements of PennDOT or other regulatory agencies involved.

d. All carrier pipe within a casing pipe shall have push-on restrained joints.

E. TESTING AND INSPECTION

1. General

a. This Section covers the testing and disinfection of the water mains. A schedule and procedure for the testing and disinfection of the different parts of the work shall be prepared and submitted to the Authority for approval two weeks before beginning the testing and disinfection. Testing and disinfection shall be performed promptly and efficiently without interference to the system operation. A minimum of 24 hours' notice shall be given before testing any main.

b. Testing and disinfection of the various sections of water mains shall begin promptly upon the completion of a section of work, unless the Authority approves otherwise. Authority inspection shall be done prior to backfilling the work. The Authority reserves the right to limit the amount of water main to be tested.

2. Notification

a. It is incumbent upon the Applicant to notify the Authority a minimum of 48 hours in advance of construction work.

3. Pressure Test

   a. General

      (1) After the pipe has been laid and backfilled as specified, all newly laid pipe shall be subjected to a hydrostatic pressure of 150 psi, or 150% of the normal working pressure, whichever is greater in accordance with AWWA C-600.

      (2) Where any section of a water main is provided with concrete reaction backing, the hydrostatic pressure test shall not be made until at least five days have elapsed after the concrete reaction backing was installed. If high early strength cement is used in the concrete reaction backing, the hydrostatic pressure test shall not be made until at least two days have elapsed.

      (3) Air release valves shall be installed but isolated during testing of the pipeline.

   b. Duration of Pressure Tests

      (1) The duration of each pressure test shall be 2 hours.

   c. Procedure

      (1) Each section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Authority. The pump, pipe connections, and all necessary apparatus, including gauges, shall be furnished by the Applicant and are subject to approval by the Authority. The Applicant will make all taps into the pipe and furnish all necessary assistance for conducting the tests.

      (2) Expelling Air Before Test

         (a) Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Applicant shall make the necessary taps at such points before the test is made. After the test has been completed, the Applicant shall remove and plug the taps or leave them in place at the direction of the Authority.

      (3) Examination Under Pressure

         (a) Any cracks or defective pipes, fittings, or valves discovered in consequence of this pressure test, shall be removed and replaced by the Applicant, and the test shall be repeated.

         (b) If the pressure does not drop within the 2-hour test period, the test shall be deemed to be successful.

4. Tapping Sleeves, Insertion Valves, and Line Stops

    a. Each instance of live-line sleeve or valve installation shall be accompanied by an air test on the ductile iron body to the existing main connection prior to cutting into the existing main.

    b. Air test shall be 150-psi for 15 minutes with zero pressure drop.

    c. Installation and testing to be documented with a report to include date, installation contractor and contact information, address, GPS coordinates of the valve, water pressure of the line before and after tapping, and pressure test results.

5. Fire Flow Flushing

    a. Flushing dates for fire flow shall be scheduled a minimum of 1 week in advance with the Authority and the Township.

    b. Maximum water usage is as follows:

        (1) On a gallon per minute (gpm) basis, no more water at any moment than flow values supported by hydrant testing with no allowance of pumping.

        (2) 30,000 gallons per 1-hour period with a minimum 3-hour waiting period before a second 30,000 gallons may be used.

        (3) 60,000 gallons per 48-hour period.

        (4) 120,000 gallons in any 7-day period.

    c. Limitations

        (1) If a fire emergency occurs at any point during the flushing, within the area serviced by ECTA, flushing must stop immediately.

        (2) Flushing shall not occur during instances of ECTA hardship. For example, substantial water production downtime or during drought conditions.

    d. An ECTA representative is to be on-site for the flushing to monitor usage. An ECTA representative off-site is to monitor system effects via SCADA.

6. Fire Flow Testing

    a. As part of the overall fire system installation, successful physical testing of the fire supply system is required.

    b. Systems to be tested to prove the system functions as intended, and the water usage or pressure drop does not detrimentally affect ECTA’s ability to service the remainder of the water distribution system.

c. An ECTA representative is to be on-site for the for the testing to monitor usage and pressures.

d. Fire flow testing is to be conducted by a certified third-party FPE certified in the Commonwealth of Pennsylvania.

e. Water volume usage shall not exceed the limits set forth for flushing events.

7. Water Storage Tank Filling

   a. When filling or re-filling water storage tanks, the water usage to not exceed requirements set for fire flushing events.

8. Disinfection

   a. General

      (1) Before being placed in service, all pipe installed shall be disinfected in accordance with AWWA C651.

   b. Form of Chlorine for Disinfection

      (1) Either liquid chlorine, sodium hypochlorite solution, or calcium hypochlorite granules or tablets shall be used for disinfection in accordance with AWWA C651, Section 2.

   c. Application of Chlorine

      (1) One of the three methods of chlorination (continuous-feed method, tablet method and slug method) specified in AWWA C651 Section 5 shall be used for disinfection. The method most suitable for the given situation shall be used and shall be reviewed with the Authority's representative before application. The continuous-feed method is suitable for general application. The tablet method is suitable for use in pipes smaller than 24 inches in diameter and only if the pipe is kept clean and dry. The slug method is suitable for use in large diameter pipes where the volume of water involved makes the continuous-feed method impractical.

   d. Point of Application

      (1) The chlorine solution shall be applied at the high end of the pipeline section through a corporation stop inserted in the top of the new pipe. If the water for the chlorine solution is supplied from the existing pipeline, there shall be a physical break between the injector supply and the injector or pump.

   e. Rate of Application

      (1) The chlorine solution shall be pumped slowly into the new pipeline until the entire main is filled with the chlorine solution. If required by the Authority, the chlorine residual shall be measured at several points along the main.

f. Point of Discharge

(1) The sterilizing solution shall be discharged through available outlets, or through taps in the main. The chlorinated water is extremely toxic, and the property and fish life shall be protected from damage due to the discharge. Where necessary, federal, state, and local regulatory agencies shall be contacted to determine special provisions for the disposal of heavily chlorinated water.

(2) One available option is to discharge the chlorinated water to the sanitary sewer. The local wastewater treatment plant operator shall be contacted in advance through the Authority's representative to obtain approval prior to disposal. If the chlorinated water cannot be discharged to the sanitary sewer or over land it shall be neutralized with a hydrant diffuser dechlorinator using sodium sulfite tablets. Check the downstream chlorine residual to determine if there is any chlorine present using a pocket colorimeter.

g. Flushing Water

(1) The Authority will provide flushing water for water main installations only. No existing water system valves shall be operated without the presence of the Authority's representative.

h. Water for Testing

(1) The Authority will furnish water for one hydrostatic test and disinfection procedures per line installed. If pipelines must be retested and disinfected, additional water will be provided at current Authority rates.

i. Disinfection of Water Main Connections

(1) If it is not possible to disinfect the pipe, valves, and fittings in the manner specified above, with the Authority's approval, the following procedure will be used:

(2) The interior of all pipe, fittings, and valves shall be swabbed with a 5% hypochlorite solution which can be obtained by mixing 3 pounds of granulated calcium hypochlorite with 5 gallons of water. After the pipe, fittings, and valves have been swabbed, they shall be thoroughly flushed with water.

j. Bacteriological Tests

(1) After final flushing is completed and before the water main is put into service the Applicant shall have the replacement water tested for bacteriological quality.

(2) Bacteriological sampling and analysis shall be performed in accordance with AWWA C651 by a PA DEP certified laboratory.

F. DETAIL DRAWINGS

Relevant Detail Drawings are:

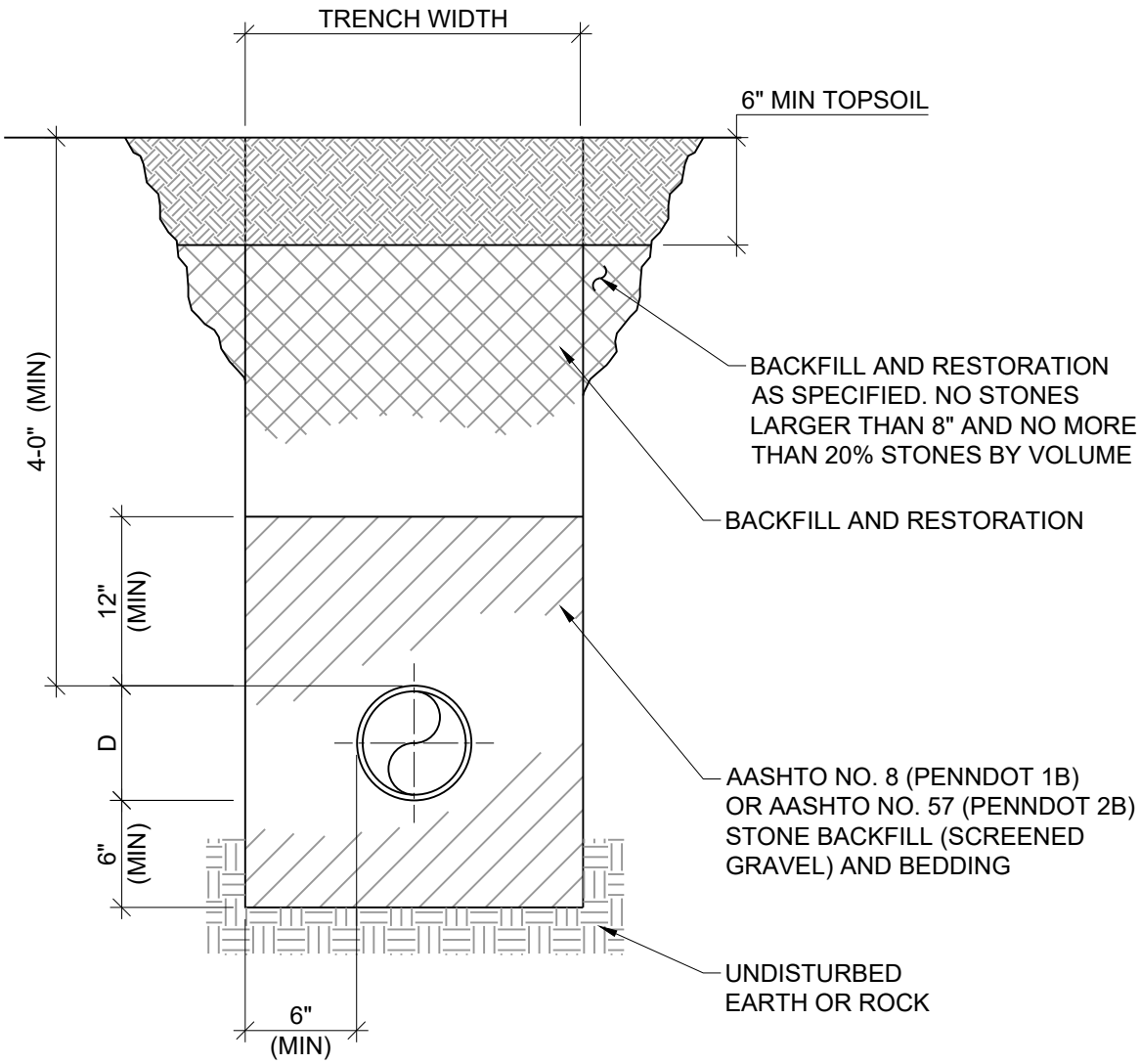
1 Right-of-Way Restoration
2 Concrete Encasement Detail
3 Pavement Restoration Detail
9 Typical Blowoff Installation
10 Typical Fire Hydrant Setting
16 Air Release Valve Manhole
17 Thrust Blocks for Horizontal Bends and Lower Vertical Bends
18 Restrained DI Pipe Length
19 Water Main Pipe Casing

END OF SECTION

APPENDIX A
DETAIL DRAWINGS INDEX

No. Description

1..... Right-of-Way Restoration
2..... Concrete Encasement Detail
3..... Pavement Restoration Detail
4..... Typical Lateral (Up to 2") Using Corporation Stop
5..... Typical Lateral (Up to 2") Using Service Saddle
6..... New Lateral Connection (Larger than 2") to a New Water Main
7..... Typical Lateral Connection (Larger than 2") to an Existing Water Main
8..... Typical Service Line - Plan
9..... Typical Blowoff Installation
10..... Typical Fire Hydrant Setting
11..... Typical Meter Pit for 5/8" - 1" Service (Not in Traffic Area)
12..... Typical Meter Pit for 1 1/2" - 2" Service (Not in Traffic Area)
13..... Typical Meter Pit for 5/8" - 2" Service (in Traffic Area)
14..... Typical Meter Pit for Large Meters (Plan)
15..... Typical Meter Pit for Large Meters (Elevation)
16..... Air Release Valve Manhole
17..... Thrust Blocks for Horizontal Bends and Lower Vertical Bends
18..... Restrained DI Pipe Length
19..... Water Main Pipe Casing



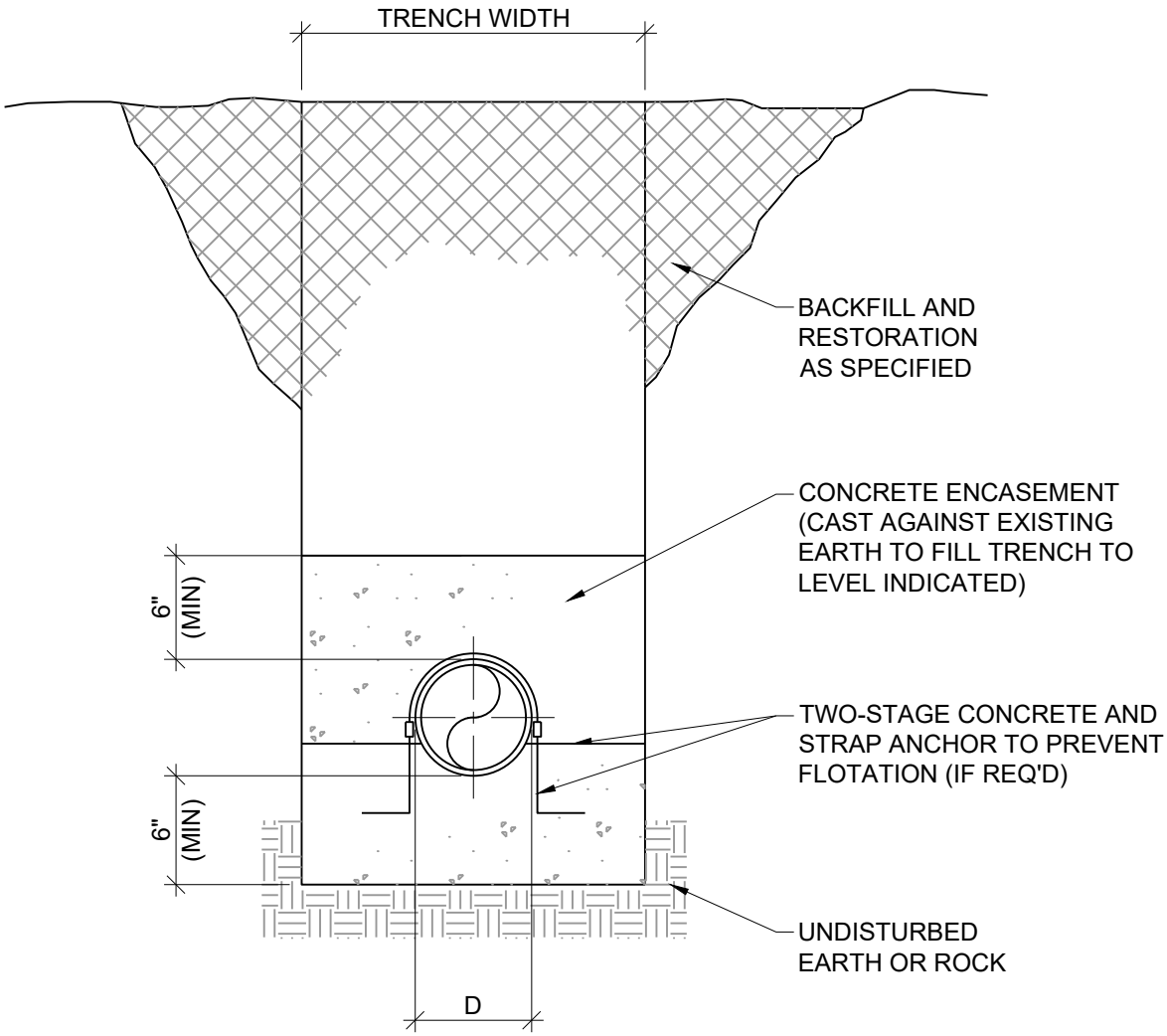
NOTES:

1. **TRENCH SIDE SLOPES SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS. BEGIN SIDE SLOPES, IF USED, APPROXIMATELY 18" ABOVE TOP OF PIPE (TYPICAL ALL BEDDING TYPES).**

1

RIGHT-OF-WAY RESTORATION

SCALE: NONE



NOTES:

1. **TRENCH SIDE SLOPES SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS. BEGIN SIDE SLOPES, IF USED, APPROXIMATELY 18" ABOVE TOP OF PIPE (TYPICAL ALL BEDDING TYPES).**

1

CONCRETE ENCASEMENT DETAIL

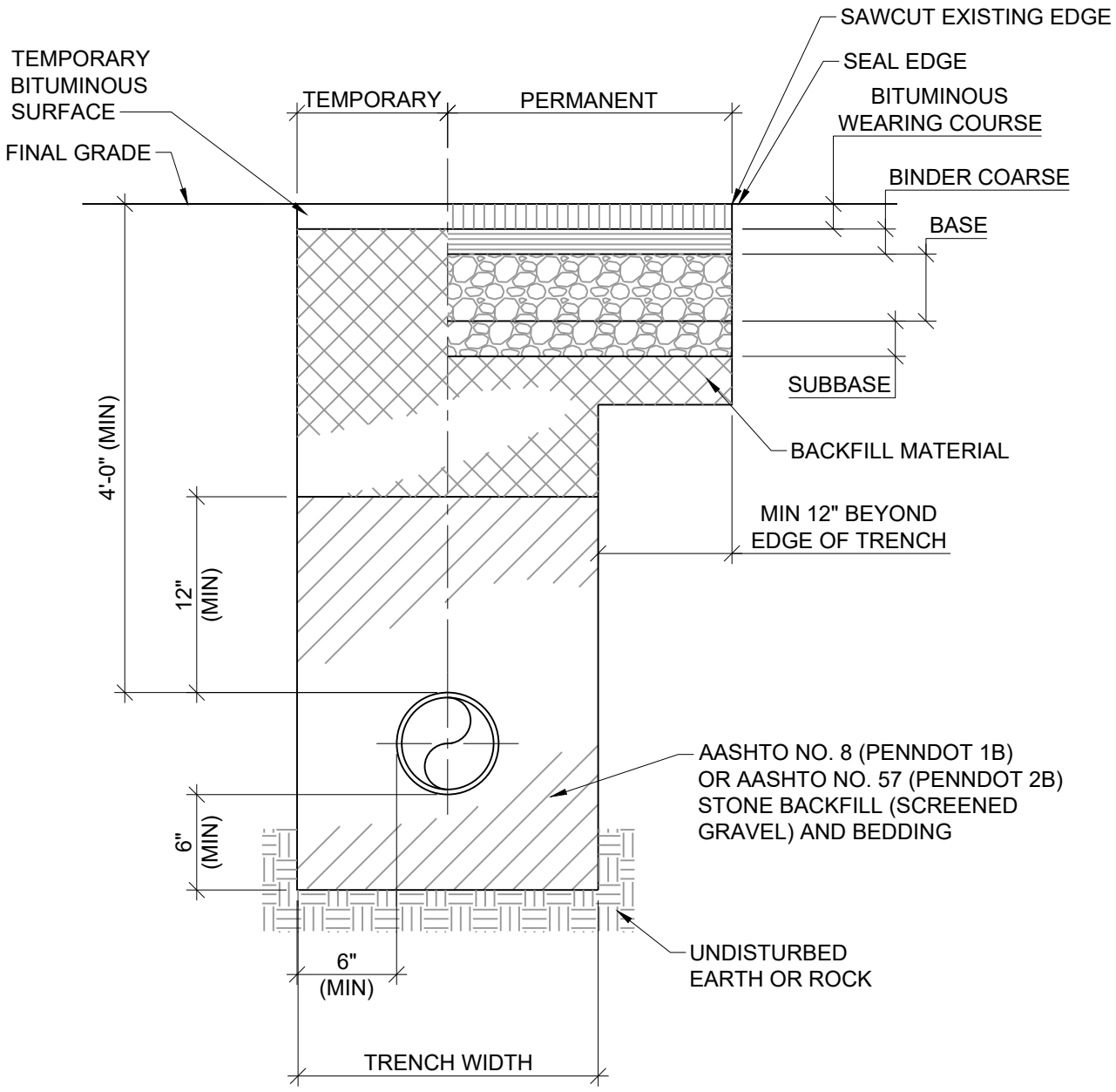
SCALE: NONE

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EAST COCALICO TOWNSHIP AUTHORITY

CONCRETE ENCASEMENT DETAIL

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT002
APPROVED BY: AGS	



NOTES:

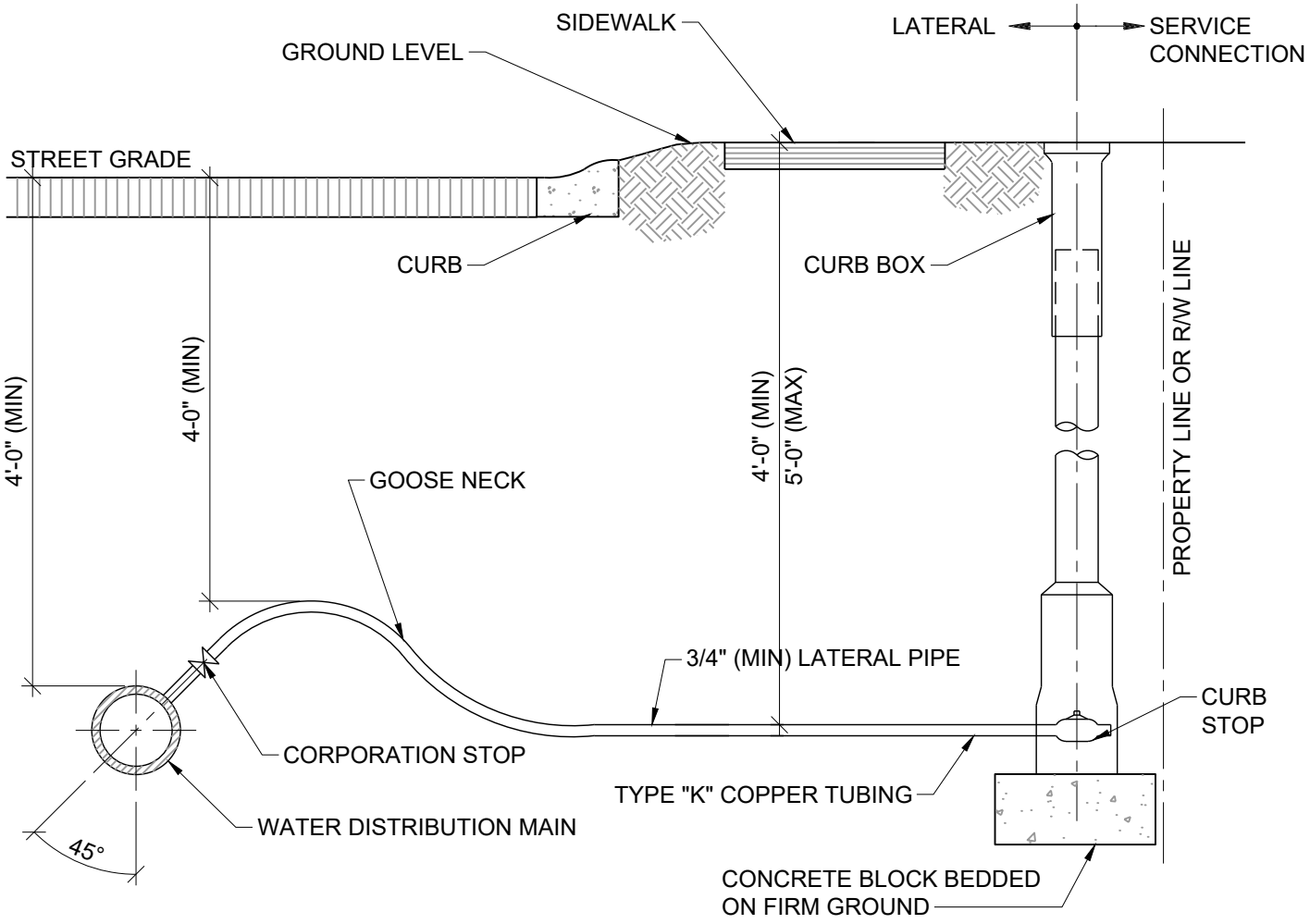
1. **BACKFILL & PAVEMENT RESTORATION IN STATE ROADS SHALL BE AS SPECIFIED BY PADOT.**

2. **BACKFILL & PAVEMENT RESTORATION IN TOWNSHIP ROADS, ACCESS DRIVES, PARKING AREAS AND LOADING AREAS SHALL BE AS SPECIFIED IN THE EAST COCALICO TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE.**

1

PAVEMENT RESTORATION DETAIL

SCALE: NONE



NOTES:

1. THE AUTHORITY MAY REQUIRE THE WATER LATERAL TO BE EXTENDED FROM THE CURB STOP TOWARD THE PROPERTY OR RIGHT-OF-WAY LINE TO ACCOMMODATE FUTURE INSTALLATION OF THE BUILDING SERVICE LINE WITHOUT UNDERMINING THE SIDEWALK OR DISTURBING OTHER UTILITIES.

1 TYPICAL LATERAL (UP TO 2") USING CORPORATION STOP

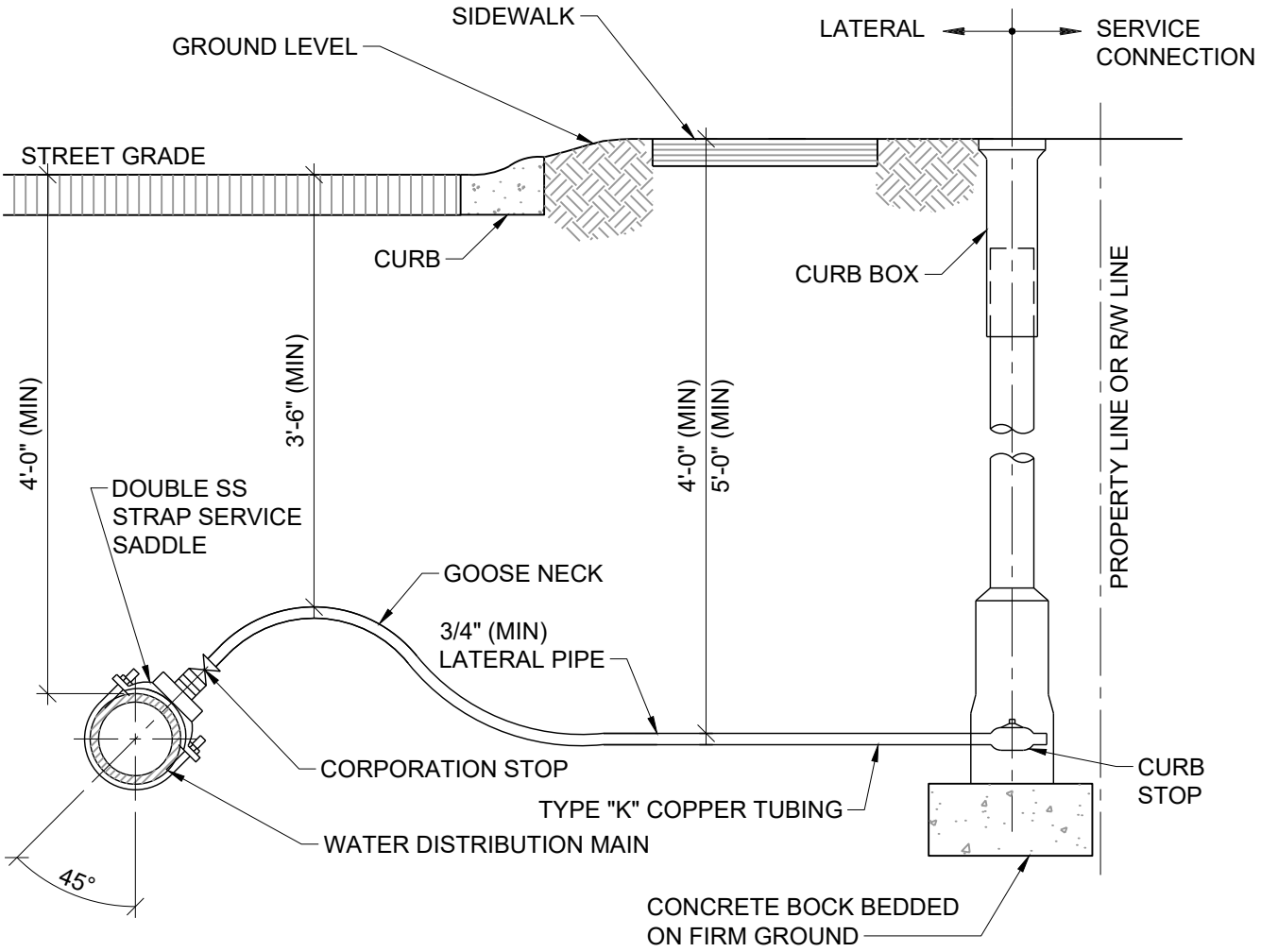
SCALE: NONE

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EAST COCALICO TOWNSHIP AUTHORITY

TYPICAL LATERAL (UP TO 2") USING COPORATION STOP

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT004
APPROVED BY: AGS	



NOTES:

1. THE AUTHORITY MAY REQUIRE THE WATER LATERAL TO BE EXTENDED FROM THE CURB STOP TOWARD THE PROPERTY OR RIGHT-OF-WAY LINE TO ACCOMMODATE FUTURE INSTALLATION OF THE BUILDING SERVICE LINE WITHOUT UNDERMINING THE SIDEWALK OR DISTURBING OTHER UTILITIES.

1 TYPICAL LATERAL (UP TO 2") USING SERVICE SADDLE

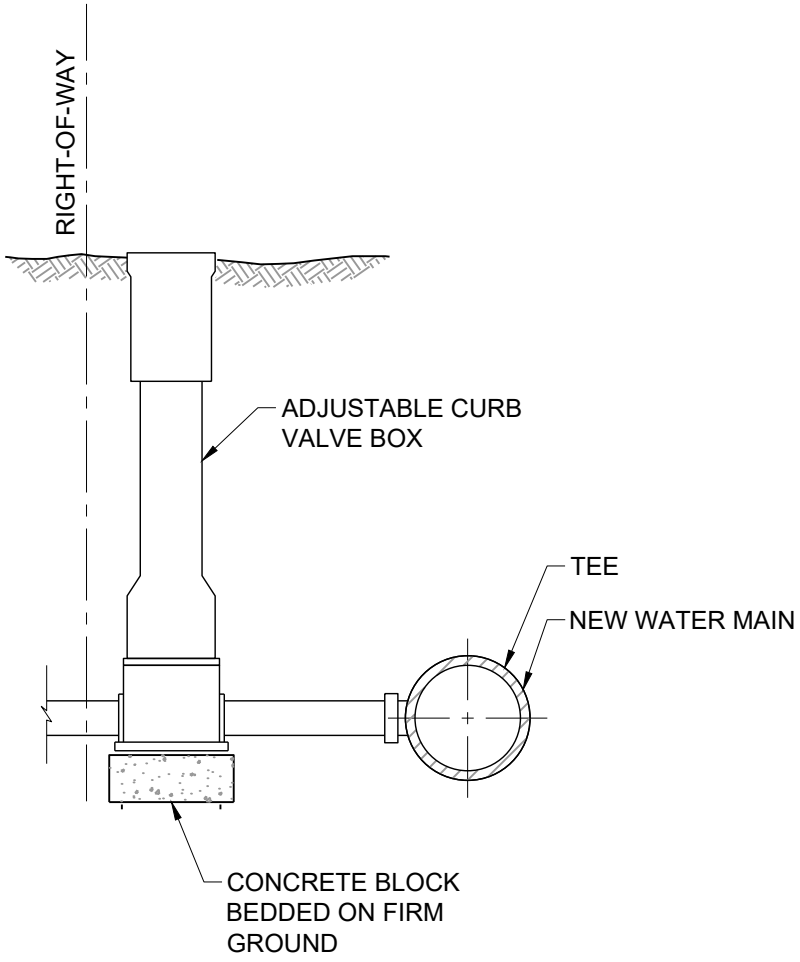
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EAST COCALICO TOWNSHIP AUTHORITY

TYPICAL LATERAL (UP TO 2") USING SERVICE SADDLE

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT005
APPROVED BY: AGS	

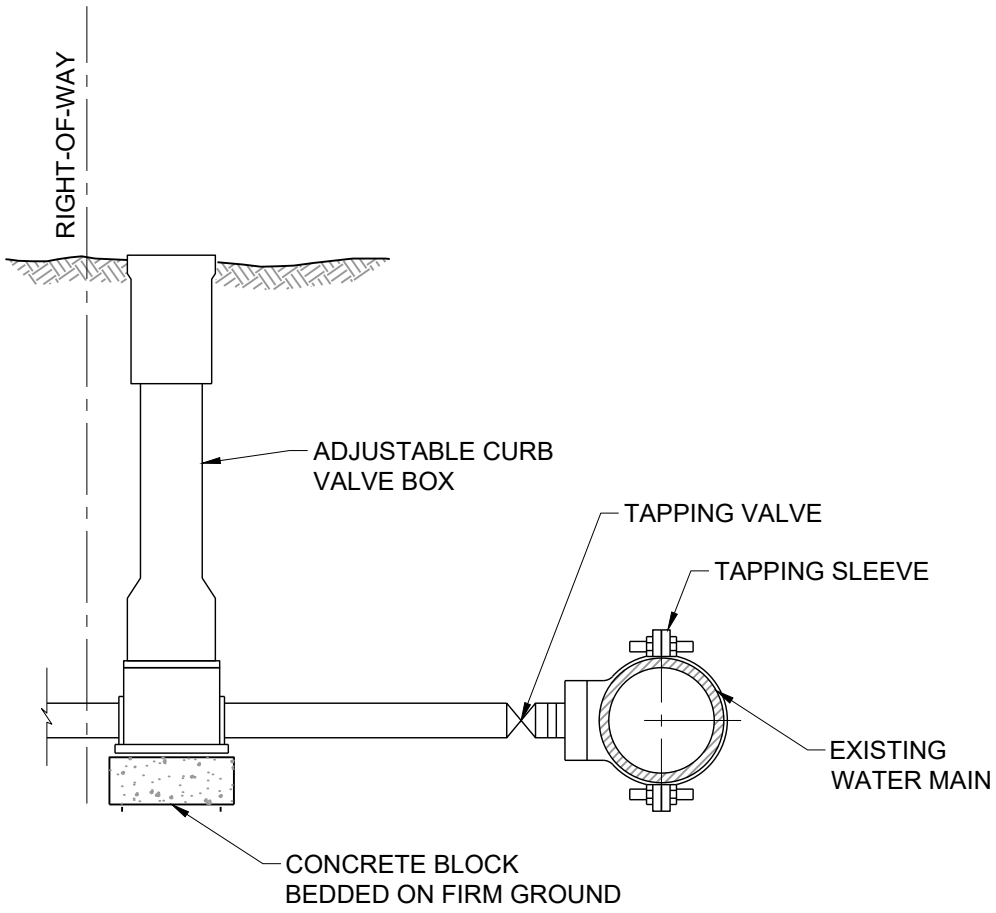


NEW LATERAL CONNECTION (LARGER THAN 2") TO A NEW WATER MAIN

1

SCALE: NONE

ENTECH ENGINEERING 1.800.825.1372 www.entecheng.com	EAST COCALICO TOWNSHIP AUTHORITY NEW LATERAL CONNECTION (LARGER THAN 2") TO A NEW WATER MAIN	DATE: 09/19/25	SCALE: AS NOTED
		PREPARED BY: ARA	PROJECT NO. 4673.030
		CHECKED BY: AGS	DRAWING NO. ECCDT006
		APPROVED BY: AGS	

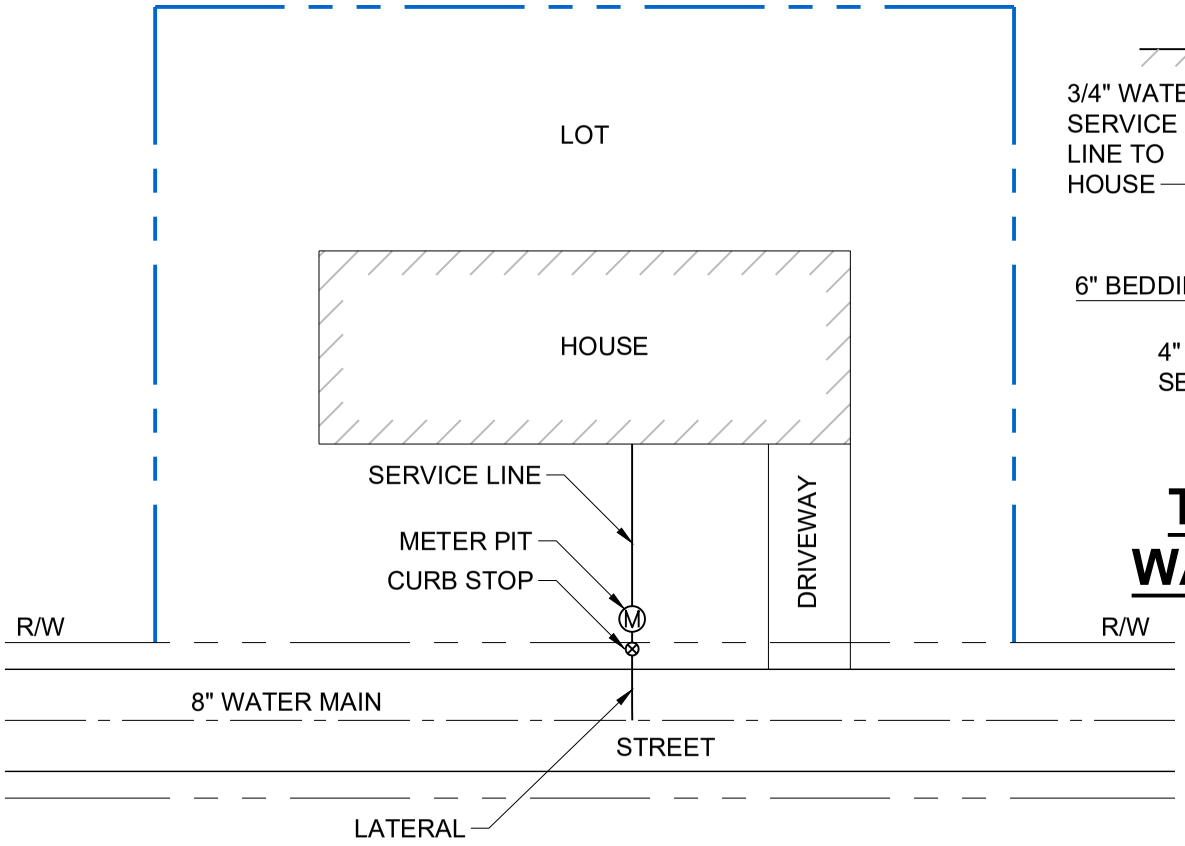


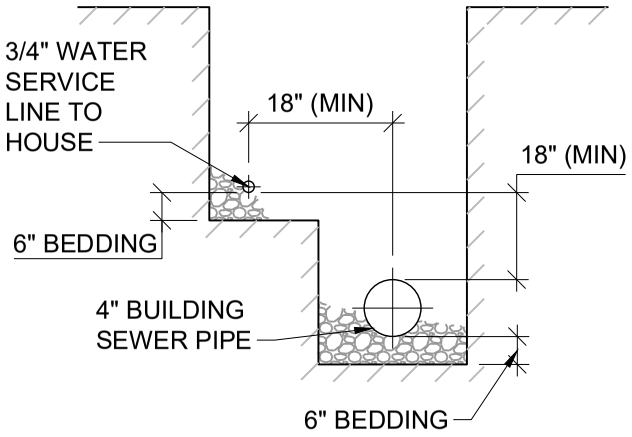
TYPICAL LATERAL CONNECTION (LARGER THAN 2") TO AN EXISTING WATER MAIN

1

SCALE: NONE

ENTECH ENGINEERING 1.800.825.1372 www.entecheng.com	EAST COCALICO TOWNSHIP AUTHORITY TYPICAL LATERAL CONNECTION (LARGER THAN 2") TO AN EXISTING WATER MAIN	DATE: 09/19/25 PREPARED BY: ARA CHECKED BY: AGS APPROVED BY: AGS	SCALE: AS NOTED PROJECT NO. 4673.030 DRAWING NO. ECCDT007





TYPICAL TRENCH FOR WATER AND SEWER PIPE

NOTES:

1. **CURB STOP SHALL BE LOCATED AT THE RIGHT-OF-WAY LINE.**
2. **ALL METERS SHALL BE LOCATED IN BELOW GRADE PITS JUST BEYOND THE CURB STOP.**
3. **A SINGLE LATERAL SHALL BE PROVIDED PER TOWNHOUSE, AND THE LATERAL AND SERVICE LINE SHALL BE SIZED TO SUPPORT FIRE SPRINKLERS, IF REQUIRED. FIRE SPRINKLER LINES SHALL HAVE SEPARATE BACKFLOW PREVENTERS.**
4. **IF 18" VERTICAL SEPARATION CANNOT BE MAINTAINED BETWEEN WATER AND SEWER SERVICES, PROVIDE 5' OF HORZONTAL SEPARATION WITH WATER ABOVE SEWER.**

1 **TYPICAL SERVICE LINE PLAN**

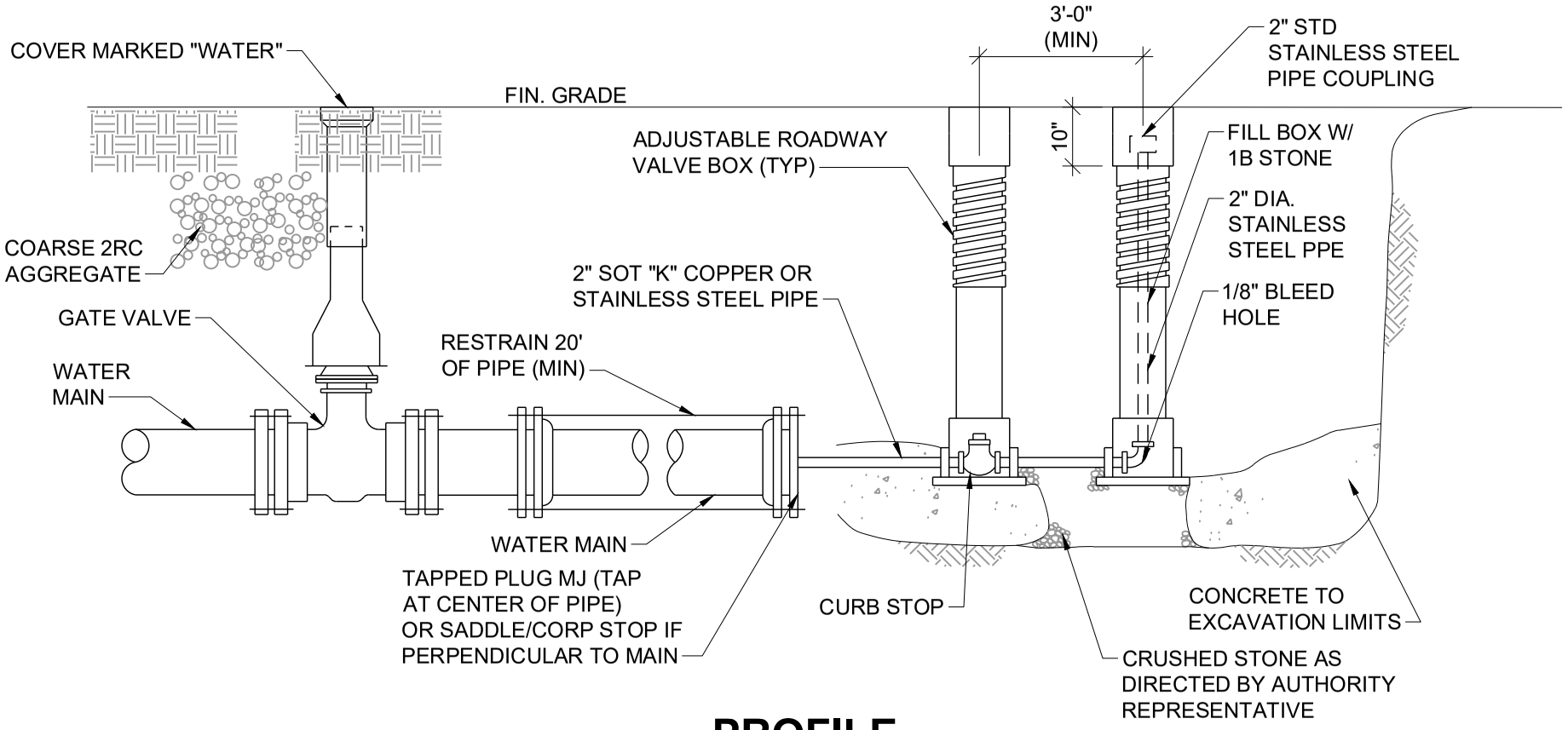
SCALE: NONE

SCALE: AS NOTED
PROJECT NO. 4673.030
DRAWING NO. ECCDT008
DATE: 09/19/25
PREPARED BY: ARA
CHECKED BY: AGS
APPROVED BY: AGS

EAST COCALICO TOWNSHIP AUTHORITY

TYPICAL SERVICE LINE PLAN

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PROFILE

NOTES: INSTALL GATE VALVE OR CORP STOP AT MAIN

1 TYPICAL BLOWOFF INSTALLATION

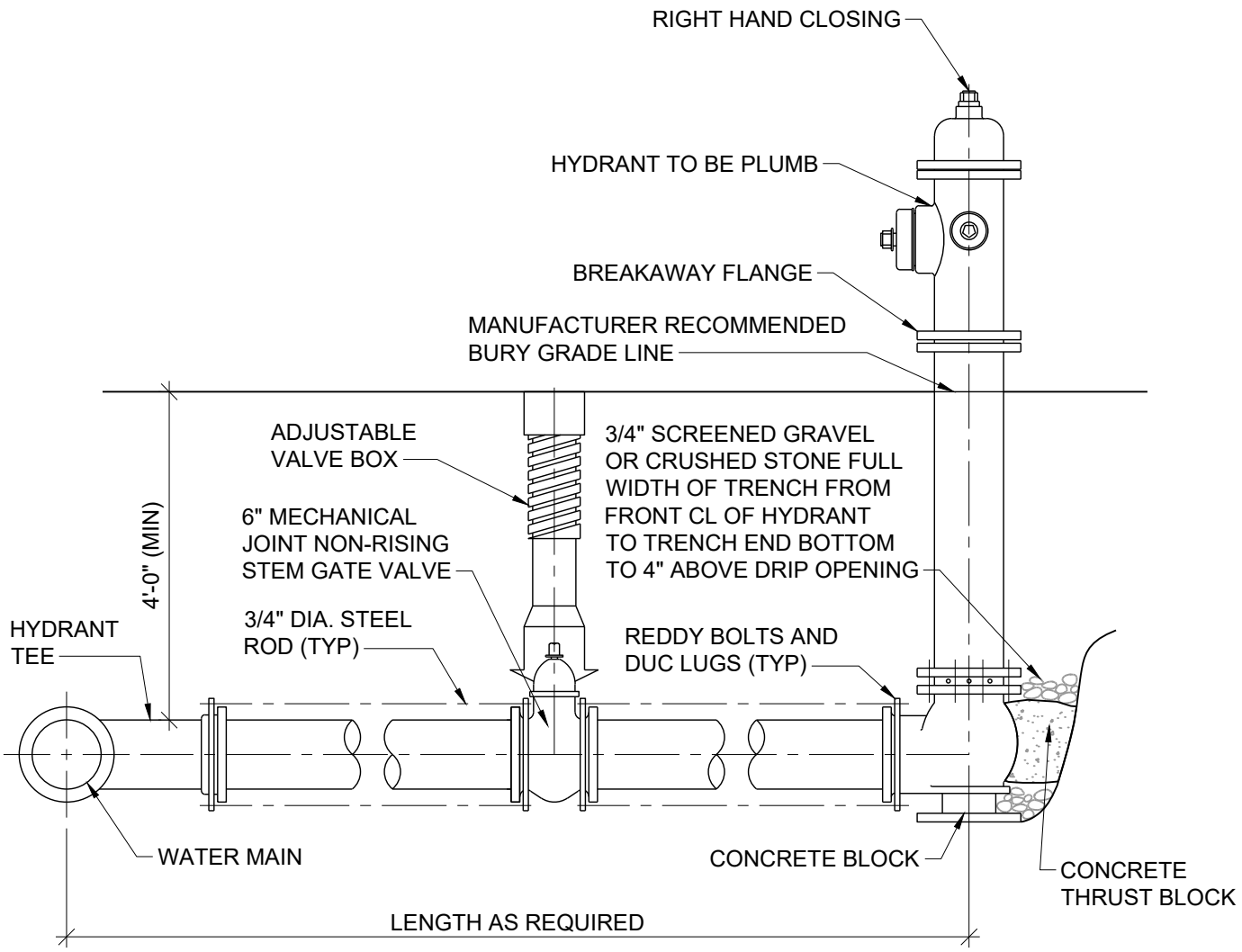
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SCALE: AS NOTED
PROJECT NO. 4673.030
DRAWING NO. ECCDT009
DATE: 09/19/25
PREPARED BY: ARA
CHECKED BY: AGS
APPROVED BY: AGS

EAST COCALICO TOWNSHIP AUTHORITY

TYPICAL BLOWOFF INSTALLATION

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NOTES:

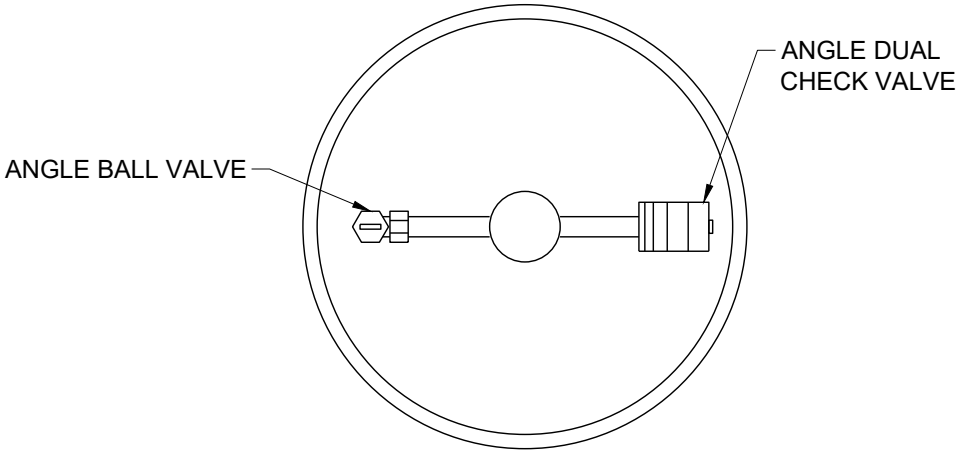
1. RESTRAINT RODS NOT REQUIRED BY AUTHORITY IF "MEGALUG" MECHANICAL JOINT RESTRAINTS USED.
2. MANUFACTURER'S RECOMMENDED BURY GRADE LINE SHALL BE WITHIN 4 INCHES OF FINAL GRADE.

1

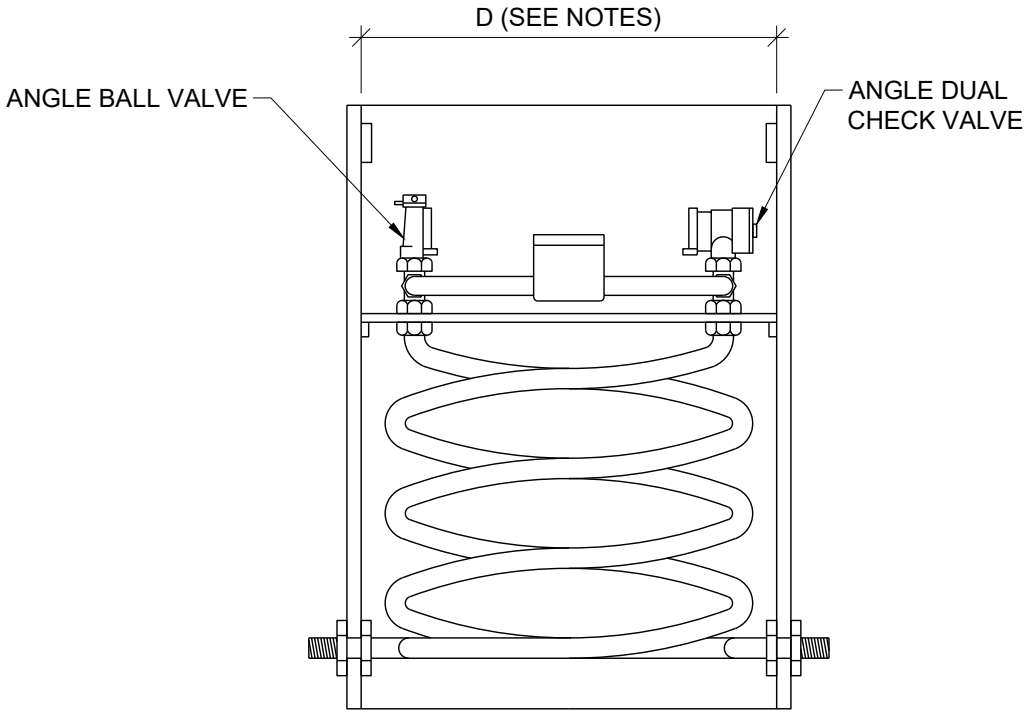
TYPICAL FIRE HYDRANT SETTING

SCALE: NONE

ENTECH ENGINEERING 1.800.825.1372 www.entecheng.com	EAST COCALICO TOWNSHIP AUTHORITY TYPICAL FIRE HYDRANT SETTING	DATE: 09/19/25	SCALE: AS NOTED
		PREPARED BY: ARA	PROJECT NO. 4673.030
		CHECKED BY: AGS	DRAWING NO. ECCDT010
		APPROVED BY: AGS	



PLAN



SECTION

NOTES:

1. 15" DIAMETER METER BOX FOR 5/8" OR 3/4" WATER METER.
2. 18" DIAMETER METER BOX FOR 1" WATER METER.
3. PIT SHALL BE FURNISHED WITH 4-INCH INSULATING PAD. LID SHALL INCLUDE A FERROUS INDICATOR WITH PENTAGON KEY AND PRECAST HOLE FOR AN ELECTRONIC METER READING ANTENNA. LID DIAMETER SHALL BE 15 INCHES FOR 5/8-INCH METERS AND 18 INCHES FOR 1-INCH METERS

TYPICAL METER PIT FOR 5/8"-1" SERVICE (NOT IN TRAFFIC AREA)

1

SCALE: NONE

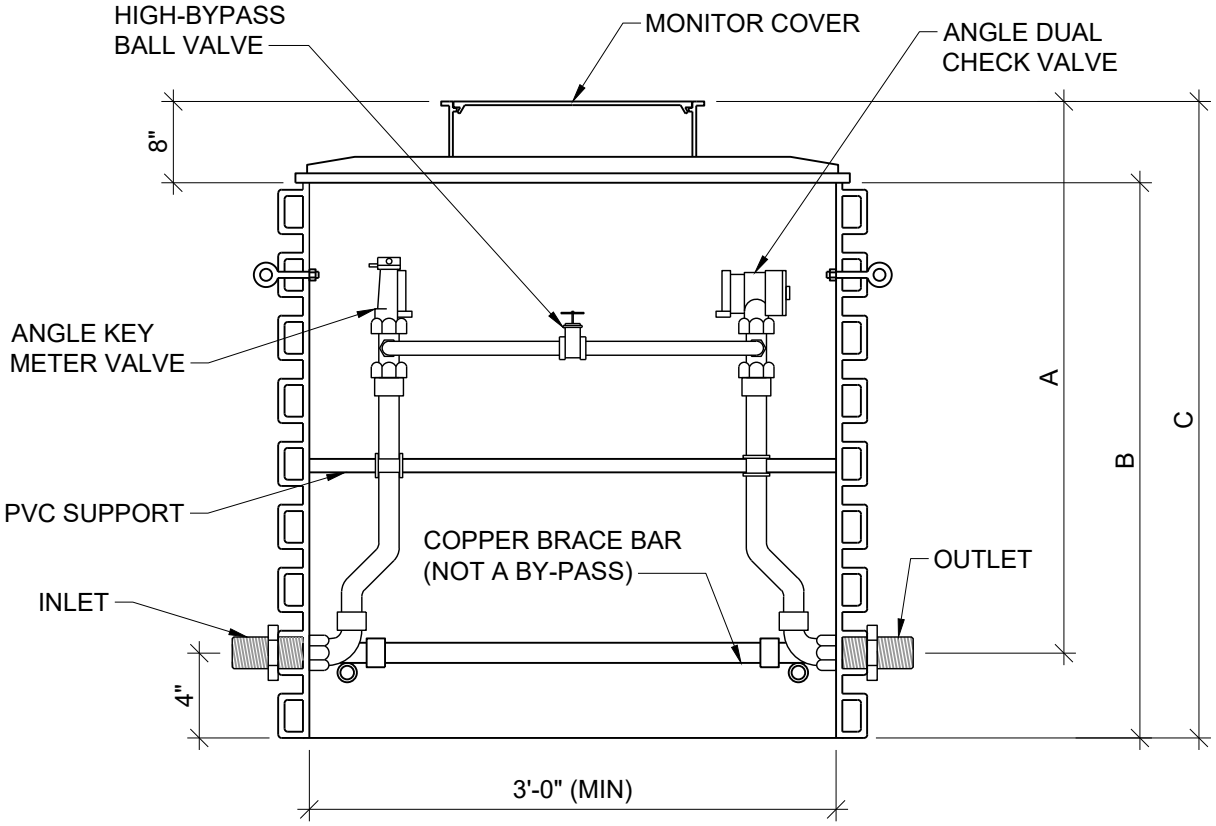
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TYPICAL METER PIT FOR 5/8"-1" SERVICE (NOT IN TRAFFIC AREA)

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT011
APPROVED BY: AGS	

APPROXIMATE VERTICAL MEASUREMENTS		
SERVICE LINE DEPTH "A"	**PVC CYLINDER LENGTH "B"**	**TOTAL PIT DEPTH "C"**
48”	44”	52”
54”	50”	58”
60”	56”	64”
66”	62”	70”
72”	68”	76”
78”	74”	82”



NOTES:

1. PIT SHALL INCLUDE A FERROUS INDICATOR WITH AN INNER LID AND 20-INCH ACCESS OPENING. LID SHALL BE DESIGNED WITH PRECAST HOLE FOR AN ELECTRONIC METER READING ANTENNA.

1 TYPICAL METER PIT FOR 1 1/2"-2" SERVICE (NOT IN TRAFFIC AREA)

SCALE: NONE

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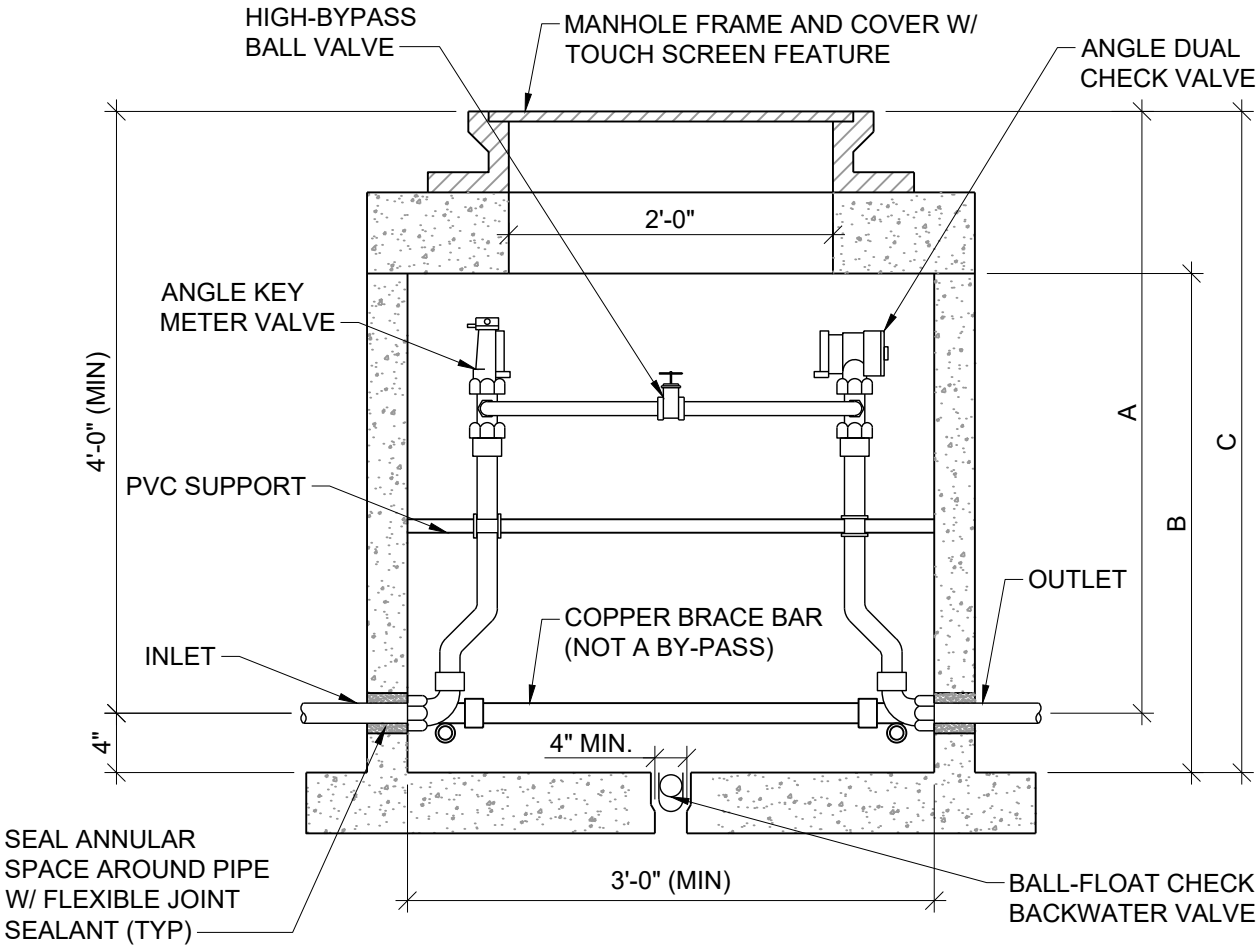
TYPICAL METER PIT FOR 1 1/2"-2" SERVICE (NOT IN TRAFFIC AREA)

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT012
APPROVED BY: AGS	

NOTES:

1. METER PIT AND MANHOLE FRAME AND COVER SHALL BE DESIGNED FOR H-20 WHEEL LOADING.
2. ONLY A DOUBLE CHECK VALVE ASSEMBLY BACKFLOW PREVENTER CAN BE INSTALLED IN THE METER PIT. IF A REDUCED PRESSURE ZONE BACKFLOW PREVENTER IS REQUIRED IT MUST BE INSTALLED IN A STRUCTURE ABOVE GRADE PROVIDED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING AND MUST BE PROTECTED FROM FREEZING.
3. PREVENT FLOTATION WITH GROUND WATER LEVEL AT FINISHED GROUND SURFACE BY DEAD WEIGHT OF STRUCTURE ONLY.

APPROXIMATE VERTICAL MEASUREMENTS		
SERVICE LINE DEPTH "A"	PVC CYLINDER LENGTH "B"	TOTAL PIT DEPTH "C"
48"	44"	52"
54"	50"	58"
60"	56"	64"
66"	62"	70"
72"	68"	76"
78"	74"	82"



1 TYPICAL METER PIT FOR 5/8"-2" SERVICE (IN TRAFFIC AREA)

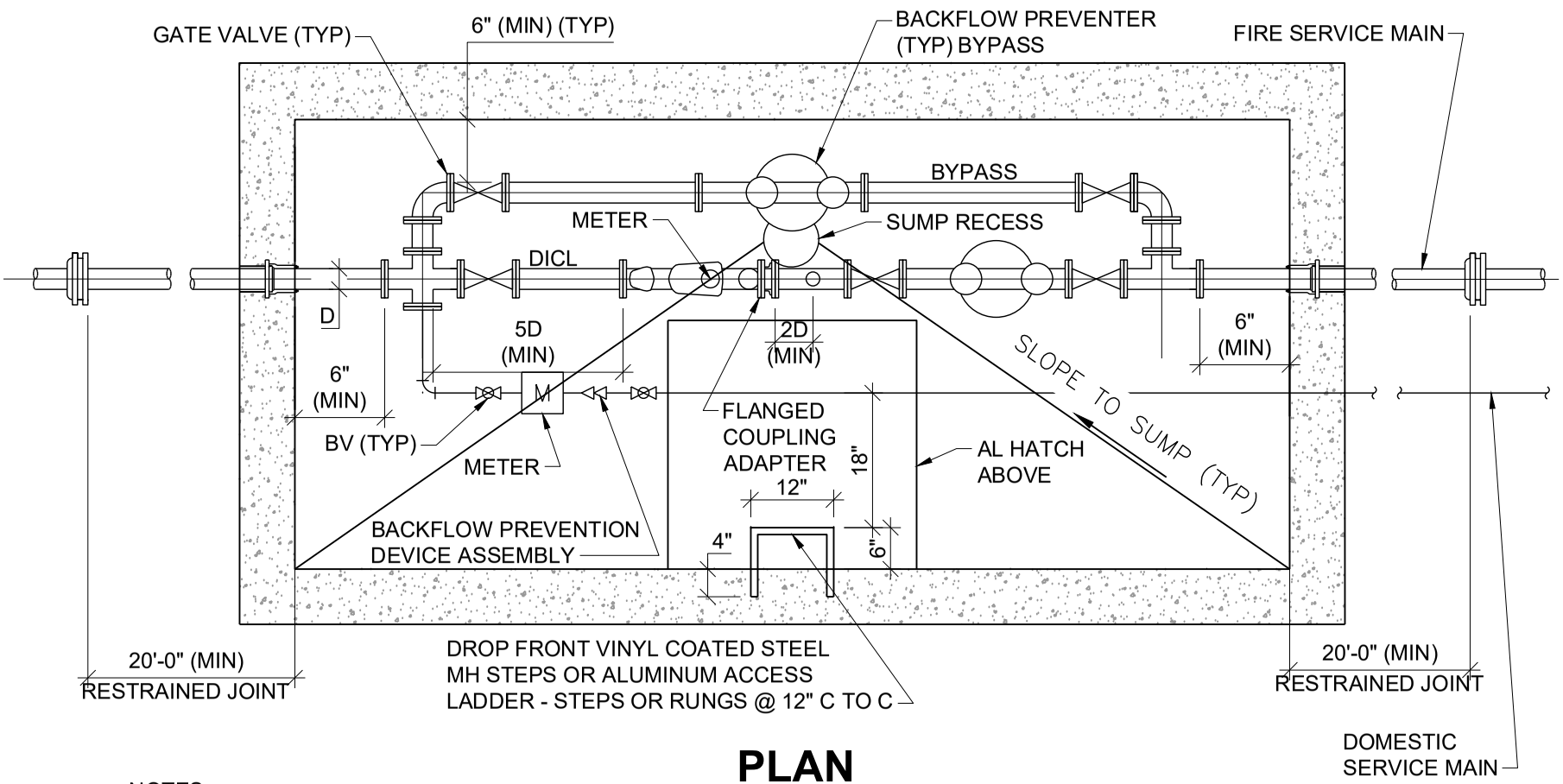
SCALE: NONE

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EAST COCALICO TOWNSHIP AUTHORITY

TYPICAL METER PIT FOR 5/8"-2" SERVICE (IN TRAFFIC AREA)

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT013
APPROVED BY: AGS	



PLAN

NOTES:

1. MINIMUM DIMENSIONS SHOWN. DIMENSIONS WILL VARY WITH METER AND PIPE SIZE.
2. VAULT AND HATCH SHALL BE DESIGNED FOR H-20 WHEEL LOADING IN TRAVELED AREAS.
3. ONLY A DOUBLE CHECK VALVE ASSEMBLY BACKFLOW PREVENTER CAN BE INSTALLED IN THE METER PIT. IF A REDUCED PRESSURE ZONE BACKFLOW PREVENTER IS REQUIRED IT MUST BE INSTALLED IN A STRUCTURE ABOVE GRADE PROVIDED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING AND MUST BE PROTECTED FROM FREEZING.
4. PREVENT FLOTATION WITH GROUND WATER LEVEL AT FINISHED GROUND SURFACE BY DEAD WEIGHT OF STRUCTURE ONLY.
5. BYPASS PIPING IS RECOMMENDED, BUT MAY BE OMITTED AT THE DISCRETION OF THE AUTHORITY.
6. LADDER MAY BE ROTATED 90-DEG W/ 18-IN CLEARANCE AT THE BASE.
7. PROVIDE 2" TEST TEE WITH 2" BALL VALVE AND 2" FIRE HOSE ADAPTER W/CAP AFTER THE FLOW METER IN ACCORDANCE WITH METER MANUFACTURER'S REQUIREMENTS.

1

TYPICAL METER PIT FOR LARGE METERS

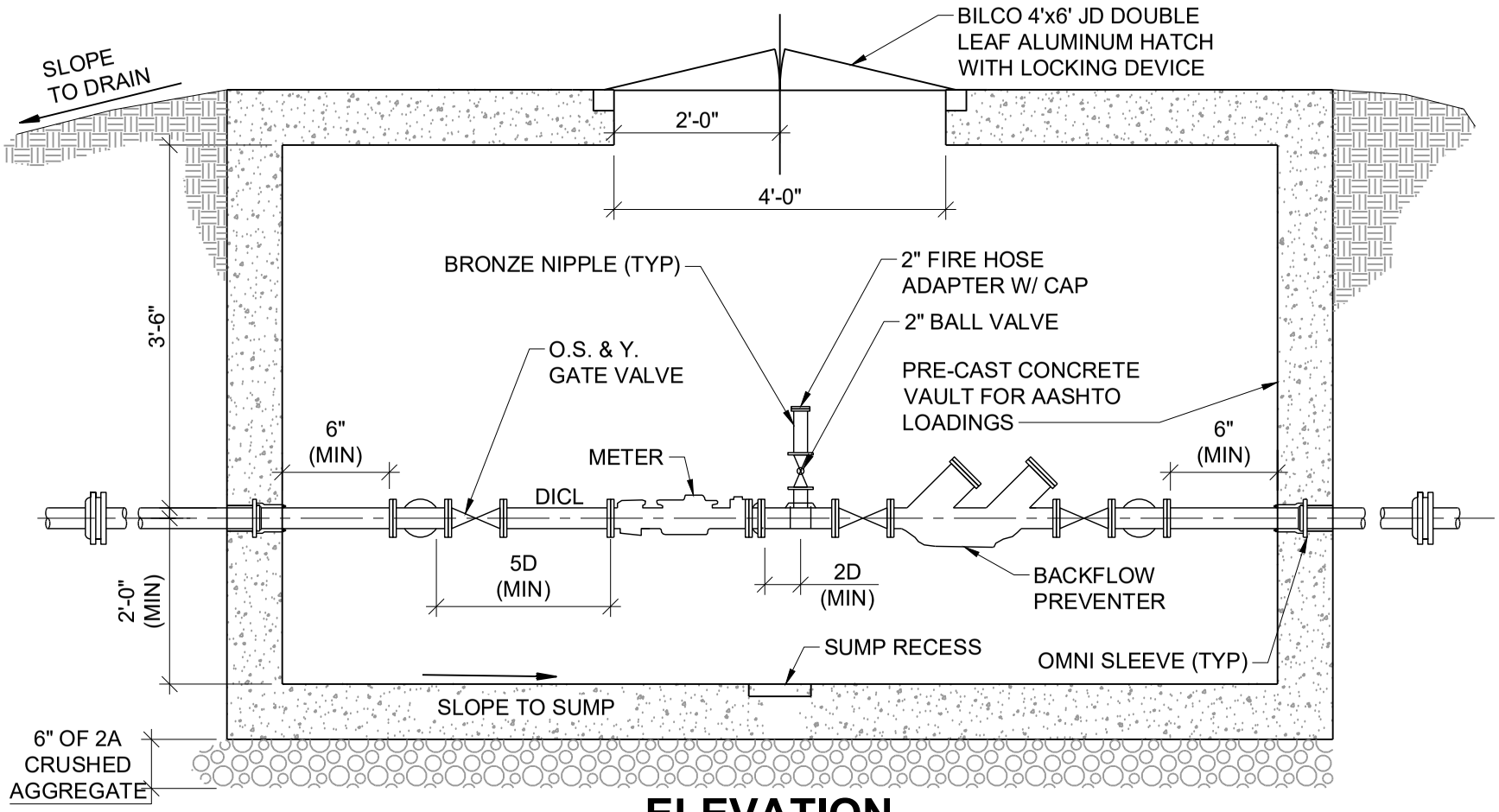
SCALE: NONE

SCALE: AS NOTED
PROJECT NO. 4673.030
DRAWING NO. ECCDT014
DATE: 09/19/25
PREPARED BY: ARA
CHECKED BY: AGS
APPROVED BY: AGS

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TYPICAL METER PIT
FOR LARGE METERS

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ELEVATION

NOTES:

1. MINIMUM DIMENSIONS SHOWN. DIMENSIONS WILL VARY WITH METER AND PIPE SIZE.
2. VAULT AND HATCH SHALL BE DESIGNED FOR H-20 WHEEL LOADING IN TRAVELED AREAS.
3. ONLY A DOUBLE CHECK VALVE ASSEMBLY BACKFLOW PREVENTER CAN BE INSTALLED IN THE METER PIT. IF A REDUCED PRESSURE ZONE BACKFLOW PREVENTER IS REQUIRED IT MUST BE INSTALLED IN A STRUCTURE ABOVE GRADE PROVIDED WITH ADEQUATE SPACE TO FACILITATE MAINTENANCE AND TESTING AND MUST BE PROTECTED FROM FREEZING.
4. PREVENT FLOTATION WITH GROUND WATER LEVEL AT FINISHED GROUND SURFACE BY DEAD WEIGHT OF STRUCTURE ONLY.
5. BYPASS PIPING IS RECOMMENDED, BUT MAY BE OMITTED AT THE DISCRETION OF THE AUTHORITY.
7. PROVIDE 2" TEST TEE WITH 2" BALL VALVE AND 2" FIRE HOSE ADAPTER W/CAP AFTER THE FLOW METER IN ACCORDANCE WITH METER MANUFACTURER'S REQUIREMENTS.

1

TYPICAL METER PIT FOR LARGE METERS

SCALE: NONE

SCALE: AS NOTED
PROJECT NO. 4673.030
DRAWING NO. ECCDT015
DATE: 09/19/25
PREPARED BY: ARA
CHECKED BY: AGS
APPROVED BY: AGS

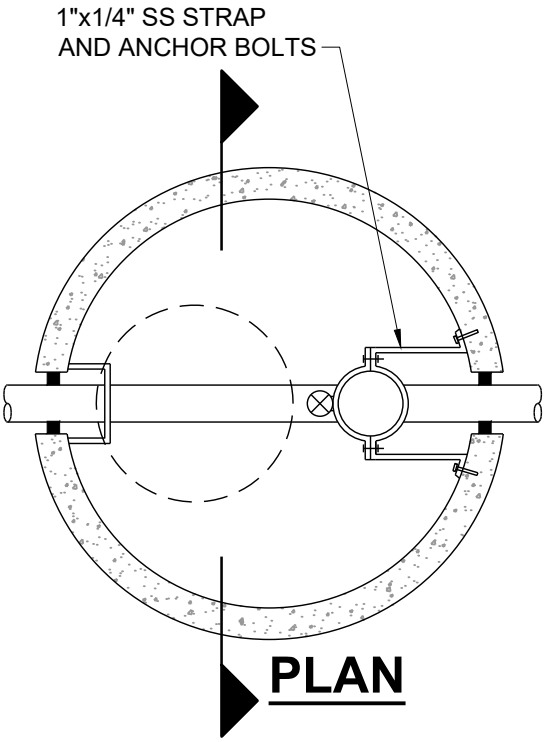
EAST COCALICO TOWNSHIP AUTHORITY

TYPICAL METER PIT FOR LARGE METERS

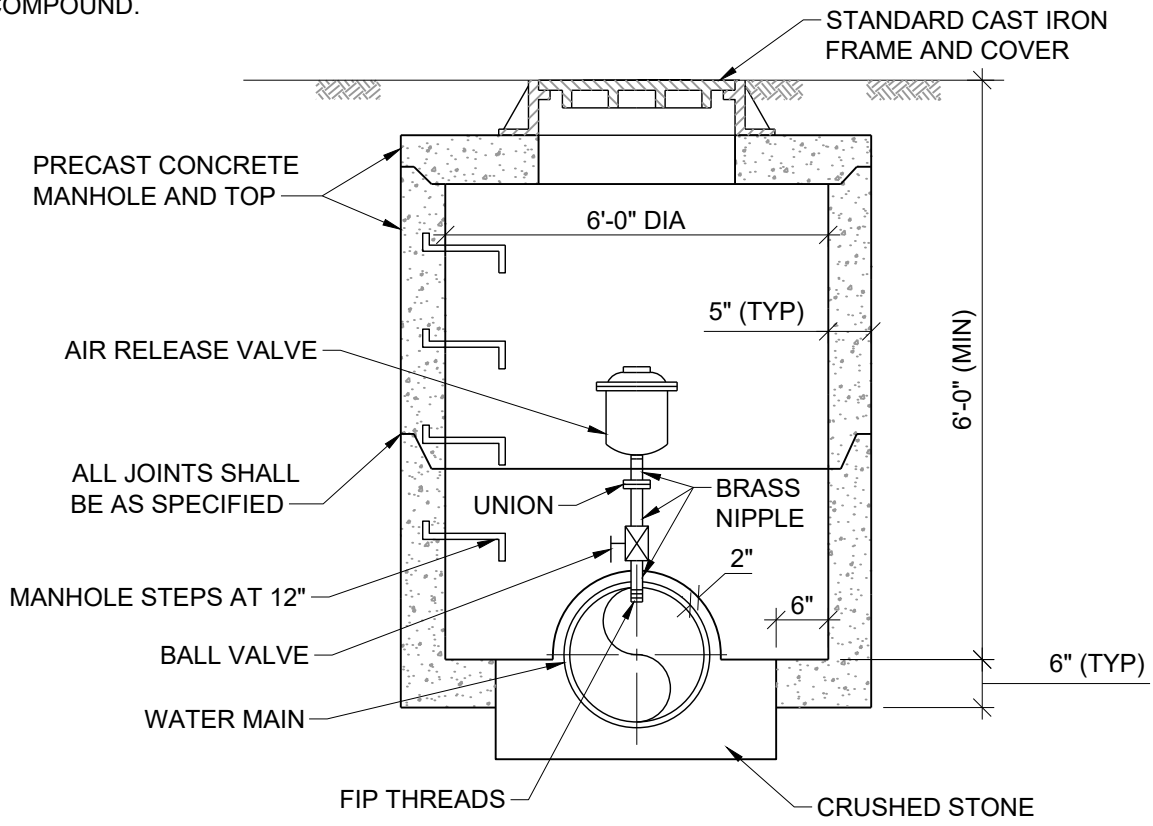
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NOTES:

1. ALL PRECAST REINFORCED CONCRETE MANHOLE SECTIONS SHALL COMPLY WITH ASTM C-478.
2. CEMENT SHALL BE TYPE II OR III, AIR ENTRAINED, WITH f'c=3,000 PSI AT 28 DAYS.
3. REINFORCEMENT SHALL BE GRADE 60 PER ASTM A-615.
4. 24" DIA. CAST IRON FRAME AND COVER PER ASTM 4-48, CLASS 30, FOR H-20 LOADING
5. CAST IRON FRAME TO BE BOLTED TO MANHOLE WITH 5/8" ANCHOR BOLTS.
6. CASTING AND GRADE RINGS TO BE SEALED TO MANHOLE WITH PREFORMED PLASTIC SEALING COMPOUND.
7. ALL JIONTS SHALL BE SEALED WITH PREFORMED PLASTIC SEALING COMPOUND.



PLAN



SECTION

1 AIR RELEASE VALVE MANHOLE

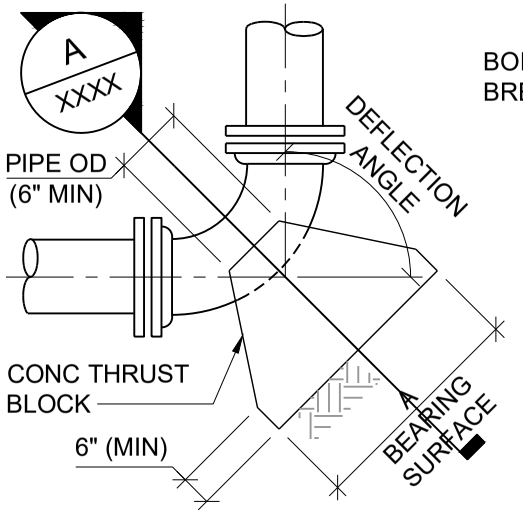
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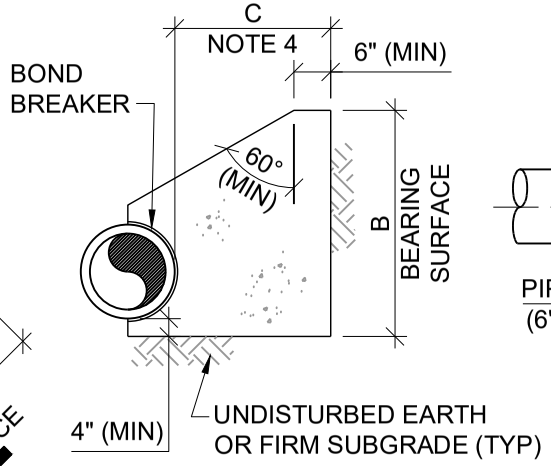
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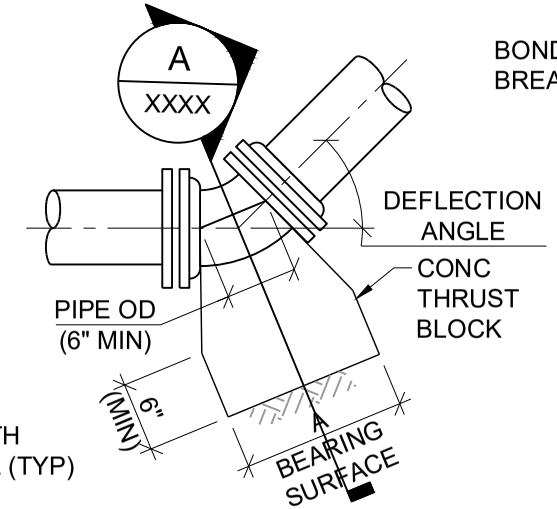
EAST COCALICO TOWNSHIP AUTHORITY

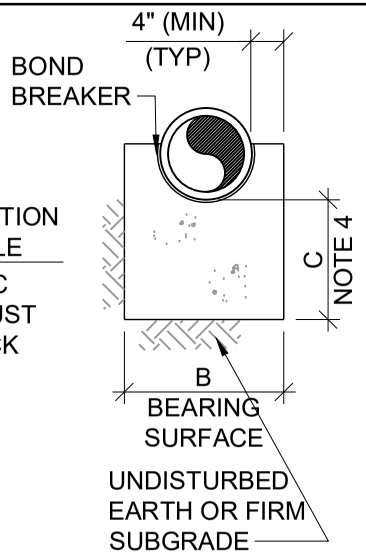
AIR RELEASE VALVE MANHOLE

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT016
APPROVED BY: AGS	









PLAN VIEW

SECTION

DETAIL FOR HORIZONTAL BENDS

ELEVATION

SECTION

DETAIL FOR LOWER VERTICAL BENDS

NOMINAL PIPE SIZE (INCHES)	MAXIMUM PIPE OD (INCHES)	REQUIRED BEARING AREA (SQ FT)					
		90 DEG	60 DEG	45 DEG	30 DEG	22.50 DEG	11.25 DEG
4	4.80	2.9	2.0	1.6	1.1	0.8	0.4
8	9.05	10	7	6	4	3	1.4
12	13.20	22	15	12	8	6	3
18	19.50	48	34	26	17	13	7
20	21.60	58	41	32	21	16	8
24	25.80	83	59	45	30	23	12

THRUST BLOCKS FOR HORIZONTAL BENDS AND LOWER VERTICAL BENDS

NOTES:

1. **MAXIMUM TEST PRESSURE = 1.5 x 150 PSI**
2. **MINIMUM ALLOWABLE SOIL BEARING PRESSURE = 2000 PSF**
3. **BEARING AREA = A x B**
4. **C SHALL BE GREATER THAN A/2 AND B/2**

THRUST BLOCK FOR HORIZONTAL BENDS AND LOWER VERTICAL BENDS

1

SCALE: NONE

SCALE: AS NOTED
PROJECT NO. 4673.030
DRAWING NO. ECCDT017
DATE: 09/19/25
PREPARED BY: ARA
CHECKED BY: AGS
APPROVED BY: AGS

EAST COCALICO TOWNSHIP AUTHORITY

THRUST BLOCK FOR HORIZONTAL BENDS AND LOWER VERTICAL BENDS

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MINIMUM RESTRAINED PIPE LENGTH (FT) FOR VERTICAL BENDS (WITHOUT POLYETHYLENE ENCASEMENT)			
DIAMETER (IN)	VERTICAL BEND ANGLE (DEGREES)		
	45	22½	11¼
6	20	1	5
8	26	12	6
10	32	15	8
12	37	18	9
14	43	21	10
16	48	23	12
18	54	26	13
20	59	28	14
24	70	34	17

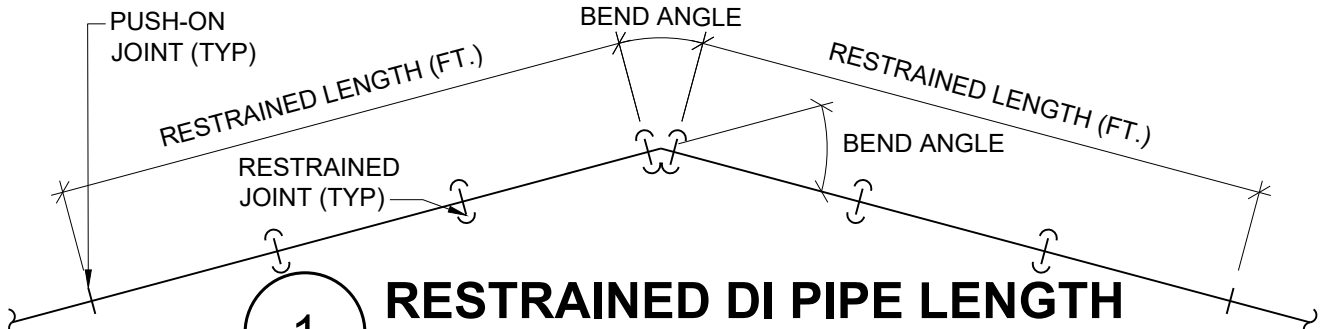
MINIMUM RESTRAINED PIPE LENGTH (FT) FOR HORIZONTAL BENDS (WITHOUT POLYETHYLENE ENCASEMENT)				
DIAMETER (IN)	HORIZONTAL BEND ANGLE (DEGREES)			
	90	45	22½	11¼
6	15	6	3	1
8	19	8	4	2
10	23	10	5	2
12	28	11	5	3
14	32	13	6	3
16	36	15	7	4
18	40	16	8	4
20	43	18	9	4
24	51	21	10	5

MINIMUM RESTRAINED PIPE LENGTH (FT) FOR VERTICAL BENDS (WITH POLYETHYLENE ENCASEMENT)			
DIAMETER (IN)	VERTICAL BEND ANGLE (DEGREES)		
	45	22½	11¼
6	29	14	7
8	37	18	9
10	45	22	11
12	53	26	13
14	61	29	15
16	69	33	16
18	77	37	18
20	85	41	20
24	100	48	24

MINIMUM RESTRAINED PIPE LENGTH (FT) FOR HORIZONTAL BENDS (WITH POLYETHYLENE ENCASEMENT)				
DIAMETER (IN)	HORIZONTAL BEND ANGLE (DEGREES)			
	90	45	22½	11¼
6	16	7	3	2
8	21	9	4	2
10	26	11	5	3
12	30	13	6	3
14	35	14	7	3
16	39	16	8	4
18	44	18	9	4
20	48	20	9	5
24	56	23	11	6

NOTES:

1. **DESIGN PRESSURE = 150 PSI**
2. **DEPTH OF COVER = 4 FEET**
3. **SAFETY FACTOR =1.5**
4. **SOIL TYPE = COHESIVE ANGULAR**
5. **SOIL INTERNAL FRICTION ANGLE = 20 DEGREES**
6. **SOIL COHESION = 200 PSF**
7. **SOIL DENSITY =90 PCF**



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RESTRAINED DI PIPE LENGTH

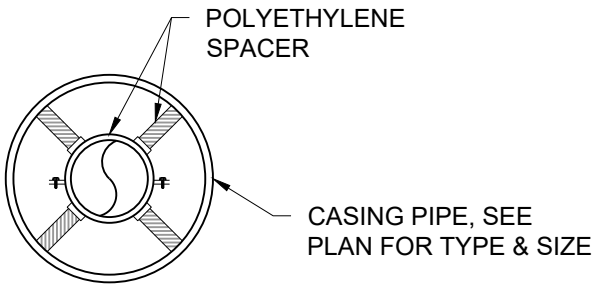
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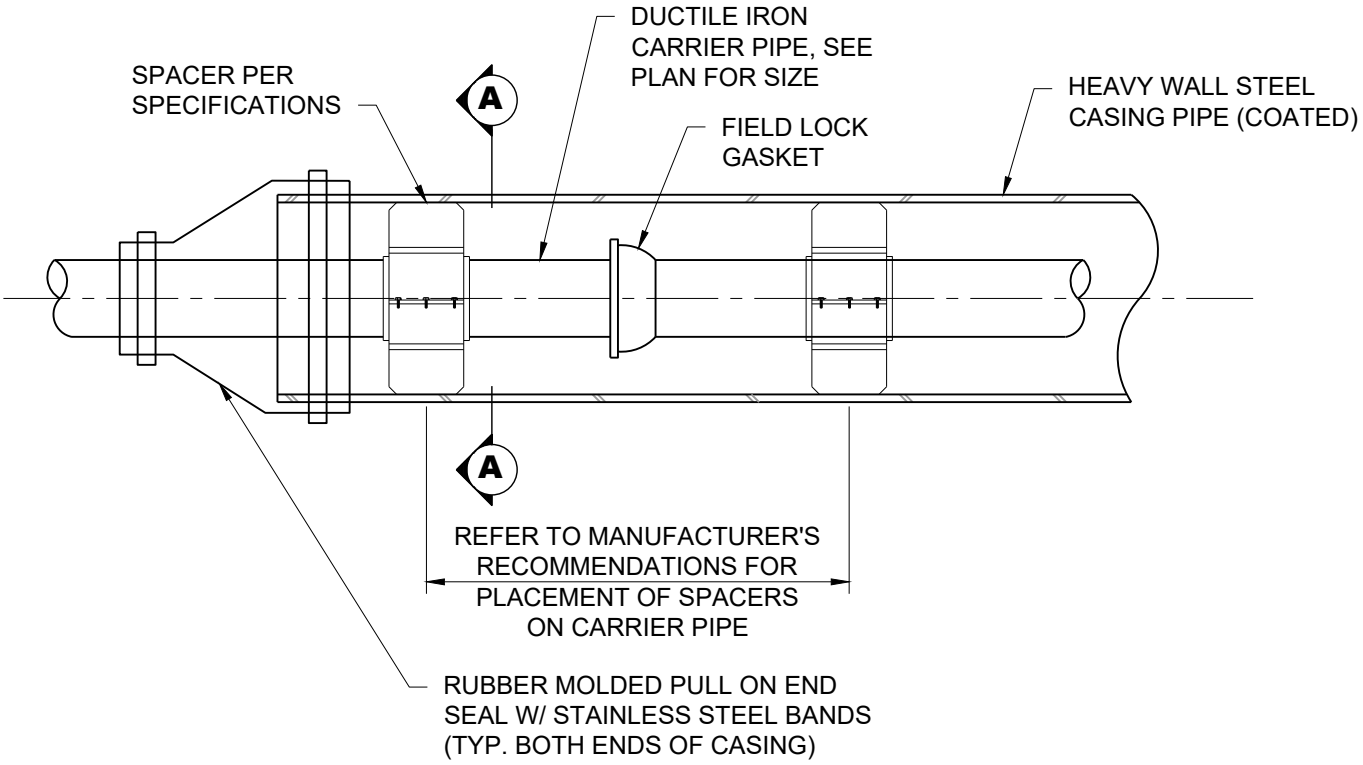
EAST COCALICO TOWNSHIP AUTHORITY

RESTRAINED DI PIPE LENGTH

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT018
APPROVED BY: AGS	



SECTION A-A



NOTES:

1. **THE STEEL CASING PIPE SHALL HAVE A MINIMUM YIELD STRENGTH OF 35,000 PSI, HAVE A THICKNESS AS REQUIRED BUT NOT LESS THAN 0.375 INCHES, AND CONFIRM TO AWWA C200 AND ASTM A53.**
2. **CASING EXTERIOR SHALL BE PAINTED WITH BITUMASTIC COATING.**
3. **PIPE CRADLES OR ISOLATORS SHALL BE FIELD ASSEMBLED AS SHOWN ON THE DETAIL DRAWINGS, APS CASING SPACERS (MODEL SSI), CCI PIPING SYSTEMS CASING SPACERS, OR APPROVED EQUAL. MANUFACTURED SPACERS SHALL BE MADE OF STAINLESS STEEL.**
4. **CASING END SEALS SHALL BE APS BRAND (MODEL AC) OR CCI PIPING SYSTEMS RUBBER END SEALS, OR APPROVED EQUAL.**
5. **MINIMUM CASING DIAMETER SHALL BE IN ACCORDANCE WITH PENNDOT OR AMTRAK REQUIREMENTS AS APPLICABLE.**

1

WATER MAIN PIPE CASING

SCALE: NONE

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EAST COCALICO TOWNSHIP AUTHORITY

WATER MAIN PIPE CASING

DATE: 09/19/25	SCALE: AS NOTED
PREPARED BY: ARA	PROJECT NO. 4673.030
CHECKED BY: AGS	DRAWING NO. ECCDT019
APPROVED BY: AGS	