FALMOUTH DEPARTMENT OF PUBLIC WORKS

WATER DIVISION - APPLICATION REQUIREMENTS AND CONSTRUCTION STANDARDS

WASTEWATERWATER DIVISION -

APPLICATION REQUIREMENTS AND CONSTRUCTION STANDARDS

ENGINEERING DIVISION - CONSTRUCTION STANDARDS

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APPLICATION REQUIREMENTS AND CONSTRUCTION STANDARDS

FALMOUTH DEPARTMENT OF PUBLIC WORKS

WATER DIVISION

TOWN OF FALMOUTH
DEPARTMENT OF PUBLIC WORKS – WATER DIVISION
APPLICATION AND CONSTRUCTION STANDARDS

SECTION 1 – GENERAL

1.1 INTRODUCTION

The Town of Falmouth is committed to the protection and preservation of its citizens' interests, both individually and as a community. These Standard Plans and Specifications have therefore been adopted as an acknowledgement of this commitment to the public good. It is the intent of these specifications to require that only the highest standards of construction be permitted in order to ensure the continued dependability, quality, and performance of publicly owned facilities.

1.2 REQUIREMENTS – GENERAL

These Application Requirements, Specifications, and Standard Details, as approved by the Town of Falmouth, are considered the minimum acceptable standards to be followed governing planning, design, materials, and construction and installation of public water distribution and service systems. In addition to the specifications contained herein, all installations shall conform to:

a) Currently acceptable engineering standards for design and construction of water distribution system.
b) Current American Waterworks Association (AWWA) standards for materials and construction practices;
c) Current Massachusetts Department of Environmental Protection (MassDEP) regulations for the construction and installation of drinking water facilities;
d) Current requirements of the National Board of Fire Underwriters (NBFU);
e) All Massachusetts General Laws;
f) United States Environmental Protection Agency (USEPA) regulations;
g) Current Board of Health and Plumbing Code requirements for the Town of Falmouth, County of Barnstable, and the Commonwealth of Massachusetts
h) Current Town of Falmouth Planning Board rules and regulations;
i) Acceptable Town of Falmouth Department of Public Works standards.

Nothing contained herein shall be construed as limiting the Town of Falmouth Department of Public Works to approve, reject, or modify any plans or proposals for the construction and installation of water distribution system and service components. The Town of Falmouth Department of Public Works further reserves the right to order any such field changes as should be required during the construction phase of any such project. Non-compliance with the Construction Standards allows the Town of Falmouth Department of Public Works to exercise its right to deny service to non-compliant main and service installations.

1.3 SUBMITTAL OF PLANS

The Town of Falmouth DPW Water Division requires plan submittals for water distribution system and water service projects. The plan submittal standards are contained herein. Plan submittals shall be

consistent with the requirements set forth in these specifications for each specific type of project. Plan submittals shall comply with the submission deadlines, submittal location, number of copies, certification, and plan scale requirements.

SECTION 2 – WATER DIVISION APPLICATION AND CONSTRUCTION STANDARDS

2.1 DEFINITIONS

1. APPLICATION FOR WATER SERVICE: The application for water from the Town's Water Distribution System in the form provided by the Town.
2. BACKFLOW: The flow of water, other liquids, or the mixture of water with other liquids from a source that is not Potable Water into a Potable Water pipe, prevention of which is by a Backflow Prevention Device.
3. BACKFLOW PREVENTION DEVICE: A Backflow Prevention Device (or approved Backflow Prevention Device) prevents the Backflow of water from the Premises into the Water Distribution System as required in 310 CMR 22.22 and Town Code Section 223 Water, Article III Cross-Connection Control.
4. CONTROL VALVE: A Control Valve is a water flow Control Valve located inside the foundation of a building, between the end of the Service Pipe and the water Meter. The Control Valve is the property and maintenance responsibility of the home or business owner.
5. CORPORATION STOP VALVE: A water service shutoff valve located at a street water supply main. This valve cannot be accessed or operated from the ground surface. The Corporation Stop Valve is the property of and maintenance responsibility of the Town.
6. CROSS CONNECTION: Any actual or potential connection between a distribution pipe of Potable Water from a public Water Distribution System and any water source, which is not of Potable Water, or any pipe, which is not a Potable Water pipe. (See 310 CMR 22.22and Town Code Section 223 Water, Article II Cross-Connection Control)
7. CURB STOP: A Curb Stop is an in-ground structure at the property line, which contains a service valve and is the connecting point between the Service Line and Service Pipe. The Curb Stop and service valve are the property of and maintenance responsibility of the Town.
8. CUSTOMER: Any person, partnership, firm, corporation, trust (real estate or other body) or organization of any type in which the owner(s) is supplied with water by the Water Distribution System. The Customer is normally the record owner of the realty being supplied with water and responsible for the account.
9. CUSTOMER SERVICE PIPE: A Customer Service Pipe is a pipe running from the Curb Stop to a Meter Valve, which valve is located immediately inside the structural wall of the Premises or the Ball Valve which is located immediately inside the Meter Pit (see W-7). The Customer Service Pipe is the property of and maintenance responsibility of the Customer.
10. LIEN: Shall mean the statuary Lien a municipality may impose pursuant to Massachusetts General Laws Chapter 40, Section 42A.
11. METER: A device for measuring and recording the flow of water from the municipal supply to the Premises.
12. METER READING DEVICE: A device on the inside or outside of a building to enable routine Meter readings without internal access to the Premises. The Town shall maintain and replace such devices at its expense.

13. POTABLE WATER: Water from any source, which is approved by the Massachusetts Department of Environmental Protection (DEP) for human consumption.
14. PREMISES: The commercial or residential property being serviced with water from the Water Distribution System.
15. PUBLIC OR PRIVATE WAY: The Town-owned or privately-owned road or street open to the public as a through-way.
16. RATES AND FEES SCHEDULE: Water Division current water usage rates, standard fees and penalties as approved by the Select Board.
17. RULES AND REGULATIONS: Town of Falmouth Department of Public Works Water Division Rules and Regulations.
18. TOWN: The Town of Falmouth, Massachusetts.
19. USER: Entity that owns the property where water is provided by the DPW Water Division and/or the property occupant uses potable water provided by the DPW Water Division.
20. UTILITY CONTRACTOR: A contractor licensed to perform work in the Town of Falmouth as defined in the Rules and Specifications Regulating Street Excavations. The Utility Contractor's license is issued by the Town of Falmouth Department of Public Works, Engineering Division.
21. WATER DISTRIBUTION SYSTEM: Network of water supply mains, booster pumps and storage tanks, used to deliver water to the Customer.
22. WATER DIVISION: The Water Division of the Town of Falmouth Department of Public Works
23. WATER MAIN: A Water Main is the pipe to which a Service Line is connected to supply water to the Premises.
24. WATER MAIN EXTENSION: A water main extension is the installation of additional water main to service proposed industrial, commercial, or building development projects.
25. WATER SERVICE LINE: A Service Line is a pipe that connects the water supply main to the Curb Stop. The Service Line is the property of and responsibility of the Town.

2.2 WATER SERVICES – TYPES

2.2.1 WATER SERVICE TYPE CLASSIFICATION

The Town of Falmouth Zoning Bylaw includes definitions of structure use. The DPW - Water Division Water Service Type will be determined using the Zoning Bylaw definitions.

Dwelling – A building or portion thereof used exclusively for residential occupancy (living, sleeping, cooking, and eating) including one-family, two-family, and multifamily dwellings. This does not include commercial accommodations used, or intended for use, by single or multiple families, as the case may be.

Single-family Dwelling – A detached dwelling designed for and occupied by a single family, but not including a mobile home.

Two-family Dwelling – A detached dwelling designed for and occupied by two separate family units, but not including a mobile home. A two-family dwelling is designed and constructed so as to contain 2 suites of one or more rooms, each suite provided with independent individual cooking and other facilities for independent housekeeping, used or intended to be used for the non-transient housing of 2 family units.

Semi-detached Dwelling – Two one-family dwellings built together at the same time and separated by a fireproof division with no openings. For the purpose of determining the water service type classification, each one-family dwelling unit shall be considered a separate single family water service.

Multi-family Dwelling – A building designed and constructed so as to contain 3 or more suites of one or more rooms, each suite provided with individual cooking and other facilities for independent housekeeping, used or intended to be used for the non-transient housing of 3 or more family units.

Mixed Use Development – A development containing a mix of residential uses and non-residential uses, including, without limitation, commercial, institutional, or other uses, as well as modifications to existing buildings.

Multiple Use – Any combination of uses allowed as a matter-of-right or by special permit on a single lot which may require separate permits for construction, occupancy, business certification, license to sell food or alcohol, or other municipal approval.

Non-residential use – Any use, including but not limited to industrial and/or commercial use, that does not include residential use and does not meet the multiple use definition.

2.2.1 SINGLE FAMILY DWELLING, TWO-FAMILY DWELLING, AND SEMI-DETACHED DWELLING WATER SERVICES

Individual water services will be extended to each single-family, two-family dwelling, or semi-detached dwelling or lot. The water service size shall be one-inch or two-inch diameter piping from the main to the curb. The water service pipe material and fittings shall comply with the DPW pipe and fitting specifications. When the total water service length exceeds two hundred (200) feet, as measured from the water main to the building, a two-inch diameter water main tap and service will be required from the main to the curb stop.

Each unit in a two-family dwelling and in a semi-detached dwelling shall require a separate water service and water meter installed within the unit being supplied.

2.2.2 MULTI-FAMILY DWELLING WATER SERVICE

Multi-family dwellings water services must be designed by a Massachusetts Registered Professional Engineer and stamped plans and calculations prepared by a Massachusetts Registered Professional

Engineer submitted for Water Division approval. The water service design must include, at a minimum, each unit's proposed number of bedrooms, projected flow volumes for each unit using design flow volumes provided in the current 310 CMR 15.203 System Sewage Flow Design Criteria or subsequent revisions, the total flow volume for the non-residential or mixed-use structure, the proposed water service pipe size and material from the water main to the curb stop and from the curb stop to the meter. The water service pipe material and fittings shall comply with the DPW pipe and fitting specifications. Multifamily dwelling units shall require a separate water meter installed within the unit being supplied. The water service design must include backflow prevention measures that comply with 310 CMR 22.22 and the Town Code Section 223 Water, Article III Cross-Connection Control.

2.2.3 NON-RESIDENTIAL, AND MIXED-USE WATER SERVICES

Non-residential and mixed-use water services must be designed by a Massachusetts Registered Professional Engineer and stamped plans and calculations prepared by a Massachusetts Registered Professional Engineer submitted for Water Division approval. The water service design must include, at a minimum, each non-residential and mixed-use unit's proposed use, projected flow volumes for each unit using design flow volumes provided in the current 310 CMR 15.203 System Sewage Flow Design Criteria or subsequent revisions, the total flow volume for the non-residential or mixed-use structure, the proposed water service pipe from the water main to the curb stop. The water service pipe material and fittings shall comply with the DPW pipe and fitting specifications. The water service design must include backflow prevention measures that comply with 310 CMR 22.22 and the Town Code Section 223 Water, Article III Cross-Connection Control.

2.2.4 SINGLE FAMILY DWELLING, TWO-FAMILY DWELLING, AND SEMI-DETACHED DWELLING WATER SERVICE REQUIRED UPGRADES

Existing single-family dwelling, two-family dwelling, and semi-detached dwelling water services are required to be upgraded to meet the current DPW – Water Division water service standards when the any of the following conditions occur:

a) The existing water service is abandoned, and a new water service is required, or;
b) The existing single-family, two-family dwelling, or semi-detached dwelling is razed and replaced by a new single-family or two-family dwelling, or;
c) There is a change in occupancy (for example, an increase in the number of bedrooms) that results in an increase in the design water demand of more than 133 percent when compared to the existing water service design water demand. Design water demand is calculated flow (gallons per day) based on Title 5 factors (310 CMR 15.203) for the existing and proposed use including a change in the number of bedrooms serviced with the existing water service, or;
d) There is a change in water service type classification.

2.2.5 MULTI-FAMILY DWELLINGS, NON-RESIDENTIAL USE, AND MIXED-USE WATER SERVICE REQUIRED UPGRADES

Existing multi-family dwellings, non-residential, and mixed-use water services are required to be upgraded to meet the current DPW – Water Division water service standards when the any of the following conditions occur:

a) The existing water service is abandoned, and a new water service is required, or;
b) The existing multi-family dwellings, non-residential use, and mixed-use is razed and replaced by a new multi-family dwelling, non-residential use, and mixed-use facility, or;
c) There is a change in use that results in an increase in the design water demand of more than 133 percent when compared to the existing water service design water demand. Design water demand is calculated flow (gallons per day) based on Title 5 factors (310 CMR 15.203) for the existing and proposed use including a change in the number of bedrooms serviced with the existing water service, or;
d) There is a change in water service type classification.

If, in the opinion of the DPW Water Division, the upgrade requires installation of an approved backflow preventer(s) on the building side of a non-residential use or mixed-use service meter for the safety of the water system, such approved device(s) shall be immediately installed at the expense of the User after due notice in writing has been given to the User by the DPW Water Division. Said device(s) shall be installed and tested in accordance with the drinking water regulations of Massachusetts, 310 CMR 22.22. All tests performed by the DPW Water Division shall be charged pursuant to the approved fee structure.

2.3 WATER SERVICE APPLICATION

2.3.1 GENERAL PROVISIONS - WATER SERVICE APPLICATION AND FEES

All applications for the introduction of Town water to Premises shall be made in writing on an Application for Water Service provided at the DPW Building, 416 Gifford Street, Falmouth, MA 02540 and on-line at the address provided at the end of this section. Only the User, or their duly authorized agent, may apply for Town water. Each water service shall require an individual application. Approval of the application by the Water Division shall create a contract between the Water Division and the Customer obligating the User to pay the Town of Falmouth its established rates and fees and to comply with the Rules and Regulations. All applicants shall pay an application fee in accordance with the current Rates and Fees Schedule.

A Water Service application can be obtained at:
https://www.falmouthma.gov/DocumentCenter/View/10559/Water-Service-Application

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The application must be completed by the Customer, or their duly authorized agent, and signed by the Customer.

Water Division fees including water service application fees can be found at: https://www.falmouthma.gov/315/Fees.

2.3.2 WATER SERVICE APPLICATION PLAN REQUIREMENTS

All of the application's required information must be provided by the user along with a plan that meets the following requirements:

a) Plan drawn to scale on an appropriately sized sheet with an Engineering scale no larger than 1" = 40' to include the following:
b) Single Family Dwelling, Two-Family Dwelling, and Semi-Detached Dwelling Service Applications
    1) House and any other existing structures
    2) Driveway and its construction material
    3) Water Service Line from the water main to the curb stop
    4) Customer Service Pipe from the curb stop to the point where it enters the house
    5) Building sewer or septic tank and leaching field for properties with private wastewater systems.
    6) Building sewer, pump, and chamber (if applicable), and building sewer connection to sewer main.
    7) All underground utilities including, but not limited to, natural gas, electric, cable, stormwater drainage, that service the property shown on the property and their connections from abutting streets or properties.
    8) Distance between the water service line, customer service pipe, and all underground utilities including, but not limited to, natural gas, electric, cable, stormwater drainage, must be indicated on the plan.
c) For multi-family dwellings, non-residential, and mixed-use service applications, in addition to the information required for Single Family Dwelling, Two-Family Dwelling, and Semi-Detached Dwelling service applications the following additional requirements apply:
    1) The required plan(s) must be stamped by a Massachusetts registered professional engineer. The plans must include construction details that conform with the DPW Water Division Construction Details and Material Requirements.
    2) The plans must state the proposed use for each unit included in the proposed development.
    3) Calculations showing the projected average daily water usage in units and peak daily flows in units per minute must be provided. Design water demand is calculated flow (gallons per day) based on Title 5 factors (310 CMR 15.203) for the proposed use(s).
    4) Recommended water service line, customer service pipe, and meter size stamped by a Massachusetts registered professional engineer must be provided. The water service pipe material and fittings shall comply with the DPW pipe and fitting specifications.
d) For applications that include a fire protection service, the following additional requirements apply:

1) The required plan(s) must be stamped by a Massachusetts registered professional engineer.
2) Calculations showing the projected fire service water usage in units per minute and recommended fire service pipe and meter size stamped by a Massachusetts registered professional engineer must be provided.
3) The plans are required to show a separate fire service tap from the Town's water main and a separate fire service to the building(s).
4) Fire services must be cement lined ductile iron pipe.
5) A separate meter for the fire service is required.
6) The plans must state the proposed use for each unit included in the proposed development.
7) Calculations showing the projected fire service water demand in units and recommended water service pipe and meter size stamped by a Massachusetts registered professional engineer must be provided.

e) If, in the opinion of the DPW Water Division, the installation of an approved backflow preventer(s) on the building side of any water service meter is considered necessary for the safety of the water system, such approved device(s) shall be immediately installed at the expense of the User after due notice in writing has been given to the User by the DPW Water Division. Said device(s) shall be installed and tested in accordance with the drinking water regulations of Massachusetts, 310 CMR 22.22. All tests performed by the DPW Water Division shall be charged pursuant to the approved fee structure. For applications that include backflow prevention, the following additional requirements apply:
   1) Plans and specifications that comply with the MassDEP Cross Connection Control Program Regulations - 310 CMR 22.22 requirements and the Town Code Section 223 Water, Article II Cross-Connection Control requirements
   2) Plans and specifications shall show the backflow device location, piping detail showing the water service piping and backflow prevention device, and manufacturer specifications for the backflow devices.
   3) The required plan(s) must be stamped by a Massachusetts registered professional engineer.
   4) All other required approvals must be obtained prior to installing the backflow prevention device.

2.3.3 WATER SERVICE APPLICATION SUBMITTAL AND REVIEW

The application, required supporting documents, and the required fee must be submitted to the DPW at 416 Gifford Street, Falmouth, MA. The required fees can be found at: https://www.falmouthma.gov/315/Fees.

The Falmouth Water Department will review the application when all of the Department's Water Service Application required documentation has been submitted. The Water Department will review the application, request any additional information it requires to review the application, and issue an approval when all the Water Department service requirements have been met. Water Division approvals may include additional conditions at the Department's discretion.

2.4 WATER SERVICE SEPARATION FROM OTHER UTILITIES

The following water service piping separation distances from other utilities are required for all water service installations.

a) The following separation distances between the water service piping and other utility piping must be maintained :
   1) Sanitary sewer (domestic or private) – Ten (10) feet horizontal and eighteen (18) inches vertical
   2) All other utilities – Five (5) feet horizontal and one (1) foot vertical
b) When any Water Service Line is located at a horizontal distance of 10 feet or less from any private individual sewage disposal system component and/or any public wastewater system component it must be installed so that the water main invert is a minimum vertical distance of eighteen (18) inches above the wastewater piping crown. If the minimum 10 feet horizontal separation cannot be maintained and/or the water service cannot be installed a minimum vertical distance of 18-inches above the wastewater piping crown, then the wastewater system piping shall be encased in control density fill for a distance of ten feet on each side of the pipe length where the separation from the water service requirements cannot be met.
c) Water service and wastewater piping crossings shall be installed in accordance with the crossing detail provided in the Utility Standards.
d) All water service installations where the water service and other utility separation distances cannot be met and/or the water service crosses other utilities must be inspected by a DPW representative prior to backfilling. It is the Owner's responsibility or, if designated by the Owner, their water service installer's responsibility to schedule an inspection by the DPW Water Division.

2.5 Water Service Material Requirements

2.5.1 WATER SERVICE MATERIAL REQUIREMENTS

The following requirements apply to all water services installed, repaired, replaced, or upgraded after the effective date of these regulations.

a) Single-family dwelling, two-family dwelling Water Service Lines:
   1) The water service Line shall be one-inch or two-inch diameter EndoPure Polyethylene Tubing (Class 200) or equivalent (see Water Division Material requirements). The Water Division shall approve any "or equivalent" material prior to installation.
   2) A two-inch diameter water service is required when the service line length is equal to or greater than 200 feet.
   3) The water service Line size designed by a Massachusetts Registered Professional Engineer in accordance with Section 2.3.2.c. Pipe and fittings shall comply with the Water Division Material requirements.
b) MULTI-FAMILY, NON-RESIDENTIAL, and MIXED-USE WATER SERVICES
   1) For MULTI-FAMILY, NON-RESIDENTIAL, and MIXED water services the water service Line size shall be designed by a Massachusetts Registered Professional Engineer in accordance with Section 2.3.2.c. Pipe and fittings shall comply with the Water Division Material requirements.

c) Water Meters:
   1) Water Meter shall be installed inside the building or in a heated utility structure.
   2) Water Meters shall be furnished by the Town at the owner's cost per the fee schedule.
   3) Meter Pits are required when Service Lines are over 400'. As an alternative an above grade, heated, Hot Box or equivalent enclosure is permissible as an alternative to a meter pit.

2.6 Water Main Extension Requirements

2.6.1 Need for Water Main Extension

a) Residential, Non-residential, and Mixed-Use building development proposals shall be reviewed by the DPW - Water Division Superintendent or his representative on an individual basis. These development proposals will be required to install or improve water mains and fire hydrants with the property owner or developer responsible for the water main and service connection full cost.

b) All water main extensions shall be run to the farthest point of the property line, except as otherwise authorized. Water main extensions shall be looped wherever possible. Non-looped water main extensions shall have a fire hydrant installed at the farthest point in the water main extension.

2.6.2 Application for Water Main Extension

a) An application for water main installation shall be completed by the developer or owner and submitted to the DPW – Water Division for review and approval before any construction can proceed.

b) All applications must contain the complete information requested. This information includes:

   1) An engineered construction plan prepared and stamped by a Massachusetts Registered Professional Engineer with an appropriate scale (no larger than 1 inch = 40 feet showing the proposed main extension and potential water service locations.

   2) Water main details consistent with the DPW – Water Division standard details.

c) Payment of all required review fees, including the Water Main Extension Fee, service installation fees, and any other fees established shall be made before construction can commence.

2.6.3 Cost for Water Main Extension

a) In all areas not serviced by the Falmouth Water System on the date of adoption of these Utility Standards, the developer or owner of a property shall be responsible for all costs with regard to water main design, approval, installation(s), and connection(s) to the existing system.

2.6.4 Water Main Extension Easements

a) The Town shall provide easement documents to be completed by the applicant at the time the application is submitted.

b) The Town and the applicant will enter into an easement agreement for the water main extension.

c) The Town's Select Board must approve the easement agreement.
d) The applicant must file the Select Board approved easement documents in the Barnstable County Registry of Deeds and provide a copy of the filing prior to the water main extension being approved by the DPW - Water Division.
e) Upon connection to the Falmouth Water System title and ownership of the water main will be transferred to the Falmouth Water System by easement and the Falmouth Water System will service, maintain, and repair the water main and appurtenances.

2.6.5 Water Main Extension Materials and Installation

a) All materials to be used in conjunction with any and all water mains and installations of the same shall be in strict accordance with DPW - Water Division material specifications available by the Falmouth DPW.
b) All construction shall be completed in strict accordance with the DPW – Water Division construction standards and details.

2.6.6 Water Main Extension Inspection

a) The DPW – Water Division or its representative must inspect each water main extension and service installation prior to being backfilled. The DPW will not bring any main extension on-line that has not been inspected. The DPW – Water Division must be notified 5 business days in advance of the water main extension construction commencing.
b) The DPW – Water Division reserves the right to engage a third-party inspector to inspect the water main extension. The cost associated with the DPW – Water Division's use of a third-party inspector will be paid by the applicant prior to the water main extension application approval. The DPW – Water Division shall provide a copy of the third-party inspector's proposal to complete the inspection work for review.
c) Pressure and Leakage Testing - The installed pipe shall be pressure tested and leakage tested in accordance with the latest edition of the appropriate AWWA Standards. A copy of the pressure test results shall be provided to the DPW – Water Division.
d) Disinfection - All new, cleaned water mains shall be disinfected in accordance with ANSI/AWWA Standard C651 Disinfecting Water Mains. The specifications shall include detailed procedures for the adequate flushing, disinfection, and microbiological testing of all water mains. A copy of the laboratory test results shall be provided to the DPW – Water Division.
e) The DPW – Water Division will not turn the water on until the applicant has provided a copy of the pressure test results and the disinfection test to the department.

SECTION 3 – WATER DIVISION MATERIAL SPECIFICATIONS

3.1 DUCTILE IRON PIPE AND FITTINGS

3.1.1 DUCTILE IRON PIPE

a) Ductile Iron Pipe (Buried Mains and Services):
   1) For water services larger than two-inch diameter, water service pipe shall be Class 52 double cement-lined ductile iron.
   2) All water mains shall be Class 52 double cement-lined ductile iron pipe.
   3) All pipe shall meet the requirements of ANSI/AWWA C151/A21.51.
   4) Class: 52
   5) Joints: a. Mechanical meeting the requirements of ANSI/AWWA C111/A21.11. b. Push-on meeting the requirements of ANSI/AWWA C111/A21.11. U.S. Pipe's Push-on Joint TRIM TYTON or approved equal.
   6) Gaskets: Conform to ANSI/AWWA C111/A21.11.
   7) Field Locking Gaskets: Shall be Field-Lok 350 as manufactured by U.S. Pipe or approved equal. The gaskets shall be a boltless, integral restraining system and shall be rated for 350 psi in accordance with the performance requirements of ANSI/AWWA C111/A21.11
   8) Lining: Conforming to ANSI/AWWA C104/A21.4
   9) Thickness of cement-mortar lining: a. 1/8 inch for pipes 12 inches and smaller. b. 3/16 inch for pipe 14 inches and larger.
   10) Cement-mortar lining to be seal coated per AWWA C104. DUCTILE IRON PIPE AND FITTINGS 7305 02611-3
   11) Accessories: Pipe shall be provided with all necessary accessories to make-up the joint (glands, tee head bolts, hex nuts, etc.). A minimum of three brass wedges shall be supplied for every joint.
   12) Corrosion resistance: Zinc coated ductile iron piping meeting all specifications for the standard ductile iron piping shall be provided in areas where the pipe will be installed in groundwater.

3.1.2 DUCTILE IRON FITTINGS

   1) Fittings shall be either cast iron or ductile iron.
   2) Fittings shall comply with ANSI/AWWA C153/A21.53.
   3) Pressure rating: 350 psi.
   4) Lining and coating: Same as pipe.
   5) Joint: Mechanical joint in compliance with ANSI/AWWA C111/A21.11. Standard gaskets conforming to ANSI/AWWA C111/A21.11 shall be provided.
   6) Mechanical Joint Glands shall be restraint glands as manufactured by EBBA Iron "Megalug", Mega-Lug Series 1100 or approved equal. Restraining glands using set screws will not be accepted
   7) Markings on fittings: Comply with ANSI/AWWA C110/A21.10.
   8) Corrosion resistance: Zinc coated ductile iron pipe fittings meeting all specifications for the standard ductile iron pipe fittings shall be provided in areas where the pipe will be installed in groundwater.

3.1.3 SPECIAL FITTINGS

a) Locking Hydrant Tees: Shall be mechanical joint, each having a bell and plain end, with a split mechanical joint on the plain end. Gate valve shall be secured directly to the tee by using the standard mechanical joint gasket and standard bolts.
b) Retainer Glands: Shall be cast of high strength ductile iron and fitted with ductile iron wedging devices and twist-off pressure nuts, four (4) each for six (6) inch pipe, six (6) each for eight (8) inch pipe, twelve (12) each for twelve (12) inch pipe, and sixteen (16) each for sixteen (16) inch pipe as manufactured by EBAA Iron Sales, Inc.
c) Couplings: Shall be cast or ductile iron, consisting of a middle ring, two (2) rubber gaskets, and the followers with stainless steel bolts and nuts. Coupling and gasket shall be sized for the particular application intended. Couplings shall be as manufactured by Romac or approved equal.
d) Plugs: Shall be ductile iron with mechanical or push-on joint and retainer feature.
e) Sleeves: Shall be ductile iron with mechanical joint, long body style meeting or exceeding the requirements of ANSI/AWWA C110/A21.10 or latest revision thereto.
f) Transition Couplings: As required for joining pipes of different diameters and shall be furnished as required and designed for compatibility with the pipe and operating pressures encountered. Transition couplings shall be as manufactured by Romac or approved equal.
g) Caps: Shall be ductile iron with mechanical or push on joint and shall be provided with joint restraint.

3.2 HIGH DENSITY POLYETHYLENE PIPE – ENDOPURE PE 4710 (2" and smaller)

3.2.1 STANDARDS

a) Meet the applicable standards of AWWA C901-20, ASTM D3350, ASTM D2239, and NSF-14 & 61.
b) Pipe shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacture of the HDPE resin shall certify the cell classification indicated.
c) Pipe shall be blue in color.
d) Pipe shall have a minimum pressure rating of 200 psi.
e) For one-inch or two-inch diameter water services EndoPure Polyethylene Tubing (Class 200) or equivalent shall be used.

3.2.2 HDPE FITTINGS

a) Butt Fusion Fittings- Fittings shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans or accepted by owner/engineer. All fittings shall meet the requirements of AWWA C901.
    1) Molded fittings shall comply with the requirements of ASTM D 3261.
    2) All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F 2206, as manufactured by ISCO Industries, Inc or other approved

manufacturer holding an ISO 9001 quality system certificate. Each fitting will be marked per ASTM F 2206 section 10 including the nominal size and fitting EDR, which will meet or exceed the pipe DR identified for the project. Fabricated fittings shall be manufactured using a McElroy DataLogger to record fusion pressure and temperature and shall be stamped with unique joint number that corresponds to the joint report. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained for a minimum of 5 years as part of the quality control and will be available upon request of owner. Test results to validate ASTM F 2206 section 7.3 and 9 shall be provided to owner or owner's representative upon request.

3) Socket fittings shall meet ASTM D 2683.

b) Electrofusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE 4710 and with a minimum Cell Classification as noted in 2.01.A. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans. All electrofusion fittings shall have AWWA approval.

3.4 IDENTIFICATION DEVICES

a) Warning Tape
   1) Material: Polyethylene, 4-mil gauge with detectable strip.
   2) Color: Blue
   3) Width: Minimum 6 inches
   4) Designation: Warning on tape that water pipe is located below tape.
   5) Identifying Letters: Minimum 1-inch-high permanent black lettering imprinted continuously over entire length.
   6) Manufacturers and Products: a. Panduit; Type HTDU. b. Reef Industries; Terra Tape.

3.5 OTHER MATERIALS

a) Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

3.6 FIELD APPLIED PIPE INSULATION

a) The insulation shall be a minimum of two (2) inches thick, having a density of 2.0 lbs. per cubic foot, and having a K-Factor of 0.14. The insulation shall be fabricated in half sections of three-foot lengths. The half section shall fit tightly over the pipe to be insulated except for the joint and fitting locations where an oversized cover shall be made to allow for any hardware.

b) The insulation shall be Trymer 2000 as manufactured by Insulated Piping Systems, Inc. or approved equal.

c) Jacketing to go over the insulation below ground shall be C.I. Wrap 50 as manufactured by Insulated Piping Systems, Inc. or approved equal. The jacket shall be wrapped around the circumference of the insulation and held in place with a 4-inch butt strip at each seam.

3.7 BURIED VALVES AND APPURTENANCES

3.7.1 VALVES

a) Resilient Seated Gate Valves: Shall be used on all water mains less than sixteen (16) inches in diameter and all hydrant branches.
   1) Valves shall be as manufactured by Mueller Co., Type A2360.
   2) Meet or exceed the requirements of ANSI/AWWA C515.
   3) Joints: Mechanical joint conforming to ANSI/AWWA C111/A21.11.
   4) Ductile iron body.
   5) Bronze stem.
   6) Resilient sealed wedge type:
   7) Wedge: Fully encapsulated; no exposed iron.
   8) Non rising stem with two O-ring stem seals.
   9) Two (2) inch square operating nut.
   10) Rated for 200 psi and tested to 400 psi.
   11) Open: Clockwise (right).
   12) All internal and external surfaces except rubber coatings shall be coated with fusion bonded, NSF 61 certified, epoxy to a minimum thickness of 8 mils. Coating shall be non-toxic, impart no taste to water and shall conform to AWWA C-550.

3.7.2 VALVE BOXES

a) Valve boxes shall be provided for each buried valve. They shall be:
   1) Domestic manufacture.
   2) Cast iron with a cast iron cover.
   3) Cover shall have the word “WATER” and an arrow indicating the direction of opening cast into the cover in raised letters.
   4) Valve box barrel shall not be less than (5-1/4) inches in diameter.
   5) Shall be two (2) piece sliding type, providing a minimum overlap of six (6) inches.
   6) The lower section shall enclose the operating nut and stuffing box/gear box of the valve and shall have a minimum diameter of 8 inches.
   7) The box shall not transmit shock or stress to the valve.

3.8 HYDRANTS

a) Hydrants shall be Mueller Model No. A423:
   1) Barrel sections shall be 5-1/4-inch diameter.
   2) Five (5) foot minimum bury.
   3) Two (2) 2-1/2-inch hose nozzles.
   4) One (1) 4-1/2-inch pumper outlet.
   5) Replaceable brass nozzles.
   6) Breakaway flange.
   7) Six (6) inch mechanical joint shoe.
   8) Open clockwise (right).
   9) Be in full compliance with AWWA C502.

b) Hydrants shall conform to National Standard Specification sizes in threads and nuts. Caps shall have retainer chains and rubber gaskets.

c) Hydrant Extension
   1) Extension Kit: If required to meet grade on site:
      i. Shall be provided by the hydrant manufacturer.
      ii. Length shall be as needed to meet finish grade.

3.9 INSTALLATION

3.9.1 Handling

a) Care shall be taken to prevent damage to pipes, valves, and appurtenances during handling and installation. All materials shall be carefully inspected for defects in workmanship and materials.

b) All operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves which do not operate easily or are otherwise defective shall be replaced at the Contractor's expense.

3.9.2 INSTALLATION

a) General:
   1) Construction methods shall conform to the applicable portions of details as shown in the Utility Standards and manufacturer's recommended installation procedures.

b) Pipe, Valves and Appurtenances:
   1) Pipe shall be installed as shown in the Utility Standards and the manufacturer's recommended installation procedures.
   2) Generally, valves shall be set and aligned plumb, supported by a flat stone or solid concrete block, with the trench bottom being firmly compacted.
   3) Valve boxes shall be set centered and plumb over the operating nuts of all direct burial valves. The top of each valve box shall be set to finished grade with at least 10 inches of overlap remaining between the upper sections for future vertical adjustment. Minimum overlap for lower, extension pieces shall be 6 inches.
   4) Valves, bolts, and all other appurtenances shall be thoroughly cleaned and given a shop coat of asphaltum varnish if another coating system is not specifically required per this specification.

5) Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

c) Hydrant Installation

1) All new hydrant locations shall be subject to field location approval by the DPW-Water Division
2) Trench, backfill and compact in strict accordance with DPW-Water Division earthwork requirements.
3) Place 1/2 cubic yard of 3/4 inch washed crushed stone around hydrant drain ports. While backfilling, place additional crushed stone to at least six (6) inches above the hydrant drain ports.
4) After being thoroughly cleaned, all iron work set below ground shall be painted with two coats of asphalt varnish as specified in AWWA C504.
5) Thrust blocking shall be placed behind the shoe of the hydrants, taking care not to block the drain outlets.
6) The hydrant shall be set plumb and to the proper grade and shall remain properly supported until it is backfilled.
7) All iron work left above ground shall be shop painted with two coats of paint of quality and color to correspond to the present standard of the Owner.
8) After the hydrant has been set, it shall be entirely draped with burlap and remain covered until the water distribution system has been accepted and put into service.

Standard Details

STANDARD DETAILS

DETAIL NUMBER	DETAIL
W–1	SERVICE CONNECTION
W–2	HYDRANT
W–3	GATE VALVE
W–4	TYPICAL WATER MAIN/TRENCH SECTIONS
W–5	CONCRETE BACKING/THRUST BLOCK
W–6	METER INSTALLATION
W–7	METER PIT MUELLER: 330RS2148RVBSN
W–8	METER PIT ALTERNATE – HOT BOX
W–9	1" BLOW OFF
W–10	SAMPLE STATION
W–11	TYPICAL TEMPORARY PAVEMENT (MASSDOT JURISDICTION)
W–12	TYPICAL PERMANENT PAVEMENT MILL AND OVERLAY (MASSDOT JURISDICTION)
W–13	TEMPORARY TRENCH PAVEMENT AND PERMANENT MILL AND OVERLAY (TOWN JURISDICTION)
W–14	UTILITY CROSSING
W–15	WATER MAIN RELOCATION

INDEX.dwg

TOWN OF FALMOUTH
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APPLICATION AND CONSTRUCTION STANDARDS

INDEX

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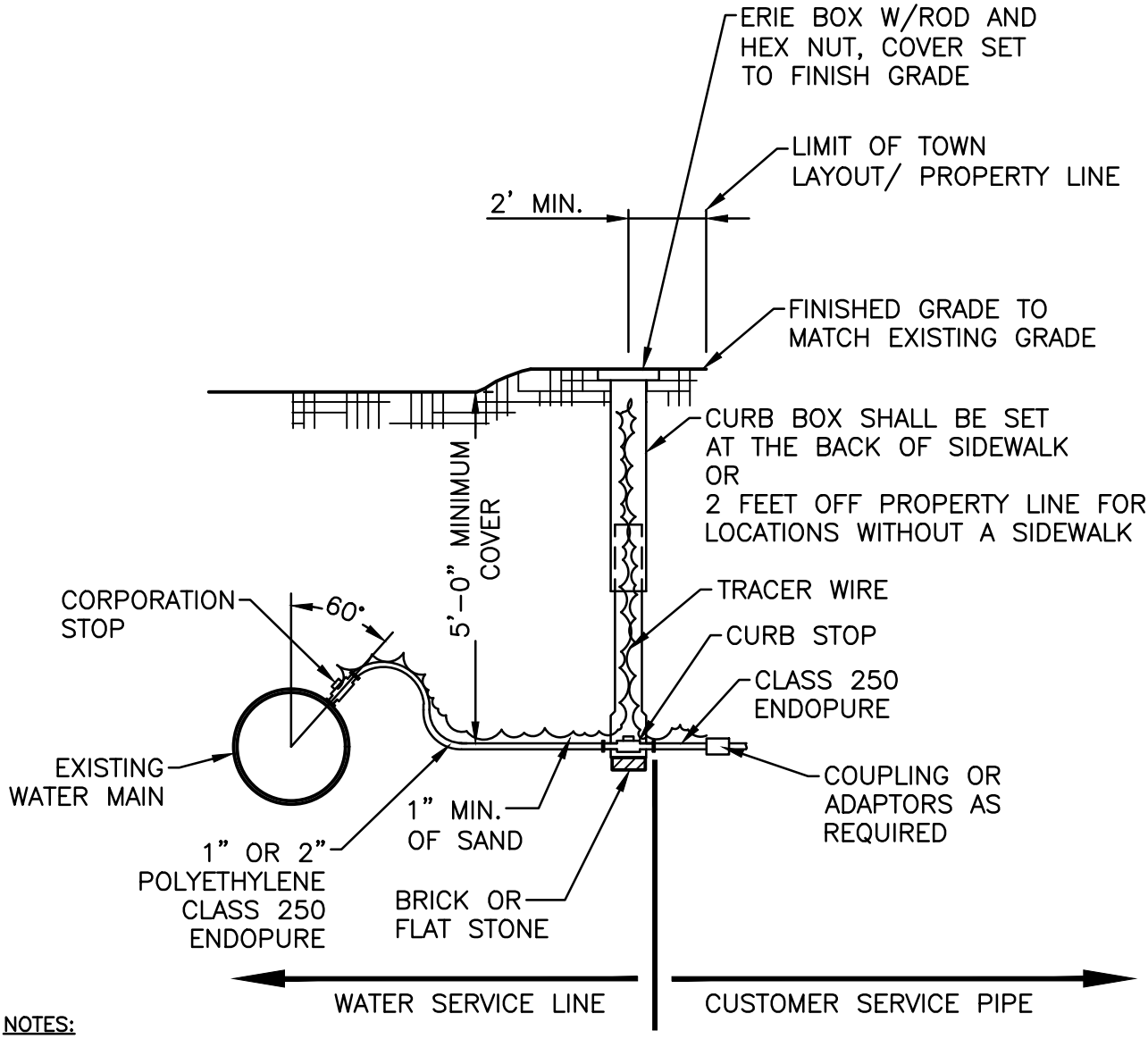

NOTES:

1. SADDLES REQUIRED FOR TAPS GREATER THAN 1–INCH IN 8–INCH DIAMETER MAINS.
2. SERVICES GREATER THAN 1–INCH IN PIPE 12–INCHES IN DIAMETER AND GREATER MAY BE DIRECT TAP.
3. MINIMUM 5'–0" COVER OVER THE WATER SERVICE PIPE.
4. BACKFILL SHALL BE NATIVE MATERIAL COMPACTED TO A DENSITY OF NOT LESS THAN 90% RELATIVE COMPACTION.
5. NO STONES OR PAVEMENT.
6. EXISTING WATER MAIN MATERIAL TO BE DETERMINED PRIOR TO SERVICE CONNECTION.
7. NEW WATER MAIN SHALL COMPLY WITH THE DPW–WATER DIVISION CONSTRUCTION STANDARDS.
8. CUSTOMER SERVICE PIPE IS A PIPE RUNNING FROM THE CURB STOP TO A METER VALVE, WHICH VALVE IS LOCATED IMMEDIATELY INSIDE THE STRUCTURAL WALL OF THE PREMISES (SEE W–6) OR THE BALL VALVE THAT IS LOCATED IMMEDIATELY INSIDE THE METER PIT WALL (SEE W–7). THE CUSTOMER SERVICE PIPE IS THE PROPERTY OF AN MAINTENANCE RESPONSIBILITY OF THE CUSTOMER. THE WATER METER ALONE IS REPAIRED AND REPLACED BY FALMOUTH WATER DEPARTMENT UPON INITIAL PAYMENT OF A WATER METER.

SERVICE CONNECTION (POLY)

SCALE: NONE

W–1_Service Connection.dwg

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SERVICE CONNECTION

W-1

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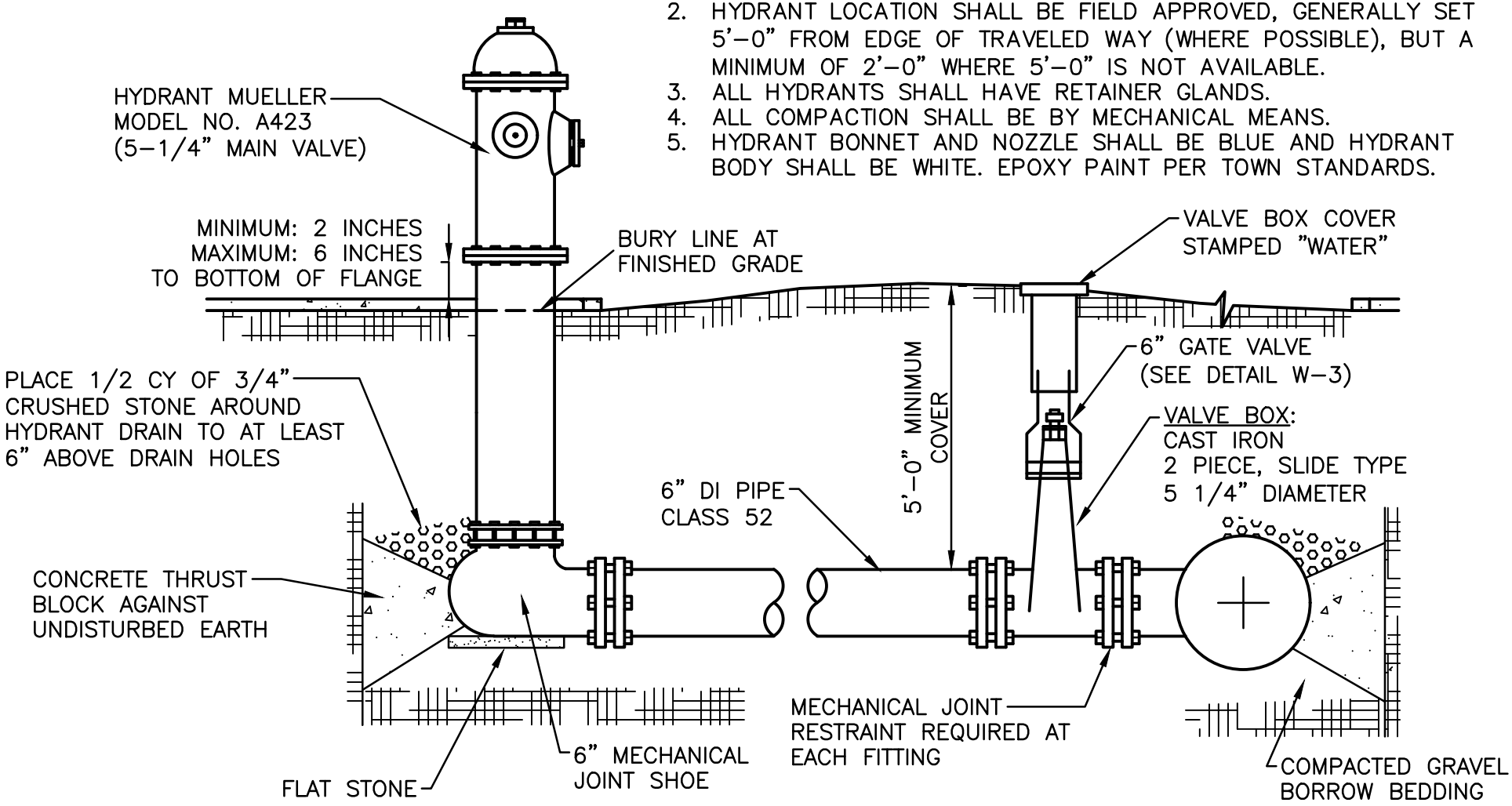
NOTES:

1. THRUST BLOCKS BACKED AGAINST UNDISTURBED SOIL AT HYDRANT & ANCHOR TEE.
2. HYDRANT LOCATION SHALL BE FIELD APPROVED, GENERALLY SET 5'–0" FROM EDGE OF TRAVELED WAY (WHERE POSSIBLE), BUT A MINIMUM OF 2'–0" WHERE 5'–0" IS NOT AVAILABLE.
3. ALL HYDRANTS SHALL HAVE RETAINER GLANDS.
4. ALL COMPACTION SHALL BE BY MECHANICAL MEANS.
5. HYDRANT BONNET AND NOZZLE SHALL BE BLUE AND HYDRANT BODY SHALL BE WHITE. EPOXY PAINT PER TOWN STANDARDS.



HYDRANT

SCALE : NONE

W–2_Hydrant.dwg

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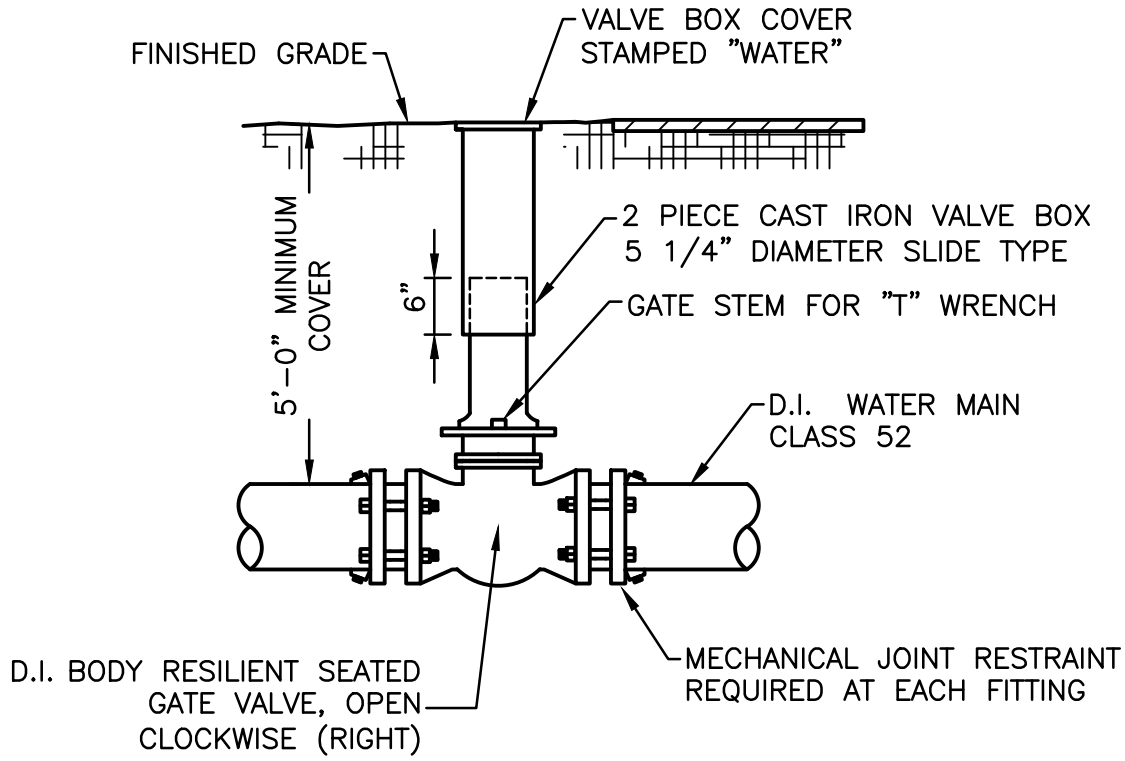
HYDRANT

W-2

DECEMBER 11, 2024



GATE VALVE

SCALE: NONE

W-3_GATE VALVE.dwg

TOWN OF FALMOUTH
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GATE
VALVE

W-3

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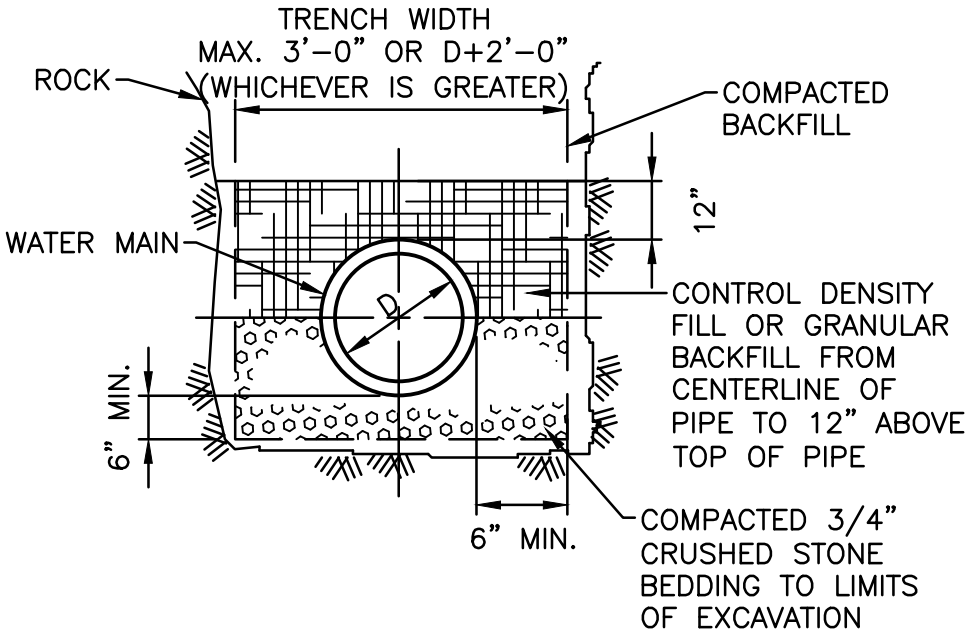
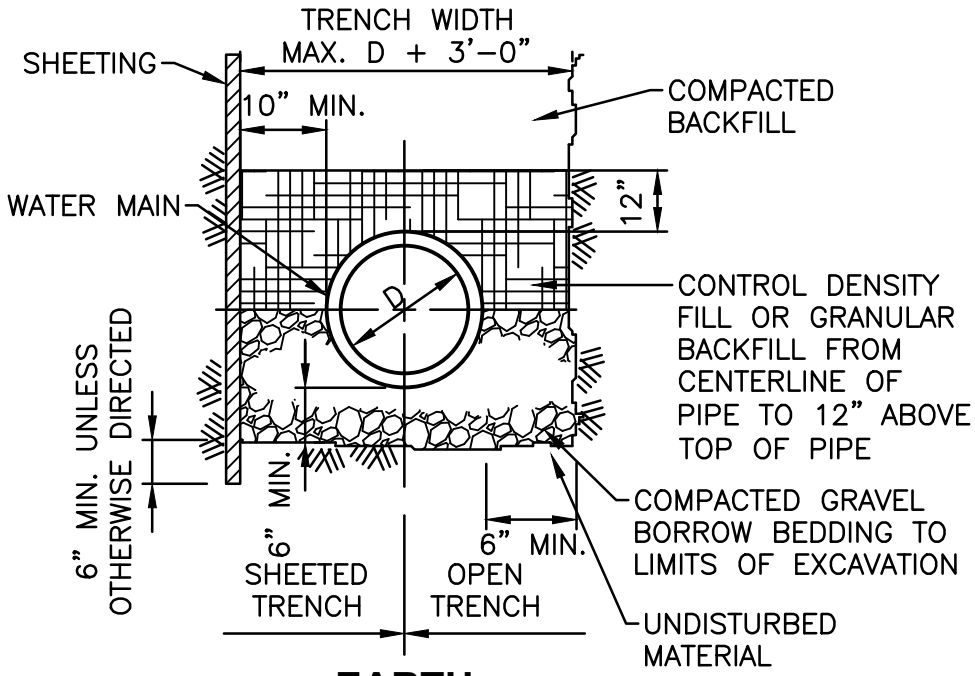


ROCK



EARTH

NOTE:

1. CONTRACTOR SHALL MAINTAIN A MINIMUM COVER OF 5'–0" FROM THE TOP OF PIPE. IF LESS THAN 5'–0" OF COVER IS APPROVED IN SPECIFIC LOCATIONS, INSULATION UPON APPROVAL OF DPW SHALL BE INSTALLED AROUND THE PIPING.
2. USE OF CONTROL DENSITY FILL SHALL BE APPROVED BY THE DPW PRIOR TO INSTALLATION.
3. GRANULAR BACKFILL SHALL BE NATIVE MATERIAL COMPACTED TO A DENSITY OF NOT LESS THAN 90% RELATIVE COMPACTION.

TYPICAL WATER MAIN / TRENCH SECTIONS

SCALE: NONE

W–4_TYPICAL WATER MAIN/TRENCH SECTIONS.dwg

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TYPICAL
WATER MAIN/TRENCH
SECTIONS

W-4

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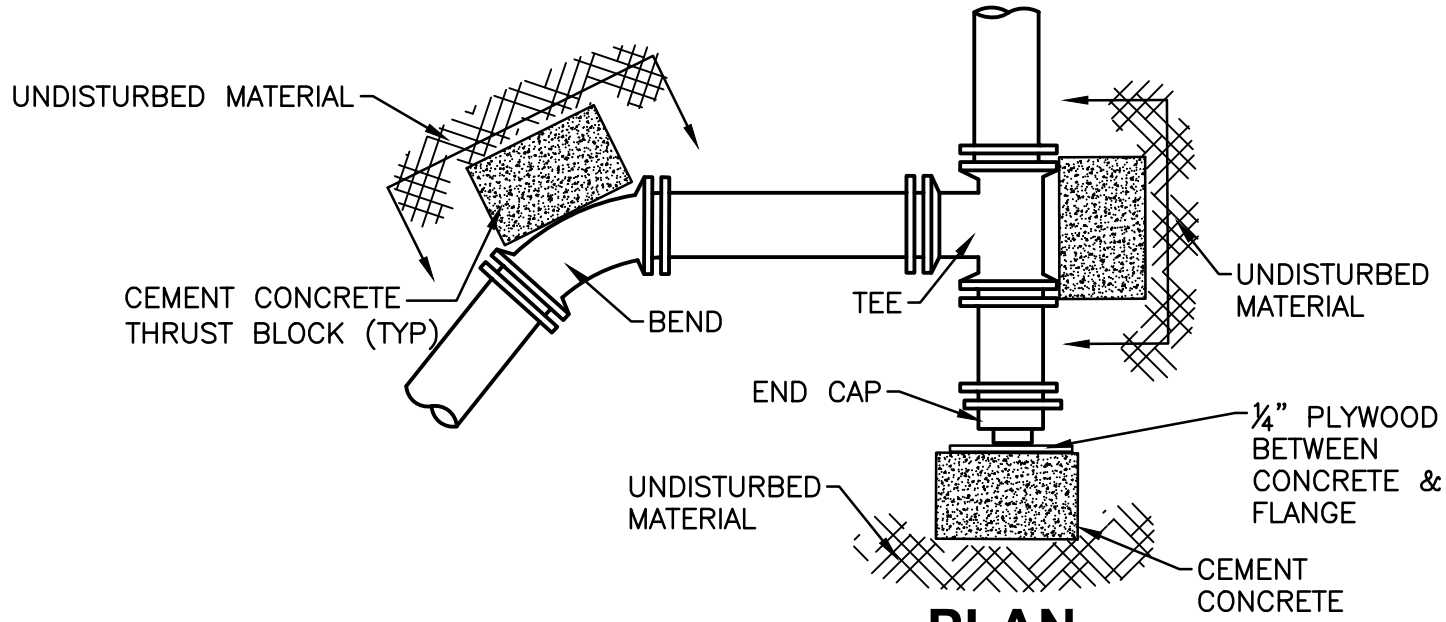

PLAN

MINIMUM BEARING FACE AREA (SQ. FT.)				
PIPE SIZE (IN)	1/4 BEND (90°)	1/8 BEND (45°)	1/16 BEND (22°)	PLUG/ TEE
6"	6.0	3.0	2.5	4.5
8"	9.0	5.0	2.5	6.5
12"	13.3	6.7	3.7	9.6

NOTES:

1. CONCRETE SHALL BE 3,000 PSI MINIMUM AT 28 DAYS.
2. THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED MATERIAL WHENEVER POSSIBLE.
3. ALL FITTINGS SHALL BE SUPPORTED IN CONCRETE.
4. FOR FIRE HYDRANT THRUSTING SEE HYDRANT DETAIL.
5. POURED CONCRETE NOT TO COME WITHIN 6" OF MECHANICAL JOINTS.
6. BEARING FACE AREA CALCULATED ASSUMING 250 PSI AND 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.
7. FOR PIPE GREATER THAN 12", SHALL BE DESIGNED BY OWNER'S ENGINEER.

CONCRETE BACKING/THRUST BLOCK

SCALE: NONE

W-5_CONCRETE BACKING/THRUST BLOCK.dwg

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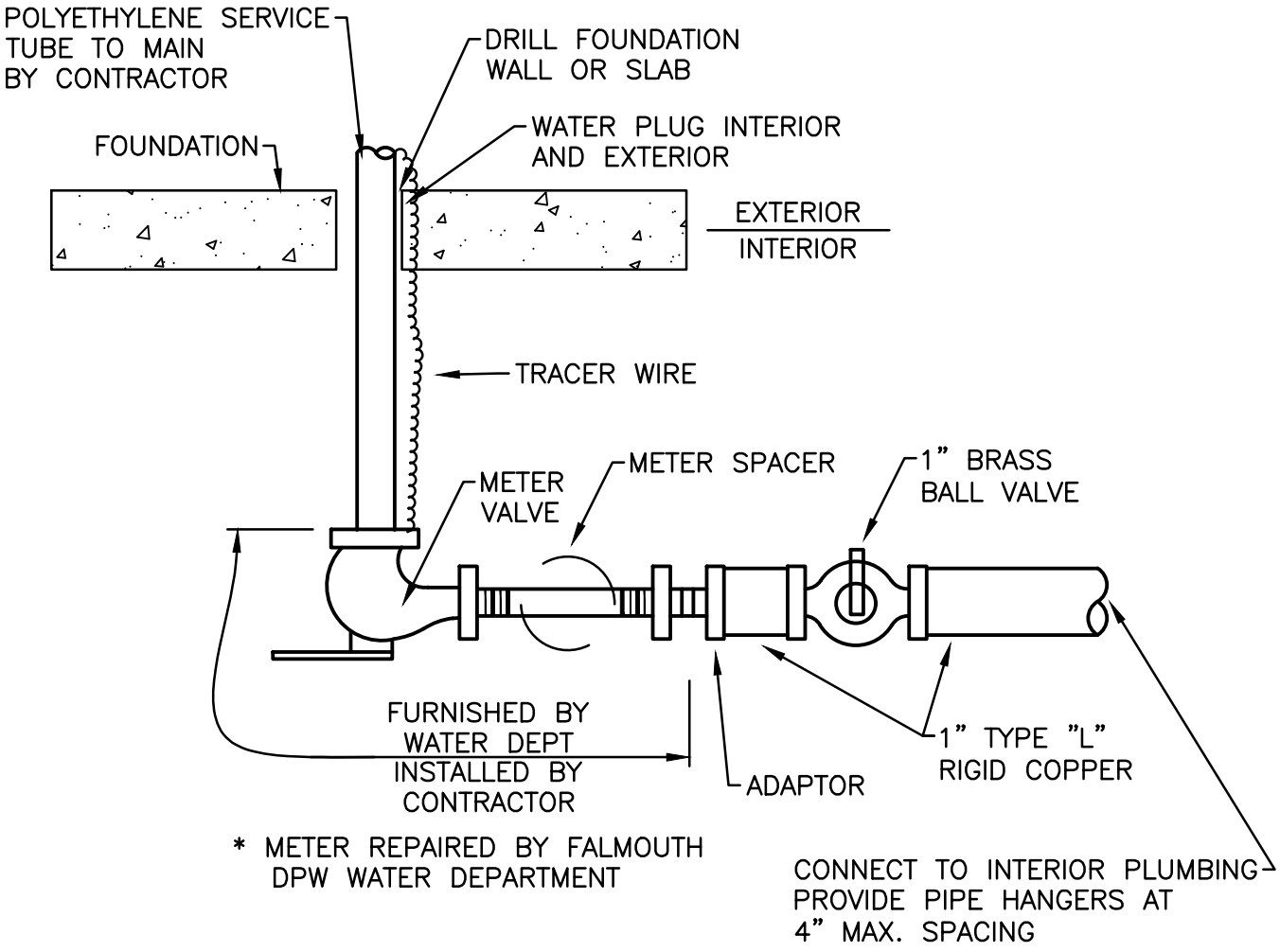
CONCRETE BACKING/THRUST BLOCK

W-5

DECEMBER 11, 2024



METER INSTALLATION

SCALE: NONE

W-6_METER INSTALLATION.dwg

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METER INSTALLATION

W-6

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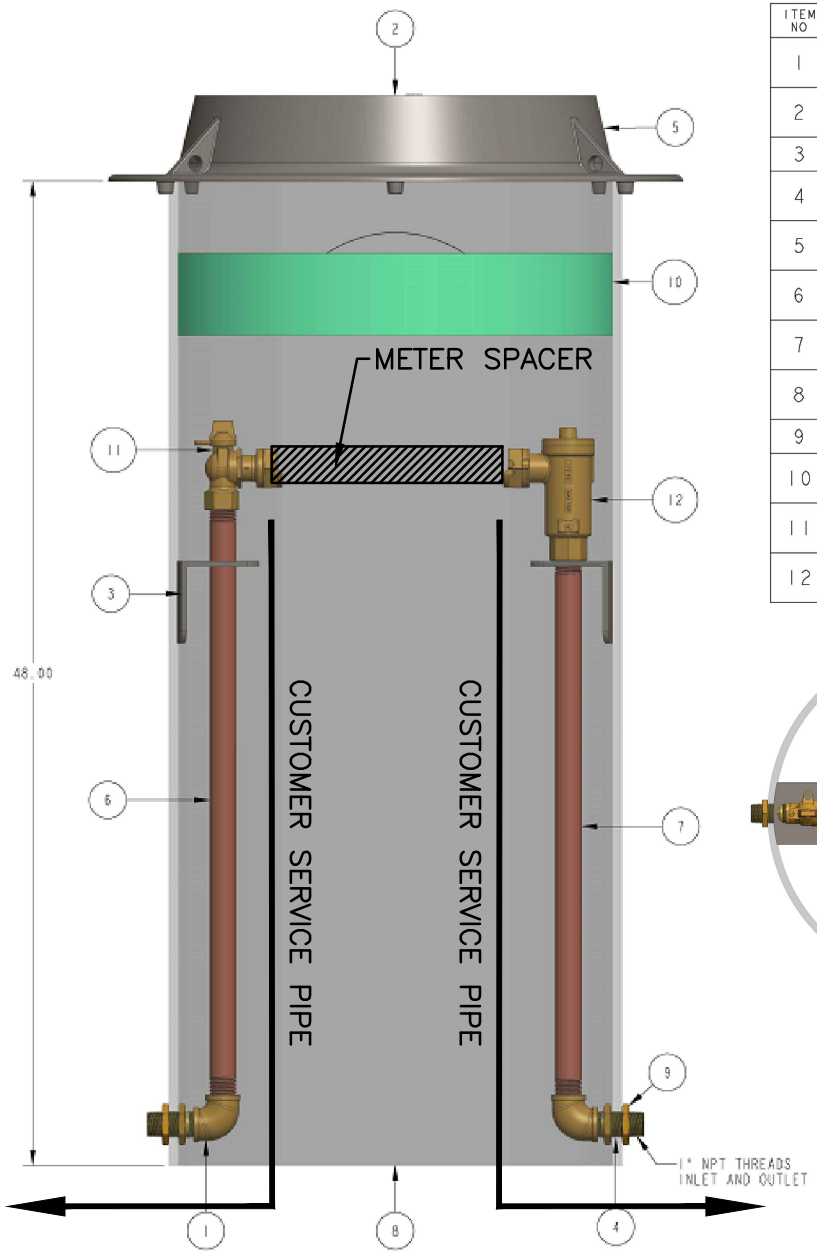
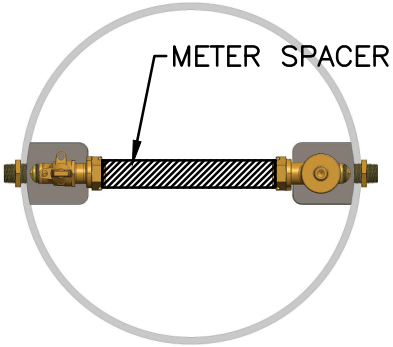
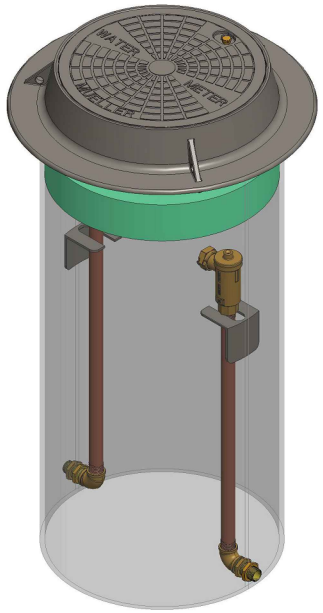


ITEM NO	PART NUMBER	QTY	DESCRIPTION	MATERIAL
1	094987	2	1" FNPT ELBOW	CAST BRONZE ASTM B584 ALLOY C89833
2	282925	1	18" DIA CAST IRON SIDE LOCKING LID (SOLD SEPARATELY)	CAST IRON ASTM A126 CLASS B
3	547400	2	1" SUPPORT BRACKET	BLACK PLASTIC ABS
4	700067	2	NIPPLE 1" X 3"	RED BRASS ASTM B43 ALLOY C23000 O61 TEMPER ANNEALED
5	700098-1	1	CAST IRON FRAME (PURCHASED SEPARATELY)	CAST IRON ASTM A48 CLASS 25A
6	700460	1	1" BRASS PIPE	RED BRASS ASTM B43 ALLOY C23000 O61 TEMPER ANNEALED
7	700493	1	1" BRASS PIPE	RED BRASS ASTM B43 ALLOY C23000 O61 TEMPER ANNEALED
8	780081-2148	1	SHELL	SDR-51 PVC PIPE ASTM D2241 GRADE 1120
9	790010	4	1" HEX NUT	ASTM B16 ALLOY C36000
10	790119	1	21" X 4" INSULATION PAD (SOLD SEPARATELY)	ETHAFOAM 220 WHITE
11	330B24265RN	1	1" REDUCED PORT BALL VALVE LLB	LEAD FREE BRASS ALLOY ASTM B584 C89833/C87850
12	330H14460AN	1	1" ASSE APPROVED VERTICAL CHECK	LEAD FREE BRASS ALLOY ASTM B584 C89833/C87850



NOTES:

1. METER PIT AND SPACER FURNISHED BY OWNER
2. WATER METER PROVIDED BY FALMOUTH DPW–WATER DIVISION.
3. CUSTOMER SERVICE PIPE IS A PIPE RUNNING FROM THE CURB STOP TO A METER VALVE, WHICH VALVE IS LOCATED IMMEDIATELY INSIDE THE STRUCTURAL WALL OF THE PREMISES (SEE W–6) OR THE BALL VALVE THAT IS LOCATED IMMEDIATELY INSIDE THE METER PIT WALL (SEE W–7). THE CUSTOMER SERVICE PIPE IS THE PROPERTY OF AN MAINTENANCE RESPONSIBILITY OF THE CUSTOMER. THE WATER METER ALONE IS REPAIRED AND REPLACED BY FALMOUTH WATER DEPARTMENT UPON INITIAL PAYMENT OF A WATER METER.



METER PIT

SCALE: NONE

W–7_METER PIT.dwg

DR. BY	AOD	1/14/22	UNLESS OTHERWISE NOTED	THIRD ANGLE PROJECTION
CHKR			BREAK CAST CORNER(S)---	C.O. NO.
ENGR			BREAK MACH CORNER(S)---	PURCH. / FINISH
MGR			TOLERANCES	PATT. NO.
MFG			UNLESS OTHERWISE NOTED	REF. NO. / SCALE
TOOL			LINEAR / ANGULAR	
FDRY			± / ±	STK. NO.
MAT'L:				

MUELLER — DESCR. 1" RIGID SINGLE METER PIT 21" DIA X 48" DEPTH LEAD FREE BRASS — NUMBER 330RS2148RVBSN

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METER PIT
MUELLER:
330RS2148RVBSN

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Typical Installation-Single w/ Meter

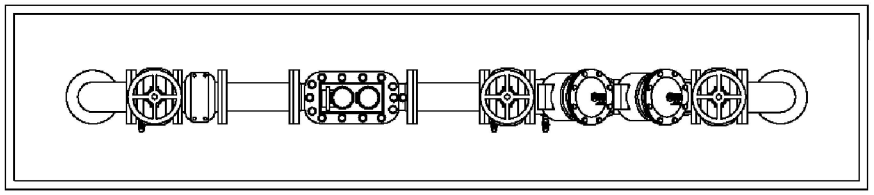
NOTES:
1. HOT BOX ENCLOSURE SIZE TO BE DETERMINED BY OWNER'S ENGINEER.
2. METER NOT REQUIRED ON FIRE SERVICE.
3. BACKFLOW PREVENTER IF REQUIRED IN ACCORDANCE WITH UTILITY STANDARDS

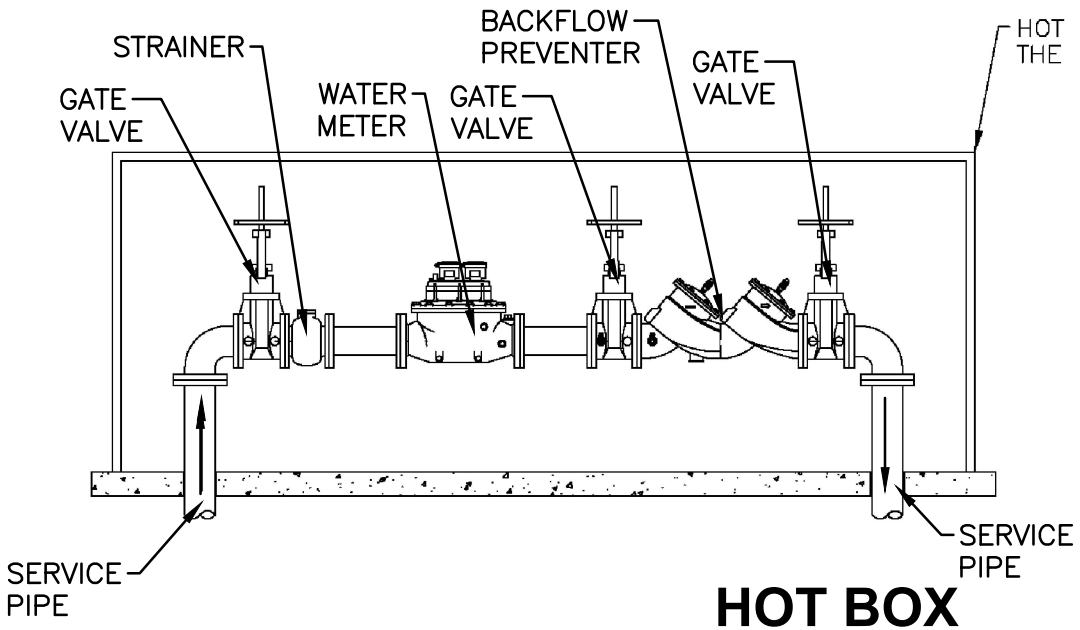
SINGLE W/ METER INSTALLATION

PIPE MATERIALS, VALVES, METER, AND BACKFLOW PREVENTER SHALL COMPLY WITH FALMOUTH UTILITY STANDARDS

PIPE SIZE: _____
BACKFLOW: _____
METER: _____
STRAINER: _____
VALVE: _____

HOTBOX P/N: _____





HOT BOX

SCALE: NONE

- RECOMMENDED SLAB SIZE IS 12" LARGER THAN THE INTERIOR DIMENSIONS OF THE SPECIFIED ENCLOSURE AND 4" THICK.
- INSULATED ENCLOSURES ARE INTERNALLY LINED WITH POLYISOCYANATE FOAM FOR A MINIMUM R8 VALUE.
- MANUFACTURER RECOMMENDS ENCLOSURES HAVE A UL OR ETL LISTED HEAT SOURCE WHEN IT IS DETERMINED THAT FREEZE PROTECTION IS NEEDED. HEATED ENCLOSURES HAVE A "H" PREFIX AND UNHEATED ENCLOSURES HAVE A "L" PREFIX.
- IF A STRAINER IS REQUIRED IT IS LOCATED BEFORE THE BFP.

W-8_METER PIT ALTERNATE – HOT BOX.dwg

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METER PIT ALTERNATE - HOT BOX

W-8

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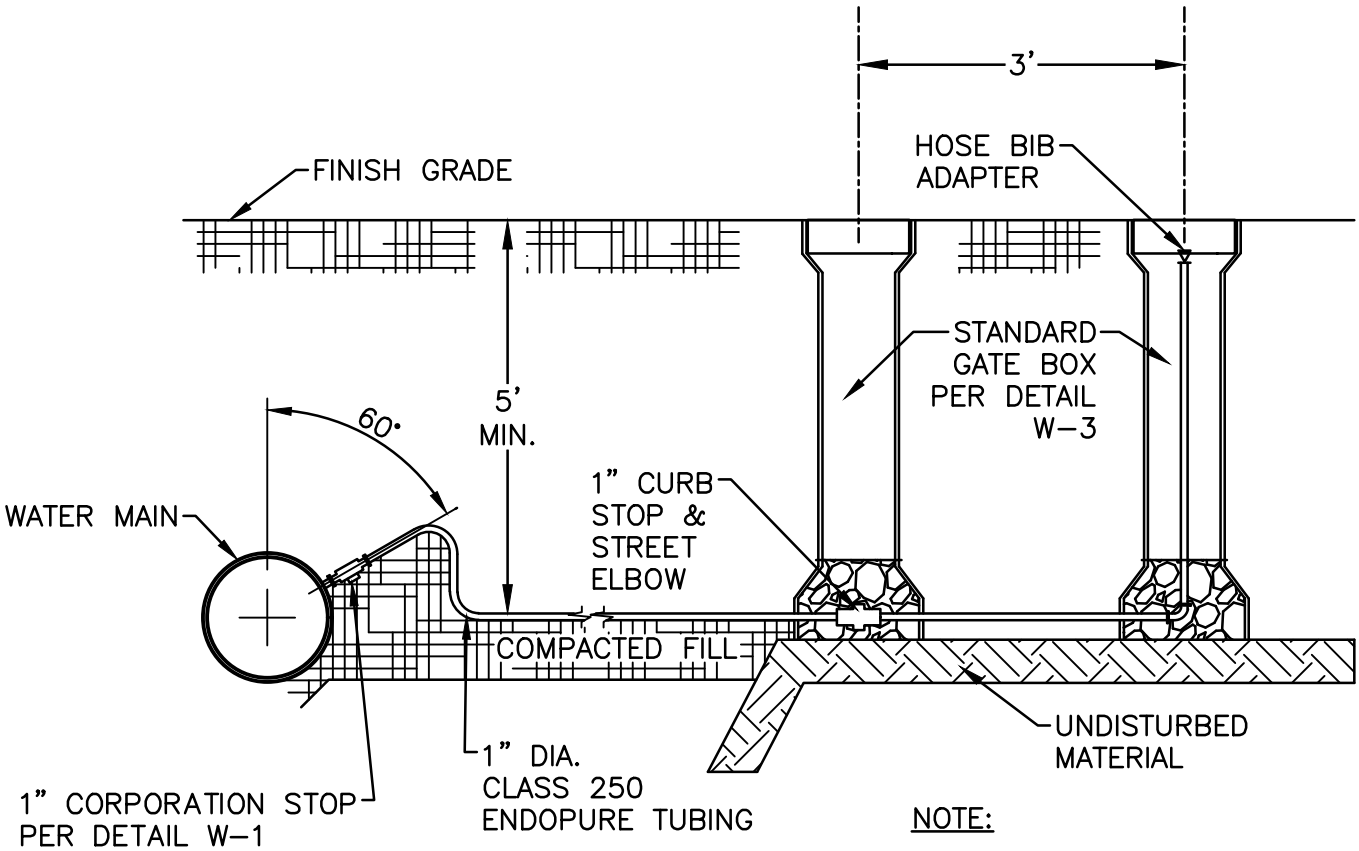

NOTE:

WEDGE STONES AROUND CURB STOP TO HOLD IN PLACE

BLOW OFF

SCALE: NONE

W-9_1" BLOW OFF.dwg

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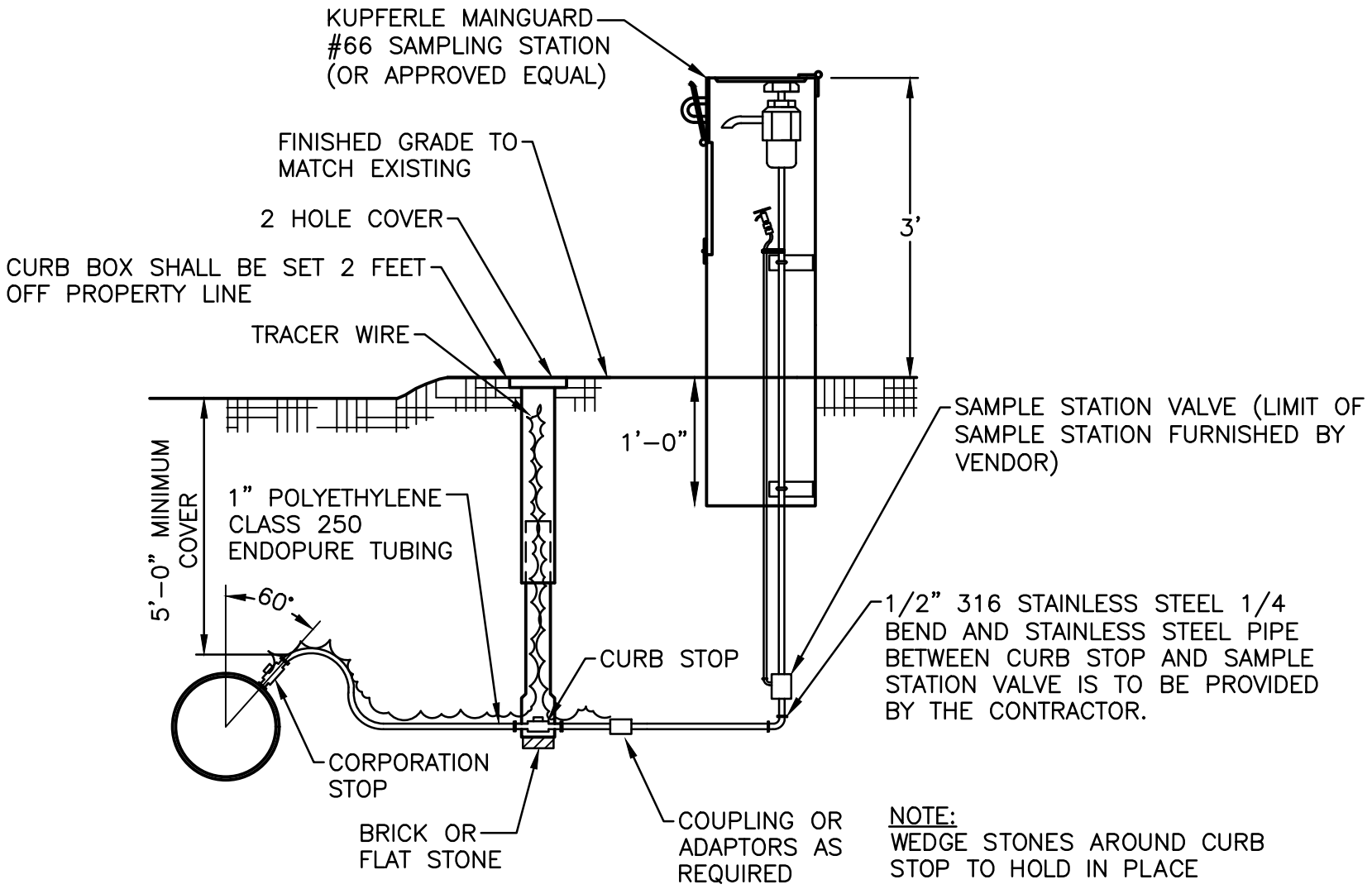
1" BLOW OFF

W-9

DECEMBER 11, 2024



SAMPLE STATION DETAIL

SCALE: NONE

W–10_SAMPLE STATION.dwg

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SAMPLE STATION

W-10

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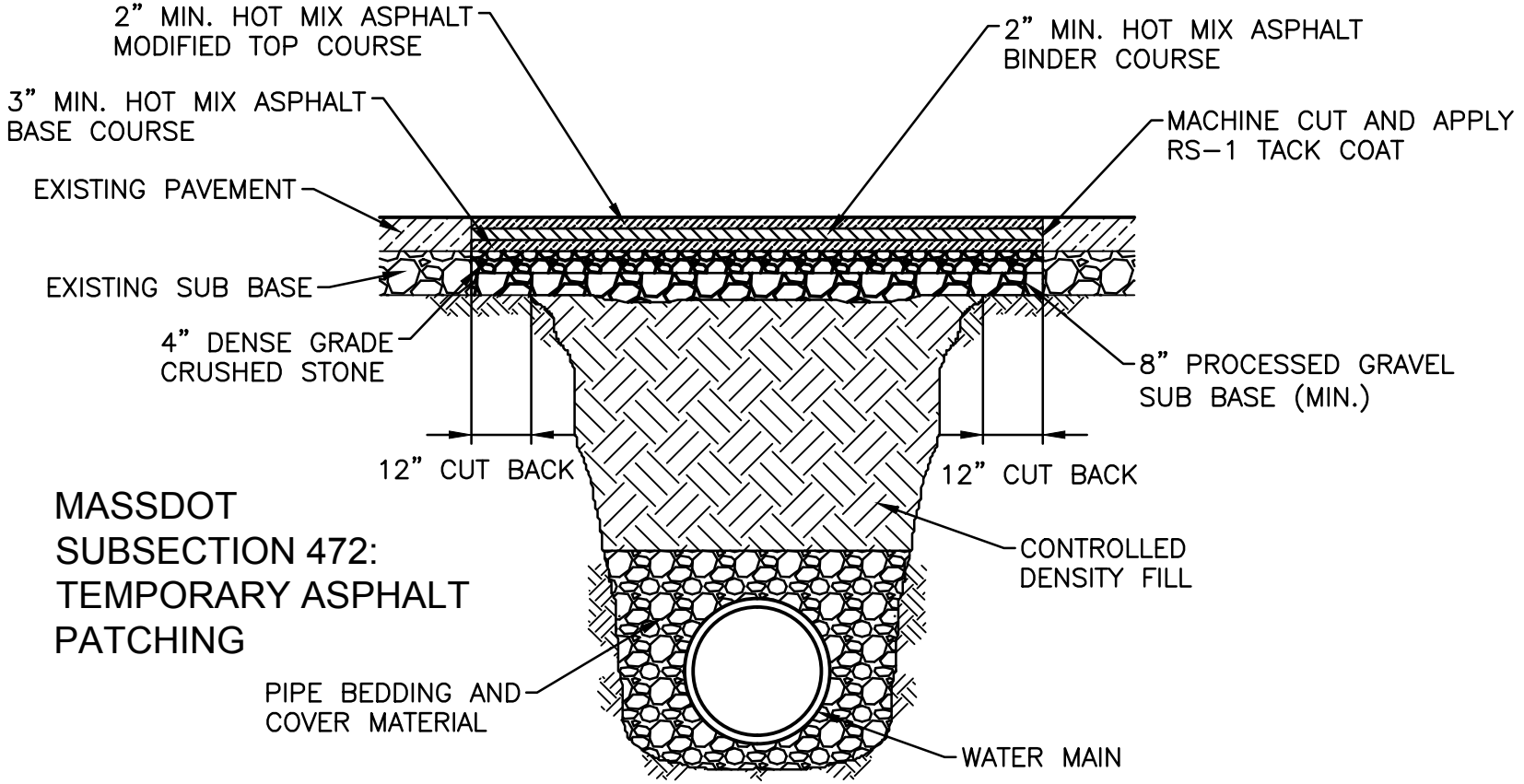

NOTE:

1. TEMPORARY TRENCH PAVEMENT MUST INCLUDE A MINIMUM OF 7" OF HOT MIX ASPHALT AS NOTED ABOVE OR MATCH THE THICKNESS OF ROADWAY, WHICHEVER IS GREATER.

TYPICAL TEMPORARY PAVEMENT (MASSDOT JURISDICTION)

SCALE: NONE

W-11_TYPICAL TEMPORARY PAVEMENT (MASSDOT JURISDICTION).dwg

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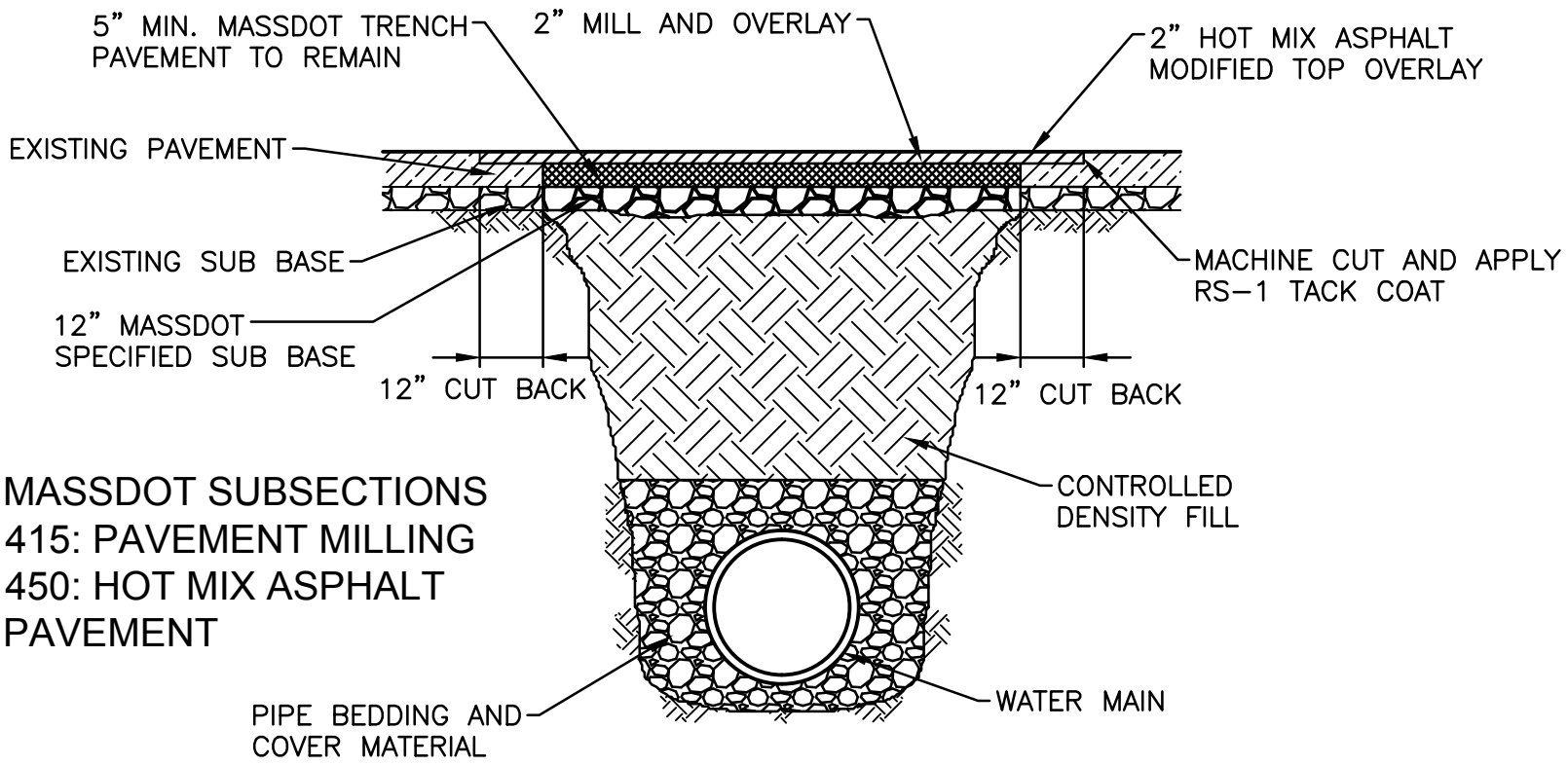
TYPICAL TEMPORARY PAVEMENT (MASSDOT JURISDICTION)

W-11

DECEMBER 11, 2024



MASSDOT SUBSECTIONS
415: PAVEMENT MILLING
450: HOT MIX ASPHALT
PAVEMENT

TYPICAL PERMANENT PAVEMENT MILL AND OVERLAY (MASSDOT JURISDICTION)

SCALE: NONE

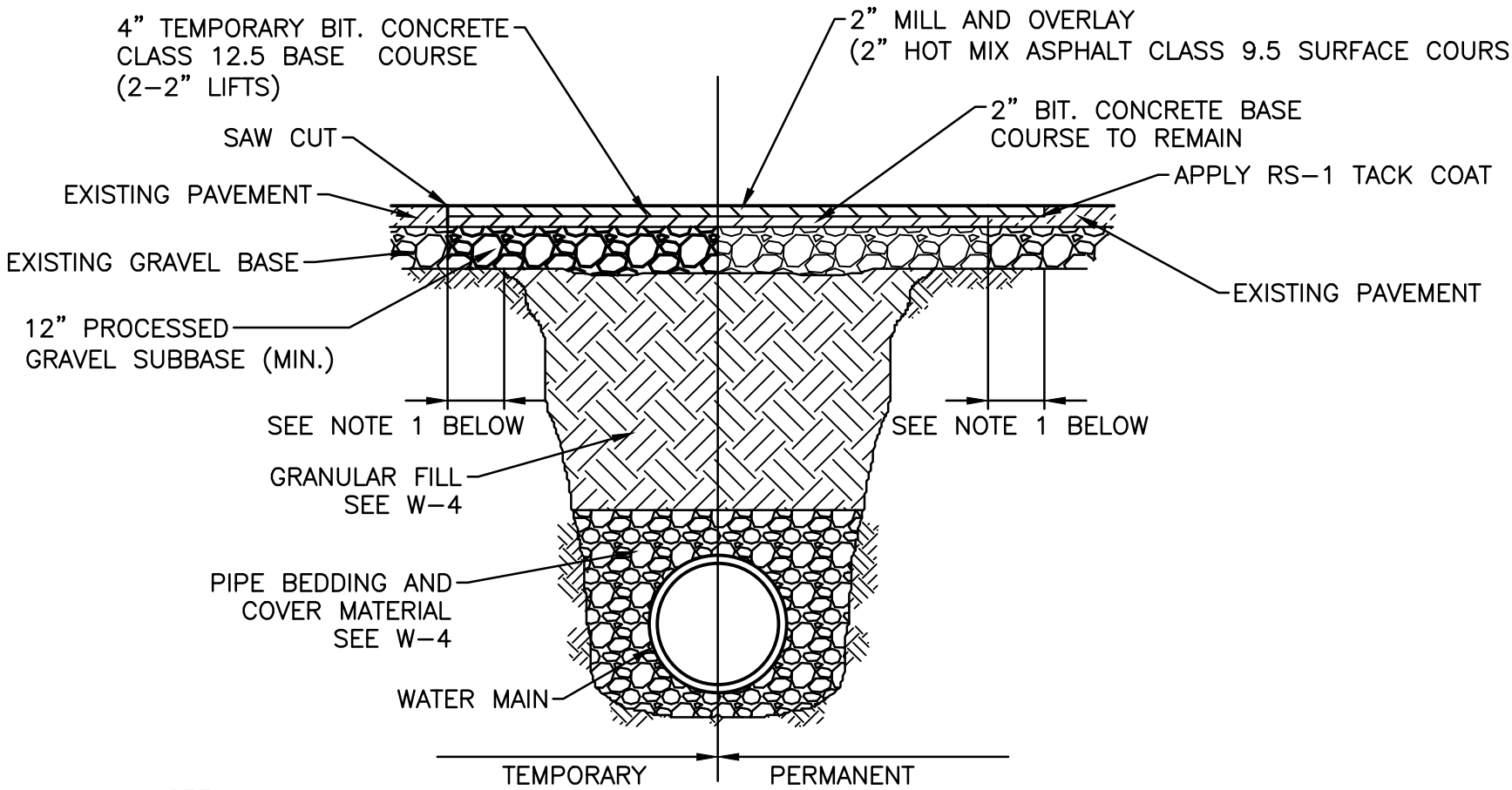
W-12_TYPICAL PERMANENT PAVEMENT MILL AND OVERLAY (MASSDOT JURISDICTION).dwg

TOWN OF FALMOUTH
DEPARTMENT OF
PUBLIC WORKS
WATER DIVISION
416 GIFFORD STREET
FALMOUTH, MA 02540
508-457-2543

TYPICAL PERMANENT
PAVEMENT
MILL AND OVERLAY
(MASSDOT JURISDICTION)

W-12

DECEMBER 11, 2024



NOTE:

1. SAWCUT EXISTING PAVEMENT 1' MIN. OUTSIDE OF TRENCH FOR BINDER PLACEMENT.
2. 2" MILL AND OVERLAY/TOP COURSE SHALL EXTEND 1' OUTSIDE THE SAW CUT.

TEMPORARY TRENCH PAVEMENT AND PERMANENT MILL AND OVERLAY (TOWN JURISDICTION)

SCALE: NONE

W–13_TYPICAL TEMPORARY TRENCH PAVEMENT AND PERMANENT MILL AND OVERLAY (TOWN JURISDICTION).dwg

TOWN OF FALMOUTH
DEPARTMENT OF
PUBLIC WORKS
WATER DIVISION
416 GIFFORD STREET
FALMOUTH, MA 02540
508–457–2543

TEMPORARY TRENCH PAVEMENT AND PERMANENT MILL AND OVERLAY (TOWN JURISDICTION)

W-13

DECEMBER 11, 2024

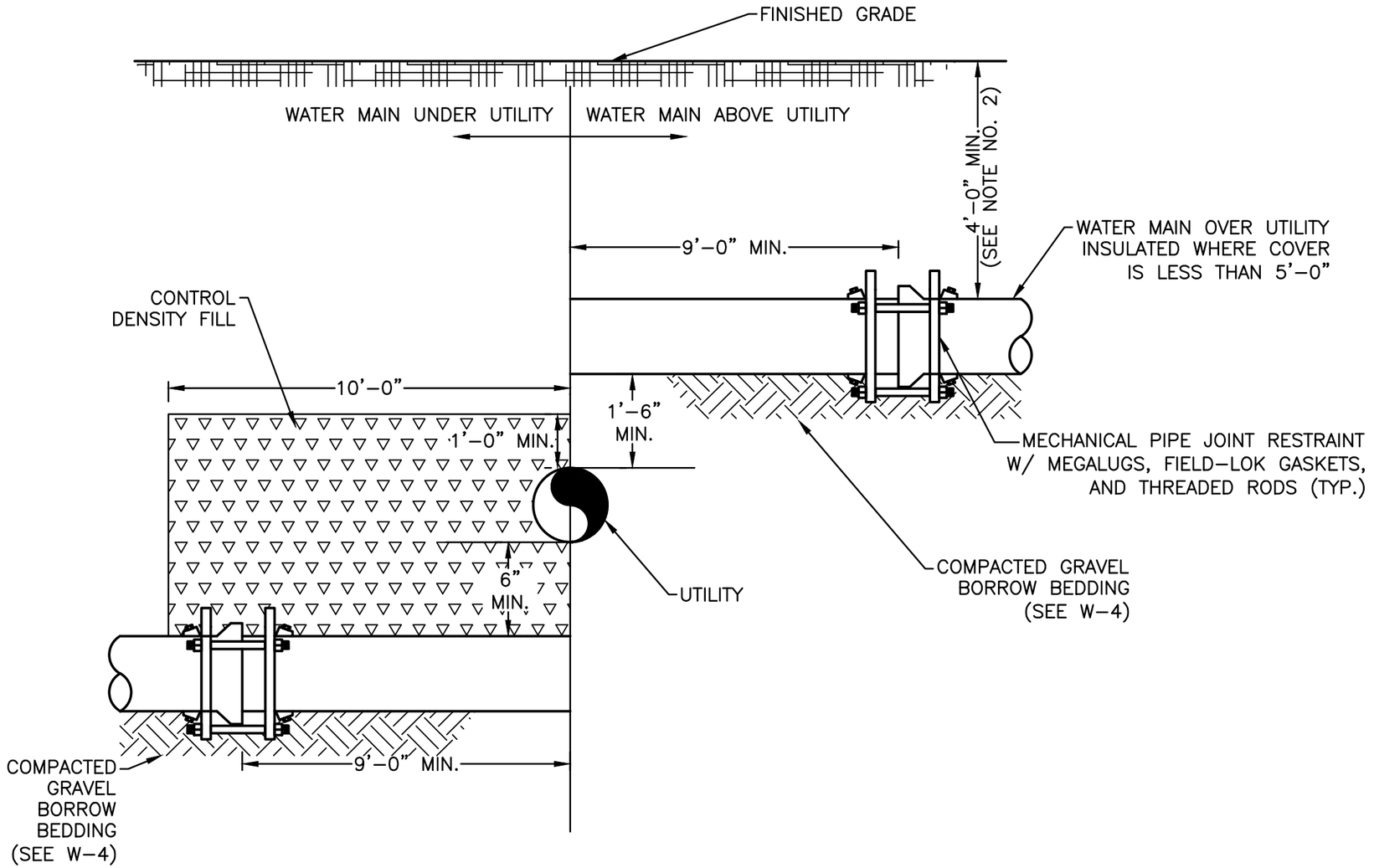
NOTES:

1. "UTILITY" REFERS TO SEWER, DRAIN AND ASBESTOS CEMENT CEMENT PIPE IN THE CONTEXT OF THIS DETAIL.

2. WATER MAINS AND SERVICES SHALL BE KEPT REMOTE FROM SEWER PIPING AND STRUCTURES. WHEREVER FEASIBLE, WATER MAINS SHOULD BE LAID AT A MINIMUM HORIZONTAL DISTANCE OF 10 FEET FROM UTILITY PIPING. IF LOCAL CONDITIONS PREVENT THIS, THE WATER MAIN SHOULD BE INSTALLED SO THAT THE INVERT OF THE WATER MAIN IS 18 INCHES ABOVE THE CROWN OF THE UTILITY PIPING.

3. WHENEVER WATER MAINS MUST CROSS UTILITY PIPING, THE INVERT OF THE WATER MAIN SHALL BE INSTALLED SO THAT IT IS 18 INCHES ABOVE THE CROWN OF THE UTILITY PIPING UNLESS THE TOP OF THE WATER MAIN WILL BE SET AT A DEPTH BELOW GRADE OF LESS THAN 4'–0". IN ADDITION, THE WATER MAIN SHALL BE CONSTRUCTED WITH ONE FULL LENGTH OF PIPE CENTERED ABOUT THE UTILITY CROSSING. THE WATER MAIN SHALL HAVE MECHANICAL JOINT RESTRAINTS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE UTILITY CROSSING. THE DISTANCE BETWEEN THE INVERT OF THE WATER MAIN AND THE CROWN OF THE UTILITY PIPING MAY BE REDUCED TO 6" TO MAINTAIN 4'–0" OF COVER WITH THE APPROVAL OF THE DPW–WATER DIVISION, IN WHICH CASE BOTH THE WATER MAIN AND UTILITY PIPING SHALL BE ENCASED IN CONTROL DENSITY FILL FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE UTILITY CROSSING AT THE DISCRETION OF THE DPW–WATER DIVISION.

4. IF WATER MAIN HAS TO BE INSTALLED BELOW UTILITY PIPING, THE CROWN OF THE WATER MAIN SHALL BE INSTALLED SO THAT IT IS 6 INCHES BELOW THE INVERT OF THE UTILITY PIPING. THE WATER MAIN SHALL BE CONSTRUCTED WITH ONE FULL LENGTH OF PIPE CENTERED ABOUT THE UTILITY CROSSING. THE WATER MAIN SHALL HAVE MECHANICAL JOINT RESTRAINTS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE UTILITY CROSSING. BOTH THE WATER MAIN AND UTILITY PIPING SHALL BE ENCASED IN CONTROL DENSITY FILL FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE UTILITY CROSSING.



UTILITY CROSSING

SCALE: NONE

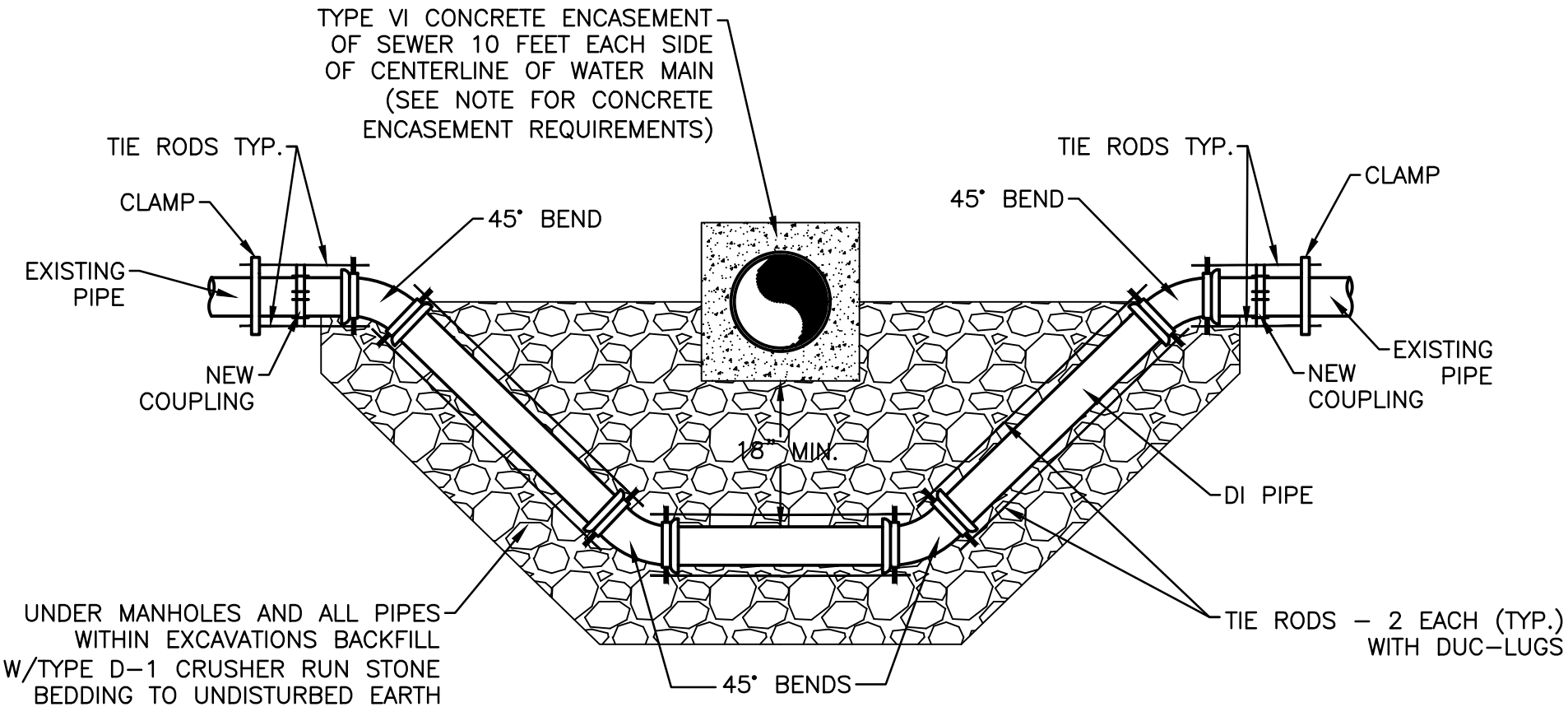
W–14_UTILITY CROSSING.dwg

TOWN OF FALMOUTH
DEPARTMENT OF PUBLIC WORKS
WATER DIVISION
416 GIFFORD STREET
FALMOUTH, MA 02540
508–457–2543

UTILITY CROSSING

W-14

DECEMBER 11, 2024



NOTE:

1. CONCRETE ENCASEMENT SHALL BE A MINIMUM OF SIX INCHES MEASURED TO THE SIDES, BELOW, AND ABOVE THE EXISTING WATER MAIN.

WATER MAIN RELOCATION DETAIL

SCALE: NONE

W-15_WATER MAIN RELOCATION.dwg

TOWN OF FALMOUTH
DEPARTMENT OF PUBLIC WORKS
WATER DIVISION
416 GIFFORD STREET
FALMOUTH, MA 02540
508-457-2543

WATER MAIN RELOCATION

W-15

DECEMBER 11, 2024

APPLICATION REQUIREMENTS AND CONSTRUCTION STANDARDS

FALMOUTH DEPARTMENT OF PUBLIC WORKS

WASTEWATER DIVISION

TOWN OF FALMOUTH
DEPARTMENT OF PUBLIC WORKS – WASTEWATER DIVISION
APPLICATION AND CONSTRUCTION STANDARDS

SECTION 1 – GENERAL

1.1 INTRODUCTION

The Town of Falmouth is committed to the protection and preservation of its citizens' interests, both individually and as a community. These Standard Plans and Specifications have therefore been adopted as an acknowledgement of this commitment to the public good. It is the intent of these specifications to require that only the highest standards of construction be permitted in order to ensure the continued dependability, quality, and performance of publicly owned facilities.

1.2 REQUIREMENTS – GENERAL

These Plans and Specifications, as approved by the Town of Falmouth, are considered the minimum acceptable standards to be followed governing planning, design, materials, and construction and installation of public wastewater collection systems and connections to the public wastewater collection system. In addition to the specifications contained herein, all installations shall conform to:

a) United States Environmental Protection Agency (USEPA) regulations;
b) All Massachusetts General Laws;
c) Current Massachusetts Department of Environmental Protection (MassDEP) regulations for the construction and installation of wastewater collection systems;
d) Falmouth Town Code Chapter 180 Sewers and Septic Systems .
e) Current Board of Health and Plumbing Code requirements for the Town of Falmouth, County of Barnstable, and the Commonwealth of Massachusetts
f) Current Town of Falmouth Planning Board rules and regulations;
g) Acceptable Town of Falmouth Department of Public Works standards.
h) Currently acceptable engineering standards for design and construction of wastewater collection systems.
i) TR-16: Guides For The Design Of Wastewater Treatment Works; 2011, 2016 Revision, and most recent revision, New England Interstate Water Pollution Control Commission (NEIWPCC).

Nothing contained herein shall be construed as limiting the Town of Falmouth Department of Public Works to approve, reject, or modify any plans or proposals for the construction and installation of wastewater collection system and service components. The Town of Falmouth Department of Public Works further reserves the right to order any such field changes as should be required during the construction phase of any such project. Non-compliance with the Construction Standards allows the Town of Falmouth Department of Public Works to exercise its right to deny service to non-compliant collection and service installations.

1.3 SUBMITTAL OF PLANS

The Town of Falmouth DPW Wastewater Division required plan submittals for wastewater collection system and wastewater service projects. The plan submittal standards are contained herein. Plan

submittals shall be consistent with the requirements set forth in these specifications for each specific type of project. Plan submittals shall comply with the submission deadlines, submittal location, number of copies, certification, and plan scale requirements.

SECTION 2 – WASTEWATER DIVISION APPLICATION AND CONSTRUCTION STANDARDS

2.1 DEFINITIONS

1. APPLICATION FOR WASTEWATER SERVICE: The application for the discharge of wastewater to the Town's Wastewater Collection System in the form provided by the Town.
2. BOARD: Shall mean the Select Board who also act as the Water and Sewer Commissioners.
3. BUILDING SEWER: Shall mean the extension from the building drain to the public sewer or other place of disposal.
4. COLLECTION SYSTEM: The Town's sanitary sewer collection system (Collection System) includes both gravity and low-pressure sewer mains, sewer stubs, or laterals, which will extend from the sewer main in the road to the property line / edge of road right-of-way, and any other associated appurtenances. These mains are generally located near the center of the Town roads.
5. CUSTOMER: Any person, partnership, firm, corporation, trust (real estate or other body) or organization of any type in which the owner(s) discharge sanitary sewage to the Wastewater Collection System. The Customer is normally the record owner of the realty being connected to the wastewater system and responsible for the account.
6. CUSTOMER SERVICE LINE: A Service Line is a pipe that connects the customer to the Town's sewer stub or lateral. The service line can be a gravity service line or a low-pressure service line. The Service Line is the property of and maintenance responsibility of the Customer.
7. GRAVITY SERVICE LINE: A customer service line that uses gravity flow to convey the sewage to the Town's sewer stub or lateral.
8. LIEN: Shall mean the statuary Lien a municipality may impose pursuant to Massachusetts General Laws Chapter 40, Section 42A.
9. LOW-PRESSURE SERVICE LINE: A customer service line that uses a low pressure pump system to convey the sewage to the Town's sewer stub or lateral.
10. PREMISES: The industrial, commercial, or residential property discharging sanitary sewage to the Wastewater Collection System.
11. PUBLIC OR PRIVATE WAY: The Town-owned or privately-owned road or street open to the public as a through-way.
12. RATES AND FEES SCHEDULE: Wastewater Division current sewer usage rates, standard fees and penalties as approved by the Select Board.
13. RULES AND REGULATIONS: Town of Falmouth Department of Public Works Wastewater Division Rules and Regulations and Falmouth Town Code Chapter 180 Sewers and Septic Systems.
14. SANITARY SEWER: A sewer which carries sewage and to which storm-, surface, and ground waters are not intentionally admitted.
15. SEPTAGE: Material physically removed from any part of an on-site system including, but not limited to, the solids, semi-solids, scum, sludge, and liquid contents of a septic tank, privy,

chemical toilet, cesspool, holding tank, or other sewage waste receptacle. Septage shall not be directly discharged to the Town's Collection System.

16. SEWAGE: A combination of the water-carried wastes from residences, business buildings, institutions, and industrial establishments, together with such ground, surface, and storm waters as may be present
17. SEWER MAIN: Pipe to which the Town's service stub or lateral is connected.
18. SEWER MAIN EXTENSION: A sewer main extension is the installation of additional sewer main to service proposed residential, industrial, commercial, or building development projects.
19. SEWER STUB OR LATERAL; The Town owned pipe extending from the sewer main to the customers property line. The sewer stub or lateral is the Customer connection point.
20. TOWN: The Town of Falmouth, Massachusetts.
21. WASTEWATER DIVISION: The Wastewater Division of the Town of Falmouth Department of Public Works

2.2 WASTEWATER SERVICES – TYPES

2.2.1 WASTEWATER SERVICE TYPE CLASSIFICATION

The Town of Falmouth Zoning Bylaw includes definitions of structure use. The DPW – Wastewater Division Sewer Service Type will be determined using the Zoning Bylaw definitions.

Dwelling – A building or portion thereof used exclusively for residential occupancy (living, sleeping, cooking, and eating) including one-family, two-family, and multifamily dwellings. This does not include commercial accommodations used, or intended for use, by single or multiple families, as the case may be.

Single-family Dwelling – A detached dwelling designed for and occupied by a single family, but not including a mobile home.

Multi-family Dwelling – A building designed and constructed so as to contain 3 or more suites of one or more rooms, each suite provided with individual cooking and other facilities for independent housekeeping, used or intended to be used for the non-transient housing of 3 or more family units.

Mixed Use Development – A development containing a mix of residential uses and non-residential uses, including, without limitation, commercial, institutional, or other uses, as well as modifications to existing buildings.

Multiple Use – Any combination of uses allowed as a matter-of-right or by special permit on a single lot which may require separate permits for construction, occupancy, business certification, license to sell food or alcohol, or other municipal approval.

Non-residential use – Any use, including but not limited to industrial and/or commercial use, that does not include residential use and does not meet the multiple use definition.

Semi-detached Dwelling – Two one-family dwellings built together at the same time and separated by a fireproof division with no openings.

Two-family Dwelling – A detached dwelling designed for two families.

2.2.1 SINGLE FAMILY AND TWO-FAMILY DWELLINGS WASTEWATER SERVICES

Individual wastewater services will be extended to each single-family and two-family dwelling or lot. The wastewater service connections shall be either gravity service connections or low-pressure service connections.

Please review the Gravity Sewer Service Guide For Residential Private Property Installation found in Appendix A and the Low-Pressure Sewer Service Guide For Residential Private Property Installation found in Appendix B for the service requirements.

2.2.2 MULTI-FAMILY DWELLING WASTEWATER SERVICE

Multi-family dwellings wastewater services must be designed by a Massachusetts Registered Professional Engineer and stamped plans and calculations prepared by a Massachusetts Registered Professional Engineer submitted for Wastewater Division approval. The wastewater service design must include, at a minimum, each unit's proposed number of bedrooms, projected flow volumes for each unit using design flow volumes provided in the current 310 CMR 15.203 System Sewage Flow Design Criteria or subsequent revisions, the total flow volume for the non-residential or mixed-use structure, the proposed wastewater service connection pipe size and material from the sewer stub or lateral to the multi-family dwelling. The wastewater service pipe material and fittings shall comply with the DPW pipe and fitting specifications.

2.2.3 NON-RESIDENTIAL, AND MIXED-USE WASTEWATER SERVICES

Non-residential and mixed-use wastewater services must be designed by a Massachusetts Registered Professional Engineer and stamped plans and calculations prepared by a Massachusetts Registered Professional Engineer submitted for Wastewater Division approval. The wastewater service design must include, at a minimum, each non-residential and mixed-use unit's proposed use, projected flow volumes for each unit using design flow volumes provided in the current 310 CMR 15.203 System Sewage Flow Design Criteria or subsequent revisions, the total flow volume for the non-residential or mixed-use structure, the proposed wastewater service pipe from the facility to the sewer stub or lateral. The wastewater service pipe material and fittings shall comply with the DPW Wastewater Department pipe and fitting specifications.

2.2.4 WASTEWATER SERVICE ABANDONED - REQUIRED UPGRADES

Wastewater services are required to be upgraded to meet the current DPW – Wastewater Division service standards when the existing wastewater service is abandoned, and a new wastewater service is required.

2.3 WASTEWATER SERVICE REQUIREMENTS

2.3.1 GENERAL PROVISIONS - WASTEWATER SERVICE APPLICATION AND FEES

All applications for the connection of the Premises to the Town wastewater collection system shall be made in writing on an Application for Water/Sewer Service Application provided at the DPW Building, 416 Gifford Street, Falmouth, MA 02540 and on-line at the address provided at the end of this section. Only the Customer, or their duly authorized agent, may apply for a connection to the Town wastewater collection system. Each sewer connection requires an individual application. Approval of the application by the Wastewater Division shall create a contract between the Wastewater Division and the Customer obligating the Customer to pay the Town of Falmouth its established rates and fees and to comply with the Rules and Regulations. All applicants shall pay an application fee in accordance with the current Rates and Fees Schedule.

A Sewer Connection application can be obtained at:
https://www.falmouthma.gov/DocumentCenter/View/10559/Water-Service-Application

The application must be completed by the Customer, or their duly authorized agent, and signed by the Customer.

Wastewater Division fees including connection application fees can be found at: https://www.falmouthma.gov/604/Fees.

The Applicant is directed to review Town Code 180 Sewers and Septic Systems, Part 3 Service Areas and Districts, Article VIII Flow Neutral Bylaw for Present and Future Sewer Services Areas (Flow Neutral Bylaw). The Applicant must satisfy the Flow Neutral Bylaw requirements prior to submitting a Wastewater Service Application. The Flow Neutral Bylaw process is separate from the Wastewater Service Application process. A copy of the Flow Neutral Bylaw is provided in Appendix C.

2.3.2 WASTEWATER SERVICE APPLICATION PLAN REQUIREMENTS

All of the application's required information must be provided along with a plan that meets the following requirements:

a) Plan drawn to scale on an appropriately sized sheet with an Engineering scale no larger than 1" = 40' to include the following:

b) Residential Sewer Connection Applications
   1) House and any other existing structures
   2) Driveway and its construction material
   3) Building sewer or septic tank and leaching field for properties with private wastewater systems.
   4) Building sewer, pump, and chamber (if applicable), and sewer customer service line connection to sewer stub or lateral.
   5) Owner's water line from street to where it enters house.
   6) All underground utilities including, but not limited to, natural gas, electric, cable, stormwater drainage, that service the property shown on the property and their connections from abutting streets or properties.
   7) Distance between the water service line, sewer customer service line, and building sewer connection to all underground utilities including, but not limited to, natural gas, electric, cable, stormwater drainage, must be indicated on the plan.

c) For multi-family dwellings, non-residential, and mixed-use service applications, in addition to the information required for residential service applications the following additional requirements apply:
   1) The required plan(s) must be stamped by a Massachusetts registered professional engineer. The plans must include construction details that conform with the DPW Wastewater Division Construction Details and Material Requirements.
   2) The plans must state the proposed use for each unit included in the proposed development.
   3) Calculations showing the projected average daily wastewater flow in units and peak daily flows in units per minute must be provided. Design wastewater flow is calculated flow (gallons per day) based on Title 5 factors (310 CMR 15.203) for the proposed use(s).
   4) Recommended building sewer connection size stamped by a Massachusetts registered professional engineer must be provided. The building sewer connection pipe material and fittings shall comply with the DPW pipe and fitting specifications.

d) For gravity connection show:
   1) Gravity pipe route from building to lateral stub, showing any bends, clean outs or other features.
   2) Note pipe material, pipe length, depth at building and depth at stub, slope. All materials must comply with DPW specifications.

e) For outdoor low pressure connection show:
   1) Gravity pipe route from building to grinder pump unit, showing any bends, clean outs or other features. Note gravity pipe material and diameter, approximate length, depth at building and depth at pump unit inlet, slope. Include grinder pump specifications and calculations prepared by a Massachusetts Registered Professional Engineer verifying the proposed grinder pump system is compatible with the design flow and customer service line configuration.
   2) Location of grinder pump unit and type (flood plain or not)
   3) Location of grinder pump control panel,
   4) Vent location (if flood plain)
   5) Route of low pressure line from grinder pump unit to lateral stub.

6) Note pipe material and diameter and type and location of any fittings. All materials must comply with DPW specifications.

f) For indoor low pressure connection (please note that outdoor pumps are recommended over indoor pumps where possible, for a number of reasons including access for maintenance) show:
   1) Note where in house where indoor pump will be located, ex: southeast corner of unfinished basement.
   2) Location of grinder pump control panel
   3) Vent location
   4) Route of low pressure line from building to lateral stub. Note pipe material and diameter and type and location of any fittings.

g) For multi-family dwellings, non-residential, and mixed-use service applications, include grinder pump specifications and calculations prepared by a Massachusetts Registered Professional Engineer verifying the proposed grinder pump system is compatible with the design flow and customer service line configuration.

2.3.3 WASTEWATER SERVICE APPLICATION SUBMITTAL AND REVIEW

The application required supporting documents, and the required fee must be submitted to the DPW at 416 Gifford Street, Falmouth, MA. The required fees can be found at: https://www.falmouthma.gov/315/Fees.

The Falmouth Wastewater Department will review the application when all of the Department's Wastewater Service Application required documentation has been submitted. The Wastewater Department will review the application, request any additional information it requires to review the application, and issue approval when all the Wastewater Department service requirements have been met. Wastewater Division approvals may include additional conditions at the Department's discretion.

2.4 WASTEWATER SERVICE SEPARATION FROM OTHER UTILITIES

The following sewer pipe separation distances from other utilities are required for all sewer customer service installations.

a) The following separation distances between the wastewater service piping and other utility piping must be maintained :
   1) Water (domestic or private) – Ten (10) feet horizontal or eighteen (18) inches vertical
   2) All other utilities – Five (5) feet horizontal and one (1) foot vertical

b) When any Water Service Line is located at a horizontal distance of 10 feet or less from any public wastewater system component it must be installed so that the water main invert is a minimum vertical distance of eighteen (18) inches above the wastewater piping crown. If the minimum 10 feet horizontal separation cannot be maintained and/or the water service cannot be installed a minimum vertical distance of 18-inches above the wastewater piping crown, then the wastewater system piping shall be encased in control density fill for a distance of ten feet on each side of the pipe length where the separation from the water service requirements cannot be met.

c) Water service and wastewater piping crossings shall be installed in accordance with the crossing detail provided in the Utility Standards.
d) All wastewater service installations where the wastewater service piping and other utility separation distances cannot be met and/or the wastewater service crosses other utilities must be inspected by a DPW representative prior to backfilling. It is the Owner's responsibility or, if designated by the Owner, their wastewater service installer's responsibility to schedule an inspection by the DPW Wastewater Division.

2.5 Wastewater Service Material Requirements

2.5.1 WASTEWATER SERVICE MATERIAL REQUIREMENTS

The following requirements apply to all wastewater services installed or repaired after the effective date of these regulations.

a) HOUSE/DWELLING and CONDOMINIUM– TOWNHOUSE STYLE UNITS WASTEWATER SERVICE LINES
    1) Gravity sewer service material requirements can be found in Appendix A, Gravity Sewer Service Guide for Residential Private Property Installations.
    2) Low pressure service material requirements can be found in Appendix B, Low Pressure Sewer Service Guide for Residential Private Property Installations.
b) MULTI-FAMILY, NON-RESIDENTIAL, and MIXED-USE WASTEWATER SERVICE LINES
    1) For MULTI-FAMILY, NON-RESIDENTIAL, and MIXED USE wastewater services the wastewater service Line size shall be designed by a Massachusetts Registered Professional Engineer in accordance with Section 2.3.2.c. Pipe and fittings shall comply with the Wastewater Division Material requirements.

2.6 Wastewater Main Extension Requirements

2.6.1 Need for Wastewater Main Extension

a) Residential, Non-residential, and Mixed-Use building development proposals shall be reviewed by the DPW - Wastewater Division Superintendent or their representative on an individual basis. These development proposals will be required to install or improve wastewater mains with the property owner or developer responsible for the wastewater main and service connection full cost.
b) All wastewater main extensions shall be run to the farthest point of the property line, except as otherwise authorized.

2.6.2 Application for Wastewater Main Extension

a) An application for wastewater main installation shall be completed by the developer or owner and submitted to the DPW – Wastewater Division for review and approval before any construction can proceed.

b) All applications must contain the complete information requested. This information includes:

1) An engineered construction plan prepared and stamped by a Massachusetts Registered Professional Engineer with an appropriate scale (no larger than 1 inch = 40 feet showing the proposed main extension, stubs, laterals, and potential sewer customer service locations.

2) Wastewater main details consistent with the DPW – Wastewater Division standard details.

c) Payment of all required review fees, including the Sewer Privilege Fee, Sewer Extension/Connection Agreements fee, connection fees, and any other fees established shall be made before construction can commence.

2.6.3 Cost for Wastewater Main Extension

a) In all areas not serviced by the Falmouth Wastewater System on the date of adoption of these Utility Standards, the developer or owner of a property shall be responsible for all costs with regard to wastewater main design, approval, installation(s), and connection(s) to the existing system.

2.6.4 Wastewater Main Extension Easements

a) The Town shall provide easement documents to be completed by the applicant at the time the application is submitted.
b) The Town and the applicant will enter into an easement agreement for the wastewater main extension.
c) The Town's Select Board must approve the easement agreement.
d) The applicant must file the Select Board approved easement documents in the Barnstable County Registry of Deeds and provide a copy of the filing prior to the wastewater main extension being approved by the DPW - Wastewater Division.
e) Upon connection to the Falmouth Wastewater Collection System title and ownership of the wastewater main will be transferred to the Town of Falmouth by easement and the Falmouth DPW Wastewater Division will service, maintain, and repair the wastewater main and appurtenances.

2.6.5 Wastewater Main Extension Materials and Installation

a) All materials to be used in conjunction with any and all wastewater mains and installations of the same shall be in strict accordance with DPW - Wastewater Division material specifications available by the Falmouth DPW.
b) All construction shall be completed in strict accordance with the DPW – Wastewater Division construction standards and details.

2.6.6 Wastewater Main Extension Inspection

a) The DPW – Wastewater Division or its representative must inspect each wastewater main extension and service installation prior to being backfilled. The DPW will not bring any main extension on-line that has not been inspected. The DPW – Wastewater Division must be notified 5 business days in advance of the wastewater main extension construction commencing.
b) The DPW – Wastewater Division reserves the right to engage a third-party inspector to inspect the wastewater main extension. The cost associated with the DPW – Wastewater Division's use of a

third-party inspector will be paid by the applicant prior to the wastewater main extension application approval. The DPW – Wastewater Division shall provide a copy of the third-party inspector's proposal to complete the inspection work for review.

c) Pressure and Leakage Testing - The installed pipe shall be tested in accordance with the testing requirements provided in Appendix D, Leakage Testing of New Sewers.

e) The DPW – Wastewater Division will allow the applicant to discharge to the installed sewer main until a copy of the sewer main leakage test results is provided to the department.

SECTION 3 – WASTEWATER DIVISION MATERIAL SPECIFICATIONS

3.1 SANITARY SEWER PIPE MATERIALS

3.1.1 PVC PLASTIC PIPE

a) PVC Plastic Pipe 4 – 15 Inch Diameter (Buried Mains and Services):

1) Unplasticized PVC gravity sewer pipe and fittings with integral wall bell-and spigot joints meeting ASTM D3034 specification for Type PSM PVC sewer pipe and fittings, standard dimension ratio (SDR) 35.

2) The pipe shall be joined with an integral bell, bell-and-spigot-type rubber gasketed joint. Rubber gasket shall conform to ASTM F477. The rubber gasket shall be compressed radially on the pipe spigot to form a watertight seal in accordance with ASTM D3212.

3) Fittings shall be made of PVC having a cell classification of 12454B or 12454C or as defined in ASTM D1784. Fabricated fittings with solvent cemented components shall be made in accordance with ASTM D2855 and ASTM F402.

4) Pipe stiffness at 5 percent deflection shall be 46 psi for all pipe diameters when tested in accordance with ASTM D2412.

5) Air and deflection testing to be performed in accordance with the requirements of this section.

3.1.2 PVC PIPE ACCESSORIES

1) Fittings - Same size, material and class as pipe, molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, couplings, adapters, and other configurations required.

2) Pipe Connection Table - When connecting dissimilar pipe materials or when connecting new pipe to existing pipe, the following connections shall be used:

TYPE TO TYPE	SOLVENT CEMENT SOCKET COUPLING	SDR TO SCHEDULE 40 (GSX/SXS)	PVC GASKETED REPAIR SLEEVE	CAST COUPLING	RUBBER ADAPTER WITH SHEAR RING	REPAIR CLAMP
Sch 40 to Sch 40	✓					✓
Sch 40 to SDR		✓				
Sch 80 to Sch. 80	✓					✓
Sch 40, 80, or SDR to DIP/CIP				✓		✓
Sch 40, 80, or SDR to clay					✓	
Sch 40, 80, or SDR to asbestos cement				✓		
DIP/CIP to clay					✓	
Asbestos cement to clay					✓	
SDR to SDR			✓			
DIP/CIP to DIP/CIP				✓		✓
Clay to clay					✓	
Asbestos cement to CIP/DIP				✓		

a) Rubber Adapter with Stainless Steel Shear Rings (4- to 15-Inches) - Fernco 4-Band Flexible Couplings or equal.
b) Repair Clamp - Dresser Model 360 “All-Around” pipe repair clamps in stainless steel or equal.
c) Cast Coupling (4- to 16-Inches) - Dresser Model 253 “Modular Long Sleeve” cast coupling, Smith-Blair Model 442 “Long Sleeve,” Romac, or equal.

3) Marking Tape – Identifying magnetic marking tape shall be 2-inches wide with the words – “SANITARY SEWER BELOW”.
4) Identification - Each pipe length and fitting shall be clearly marked with:
    a. Manufacturer’s name and trademark.
    b. Nominal pipe size and class.
    c. Material designation.

3.2 MANHOLES

3.2.1 PRECAST CONCRETE BASES

a) Design and manufacture of precast concrete bases for manholes shall conform to the requirements of this Section and ASTM C478. Bases shall conform to the dimensions indicated on the Drawings, and the horizontal joint at the top of the base shall be compatible with that of the precast wall section.

b) Precast bases shall be manufactured to contain openings in the wall, of minimum size, to receive the ends of the installed sewer pipe. Openings shall be accurately positioned to conform with line and grade of the connecting sewer.
c) The top of the manhole base shall extend at least 10 inches above any pipe openings in the base.

3.2.2 PRECAST CONCRETE WALLS AND MANHOLES TOPS

a) Design and manufacture of precast concrete walls shall conform to the requirements of this Section and ASTM C478.
b) Precast concrete walls shall be made with straight, circular pipe sections and eccentric cone. The total height of precast wall required for each manhole shall be determined in the field and shall be such that the vertical distance between the top of the assembled precast units and the bottom of the installed cast iron manhole frame is a minimum of 4 inches and a maximum of 12 inches, to allow for grade adjustment rings.
c) If required, manhole steps shall be cast integrally or grouted solid into the precast wall units as specified in a later article. Lifting holes that extend completely through the manhole are not permitted in the precast units.
d) All joints in the precast wall, including the joint at the top of the base, shall be made up using one of the following:
    1) "Snap-On" type O-ring gasket and shall conform to ASTM C443; except that joint taper shall not exceed 3-1/2 degrees. The precast sections shall be provided with a special groove (cast into the male end) to receive and hold the gasket in position during joint assembly.
        a. When using O-ring gaskets, the gap between sections shall be packed on the inside and outside with grout after joint assembly. The grout shall be A-H Axpandcrete by Anti-Hydro, Masterflow 713 Plus by Degussa, or Five Star® Grout by Five Star Products, Inc., or equal, and shall be troweled smooth so that no projections remain on the inside. There shall be concrete to concrete bearing between the various sections, and the gasket shall not support the weight of the section.
        b. Two beads of butyl-type rope joint sealant material. Install to manufacturer's specifications. Barrel mating surfaces shall be clean, dry, and free from grease, oil, dirt, or organic matter to assure a proper watertight seal between seating and butyl rope material.
e) If required, precast reinforced concrete slab tops for manholes shall be manufactured in accordance with ASTM C478, except that thickness and reinforcing shall be as shown on the Drawings. Openings shall be of the proper diameter to receive the frame specified.
f) Manhole tops shall be cast with four threaded inserts to accommodate frame hold-down bolts.

3.2.4 FRAME AND COVERS

a) Frames and covers shall be of the make, style, opening, height, weight, and other designation specified herein or shown on the Drawings.
b) Material shall be gray cast iron conforming to ASTM A48, Class 30; or shall be ductile cast iron conforming to ASTM A536, Grade 60-40-18.
c) Unless otherwise scheduled, frames and covers shall be heavy duty (H-20 Traffic Loading), non-penetrating pickhole type of non-rocking design, and shall have machined bearing surfaces to prevent

rocking and rattling under traffic loads. Covers shall have cast in, 1-1/2- inch wide, raised letters, the words "SEWER".

d) Unless otherwise noted, all manhole covers shall be self-sealing and shall be furnished with O-ring rubber gaskets.
e) Surface finish shall be smooth and well-cleaned by shot-blasting or by some other approved method.
f) Frames and covers shall have clear opening of 30-inch diameter.
g) Rubber gasketed lids shall be installed on all manholes into which pressure sewer discharges.
h) Manufacturer shall be EJ or equal.
I. Vented covers shall not be used, unless required by Engineer.
i) Water-tight and/or locking manhole frames and covers shall be provided when indicated on the manhole schedule located on the Drawings

3.2.5 MANHOLE STEPS

a) Manhole steps are to be provided in manholes. Steps are to be cast in or grouted solid into the precast units at intervals of 12 inches. Steps shall be in conformance with OSHA requirements having drop front or equivalent. Bolted-on types are not acceptable. Manhole steps to be Neenah Casting Company R-1982F, Syracuse Casting Company #2588-2, M.A. Industries, Inc. or equal copolymer polypropylene reinforced with 1/2-inch steel rod.

3.2.6 GRADE RINGS

a) General - Grade adjustment for a manhole shall not exceed 12 inches. In no event shall more than three grade rings be used for final adjustment.
b) Precast Concrete Grade Rings - Precast concrete grade rings for leveling units shall be manufactured in compliance with the requirements of the Specifications for Precast Reinforced Concrete Manhole Sections, ASTM C478; and shall be as thick as necessary to provide the required grade adjustment but not less than 3-inches or greater than 6-inches in height. Split grade rings are unacceptable. Broken or cracked concrete grade rings will not be acceptable.
c) Final adjustment of less than 6-inches shall be in accordance with Paragraph 3.03.D.2.
d) Rubber grade rings are not allowed.

3.2.7 CEMENT GROUT

a) Cement grout shall be non-shrink, non-metallic.
b) Use Type I cement where grout is not in contact with sewage.
c) Use Type II (sulfate resistant) where grout is in contact with sewage

3.2.9 PIPE SEALS

a) Sanitary sewer connections between manholes and pipes shall be made with rubber gasket sleeves in the manufactured sizes available, with stainless steel straps and bolts. Elastomeric waterstop gaskets are not permitted. Provide rubber boot-type connectors with all stainless steel hardware as manufactured by NPC, Inc., Model Kor N' Seal; Press Seal Gasket Corporation, Model PSX; Hamilton Kent, Tylox Boot Connectors or equal.
b) Openings in manholes for 8-inch sewers shall be as follows:
    1) Influent Sewer Slope Less Than 6 Percent - Use 11-inch diameter boot.
    2) Influent Sewer Slope 6 to 12 Percent - Use 12-inch diameter boot.
    3) Influent Sewer Slope Greater Than 12 Percent - Use 13-inch diameter boot.

c) The ends of the pipe shall be accurately positioned in the openings, properly secured against movement, and the remaining annular space between the pipe wall and the base completely packed with A-H Axpandcrete by Anti-Hydro, Masterflow 713 Plus by Degussa, or Five Star® Grout by Five Star Products, Inc., or equal. Before the grout has set, the Contractor shall recheck invert elevations of the ends of the pipe and perform any adjustments which are necessary to establish the required line and grade of the sewer.

3.2.10 DROP SECTIONS

a) Whenever the invert of a pipe entering a manhole is 24 inches or more in height above the invert of the lowest pipe leaving the manhole, it shall be connected to the manhole with an inside drop section as shown on the Drawings.
b) Inside Drop Connection
    1) When inside drops are used, a 5-foot diameter manhole shall be installed.
    2) Use polyvinyl chloride (PVC) sewer pipe and fittings (SDR Class 35) in accordance with Section 02733.
    3) Inside drop shall be constructed in accordance with Detail S-3.
    4) Discharge of drop shall not be on the top of the bench wall but into the channel. A 45 degree or less bend may be used to direct flow into the channel.

3.2.12 BENCH WALL CONSTRUCTION

a) Bench walls shall have a slope between 0.1 inches per foot and 0.5 inches per foot. No lateral sewer, service connection, or drop manhole pipe should discharge onto the surface of the bench.
b) Bench walls shall comply with Detail S-1.

3.2.13 WATERPROOFING

a) The Contractor shall furnish manholes waterproofed over the entire exterior surface that will be below finished grade. The waterproofing shall not mar or interfere with the specified exterior finish for these structures. Waterproofing shall be accomplished prior to structure installation for precast sections and shall be applied to dry surfaces under proper weather conditions.

3.2.15 GEOTEXTILE FABRIC

a) Geotextile fabric placed for manhole installations shall be Mirafi 180N or equivalent

3.4 LOW PRESSURE SEWAGE MAIN

3.4.1 LOW PRESSURE PIPING MATERIALS

a) Polyethylene for pressure pipe with material conforming to ASTM D3350, Type PE3408 Pressure Class 200, SDR-11.
b) Pipe and fittings 1-1/4-inch through 4-inch shall be manufactured and furnished by the pipe supplier and in conformance with AWWA C901 requirements. For pipe sizes greater than 4-inch, pipe and material shall conform to AWWA C906.
c) Joints for polyethylene pipe shall be joined by the butt fusion method in a manner recommended by the pipe manufacturer.
d) Threaded transitions for flushing / cleanout assemblies shall be SDR-11 butt fusion by male 304 stainless steel threaded transition, thread type NTP.

e) Caps shall be installed at the end of service laterals. Caps shall be secured (screwed or welded) to facilitate testing.

3.4.2 PIPE ACCESSORIES

a) Fittings - Same material, class, coating and lining as pipe, unless under Article 2.01 it was specifically described otherwise. Fittings molded or formed to suit pipe size and end design and in required tee, bends, elbow, couplings, adapters, and other configurations.
b) Pipe openings in walls shall be precast or core drilled and completely sealed against water seepage with a mechanical type seal consisting of interlocking synthetic rubber links and nuts with pressure plates wider at ends, the seal shall be link seal manufactured by Thunderline Corporation, Innerlynx, Flexicraft or equal.
c) Magnetic locating tape, trace wire, shall be a minimum of 2 inches wide with the words “Sewer Line Below”.

3.4.3 IDENTIFICATION

a) Each pipe length and fitting shall be clearly marked with:
    1) Manufacturer’s name and trademark.
    2) Nominal pipe size and class.
    3) Material designation

3.4.4 CHECK VALVES AND CURB STOPS (Town Installed)

a) All check valves and curb stops (at property connections) shall be Stainless steel as part of the E-One standard lateral kit rated for minimum pressure of 250 psi.
b) Check valves shall be so designed that when there is no flow through the line, the disc shall hang lightly against the seat and shall afford ample waterway with but a small angle of opening.
c) All check valves shall be provided with screwed or bolted covers for access to the disc.

3.4.5 BURIED GATE VALVES AND ISOLATION VALVES GREATER THAN 2 INCHES

a) Buried gate valves shall be resilient seated, non-rising stems, 2-inch operating nuts, O-ring seal and shall open counterclockwise (left).
    1) Underground gate valves shall be of the iron body, bronze mounted type conforming to AWWA Standard C500.
    2) Mechanical joint type designed for underground use at 150 psi.
    3) Underground gate valves shall be Mueller, Kennedy Valve Manufacturing Company, J&S Valves, or equal.
    4) Valve box shall comply with DPW Wastewater standard details.

3.4.6 BALL VALVES (Town Installed)

a) Ball valves for low pressure sewer flushing /cleanout assemblies shall be 316 Stainless Steel, full port, pressure rated for a minimum of 150 psi, with female NPT threaded connection.
b) Ball valve ends shall be as needed to connect to SDR 11 HDPE pipe in low pressure sewer cleanouts/flushing assemblies.

3.4.7 AIR RELIEF VALVE (Town Installed)

a) Air relief valves shall be installed on pressure mains in locations to be determined by the Town.
b) A brass shutoff valve shall be installed on all connections between the air relief valves and the pressure mains.

c) The air relief valves shall be designed to release air from the sewer mains when pumps are started and the main is being filled and to admit air into the sewer main when pumps are stopped and the main is being drained by gravity.

d) Manufacturer - A.R.I., D-020 or equal.
   1) Type - Combination air valve for sewage.
   2) Operation - The valve is specially designed to operate with liquids carrying solid particles such as sewage and effluent. Provides separation of the liquid from the sealing mechanism. The air gap separation is sustained under pressure up to 230 psi by a conical body shape, and under vibration, by a spring-loaded joint.
   3) Air and Vacuum Component - The valve must discharge air at high velocity during filling of the system and admit air during its drainage. The valve should be designed to prevent premature closing.
   4) Automatic Component - The valve will release accumulated air from the system while the system is under pressure and operating. Large dimension automatic orifice of at least 0.0186 square inches attached to the kinetic orifice is less exposed to obstruction by debris. The same orifice for a wide pressure range (up to 230 psi).
   5) Pressure - 3 to 230 psi.
   6) Testing Pressure - 360 psi.
   7) Ends - Flanged ends, ANSI standard, or 2-inch male threads NPT.
   8) Body Material - Stainless steel.
   9) Drainage Outlet - For easy removal of excess fluids.

3.4.8 ISOLATION VALVES UP TO 2 INCHES (Town Installed)

a) Ball valves used for isolating low pressure pipe up to 2-inches shall be of brass or bronze construction and two rubberized O-ring seals to provide pressure-tight seal. Ball valves shall be Figure H-15204 as manufactured by Mueller-Oriseal, B22 as manufactured by Ford Meter Box Company, Hayes, Nuseal, or equal. Valves shall be full port.

b) Curb boxes shall be 2-1/2-inch shaft size two-piece screw type. They shall be adjustable from 48-inch to 72-inch. Curb boxes shall be constructed of cast iron and thoroughly coated with two coats of asphaltum varnish.

c) Curb box top section shall include a watertight cover which shall be of the “old style” with the word “Sewer” cast into it and shall include a brass pentagon screw.

d) Curb box rods shall be supplied with a hole in the “U” portion for the insertion of a brass pin. Pins shall be supplied and shall be made of brass.

e) Curb boxes shall be as manufactured by Ford Meter Box Company, Mueller Company, or equal.

3.4.9 FRAMES AND COVERS (Town Installed)

a) Covers shall be Cleanout/Monument Box assembly, material shall be Gray Iron, 8-inch tall. Top flange bolted to structure. The cover shall be watertight gasketed type. Gasket shall be neoprene O-ring. In locations where locking covers are called for cover shall have stainless steel fasteners.

b) The covers shall be 26 inches in diameter with 24-inch clear opening in frame.

c) Cover shall read “Sewer”. D. Cover shall be EJ Model 1040 or equal.

APPENDIX A

Gravity Sewer Service Guide For Residential Private Property Installation

TOWN OF FALMOUTH

DEPARTMENT OF PUBLIC WORKS

GRAVITY SEWER SERVICE

GUIDE FOR RESIDENTIAL PRIVATE PROPERTY INSTALLATION

I. GENERAL

A. This document is intended to provide guidance for property owners and their licensed plumbers for the installation of the gravity sewer service connection from the home or served structure to the Town's gravity sewer service lateral.

B. Plumbers are advised to review property site information and the Town's sewer service area plans to determine whether the property can be served by an on-site gravity sewer, to confirm the lateral stub location, and to lay out the sewer connection. There are a few properties in areas served by the Town's gravity collection system that, due to the relative elevation of the property, require a low pressure pump. These plans are available for review at the Public Works building at 416 Gifford Street.

C. The property owner and their licensed plumber are responsible for obtaining the Combined Permit and associated inspections and approvals including:

1. Building Department – Plumbing
2. Sewer Division – Department of Public Works
3. Conservation Commission (if applicable)
4. Health Department (for abandonment of septic systems)

II. MATERIALS AND EQUIPMENT

A. Materials and Equipment to be Supplied by Town

1. The Town will install a service lateral from the main in the street to the property line. The service lateral will include a clean-out at the curb and will be capped.

B. Materials and Equipment to be Supplied by Property Owner

1. Gravity Sewer Pipe – 4" pipe (or sized to match existing sanitary sewer from house) and fittings as required to connect existing sanitary piping to the Town-supplied gravity service lateral stub. Pipe shall be SDR-35 PVC pipe and fittings with gasketed "push-on" joints. **Note:** Pipe and transition couplings within 10' of the foundation shall be as required by the local plumbing code and may require an adapter.

III. EXECUTION

A. Gravity Sewer Pipe - The pipe shall be placed at a 2 percent slope (minimum slope shall be 1/8" per foot, or 1 percent) from the house / structure to the gravity service lateral stub. Gravity pipe shall be laid in a bed of gravel and then backfilled with clean, compactable material. As an alternative, sewer pipe can be placed in a bed of sandy, well-drained soil. Stones greater than 2 inches shall be removed such that no stones are within 6 inches of the installed pipe. No 90 degree bends shall be used.

B. Location and Depth – Place gravity sewer pipe at a minimum depth of 4-feet, if possible. Maintain a minimum 5' distance from potable water service.

C. Tracing Tape - A tracing tape indicating sewer below or equivalent shall be installed above the entire sewer line approximately 12 inches below the surface.

D. Backfilling – Take care to "tamp" the soil along both sides of the pipe (up to the top of the pipe) prior to backfilling the entire trench. Mechanically compact backfill over the pipe trench. When backfilling under driving surfaces, trench shall be backfilled in 6- to 8-inch lifts and well compacted. In lawn areas backfill in 18-inch lifts and adequately compacted.

E. Cleanouts – Install 4-inch cleanouts on property if and where bends that are 45 degrees or greater are installed on the gravity system or as otherwise necessary (100' intervals). Cleanouts must be capped with a frame and cover properly rated for their location (H-20 if may potentially be driven over) to protect from damage, and to ensure they can be located in the future.

F. Connection to the Town Sewer System

1. Sewer installation should proceed from the Town service lateral fitting with bell ends of the pipe facing upstream toward the building.

2. This initial connection and run of pipe must be inspected by the Town **prior to backfilling.** Contact the Town Plumbing Inspector at 508 495-7470 and the Town Department of Public Works at 508-457-2543 to schedule the inspection at least 48 hours prior to connecting to the system. **Note: ensure that no dirt or foreign material enters the pipe during installation.**

3. The Town-supplied sewer stub, or lateral, was supplied with a cap / plug. Excavate to expose the cap. Remove the cap and connect the private system to the Town's system. **Ensure that no dirt or foreign material enters the pipe during connection.**

G. Final Acceptance and Service Activation – The plumber must provide the Department of Public Works the completed Service Installation Certification Checklist and As-Built

Town of Falmouth
Department of Public Works

Sewer Service Lateral Installation Certification Checklist

LOCATION INFORMATION

Owner's Name: _____ Date: _____

Property Address: _____

PLUMBER INFORMATION

Company Name: _____ Date Activated: _____

Name of Certifying Plumber: _____ License No.: _____

GRAVITY SERVICE LATERALS

☐ All pipe & fittings are gasketed SDR-35 PVC
☐ Pipe slope is 2% (1/4"/ft.); not less than 1% (1/8"/ft.)
☐ Minimum cover depth is 4 feet
If exception was granted, specify minimum depth:_____
☐ Cleanouts at changes in direction greater than 45 degrees or 100 foot intervals; clean out covered with a frame and cover properly rated for their location
☐ Pipe properly bedded & compacted
☐ Detectable tracer tape installed 12 inches below surface (must be traceable, green tape marked "sewer below")
☐ All stormwater, roof rain runoff, sump pumps and any other non-sanitary sewer discharges disconnected from building sewer system
☐ Connection to building sewer is upstream of septic system
☐ As-built drawing prepared and submitted with this checklist

LOW PRESSURE PUMP SYSTEM LATERALS

☐ Pump influent pipe is PVC and pipe slope is 2% (1/4"/ft.); not less than 1% (1/8"/ft.); cleanouts installed as above if required; connection to building sewer upstream of septic system.
☐ Pump effluent pipe is 1.25" SDR-11 HDPE. Fittings are plastic compression-style
☐ Pump system was installed as per manufacturers' instructions
☐ Electrical connections were made as per manufacturer's instructions and Electrical Code
☐ Pump system ballast ring installed (if applicable)
☐ Pump discharge pressure pipe was checked for leaks.
☐ Minimum cover depth is 4 feet
If exception was granted, specify minimum depth:_____
☐ Pipe properly bedded & compacted
☐ Detectable tracer tape installed 12 inches below surface (must be traceable, green tape marked "sewer below")
☐ All stormwater, roof rain runoff, sump pumps and any other non-sanitary sewer discharges disconnected from building sewer system
☐ As-built drawing prepared and submitted with this checklist

CERTIFICATION

I CERTIFY THAT THE ABOVE REQUIREMENTS HAVE BEEN MET AND THIS SANITARY SEWER SERVICE INSTALLATION MEETS ALL APPLICABLE STANDARDS OF CONSTRUCTION.

Name (printed): _____ Date: _____

Signature: _____

Sewer Connection Plan within 24 hours of activating the service lateral. The failure to do this may result in water and sewer service being discontinued at the property.

Appendix B

Low Pressure Sewer Service Guide For Residential Private Property Installation

TOWN OF FALMOUTH

DEPARTMENT OF PUBLIC WORKS

LOW PRESSURE SEWER SERVICE

GUIDE FOR RESIDENTIALPRIVATE PROPERTY INSTALLATION

I. GENERAL

A. This document is intended to provide guidance for property owners and their licensed plumbers for the installation of low pressure pump-type sewer service connections. These pumps will be required for properties served by the Town's low pressure sewer system. They will also be required for properties which, due to their elevation, will have to pump to the Town's gravity sewer system.

B. The installer is advised to read the entire document and the manufacturer's user manual/installation instructions before proceeding with the installation of the low pressure pump system or any appurtenances associated with the installation.

C. Definitions

1. Town – the Town of Falmouth, MA, Department of Public Works.

2. Property Owner – the property and/or home owner responsible for the installation of the low pressure pump system.

3. Licensed Plumber – the entity responsible for the permitting (see Section I.H) and installation of the low pressure pump system from the home to the Town's sewer stub. It is understood that the licensed plumber may engage other trades (electrical, earthwork, etc.) to provide a complete installation.

D. The Town of Falmouth is in the process of installing a wastewater collection system which includes both gravity and low pressure sewer mains. These mains are generally located near the center of the Town roads. The Town's contractor is installing the sewer mains and sewer stubs, or laterals, which will extend from the sewer main in the road to the property line / edge of road right-of-way. The Town is responsible for the installation and maintenance of the stub up to the property line.

E. A Massachusetts-licensed plumber is required to oversee the sewer connection on behalf of the property owner. Therefore the property owner is required to engage a licensed plumber.

F. Plumbers are advised to review property site information and the Town's sewer service area plans to determine whether the property will require a low pressure pump system, to

confirm the lateral stub location, and to lay out the sewer connection. These plans are available for view at the Public Works building at 416 Gifford Street.

G. The property owner is responsible for installing the grinder pump. They are also responsible for providing and installing various appurtenances required for a complete, functioning grinder pump system.

H. The property owner and their licensed plumber are responsible for obtaining the Combined Permit and associated inspections and approvals required for the low pressure pump system and service including:

1. Building Department – Electrical, Plumbing
2. Sewer Division – Department of Public Works
3. Conservation Commission (if applicable)
4. Health Department (for abandonment of septic systems)

II. MATERIALS AND EQUIPMENT

A. Materials and Equipment to be Supplied by Town

1. The Town will install a low pressure service lateral from the main in the street to the property line. The service lateral will include a combination curb stop and check valve at the property line and will be capped.

2. Pump Unit – The Town will provide one pump unit for each single family residential property in the low pressure portion of the service area. The property owner or their plumber must identify which one of three types of pump units is requested for the property. The following appurtenances will also be provided by the town for all units: alarm panel and remote sentry panel. For outdoor pump units, the following appurtenances will also be provided: ballast, supply cable, discharge whip for connecting to pump outlet, 1-1/4” threaded by compression coupling for connecting to combination valve at lateral):

   i. Outdoor Standard Unit: This unit has an automatic internal vent system housed within the cover. The unit is intended for installations where the pump system cover will not be subject to flood conditions.

   ii. Outdoor Flood Zone Unit: This unit is exactly the same as the Outdoor Standard Unit except that it has a different cover that is provided with an orifice for connecting an external PVC vent pipe. The flood zone unit is intended for installations where the pump system cover may be subject to flood conditions.

iii. Indoor Unit: It is recommended that this unit be considered only when installation of one of the other two pump unit types is not feasible, primarily because the outdoor installation will be more accessible for maintenance.

B. Materials and Equipment to be Supplied by Property Owner

1. Influent Pipe – 4" PVC (or sized to match existing sanitary sewer from house) as required to connect existing sanitary piping to low pressure pump basin. Influent pipe shall be SCH 40 PVC pipe and fittings with integral wall bell-and-spigot joints or as required by the local plumbing code.

2. Discharge Pipe - 1-1/4-inch high density polyethylene (PE) pressure pipe with material conforming to ASTM D3350, Type PE-3408 Pressure Class 200, SDR-11. Fittings for use with pipe shall be manufactured and furnished by the pipe supplier and in conformance with AWWA C901 requirements. Discharge pipe fittings shall be compression fittings.

3. Pump Station Bedding Material – Round aggregate or gravel, free flowing, with particle sizes between 1/8" and 3/4" in diameter. Bedding material, or gravel, is for placement under the low pressure pump basin.

4. Reinforcing Fabric - Separation geotextile fabric shall consist of a non-woven fabric that meets or exceeds the following requirements.

TEST	ASTM	CRITERIA
Mass per unit area	D5261	>=8oz/sy
Apparent opening size	D4751	<No. 70 sieve
Puncture resistance	D4833	>= 130 lb
Tensile strength	D4632	>= 150 lb
Permittivity	D4491	>= 0.1 sec-1
Burst strength	D3786	>= 200 psi

5. Backfill Material – To protect against frost heave in areas with native sand and a high, fluctuating water table, Class 1B backfill material as defined by ASTM 2321 is recommended. This material is composed of dense-graded, manufactured, angular, granular material (crushed stone) with little or no fines that when compacted leaves relatively low void space. Particle size should range from ¼" to ¾" in diameter. **As an alternative, well-draining sandy soils may be used as backfill material.**

6. Tracer tape (traceable, green tape marked "sewer below")

7. Electrical Conduit – 1-1/4” PVC-coated RGS conduit, or as required by the local codes, to be located to the depth required by the local electrical codes.
8. Pedestal Mounting – If the property owner desires to locate the low pressure pump away from the main structure or house, the alarm / disconnect panel will need to be pedestal mounted. The mounting materials, design, and installation are to be developed by the property owner and licensed plumber.
9. PVC vent pipe (where required, see below).

III. EXECUTION

A. Pump Station Installation – **Note: The Low Pressure Pump Station is to be installed per the manufacturer’s instructions. Deviating from the manufacturer’s instructions may void the manufacturer’s warranty**. The following sections give guidance on installation procedures related to the low pressure pump station installation.

1. Location – The low pressure pump station location is to be determined by the property owner and the licensed plumber. Issues to consider include the location of the Town’s low pressure sewer stub, or lateral, the location of the house’s existing sanitary pipe, and other property features. Call Dig Safe 72 hours in advance of excavation.

2. Pump Type – Plumber must pre-select one of three types as per section II-A-2.

3. Depth – The low pressure station shell has prefabricated openings for the inlet gravity pipe and the discharge low pressure pipe. The depth of the low pressure pump station (and depth of excavation) is dependent on the existing sanitary sewer depth at the desired location.

4. Excavation – Excavate area to the depth required for bedding and placement of the low pressure pump station. Line bottom of excavation with reinforcing fabric. Extend fabric 6” up the sides of the excavation.

5. Bedding – Place 6-inches, minimum, of bedding material (round, free flowing aggregate).

6. Pump Station Placement – Pump station shell shall be placed on the gravel bedding. Follow the manufacturer’s instructions for lifting the unit. The tank shall be placed such that the cover of the tank is approximately 3 inches above the final ground surface, which should slope away from the unit. Extend the pump station shell and internal vent pipe through use of the extension kit(s), if required (not provided by the Town), per the manufacturer’s instructions.

7. Ballast – Install ballast ring as per manufacturer’s instructions.

8. Backfill – Once the inlet pipe, discharge pipe, and electrical connections are made, backfill the excavation with backfill material (a dense-graded angular crushed stone or well-draining sandy soil). Backfill to within 6-inches of final grade in 18-inch lifts.

9. Fine Grading – Loosely place topsoil or native material in top 6-inches of excavation to within 4- to 6-inches of the access hatch; mounding to account for settlement. If desired, place backfill material (crushed stone) within 4- to 6-inches of the access hatch. The crushed stone will act as a “no mow” strip around the access hatch. Alternatively, place topsoil and native material up to the access hatch.

B. Inlet Pipe - The inlet pipe shall be placed at 2 percent slope (not less than 1 percent slope) from the house / structure to the low pressure pump station. Gravity pipe shall be laid in a bed of gravel or clean native material and then backfilled with clean, compactable material. Install detectable tracer tape above pipe, 12 inches below surface. Compact pipe trench with bucket of excavator. Influent sewer pipe shall be placed in the grommet (consult manufacturer’s instructions for limit on how far pipe should extend into the well). Note: 4” SDR35 may not create a watertight seal with certain grommets; see manufacturer’s recommendations.

C. Discharge Pipe – 1-1/4” PE discharge pipe shall be laid on compacted native material. Boulders and cobbles greater than 2 inches shall be removed such that no boulders or cobbles are within 6 inches of the installed pipe. Install detectable tracer tape above pipe, 12 inches below surface. Backfill around pipe with clean compactable native material. When backfilling under driving surfaces, trench shall be backfilled in 6- to 8-inch lifts and well compacted. In lawn areas backfill in 18-inch lifts and adequately compact. Pipe shall be installed at a consistent slope so that there are no significant high points or low points in the line from the grinder pump station to the Town’s sewer stub.

D. Pipe Location and Depth – Place discharge sewer pipe at a minimum depth of 4-feet, if possible. Maintain a minimum 5’ distance from potable water service.

E. Venting:

i. Standard Unit: This unit has an automatic internal vent system housed within the cover. The unit is intended for installations where the pump system cover will not be subject to flood conditions. The cover must be not be buried. The cover must be sufficiently above grade (approximately 3 inches above grade) to vent properly.

ii. Flood Zone Unit: This unit has a special cover that is provided with an orifice for connecting an external PVC vent pipe. The vent pipe must be installed in accordance with manufacturer’s recommendations, including: the vent line must

have a consistent upward slope (no low points). The flood zone unit is intended for installations where the pump system cover may be subject to flood conditions.

F. Electrical Panel and Connections

1. Electrical Supply Connection – Verify that the service voltage is the same as the motor voltage shown on the name plate. Licensed plumber, through his electrician, shall wire the system from the structure's existing power panel to the pump alarm / disconnect panel. Wiring of the supply and alarm / disconnect panels shall be per the manufacturer's instructions and per the local codes.

2. Low Pressure Pump Electrical Connection

a. Mount alarm / disconnect panel per manufacturer's recommendations and within 80 feet of the proposed grinder pump station site. Increasing this distance may compromise the communication between the pumps and the alarm / disconnect panel. The alarm / disconnect panel is intended to be mounted on the side of the house or structure, approximately 5-foot above grade, but may be pedestal mounted. **Do not core holes in the top or sides of the alarm panel; do not alter the panel in a way that would allow water to enter the panel.**

b. At the low pressure pump station - Follow the manufacturer's instructions to prepare the supply cable for installation. The supply cable will be connected to the pump and located inside the pump basin. Feed the free end of the cable to the exterior and through electrical conduit (placed vertically) until the cable is 24" deep, minimum. **All underground cable must be installed within conduit.** Also comply with the local codes.

c. Between the pump station and the supply / disconnect panel - Run the supply cable (conduit) in a trench at least 24" deep. A**ll underground cable must be installed within conduit. Do not splice cables; request a longer cable length from the Town if more than 32 feet of cable is required (50 foot and 75 foot cable lengths are also available).**

d. At the supply / disconnection panel - Install conduit from the bottom of the alarm / disconnect panel to a minimum of 24-inches below grade and feed supply cable through the conduit. Backfill the supply cable with native material.

e. Wire the alarm / disconnect panel per the manufacturer's instructions.

G. Cleaning

1. Prior to hooking up to the Town system:

a. Clean the pump station per the manufacturer's instructions.

b. Thoroughly clean all new pipes by flushing with water or other means to remove dirt, stones, etc. Do not flush to the wastewater system; flush to the ground.

H. Inspections and Connection to Town Sewer System

1. Inspection will be required by the Town Plumbing Inspector, the Town Electrical Inspector, and the Town's Wastewater Division. Inspection by the Town's Conservation Agent may be required if applicable. Inspection by the Town's Health Department of the septic system abandonment will be required for permit close out.

2. The pump unit installation, piping and **connection** to the Town's sewer system shall be **inspected** by the Town. Contact the Town Plumbing Inspector at 508-495-7470 and the Town Department of Public Works at 508-457-2543 to schedule the inspection at least 48 hours prior to connecting to the system. Operation of the low pressure sewer shall be conducted at this time.

3. The Town-supplied sewer stub, or lateral, was supplied with a combination curb stop/check valve with cap/plug. Excavate to expose the threaded cap, taking care not to disturb the check valve located downstream of the cap. Remove the threaded cap and connect the private system to the Town's system through use of a 1-1/4" threaded by compression coupling (to be provided with the pump unit). **Do NOT rotate the combination valve when connecting. The check valve must be left in the vertical orientation, and the curb stop must be at the top of the fitting, accessible for shut off.**

I. Testing

1. After hooking up to the Town system and in the presence of Town Representative, operate the pump system to inspect the discharge piping for leaks, as described below. **Note: The Town Representative function is strictly to ensure the proper connection of the system at the Town service lateral. It is not an approval of the pump or appurtenance installation / operation.**

2. Test the low pressure pump system **per the manufacturer's instructions**. In general, testing will consist of:

a. Confirm that Town has opened the curb stop on the sewer lateral.

b. Open discharge valves.

c. Fill pump station tank with water.

d. Turn on pump power and alarm circuit breakers.

e. Monitor pump operation.

f. Inspect entire assembly (from pump unit to lateral stub) for leaks.

g. Simulate alarm situations and verify that alarms function.

J. Service Activation – The plumber must provide the Department of Public Works the completed Service Installation Certification Checklist and an as-built Sewer Connection Plan within 24 hours of activating the service lateral. The failure to do this may result in water and sewer service being discontinued at the property.

K. Testing by Manufacturer's Representative and Commencement of Warranty – After the Town inspections and sewer connection have been completed, contact the manufacturer's representative, F.R. Mahony, to schedule a final "start-up" inspection. The installation must pass inspection by the Manufacturer's Representative in order to activate the 5-year warranty.

Town of Falmouth
Department of Public Works

Sewer Service Lateral Installation Certification Checklist

LOCATION INFORMATION

Owner's Name: _____ Date: _____

Property Address: _____

PLUMBER INFORMATION

Company Name: _____ Date Activated: _____

Name of Certifying Plumber: _____ License No.: _____

GRAVITY SERVICE LATERALS

☐ All pipe & fittings are gasketed SDR-35 PVC
☐ Pipe slope is 2% (1/4"/ft.); not less than 1% (1/8"/ft.)
☐ Minimum cover depth is 4 feet
If exception was granted, specify minimum depth:_____
☐ Cleanouts at changes in direction greater than 45 degrees or 100 foot intervals; clean out covered with a frame and cover properly rated for their location
☐ Pipe properly bedded & compacted
☐ Detectable tracer tape installed 12 inches below surface (must be traceable, green tape marked "sewer below")
☐ All stormwater, roof rain runoff, sump pumps and any other non-sanitary sewer discharges disconnected from building sewer system
☐ Connection to building sewer is upstream of septic system
☐ As-built drawing prepared and submitted with this checklist

LOW PRESSURE PUMP SYSTEM LATERALS

☐ Pump influent pipe is PVC and pipe slope is 2% (1/4"/ft.); not less than 1% (1/8"/ft.); cleanouts installed as above if required; connection to building sewer upstream of septic system.
☐ Pump effluent pipe is 1.25" SDR-11 HDPE. Fittings are plastic compression-style
☐ Pump system was installed as per manufacturers' instructions
☐ Electrical connections were made as per manufacturer's instructions and Electrical Code
☐ Pump system ballast ring installed (if applicable)
☐ Pump discharge pressure pipe was checked for leaks.
☐ Minimum cover depth is 4 feet
If exception was granted, specify minimum depth:_____
☐ Pipe properly bedded & compacted
☐ Detectable tracer tape installed 12 inches below surface (must be traceable, green tape marked "sewer below")
☐ All stormwater, roof rain runoff, sump pumps and any other non-sanitary sewer discharges disconnected from building sewer system
☐ As-built drawing prepared and submitted with this checklist

CERTIFICATION

I CERTIFY THAT THE ABOVE REQUIREMENTS HAVE BEEN MET AND THIS SANITARY SEWER SERVICE INSTALLATION MEETS ALL APPLICABLE STANDARDS OF CONSTRUCTION.

Name (printed): _____ Date: _____

Signature: _____

APPENDIX C

FLOW NEUTRAL BYLAW

Chapter 180. Sewers and Septic Systems

Part 3. Service Areas and Districts

Article VIII. Flow Neutral Bylaw for Present and Future Sewer Service Areas

[Added AFTM 11-13-2013, Art. 41, approved 1-27-2014]

§ 180-51. Purpose.

The Town of Falmouth's Wastewater Treatment Facility on Blacksmith Shop Road (WWTF) has limited treatment and disposal capacity as determined by a discharge permit issued by the Massachusetts Department of Environmental Protection (DEP). In order to comply with the terms and conditions of the discharge permit, to manage present and future wastewater flows, to meet present and future water quality standards, and to support broader community planning objectives, the Town adopts this Flow Neutral Bylaw for Present and Future Sewer Service Areas. This bylaw shall apply to all present sewer service areas of the Town, except for the New Silver Beach Sewer Service Area, governed by §§ **180-37** through **180-50** herein, and it shall apply to any future sewer service areas to be serviced by the Wastewater Treatment Facility on Blacksmith Shop Road. Nothing in this bylaw shall exempt the owner of a property in a present or future sewer service area from all other applicable statutes, bylaws, rules and regulations.

§ 180-52. Mandatory sewer connection; elimination of septic systems in sewer service areas.

A. The requirements for mandatory connection in sewer service areas are detailed in § **180-6** of the Code of Falmouth, Sewers and Septic Systems.

B. Within thirty (30) days of the property's connection to the public sewer, any septic system or other waste disposal system located on the property shall be decommissioned in accordance with Board of Health regulations.

§ 180-53. Determination of wastewater flow in sewer service areas.

A. Wastewater flow to the public sewer shall be determined in accordance with either: 1) the provisions set forth in 310 CMR 15; or 2) water meter data provided by the Department of Public Works as adjusted for seasonal occupancy; or 3) any other method acceptable to the Department of Environmental Protection and the Town of Falmouth. Any structure, legally in existence as of January 1, 2014, regardless of its flow, may by right maintain that flow or number of bedrooms. "Bedroom" is defined in 310 CMR 15.002 (Title 5: Standard requirements specified in 310 CMR

15.000, Massachusetts State Environmental Code), and the number of bedrooms in the Assessor's records as of January 1, 2014, are presumed accurate.

B. The flow allocations for present and future sewer service areas for treatment at the Blacksmith Shop Road Wastewater Treatment Plant are as follows:
[Amended 4-10-2023 ATM by Art. 32, approved 6-9-2023]

(1) Areas sewered prior to the Town's 2013 Comprehensive Wastewater Management Plan: 450,000 gallons per day (excluding the service areas listed below).

(2) Little Pond Sewer Service Area: 260,000 gallons per day.

(3) Teaticket-Acapesket Service Area: 360,000 gallons per day.

C. These flow allocations will be adjusted if additional flow or modifications to sewer service areas are made through (1) approved comprehensive wastewater management plans, (2) approved notice of project change to a comprehensive wastewater management plan, or (3) approval from MA Department of Environmental Protection.
[Amended 4-10-2023 ATM by Art. 32, approved 6-9-2023]

§ 180-54. Allocation of available capacity in sewer service areas.

The Wastewater Superintendent shall periodically notify the Board of Selectmen of the available capacity at the Wastewater Treatment Facility. The Selectmen in consultation with the Planning Board may set priorities for the available capacity.

§ 180-55. Modifications to existing parcels or changes in use in sewer service areas.

A. Single-family residences.

(1) Existing development. Modifications of an existing single-family dwelling on a parcel of 40,000 square feet or less may increase the total number of bedrooms to four (4) by right. Modifications of existing single-family residences on parcels over 40,000 square feet may increase the number of bedrooms to one (1) bedroom per 10,000 square feet of lot area by right.

(2) New development. A single-family residence may have four (4) bedrooms by right on parcels of 40,000 square feet or less. On parcels greater than 40,000 square feet, a single-family residence may have one (1) bedroom per 10,000 square feet of lot area by right.

(3) Addition of bedrooms, beyond those permitted in Subsection **A(1)** and **(2)** above shall require a variance from the Board of Selectmen in accordance with § **180-56**.

B. Multifamily residences.

(1) Existing development. Modifications of an existing multifamily residence may increase the number of bedrooms to one (1) bedroom per 10,000 square feet of lot area by right.

(2) New development. A new multifamily dwelling is allowed one bedroom per 10,000 square feet of lot area by right. In Zoning Districts where up to six (6) units per acre are allowed, up to three (3) bedrooms per permitted unit are allowed by right.

(3) Addition of bedrooms in multifamily dwellings, beyond which is allowed by right, shall require a variance from the Board of Selectmen in accordance with § **180-56**.

C. Nonresidential development.

(1) Existing development.

(a) Modifications or changes of use, including residential to nonresidential, that increase flow to a level that is no more than ten (10) percent above that permitted as of January 1, 2014, by 310 CMR 15 (Title 5) are allowed by right.

(b) Modifications or changes of use that increase flow more than that allowed by right in Subsection **C(1)(a)** require a variance from the Board of Selectmen in accordance with § **180-56**.

(2) New development.

(a) New nonresidential development on a vacant parcel with a wastewater flow up to 110 gallons per day per 10,000 square feet of lot area is allowed by right.

(b) New nonresidential development on a vacant parcel with a proposed wastewater flow greater than 110 gallons per day per 10,000 square feet shall require a variance from the Board of Selectmen in accordance with § **180-56**.

§ 180-56. Variances in sewer service areas.

A. The Board of Selectmen, after a public hearing of which notice has been given by publication 1) in a newspaper of general circulation and 2) posting with the Town Clerk and on the Town website for a period of no less than fourteen (14) days prior to the date of hearing, may grant a variance, provided both Subsection **A(1)** and **(2)** below are satisfied:

(1) Sufficient capacity exists in the treatment facility, as determined by the Wastewater Superintendent. If sufficient capacity does not exist then no variance shall issue.

(2) Should the Wastewater Superintendent determine sufficient capacity exists the applicant must then demonstrate, through a positive referral from the Board of Health, that a septic system for the total number of bedrooms or nonresidential flow requested, meeting the provisions of 310 CMR 15.000 (Title 5) without significant variances, can be sited on the parcel. If the Board of Health does not make a referral within 45 days of receipt of the request, it shall be considered a positive referral.

B. The Board of Selectmen may, at its sole and absolute discretion, issue a variance that in its judgment could be granted without substantially derogating from the intent or purpose of this bylaw should the applicant fail to satisfy criteria in § **180-56A(2)** above.

§ 180-57. Rebuilding a building because of casualty loss in sewer service areas.

Relating to Article **VIII**, a property owner may rebuild a structure destroyed by fire, flood, storm or other acts of nature as a matter of right, provided that the new structure does not exceed the wastewater flow and number of bedrooms of the structure being replaced.

§ 180-58. Mandatory water conservation in sewer service areas.

The Board of Selectmen may adopt mandatory water conservation measures, after public hearing, consistent with the purposes of this bylaw.

§ 180-59. Transferability in sewer service areas.

The number of bedrooms or flow on any particular parcel of land cannot be sold, exchanged, transferred, or otherwise used to benefit the number of bedrooms or flow on another parcel or another's right to a sewer connection.

§ 180-60. Severability.

If any provision of this bylaw is declared invalid or unenforceable, the other provisions shall not be affected thereby but shall continue in full force and effect.

§ 180-61. Violations and penalties.

A. Any person found to be violating any provision of Article **VIII** shall be served by the Town with written notice stating the nature of the violation and providing a reasonable time limit for the satisfactory correction thereof.

B. Any person who shall continue any violation beyond the period permitted in Subsection **A** shall be guilty of a misdemeanor and subject to a fine in an amount not exceeding fifty dollars ($50) for each violation. Each day in which such a violation shall continue shall be deemed a separate offense.

C. This section shall in no way limit the Town's power and authority to seek other remedies at law that it may have. Any person violating any of the provisions contained herein shall be liable to the Town for any expense, loss or damage occasioned the Town by such violation.

APPENDIX D

LEAKAGE TEST OF NEW SEWERS

SECTION 02735

LEAKAGE TESTS OF SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Leakage testing of gravity sewers by air pressure methods.

B. Manhole vacuum testing.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICE ITEMS

B. Section 01700 - RECORD DOCUMENTS

C. Section 02733 - SANITARY SEWER PIPING

D. Section 02734 - SANITARY SEWER MANHOLES

1.03 REFERENCES

A. Uni-Bell Plastic Pipe Association - UNI-B-6-98 Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe. Refer to example calculation at end of this Section.

B. ASTM F1417 – Standard Practice for Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air

1.04 TEST REQUIREMENTS

A. Backfilling of the sewer trench to ground or road surface shall be in place and completed, except for final paving, for 30 calendar days, or as approved by Engineer, prior to testing of each section of sewer.

B. Testing shall be completed prior to final paving and final restoration.

C. Low pressure air test shall not exceed drop of 1.0 psig for time period listed in attached Table 02735-1. Test procedure shall conform to ASTM F1417 and UNI-Bell Plastic Pipe Association Publication UNI-B-6-98 for Low Pressure Air Testing of Installed Sewer Pipe. Refer to Table 02735-1 for maximum allowable time for a 1.0 psig drop.

D. Deflection Test - Maximum deflection 5 percent. Refer to Section 02733 for detail of GO-NO-GO mandrel.

E. Maximum test length shall not exceed 1,000 feet.

1. In the case of sewers laid on steep grades, the length of line to be tested at any one time may be limited by the maximum allowable internal pressure on the pipe and joints at the lower end of the line. The recommendations of the pipe manufacturer shall be followed in this regard.

F. The Engineer shall witness all tests.

1.05 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. The following copies of forms for testing are attached to the end of this Section.

1. Table 02735-1, Low Pressure Air Testing of Sewers.

2. Low Pressure Air Testing of New Sewers.

3. Manhole vacuum tests.

1.06 FIELD MEASUREMENTS

A. Low Pressure Air Testing

1. Measure length of section to be tested.

2. Measure time interval and pressure drop.

3. Record measurements on form at end of specification section.

1.07 COORDINATION

A. Coordinate maintenance of traffic with local authorities.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that backfill has been in place the required time before start of test.

B. Verify that no connections to live sewers or live laterals have been made.

3.02 PREPARATION

A. Verify that pipelines and manholes have been flushed and cleaned of all debris, stones, silt, etc. such that all surfaces of pipe and manholes are visible.

B. The Contractor shall have on the job all the proper tools, pipe plugs, air bags, gauges, pumps, wires, water trucks, compressors, etc. necessary to properly test the pipe and manholes.

3.03 TESTING

A. Low Pressure Air Testing

1. Prior to start of test permanently repair all visible leaks.

2. Isolate each section to be tested with air tight plugs.

3. Low pressure air testing procedures shall conform to ASTM F1417 as modified by UNI-B-6-98.

4. On ductile iron pipe sewer sections, no pressure drop is permitted.

5. On PVC sewers, the maximum allowable drop in pressure from the test pressure shall be 1.0 psig during the minimum holding time.

   a. Test pressure shall be calculated using the following equation:

$$P = 3.5 + \frac{H}{2.31}(psig)$$

   where:

   P = Test pressure, maximum of 10 psi
   H = Height of groundwater above invert

6. All pressurizing equipment used for low-pressure air testing shall include a regulator or relief valve set no higher than 9 psig to avoid over-pressurizing and displacing temporary or permanent plugs. In no case should the starting pressure exceed 9.0 psig.

7. Either mechanical or pneumatic plugs may be used. All plugs shall be designed to resist internal testing pressures without the aid of external bracing or blocking. If pneumatic plugs are utilized, a separate hose shall also be required to inflate the pneumatic plugs from the above ground control panel. Plug the upstream end of the line first to prevent any upstream water from collecting in the test line. This is particularly important in high groundwater situations. When plugs are being placed, the pipe adjacent to the manhole shall be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole. A probable point of leakage is at the junction of the manhole and the pipe, and this fault may be covered by the pipe plug, and thus not revealed by the air test.

8. To facilitate test verification by the Engineer, all air used shall pass through a single, above ground control panel. The above ground air control equipment shall include a shutoff valve, pressure regulating valve, pressure relief valve, input pressure gauge, and a continuous monitoring pressure gauge having a pressure range from 0 to at least 10 psi. The continuous monitoring gauge shall have minimum divisions of 0.10 psi and an accuracy of $\pm$0.04 psi. The equipment to include a separate certified test gauge for periodic checking of the accuracy of the basic equipment gauges.

9. Two separate hoses shall be used to: (1) connect the control panel to the sealed line for introducing low-pressure air, and (2) a separate hose connection for constant monitoring of air pressure build-up in the line. Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater above pipe, but not greater than 9.0 psig. After a constant pressure of 4.0 psig is reached, the air supply shall be throttled to maintain that internal pressure for at least 2 minutes or until the temperature of the entering air to equalize with the temperature of the pipe wall. When temperatures have been equalized and the pressure stabilized at 4.0 psig, the air hose from the control panel to the air supply shall be disconnected.

10. The continuous monitoring pressure gauge shall then be observed while the pressure is decreased to no less than 3.5 psig (greater than the average back pressure of any

groundwater over the pipe). At a reading of 3.5 psig, timing shall commence with a stop watch or other timing device that is at least 99.8 percent accurate.

11. If the time shown in Table 02735-1 (at the end of this Section) for the designated pipe size and length elapses before the air pressure drops 1.0 psig, the section undergoing test shall have passed the leakage test. The test may be discontinued once the prescribed time has elapsed even though the 1.0 psig drop has not occurred.

12. If the pressure drops 1.0 psig before the appropriate time shown in Table 02735-1 has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test.

13. If the section fails to meet the above requirements, the Contractor shall determine at his own expense the source, or sources of leakage, and he shall repair or replace all defective materials and/or workmanship to the satisfaction of the Engineer. The extent and type of repair as well as results shall be subject to the approval of the Engineer. The completed pipe installation shall then be retested and required to meet the requirements of this test.

14. The times shown in Table 02735-1 are for the length of main sewer tested. For lengths other than those shown, the time to be interpolated. Further, the tables do not have any reduction of time for length of laterals connected to the section of sewer being tested since it normally is not significant. For all precise calculation of time allowance including laterals, refer to UNI-Bell UNI-B-6 publication and the sample calculations and formula shown at the rear of this section.

15. Impacts of groundwater on air testing are outlined in UNI-B-6-98. These considerations need to be addressed when air testing in groundwater.

B. Manhole Vacuum Testing

1. General

   a. After the manhole has been completely constructed, the frame installed thereon, and the trench backfilled, a vacuum test shall be performed.

   b. Any damage caused to properties due to sewage handling and/or sewage backup while vacuum testing shall be the responsibility of the Contractor.

2. Vacuum Testing Equipment - Furnish testing equipment as specified in the manufacturer's written instructions. For this procedure, pressure gauge MUST read in inches of mercury, not in psi.

3. Vacuum Test Procedures

   a. Perform vacuum testing in accordance with the testing equipment manufacturer's written instructions.

   b. Draw a vacuum of 10 inches of mercury and close the valves.

   c. Manhole will be acceptable when vacuum does not drop below 9 inches of mercury for the following manhole sizes and times:

      i. 4-Foot Diameter - 60 seconds.

ii. 5-Foot Diameter - 75 seconds.

iii. 6-Foot Diameter - 90 seconds.

MANHOLE DEPTH	MANHOLE DIAMETER	TIME TO DROP 1" HG
		(10" to 9")
10 ft or less	4 ft	120 seconds
10 ft to 15 ft	4 ft	150 seconds
> 15 ft	4 ft	180 seconds
Note: For 5 ft diameter manholes, add 30 seconds to the times above. For 6 ft diameter manholes, add 60 seconds to the times above.		

d. Repair or replace defective manholes and retest.

4. If the manhole fails to meet the above testing requirements, the Contractor shall determine, at his own expense, the source(s) of the leakage, and he shall repair or replace all defective materials and/or workmanship to the satisfaction of the Engineer. The extent and type of repair, as well as results, shall be subject to the approval of the Engineer. The completed repairs shall then be retested and required to meet the leakage requirements of this test.

(continued)

TABLE 02735-1

LOW PRESSURE AIR TESTING OF SEWERS

PIPE DIAMETER (INCHES)	*SHORTEST TIME (MIN:SEC)	LENGTH FOR SHORTEST TIME (FT.)	TIME FOR LONGER LENGTH (SEC.)	TIME (MIN:SEC) FOR LENGTH (L) SHOWN					
				100 FT.	150 FT.	200 FT.	250 FT.	300 FT.	350 FT.
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.855 L	5:40	5:40	5:40	5:40	5:40	5:40
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51

For further information or clarification, see the Uni-Bell PVC Pipe Association, Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe, http://www.uni-bell.org/resources/UNI-B-6-98.pdf.

*Time allowed for 1.0 psig drop in pressure.

Job No. _____
Contract No._____

LOW PRESSURE AIR TESTING OF NEW SEWERS

Date: _____
Project:_____
Contractor:_____
Weather:_____

Section Tested (List Manholes)	Length (Feet)	Diameter (Inches)	Material	Time Start/Time Finish	Time Interval (Minutes)	Air Pressure Initial/Final (psig)	Total Pressure Loss (psig)	Pass / Fail
to								
to								
to								
to								
to								
to								
to								
to								

COMMENTS:

WITNESS:
OWNER/ENGINEER _____
Name _____
Title _____
Signature _____

WITNESS:
CONTRACTOR_____
Name _____
Title _____
Signature _____

Job No._____

Contract No._____

MANHOLE VACUUM TEST

Date: _____

Project:_____

Contractor:_____

Weather:_____

Manhole No.	Inside Diameter (Feet)	Required Test Time (Seconds)	Initial Vacuum (10 inches)	Final Vacuum	Pass/Fail

COMMENTS:

WITNESS:	**WITNESS:**
OWNER/ENGINEER _____	CONTRACTOR_____
Name _____	Name _____
Title _____	Title _____
Signature _____	Signature _____

END OF SECTION

SECTION 02741

PRESSURE TESTS OF FORCE MAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure testing of underground force mains and low pressure sewer systems.

B. Test requirements.

C. Required replacement or repair if test fails.

D. Project records.

1.02 RELATED SECTIONS

A. Section 01025 - UNIT PRICE ITEMS

B. Section 01700 – RECORD DOCUMENTS

C. Section 02740 - SEWAGE FORCE MAINS

D. Section 02744 - LOW PRESSURE SEWAGE MAIN

1.03 TEST REQUIREMENTS FOR HDPE FORCE MAINS AND LOW PRESSURE SEWER SYSTEMS

A. HDPE force mains and low pressure sewer pipe shall be tested in accordance with ASTM F2164. All newly laid HDPE pipe shall be subject to hydrostatic pressure testing. The following procedure shall be used:

1. All newly installed pipe or any section thereof (including fittings and valves), shall be subjected to a hydrostatic pressure 50 percent in excess of the system design pressure at any point in the section being tested, but in no case less than 150 pounds per square inch for a period of two hours. Contractor shall verify that the pressure rating of components or devices connected to the pipeline exceeds the test pressure.

2. The Contractor shall accomplish the required tests by individually testing each section of the installed main. The maximum length of section permitted to be tested at any one time will be 1 mile, and normally will be less.

3. The test procedure consists of the initial expansion phase and the test phase. For the initial expansion phase, the test section shall be pressurized to the required test pressure and make-up water shall be added as required to maintain the required test pressure for a period of four hours.

4. For the test phase, the test pressure shall be reduced by 10 psi. Pressure shall remain within 95 percent of the test phase pressure for a period of one hour. No make-up water shall be added nor the pressure increased during the test phase.

5. Low pressure sewer mains and laterals shall be tested with each curb stop valve assembly in the closed position.

6. Testing of low pressure laterals from the curb stop to the future grinder pump shall be done by others. Testing (by others) shall occur prior to connection to the grinder pump assembly and shall be performed from the grinder pump connection point to the curb valve. Grinder pump installation shall not occur until testing has been completed.

B. Test Pressure Restrictions - Test pressure shall:

1. Not exceed pipe or thrust restraint design pressures.

2. Not exceed twice the rated pressure of the valves when the pressure boundary of the test section includes closed valves.

3. The time required to pressurize, expand and stabilize, hold test pressure, and depressurize the system shall not exceed 8 hours.

4. If retesting is required, the section shall be depressurized for a minimum of 8 hours prior to retesting the section to be tested.

C. Leakage Test

1. No leakage within the low pressure system is acceptable.

2. No water may be supplied into the newly installed pipe, or any valved section thereof, to maintain pressure during the test phase of the low pressure sewer system.

3. If the section of low pressure sewer tested does not meet the test pressure requirement (no more than 5% loss of the test phase pressure), the test shall be considered a failure.

1.04 SUBMITTALS

A. For each test, submit a completed “Flushing and Testing of Force Main Tabulation Sheet” attached at the end of this section.

1.05 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Contractor to complete and submit for each test the “Flushing and Testing of Force Main Tabulation Sheet” for recording data for flushing and testing pressure pipe (see form at end of this Section). Contractor shall fill out form and both Contractor and Engineer shall sign upon completion.

1.06 REGULATORY REQUIREMENTS

A. Submit proof of testing as required by local, county or state agencies and this section of the specifications.

1.07 FIELD MEASUREMENTS

A. Measure length of test section.

B. Measure quantity of water used to maintain test pressure during test period.

C. Measurements required to complete the Tabulation Sheet.

1.08 COORDINATION

A. Contractor is responsible for obtaining water for flushing and pressure test.

B. Provide 48-hour notice to local water department (Owner) when water for flushing and testing is required.

C. Owner of existing water system to operate all valves and hydrants unless Contractor has been authorized by Owner to operate water systems valves and hydrants.+

D. If water does not come from a municipal source, the source shall be approved by the Engineer.

PART 2 PRODUCTS

2.01 WATER SUPPLY

A. Owner shall supply water. Contractor shall pay for all water needed to fill and flush water main and appurtenances as specified in Section 01500.

B. All water for flushing shall be furnished and disposed of in accordance with all federal, state, and local requirements by the Contractor at his expense.

C. A back flow preventer shall be installed at any connection to the Town's water supply.

PART 3 EXECUTION

3.01 EXAMINATION

A. Backfilling of the pressure pipe trench to ground surface or road surface shall be in place and completed, except for final paving, for seven calendar days or as approved by the Engineer prior to start of testing of each section of force main or low pressure sewer.

3.02 PREPARATION

A. The Contractor shall supply all plugs, pumps, weirs, gauges, etc., necessary to conduct the tests, including means to accurately measure the quantity of water used to maintain test pressure during the test period.

B. Flush all piping systems with water prior to testing. Flushing shall be sufficient to remove all dirt/debris from force main.

3.03 TESTING

A. Pressure and leakage tests shall be conducted on all force main and low pressure pipe.

B. The Engineer shall witness all tests.

C. All test results shall be recorded on the appropriate form attached at the end of this section.

D. Contractor is responsible for temporary connections to facilitate filling of force main, release of air from force main, and pressure testing. Connection devices shall be reviewed by Engineer before starting testing. All temporary connections shall be plugged after a successful test.

E. When filling force mains with water for flushing or testing, a direct connection from potable water source to force main is strictly prohibited.

F. Pressurization - Each valved section of pipe shall be slowly filled with water. The specified test pressure, based on the elevation of the lowest point of the pipe 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.

G. Air Removal - Before applying the specified test pressure, air shall be expelled completely from the pipe and valves.

H. Examination - Any exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, or valves that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated.

I. All visible leaks, regardless of the amount, shall be repaired.

J. If the section being tested fails to pass the pressure or leakage test, the Contractor shall determine, at his own expense, the source or sources of leakage, and he shall permanently repair or replace all defective materials and/or workmanship. The extent and type of repair as well as results shall be subject to the approval of the Engineer. The completed pipe installation shall then be retested and required to meet the pressure and leakage requirements of this test.

K. Testing and retesting shall be completed prior to final paving.

L. The use of sealants, applied from outside or inside of pipe, is not acceptable.

(continued)

4.1.5 *Leakage defined.* Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi (35 MPa or 0.35 bar) of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

4.1.6 *Allowable leakage.* No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133{,}200} \qquad \text{(Eq 1)}$$

Where:

L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

Table 6 Allowable Leakage per 1000 ft (305 m) of Pipeline*—*gph*†

Avg. Test Pressure *psi* (*bar*)	Nominal Pipe Diameter—*in.*															
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450 (31)	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400 (28)	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350 (24)	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300 (21)	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275 (19)	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250 (17)	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225 (16)	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200 (14)	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175 (12)	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150 (10)	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125 (9)	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100 (7)	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

†To obtain leakage in litres/hour, multiply the values in the table by 3.785.

4.1.6.2 When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. (0.0012 L/h/mm) of nominal valve size shall be allowed.

4.1.6.3 When hydrants are in the test section, the test shall be made against closed hydrant valves.

4.1.7 *Acceptance of installation.* Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified in Sec. 4.1.6, the contractor shall, at his own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.

4.1.7.1 All visible leaks are to be repaired, regardless of the amount of leakage.

FLUSHING AND TESTING OF HDPE FORCE MAINS AND LOW PRESSURE SEWERS
TABULATION SHEET

Job No._____ Location _____
Contract No. _____ Contractor _____
Project _____
Contractor's Representative _____
Observed by_____

FLUSHING

Date_____ Weather _____ Temperature _____
Section Flushed_____ft. of ____-inch diameter pipe
Line Flushed_____hrs. _____ min. @ _____ gal/min.
Line Flushed Through_____Manhole #_____

PRESSURE TESTING

Date _____ Weather _____
Section Tested _____
____-ft. of ___-inch diameter _____ pipe in ___-ft laying lengths

EXPANSION PHASE

Time Started _____ Time Finished _____ Elapsed Time _____
Test Pressure: Start _____ psi Finish _____ psi
Gallons of water added to maintain pressure _____ gallons

TEST PHASE (Lower system pressure by 10 psi – no make-up water added during test phase)

Time Started _____ Time Finished _____ Elapsed Time _____
Test Pressure: Start _____ psi Finish _____ psi
Pass _____ Fail _____

WITNESS:	WITNESS:
OWNER/ENGINEER _____	CONTRACTOR_____
Name _____	Name _____
Title _____	Title _____
Signature _____	Signature _____

Construction Details

STANDARD DETAILS

DETAIL NUMBER	DETAIL
S–1	STANDARD PRECAST GRAVITY MANHOLE
S–2	MANHOLE FRAME AND COVER
S–3	INSIDE DROP MANHOLE CONNECTION
S–4	SEWER DOGHOUSE MANHOLE CONNECTION
S–5	GRAVITY SEWER CONNECTION TO EXISTING MANHOLE
S–6	PRESSURE SEWER OR FORCE MAIN CONNECTION AT GRAVITY MANHOLE
S–7	4" AND 6" GRAVITY LATERAL
S–8	LOW PRESSURE LATERAL INSTALLATION
S–9	LATERAL CHIMNEY CONNECTION
S–10	SUBGRADE CLEANOUT (NON–PAVED SURFACES) GRADE CLEANOUT (PAVED SURFACES)
S–11	MANUAL AIR RELEASE VALVE
S–12	SEWER TRENCH
S–13	WATER MAIN RELOCATION
S–14	PIPE FOUNDATION CONCRETE ENCASEMENT
S–15	THRUST BLOCK

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APPLICATION AND CONSTRUCTION STANDARDS

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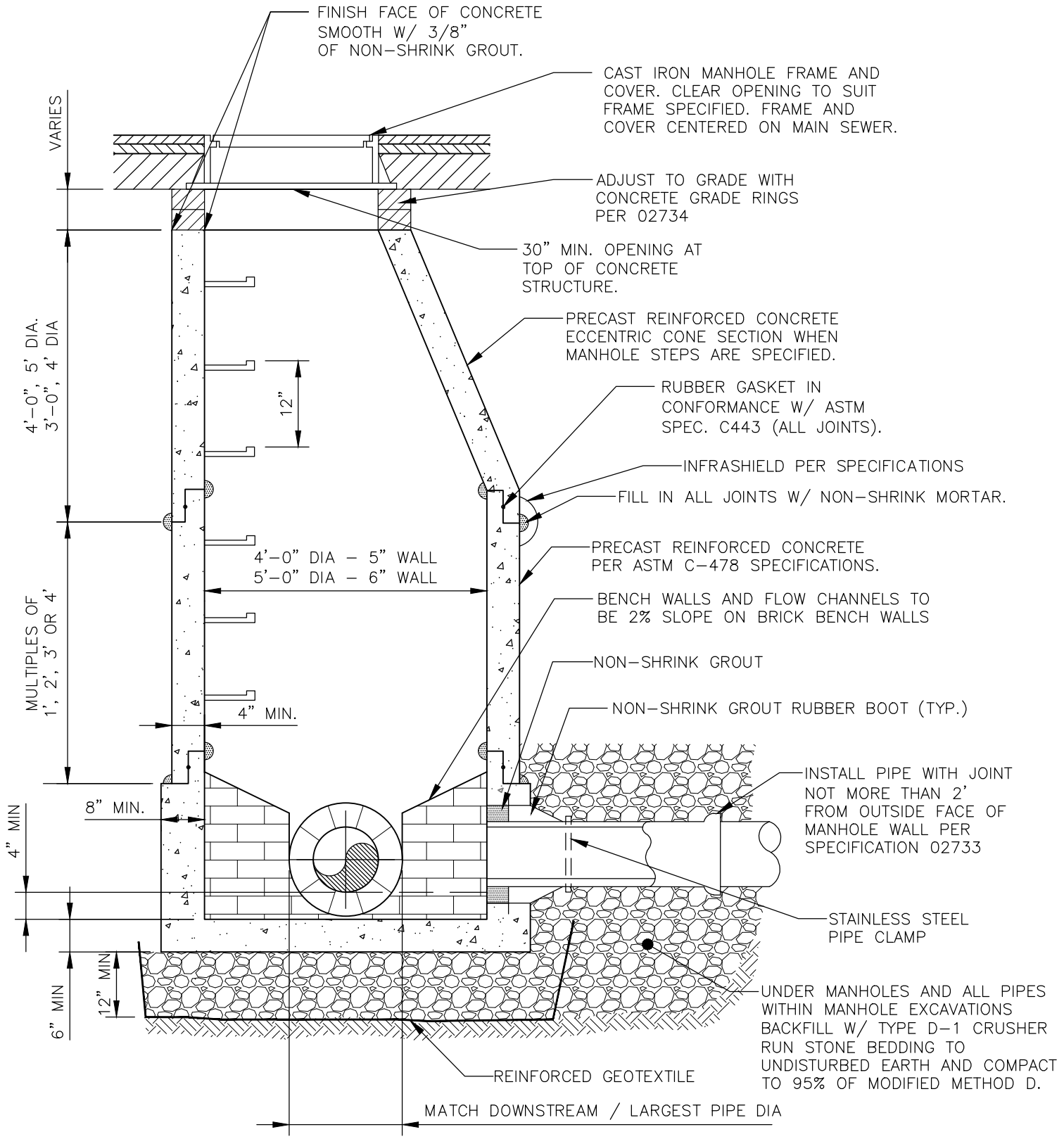

STANDARD PRECAST GRAVITY MANHOLE

SCALE: NONE

S-1_STANDARD PRECAST GRAVITY MANHOLE.dwg

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STANDARD PRECAST GRAVITY MANHOLE

S-1

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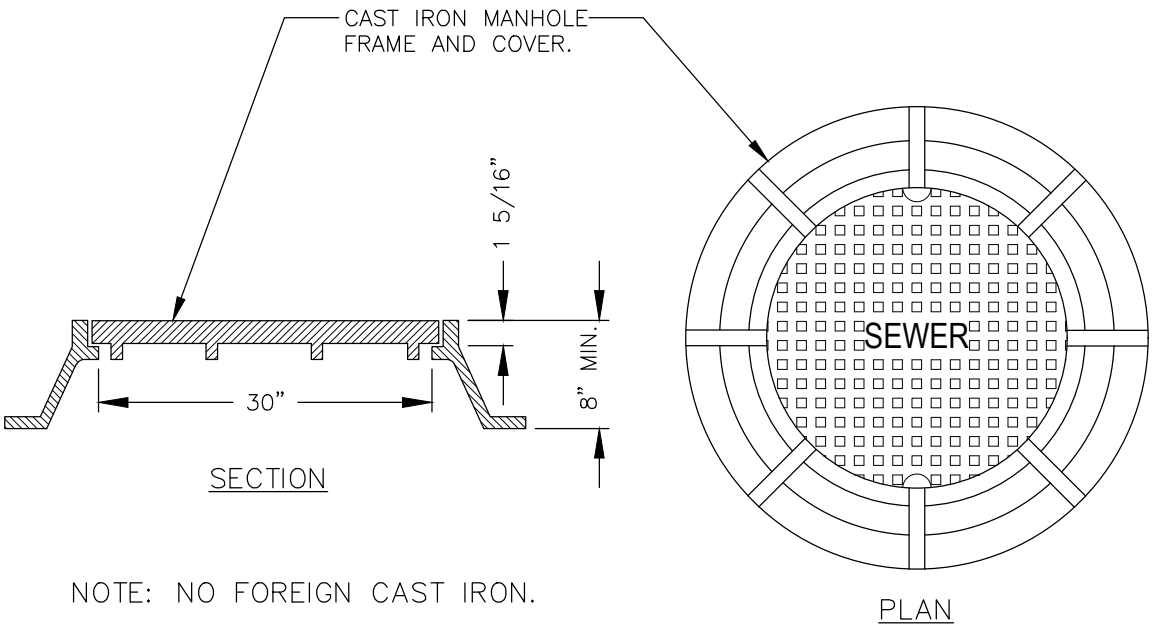

NOTE: NO FOREIGN CAST IRON.

MANHOLE FRAME AND COVER

SCALE: NONE

S-2_MANHOLE FRAME AND COVER.dwg

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MANHOLE FRAME AND COVER

S-2

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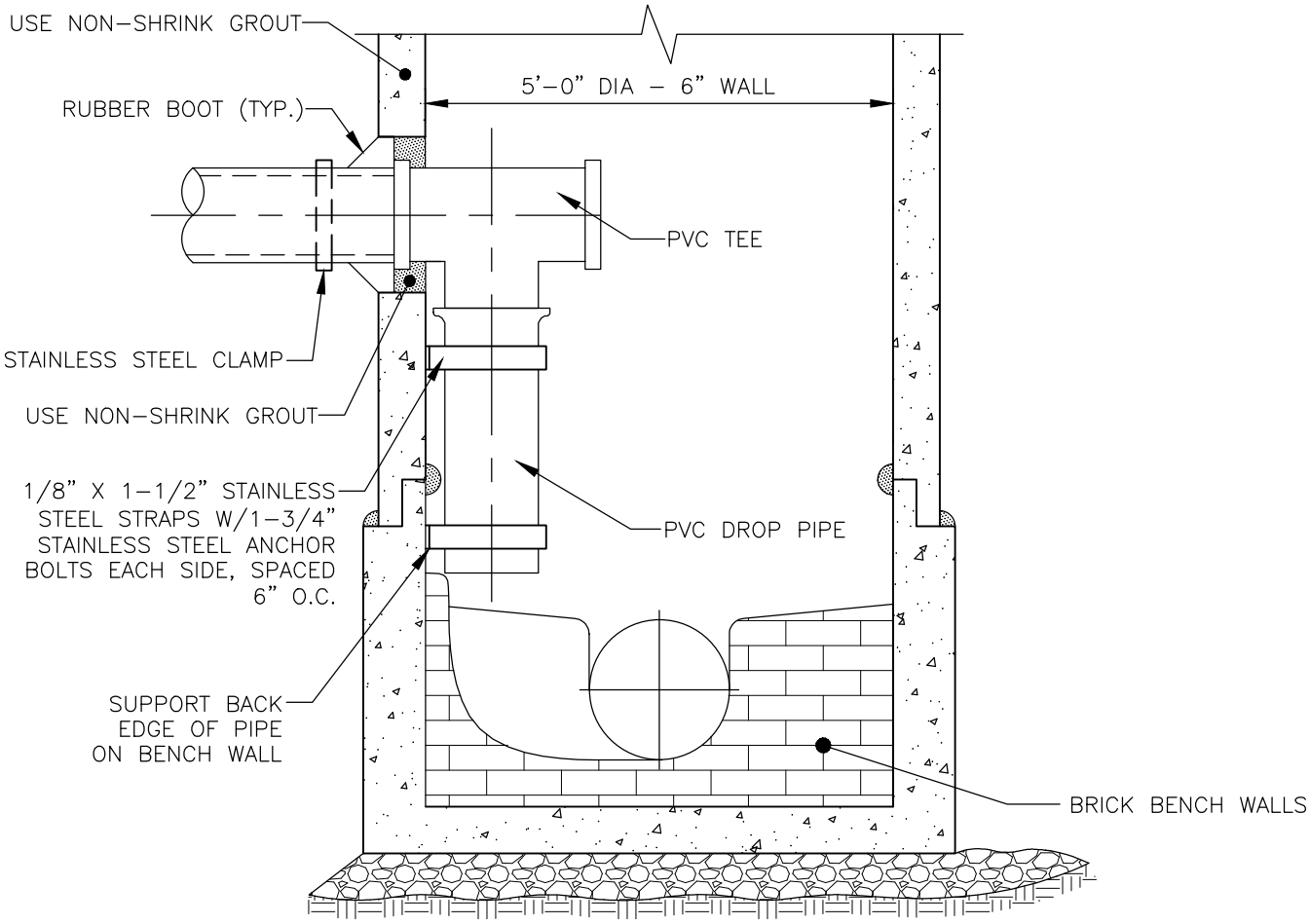

NOTES:

1. USE WHERE DROP MANHOLE IS SPECIFIED UNLESS OTHERWISE NOTED.
2. DROP SHOULD DISCHARGE INTO CHANNEL AND NOT ON BENCH WALL.

INSIDE DROP MANHOLE CONNECTION

SCALE: NONE

S-3_INSIDE DROP MANHOLE CONNECTION.dwg

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INSIDE DROP MANHOLE CONNECTION

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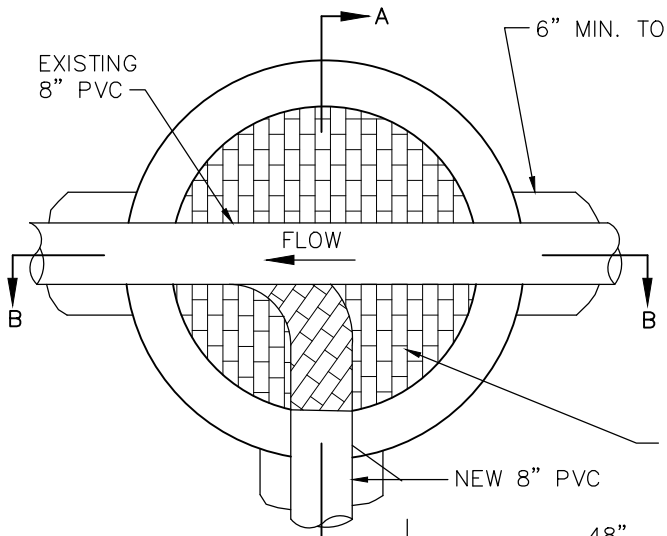
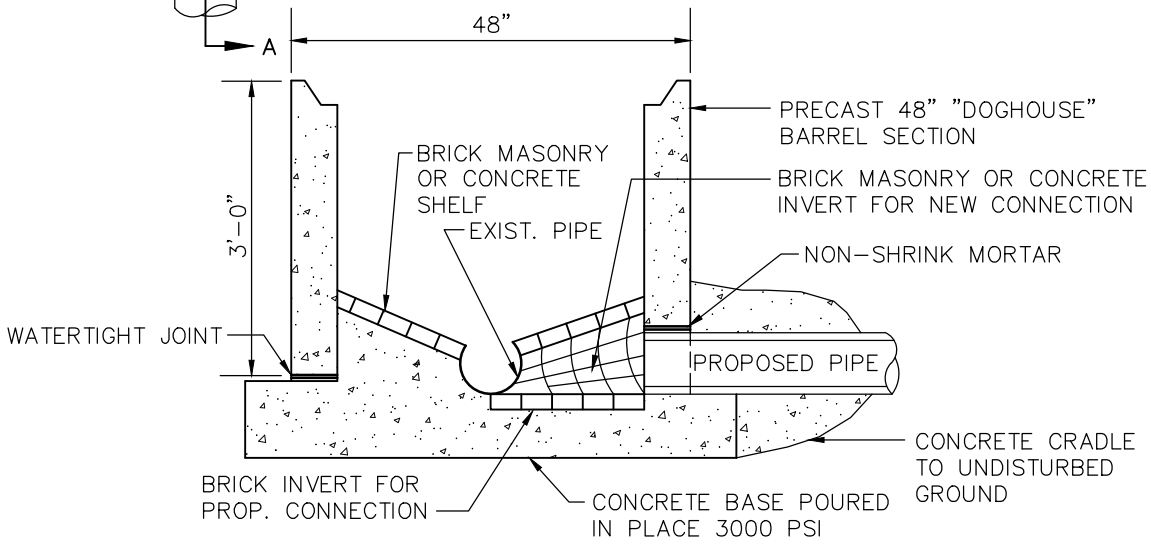
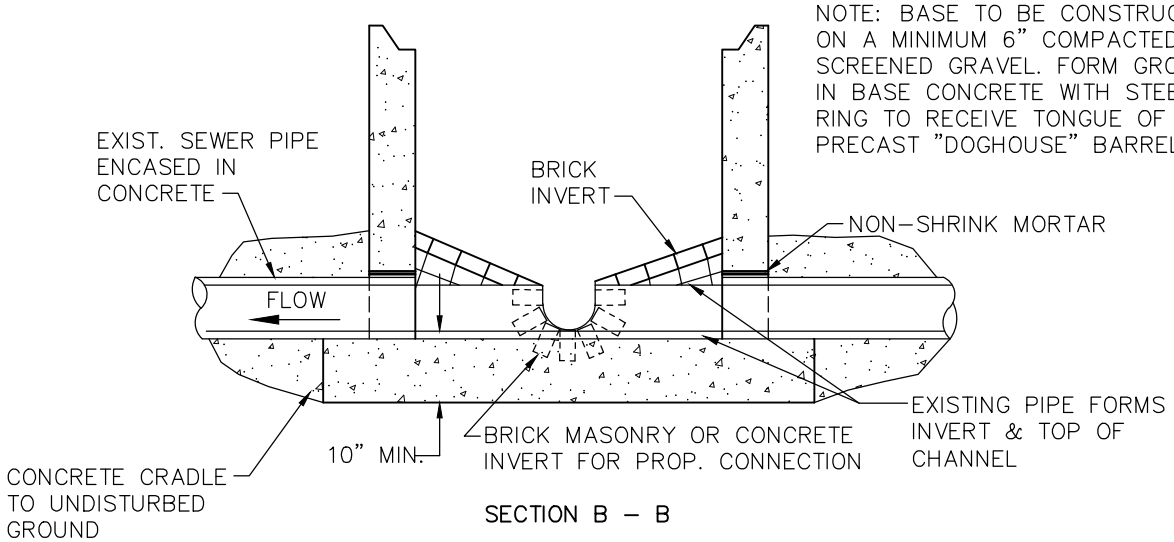


NOTES:
1. INVERT TO BE FORMED BY CUTTING EXISTING PIPE AT 0.8D & CONSTRUCTING CONCRETE FILL INVERT TO 0.8D.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SEWER FLOWS.
3. CONTRACTOR SHALL SUBMIT DETAILS OF CUTTING INTO EXISTING SANITARY. TO ENGINEER FOR REVIEW.
4. FOR ADDITIONAL DIMENSIONS AND DETAILS NOT SHOWN, SEE OTHER MANHOLE DETAILS.



SECTION A – A

NOTE: BASE TO BE CONSTRUCTED ON A MINIMUM 6" COMPACTED SCREENED GRAVEL. FORM GROOVE IN BASE CONCRETE WITH STEEL RING TO RECEIVE TONGUE OF PRECAST "DOGHOUSE" BARREL



SECTION B – B

DOGHOUSE SEWER MANHOLE

NOT TO SCALE

S-4_SEWER DOGHOUSE MANHOLE CONNECTION.dwg

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SEWER DOGHOUSE MANHOLE CONNECTION

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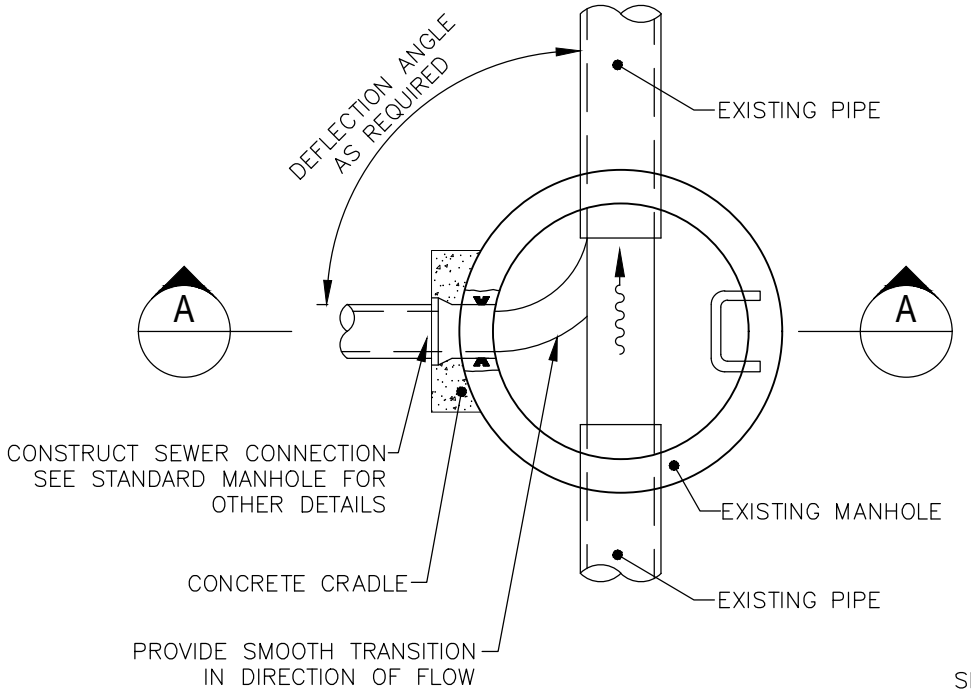
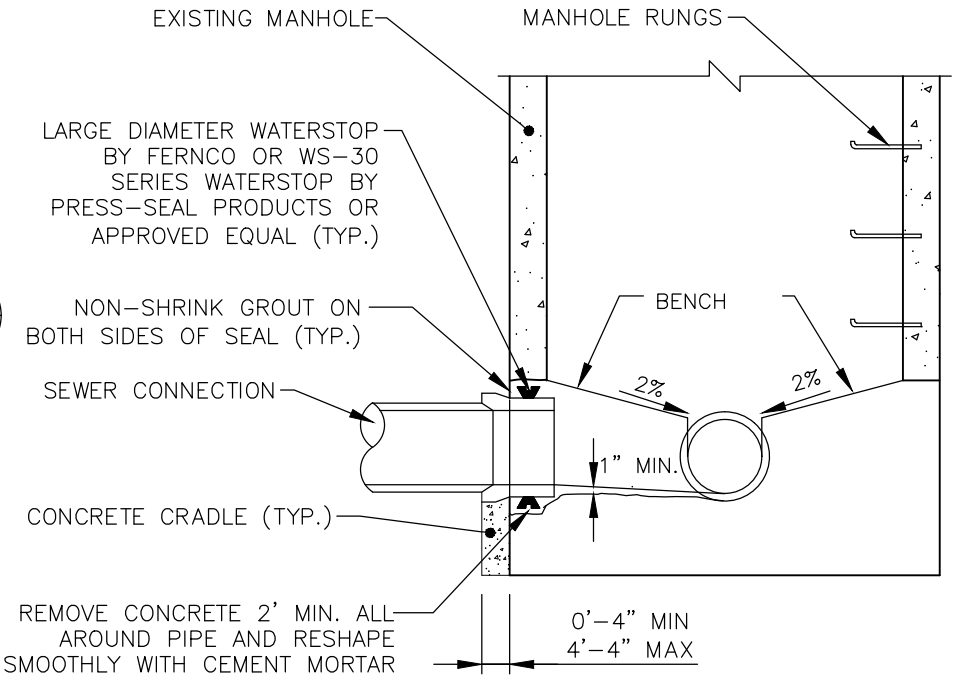


PLAN



SECTION A-A

NOTES:

1. CLEAN AND ROUGHEN ALL SURFACES AGAINST WHICH NEW MORTAR IS TO BE PLACED.
2. EXISTING CONCRETE TO BE REMOVED TO MEET NEW CHANNEL. CONCRETE TO BE REMOVED TO A LINE AT LEAST 1-INCH BEYOND FINISHED CHANNEL LINE AND FINISHED OFF TO NEW LINE WITH CEMENT MORTAR.
3. WHERE PIPE IS ABANDONED, PLUG PIPE WITH 12-INCH MIN CONCRETE AND BUILD UP CHANNEL TO ELEVATION OF EXISTING BENCH TO DIVERT FLOW OF NEW MANHOLE CHANNEL.
4. PIPE PENETRATION MUST NOT BE THROUGH THE CONE SECTION OR A MANHOLE JOINT, NOR SHALL IT INTERFERE WITH THE MANHOLE RINGS.

GRAVITY SEWER CONNECTION TO EXISTING MANHOLE

SCALE: NONE

S-5_GRAVITY SEWER CONNECTION TO EXISTING MANHOLE.dwg

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GRAVITY SEWER CONNECTION TO EXISTING MANHOLE

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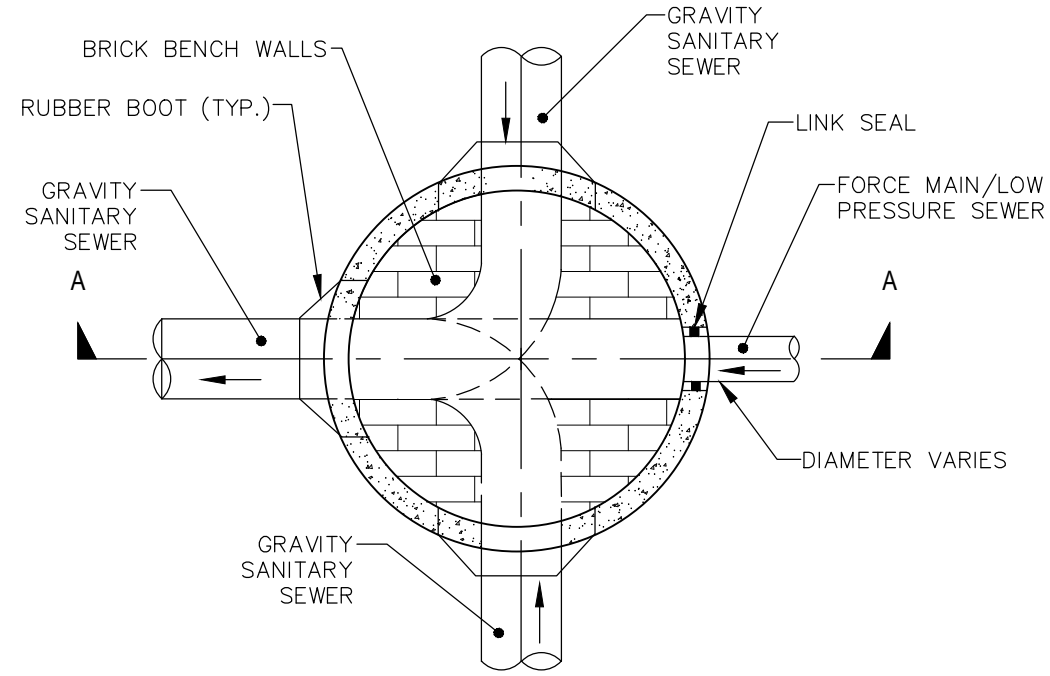
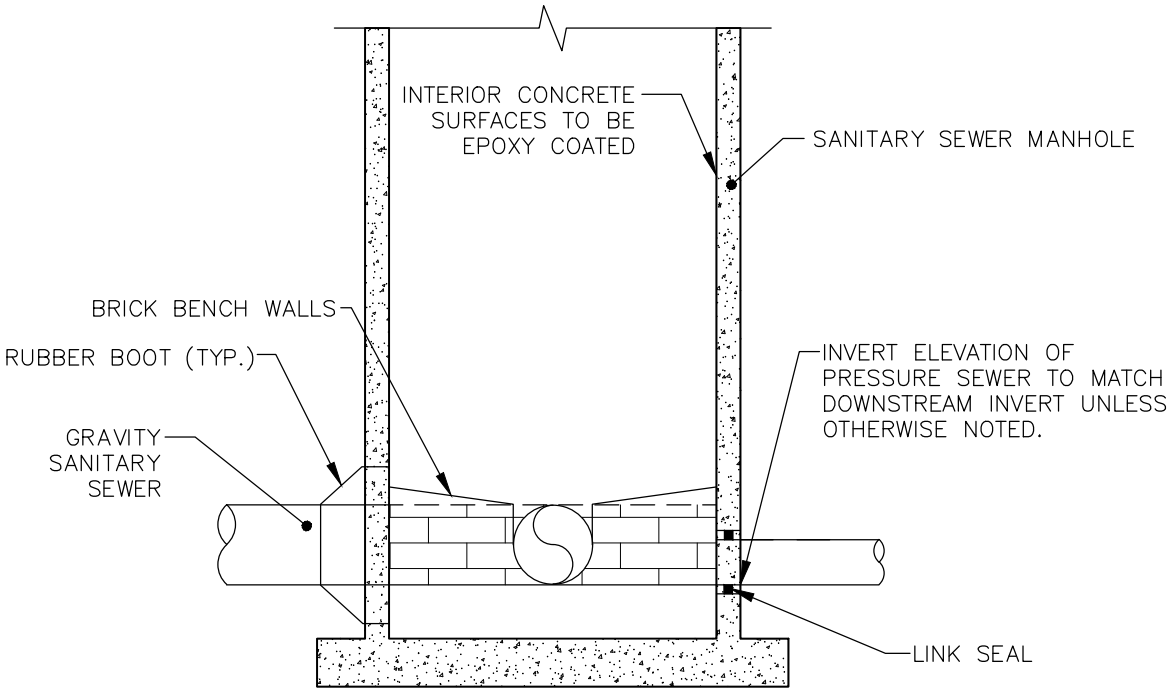


SECTION A–A



SECTION A–A

PRESSURE SEWER OR FORCE MAIN CONNECTION AT GRAVITY MANHOLE

SCALE: NONE

S–6_PRESSURE SEWER OR FORCE MAIN CONNECTION AT GRAVITY MANHOLE.dwg

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PRESSURE SEWER OR FORCE MAIN CONNECTION AT GRAVITY MANHOLE

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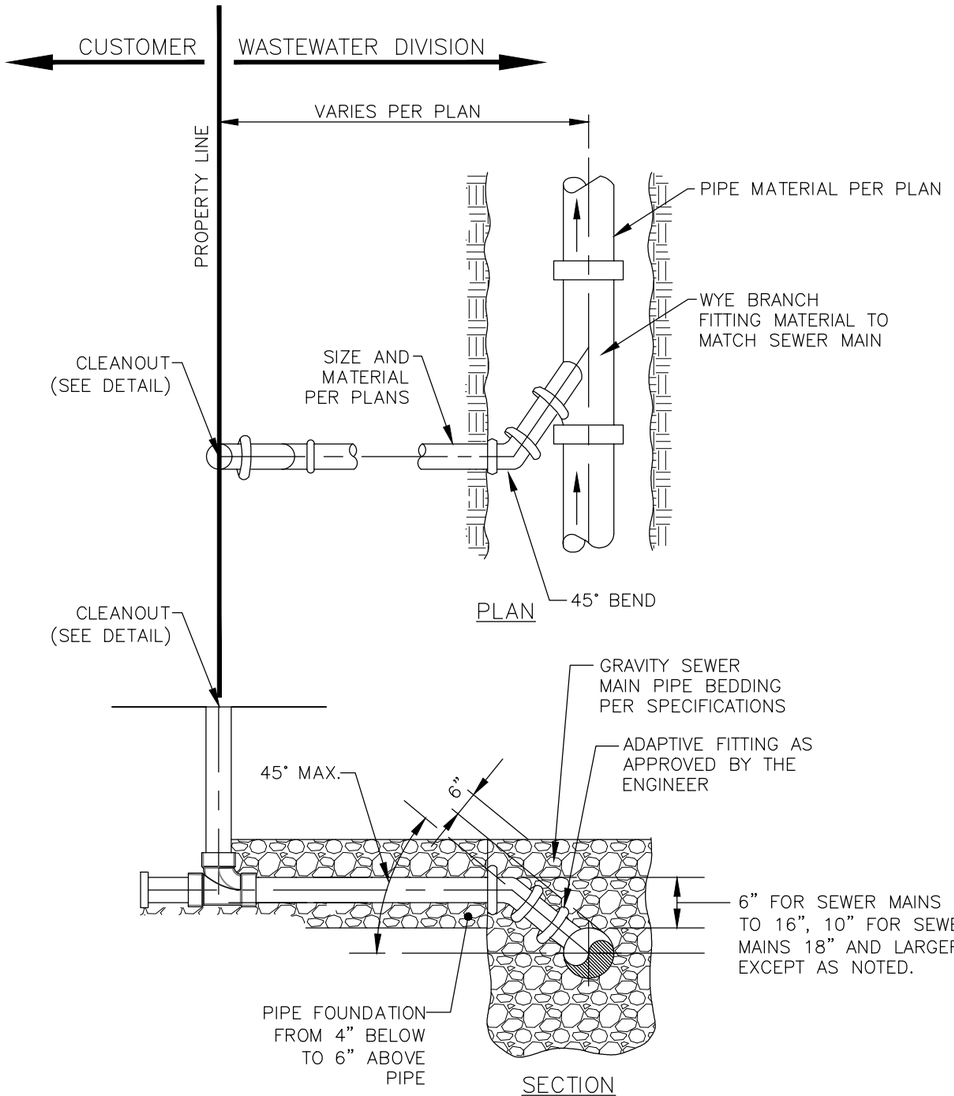
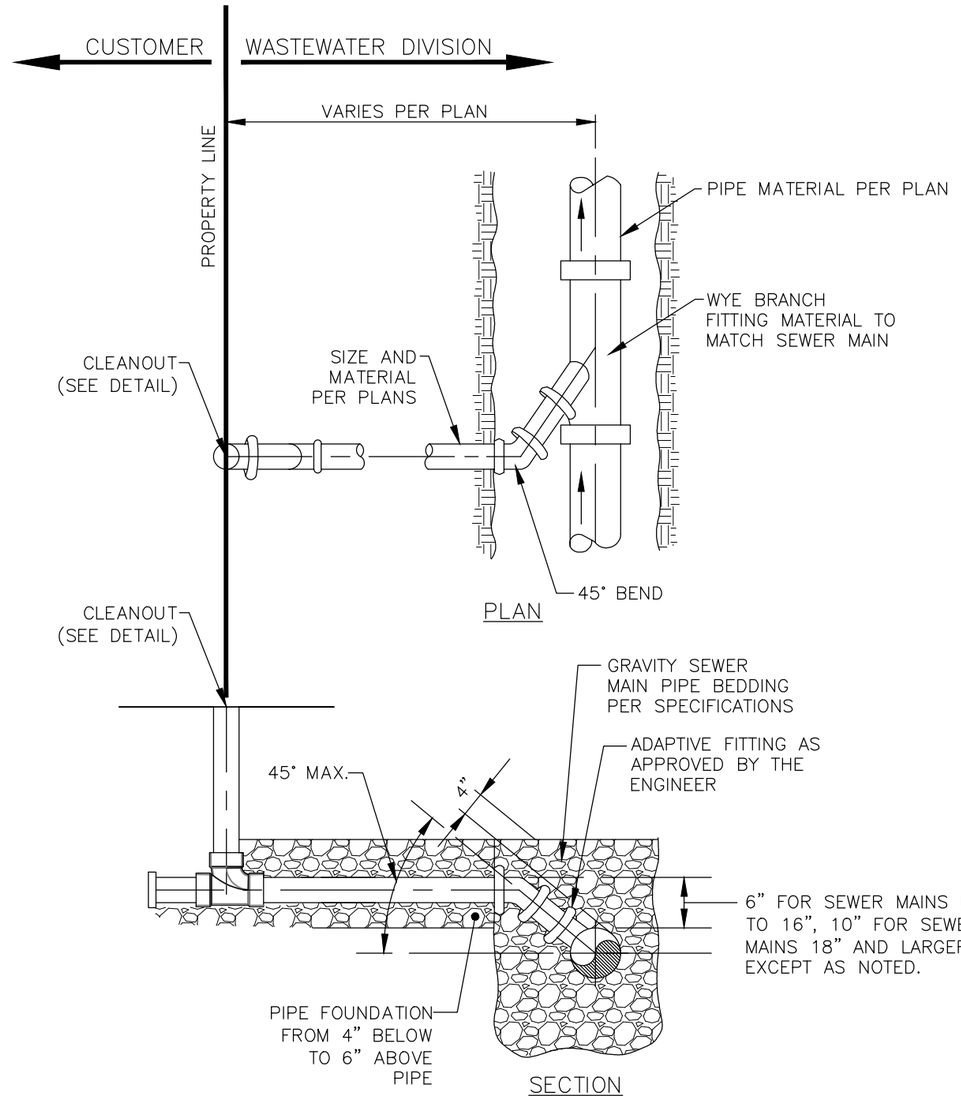


NOTE: 6" GRAVITY LATERALS SHALL HAVE A MINIMUM SLOPE OF 1.5%.

6" GRAVITY LATERAL

SCALE: NONE



NOTE: 4" GRAVITY LATERALS SHALL HAVE A MINIMUM SLOPE OF 2%.

4" GRAVITY LATERAL

SCALE: NONE

S-7_4" AND 6" GRAVITY LATERAL.dwg

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4" AND 6" GRAVITY LATERAL

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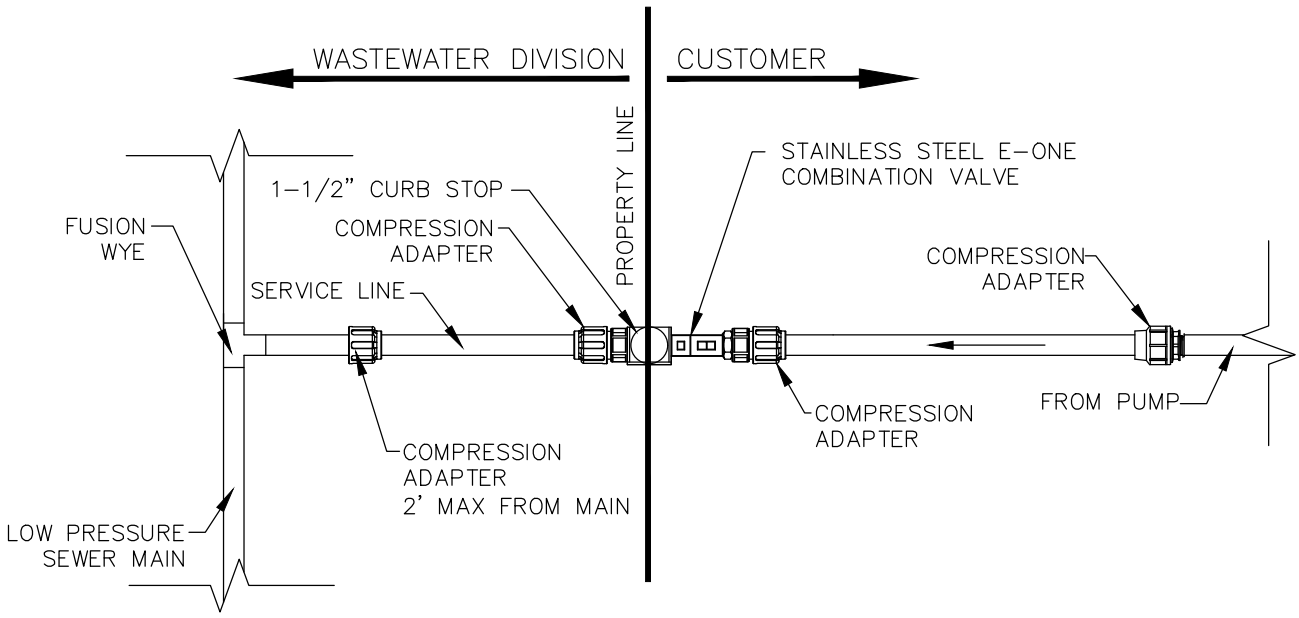
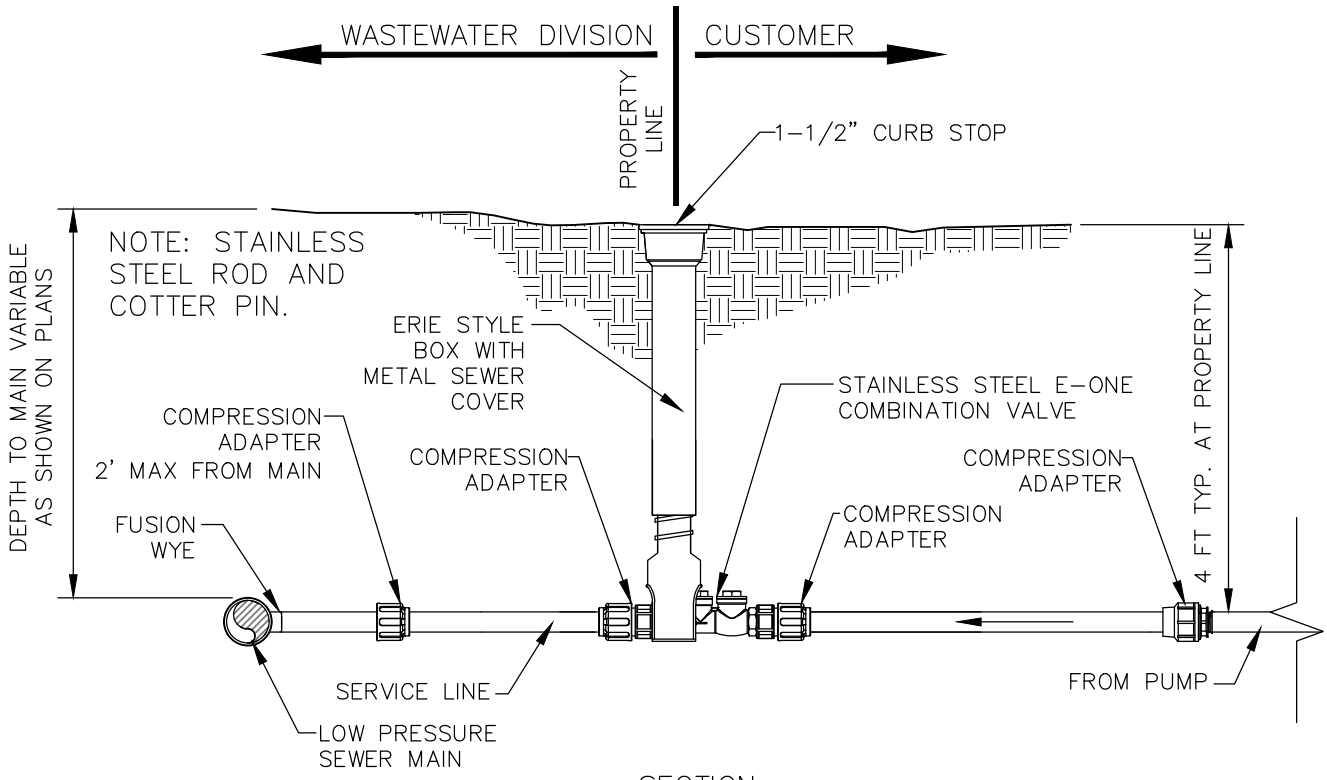


PLAN



SECTION

LOW PRESSURE LATERAL INSTALLATION

SCALE: NONE

S-8_LOW PRESSURE LATERAL INSTALLATION.dwg

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LOW PRESSURE LATERAL INSTALLATION

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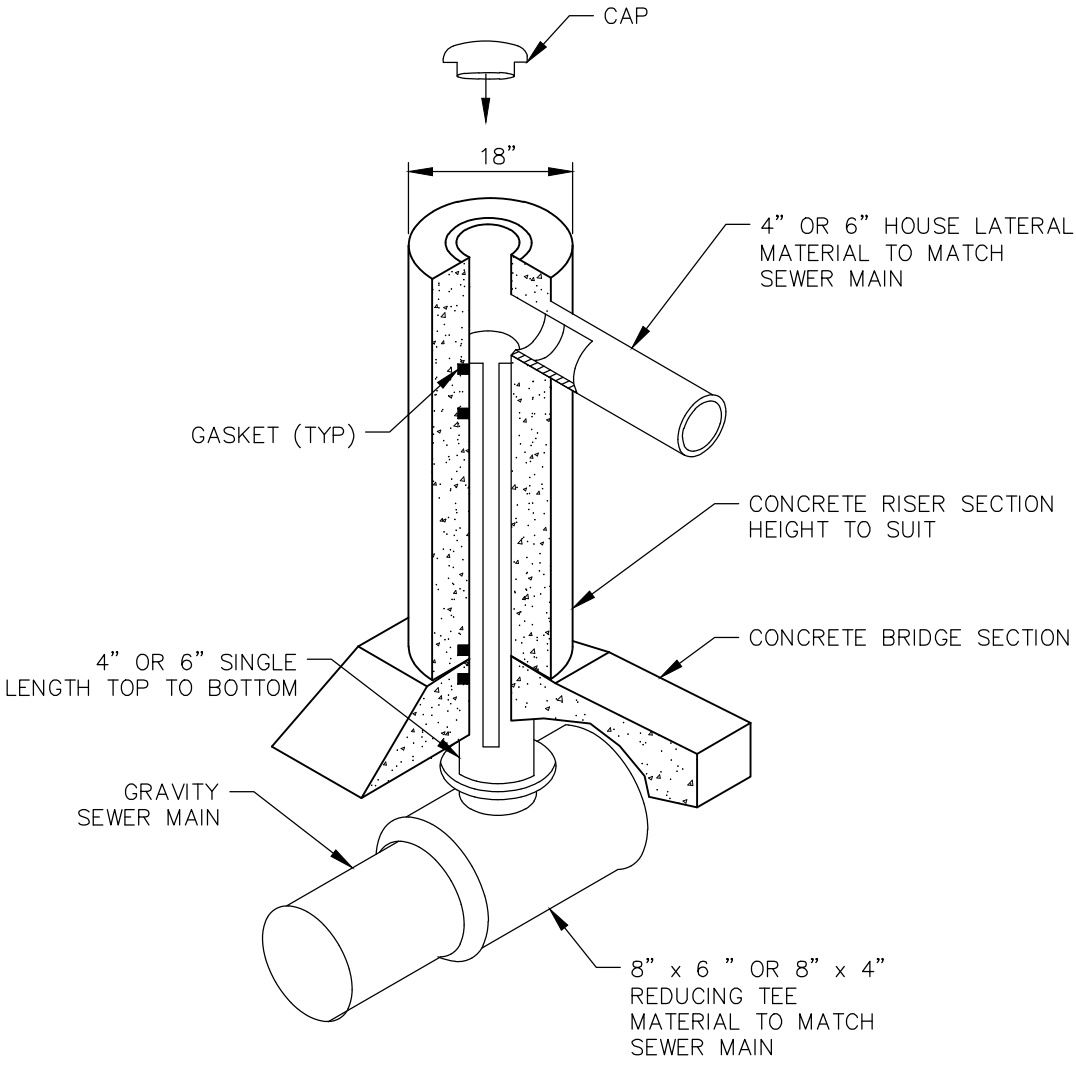

LATERAL CHIMNEY CONNECTION

SCALE: NONE

S-9_LATERAL CHIMNEY CONNECTION.dwg

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LATERAL CHIMNEY CONNECTION

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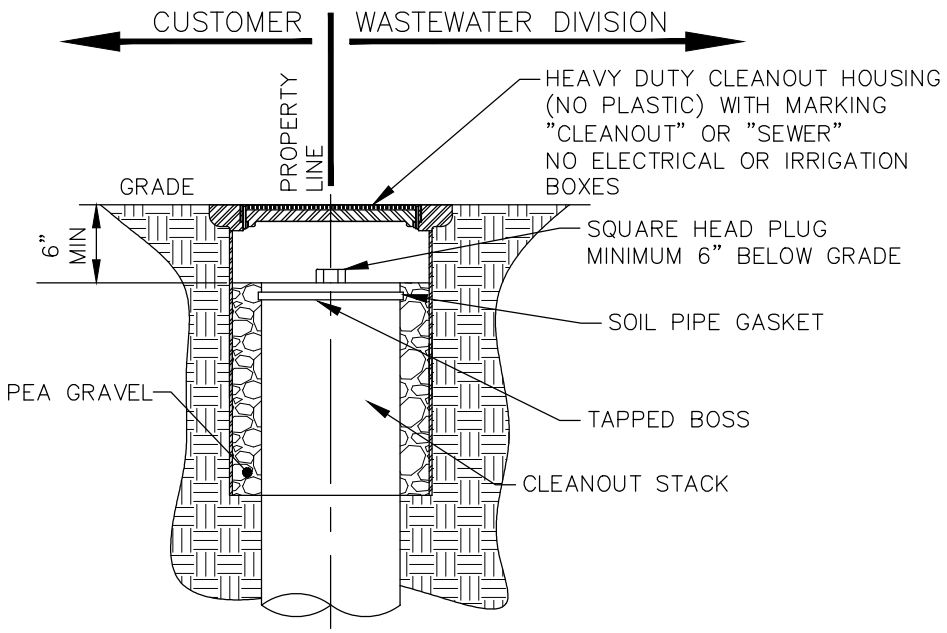
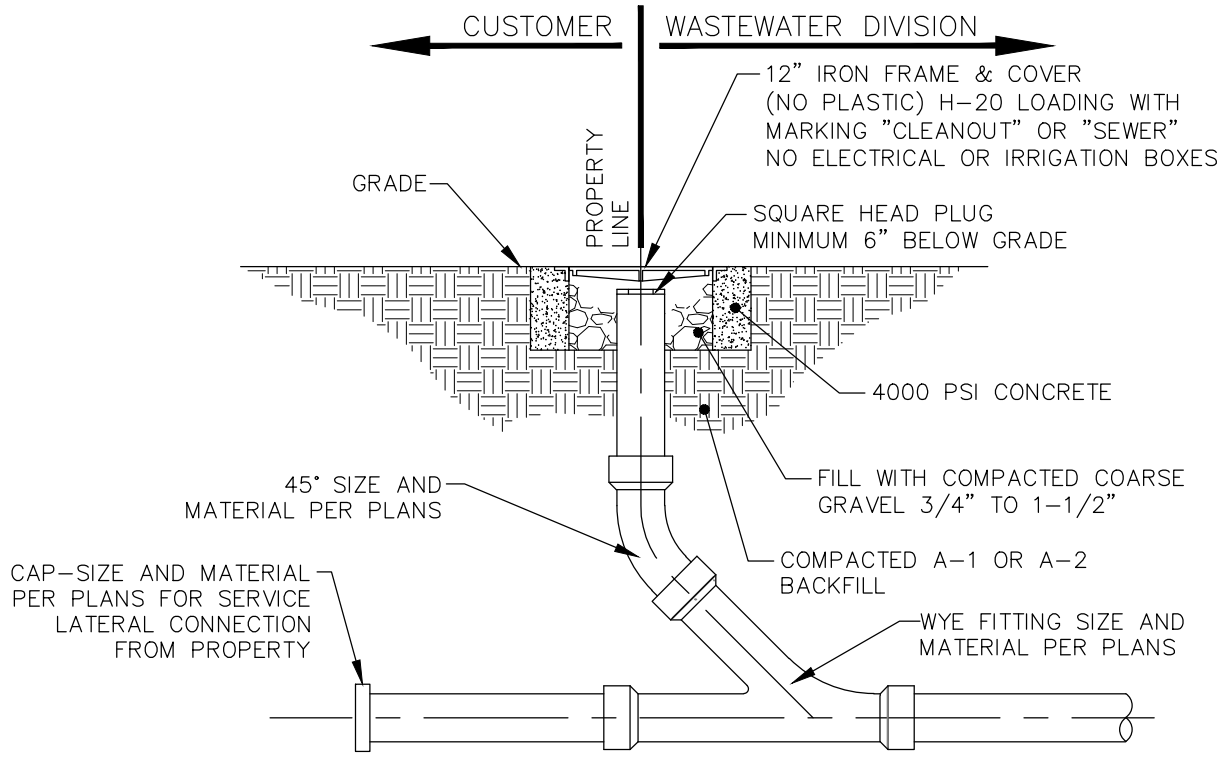


GRADE CLEANOUT (NON-PAVED SURFACES)

SCALE: NONE



NOTE:
GRAVITY SANITARY SEWER LATERALS SHALL BE 4-INCH DIAMETER FOR SINGLE FAMILY RESIDENTIAL PROPERTIES AND 6-INCH DIAMETER FOR COMMERCIAL AND MULTI-FAMILY RESIDENTIAL PROPERTIES UNLESS OTHERWISE NOTED ON THE PLANS.

GRADE CLEANOUT (PAVED SURFACES)

SCALE: NONE

S-10_GRADE CLEANOUT (NON-PAVED SURFACES) GRADE CLEANOUT (PAVED SURFACES).dwg

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GRADE CLEANOUT
(NON-PAVED SURFACES)
GRADE CLEANOUT
(PAVED SURFACES)

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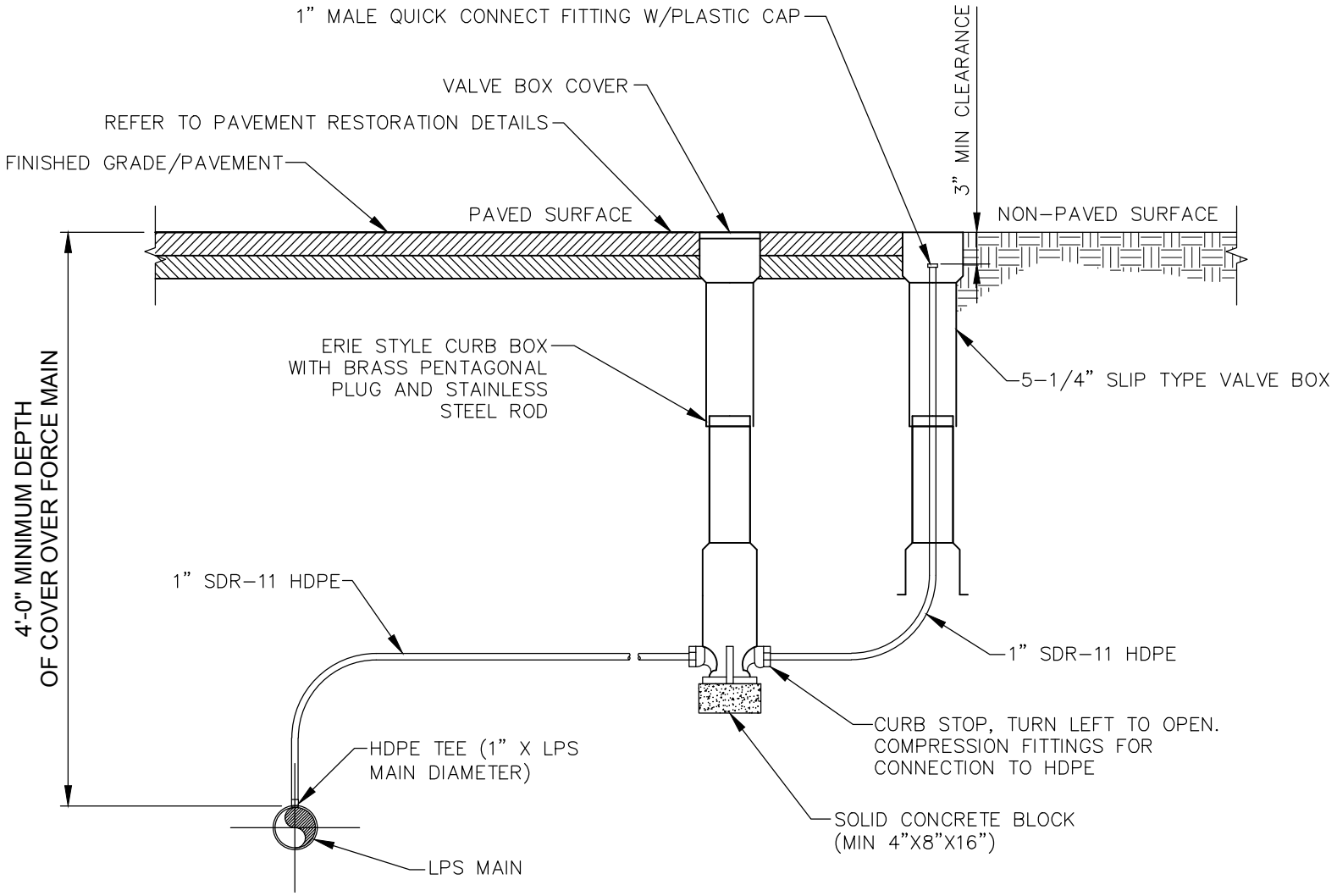

MANUAL AIR RELEASE VALVE

SCALE: NONE

S-11_MANUAL AIR RELEASE VALVE.dwg

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MANUAL AIR RELEASE VALVE

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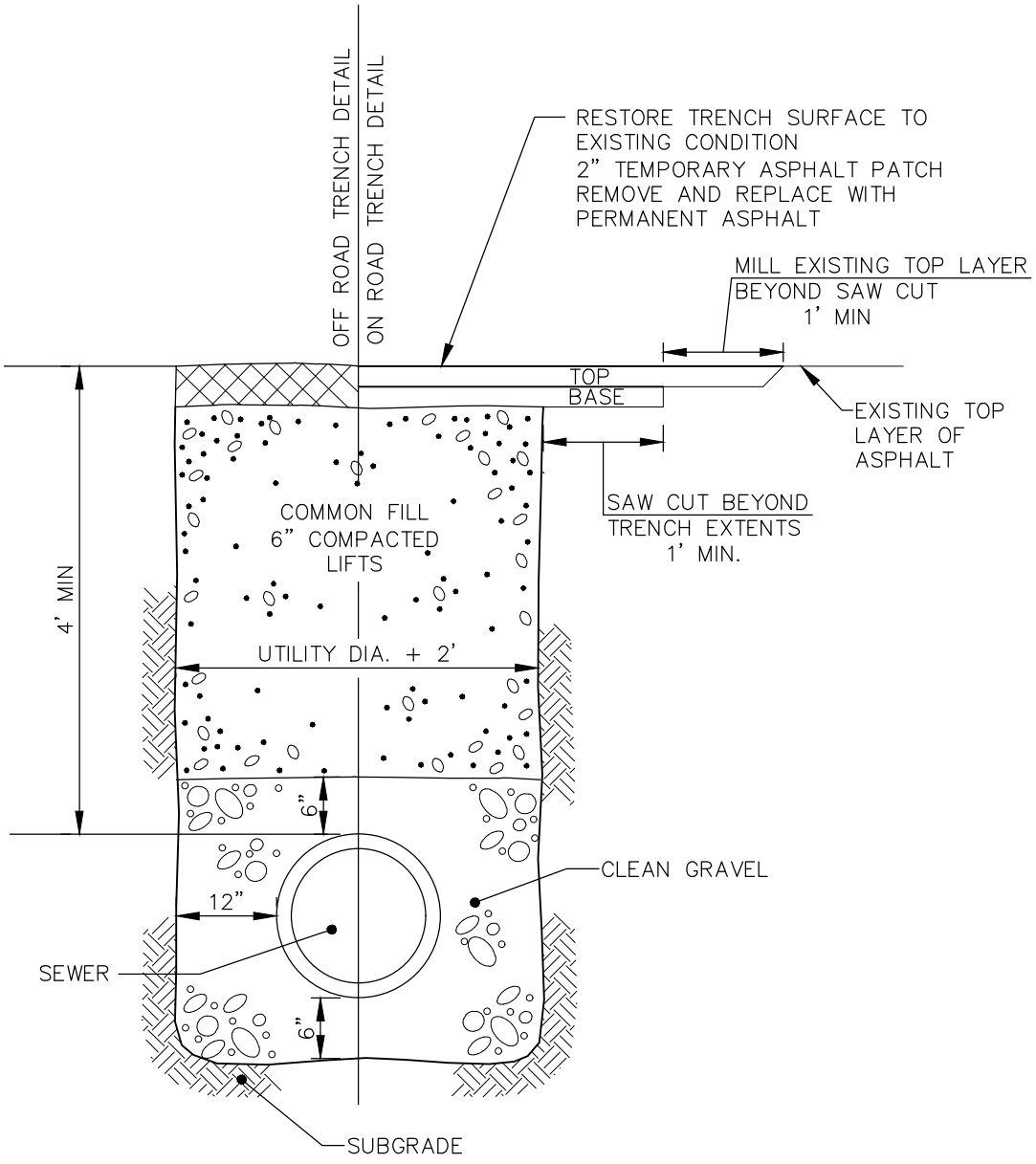

NOTE:
ASPHALT PLACEMENT SHALL FOLLOW CURRENT MASSDOT SPECIFICATIONS.

SEWER TRENCH

SCALE: NONE

S-12_SEWER TRENCH.dwg

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SEWER TRENCH

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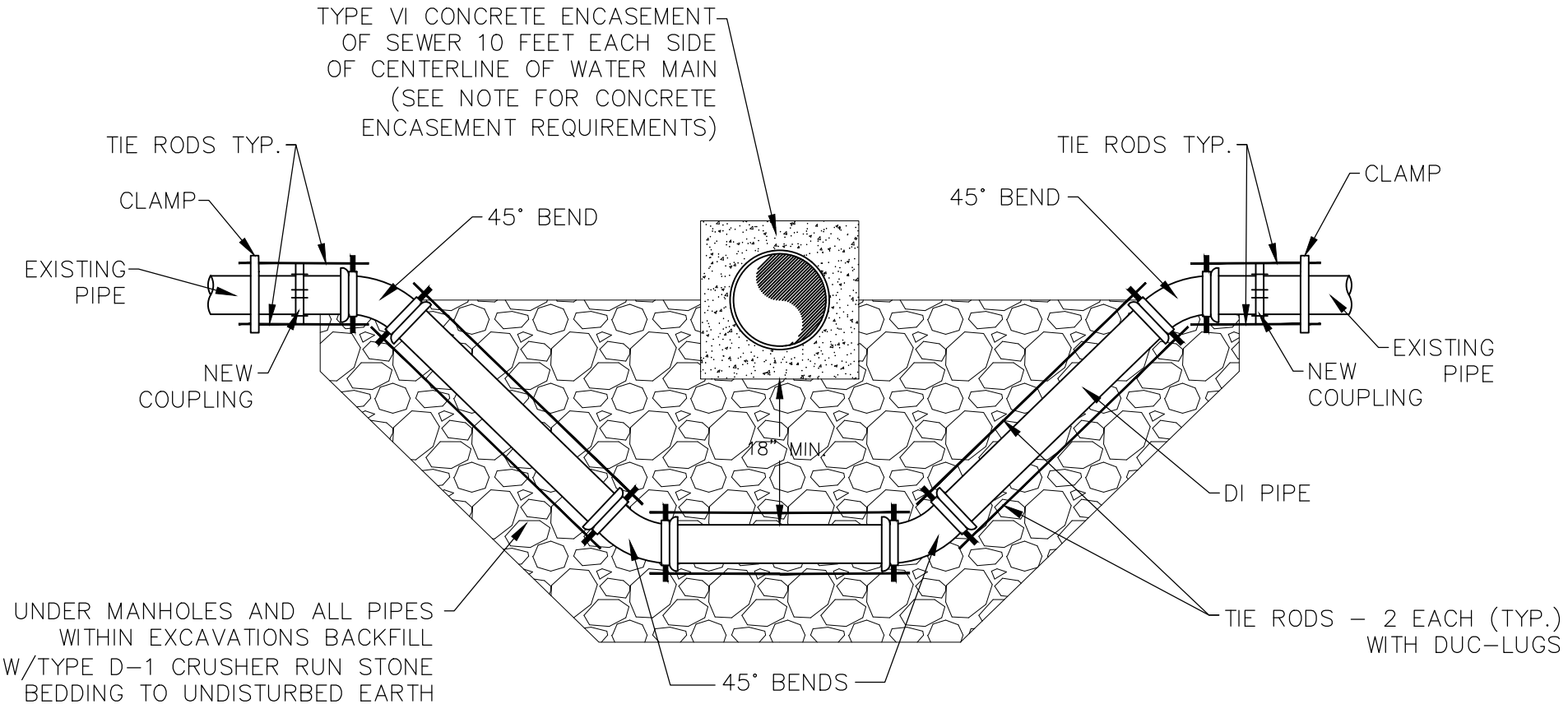

NOTE:

1. CONCRETE ENCASEMENT SHALL BE A MINIMUM OF SIX INCHES MEASURED TO THE SIDES, BELOW, AND ABOVE THE EXISTING WATER MAIN.

WATER MAIN RELOCATION

SCALE: NONE

S-13_WATER MAIN RELOCATION.dwg

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WATER MAIN RELOCATION

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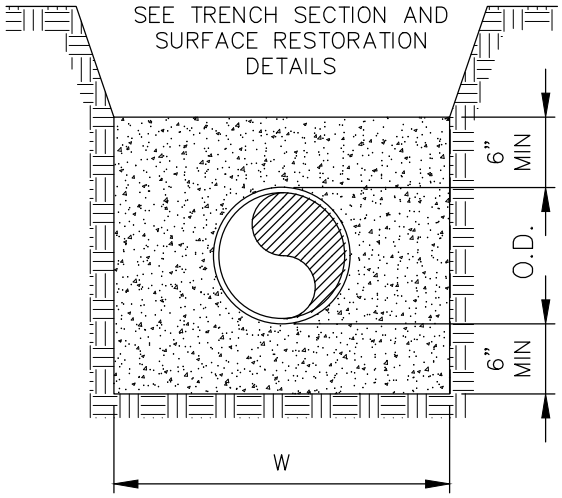

PIPE FOUNDATION CONCRETE ENCASEMENT

SCALE: NONE

S-14_PIPE FOUNDATION CONCRETE ENCASEMENT.dwg

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PIPE FOUNDATION CONCRETE ENCASEMENT

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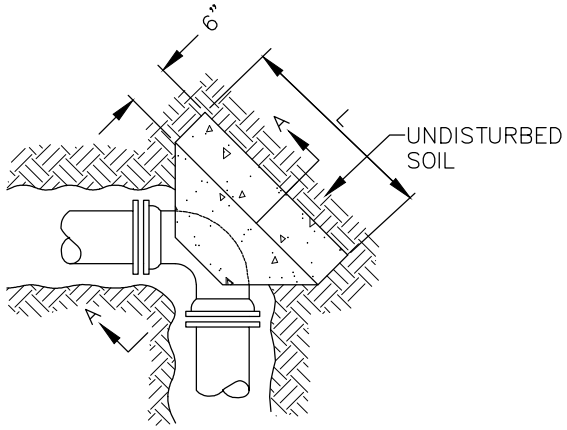

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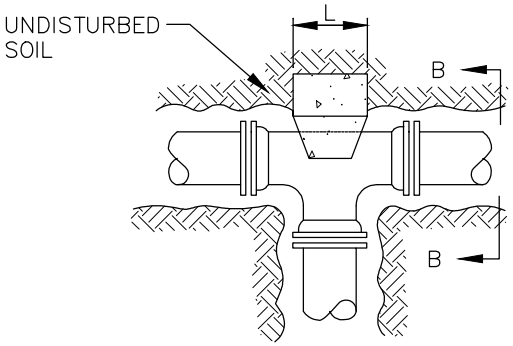

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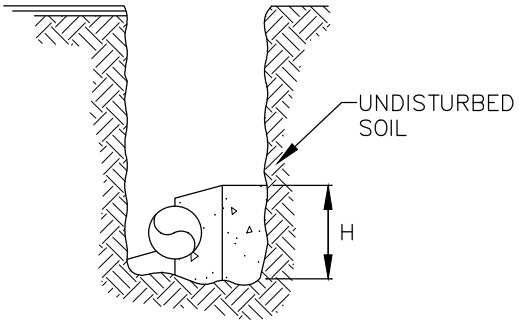
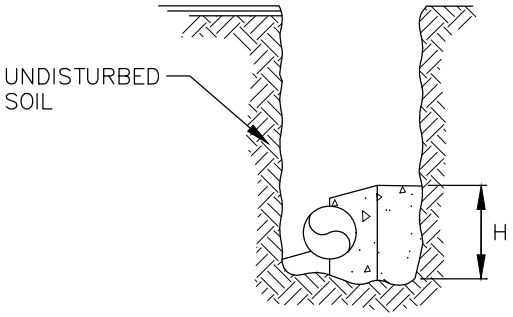


SECTION A–A

ALL HORIZONTAL BENDS



SECTION B–B

TEE OR TAPPING SLEEVE

HORIZONTAL ANCHOR DIMENSIONS FOR AVERAGE SOIL CONDITIONS

UP TO 150 P.S.I. WORKING PRESSURE

	PIPE SIZE	PLUG, CAP, TEE OR TAP SLEEVE		90° BEND		45° BEND		22 1/2° BEND		11 1/4° BEND	
		H	L	H	L	H	L	H	L	H	L
✳	4"	1'–0"	2'–0"	1'–0"	2'–0"	1'–0"	1'–4"	0'–9"	1'–0"	0'–6"	1'–0"
	6"	1'–0"	2'–0"	1'–0"	2'–0"	1'–0"	1'–4"	0'–9"	1'–0"	0'–6"	1'–0"
	8"	1'–4"	2'–8"	1'–4"	2'–8"	1'–4"	1'–6"	1'–0"	1'–0"	0'–9"	1'–0"

✳ FOR 3" AND SMALLER PIPE

THRUST BLOCK

SCALE: NONE

S–15_THRUST BLOCK.dwg

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THRUST BLOCK

S-15

MARCH 17, 2025

CONSTRUCTION STANDARDS

FALMOUTH DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION

STANDARD DETAILS

DETAIL NUMBER	DETAIL
ENG–01	UTILITY TRENCH
ENG–02	PRECAST CONCRETE CATCH BASIN
ENG–03	PRECAST CONCRETE DRAIN MANHOLE
ENG–04	LEACHING PIT
ENG–05	MINOR STREET CROSS SECTION
ENG–06	MAJOR STREET CROSS SECTION
ENG–07	GRANITE CURB
ENG–08	CEMENT CONCRETE WALK
ENG–09	DETECTABLE WARNING
ENG–10	CONCRETE DRIVEWAY APRON
ENG–11	DRIVEWAY PERMIT DETAIL FOR PUBLIC ROAD
ENG–12	SIGHT DISTANCE

INDEX.dwg

TOWN OF FALMOUTH
DEPARTMENT OF
PUBLIC WORKS
ENGINEERING DIVISION
416 GIFFORD STREET
FALMOUTH, MA 02540
508–457–2543

STANDARD DETAILS

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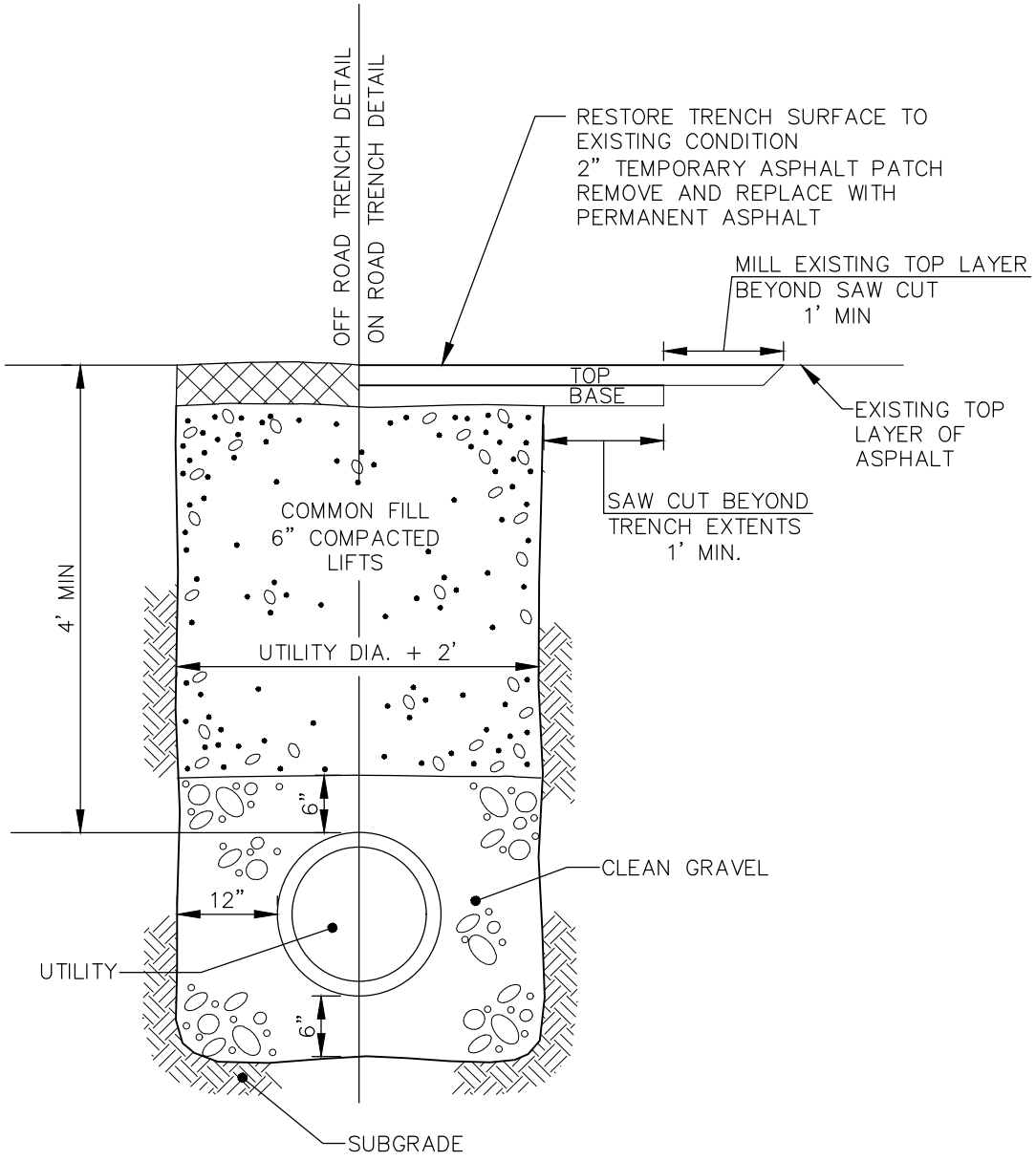

NOTE:
ASPHALT PLACEMENT SHALL FOLLOW CURRENT MASSDOT SPECIFICATIONS.

UTILITY TRENCH

SCALE: NONE

ENG-01_UTILITY TRENCH.dwg

TOWN OF FALMOUTH
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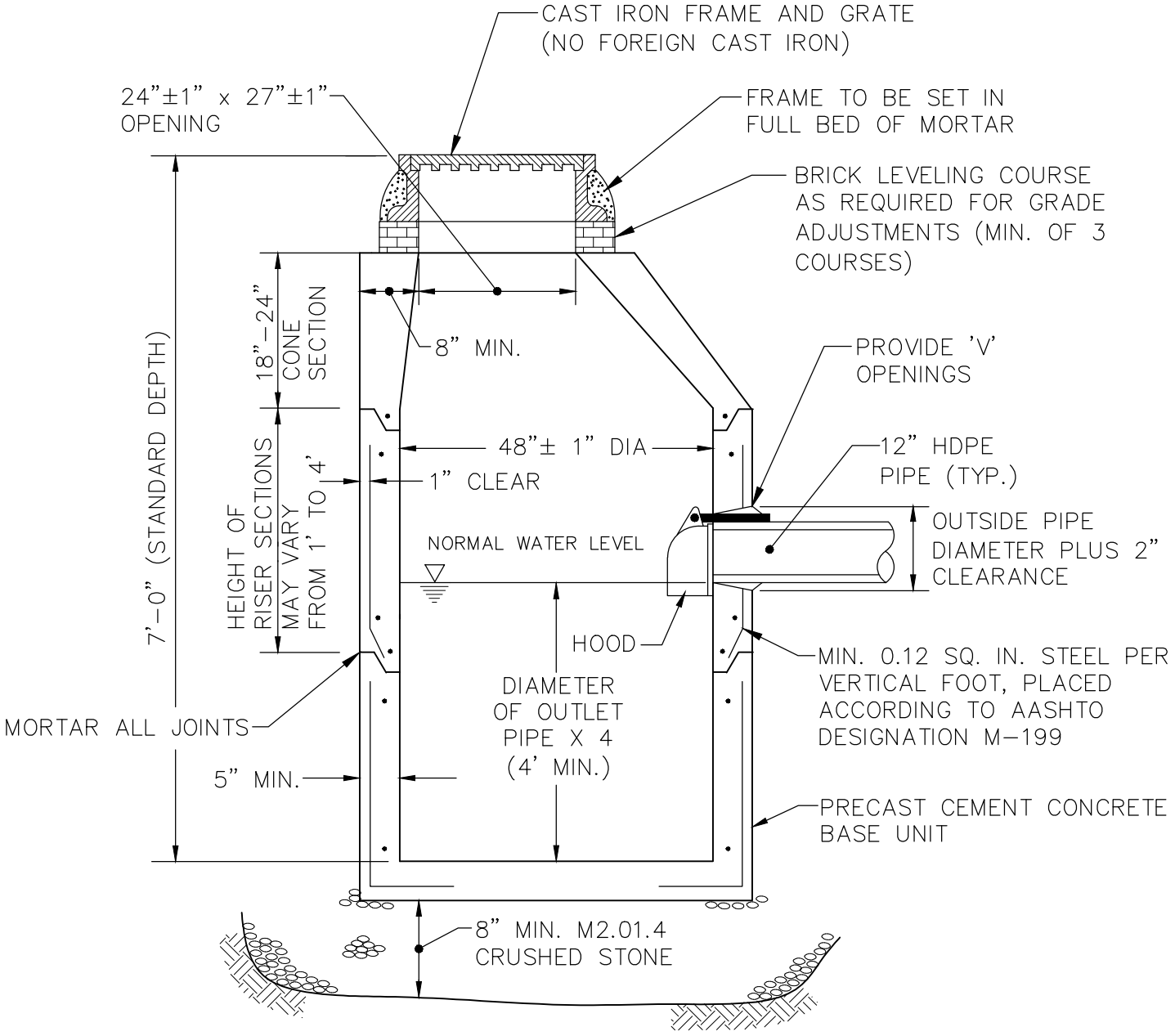
508-457-2543

UTILITY TRENCH

ENG-01

FEBRUARY 25, 2025



PRECAST CONCRETE CATCH BASIN

SCALE: NONE

ENG–02_PRECAST CONCRETE CATCH BASIN.dwg

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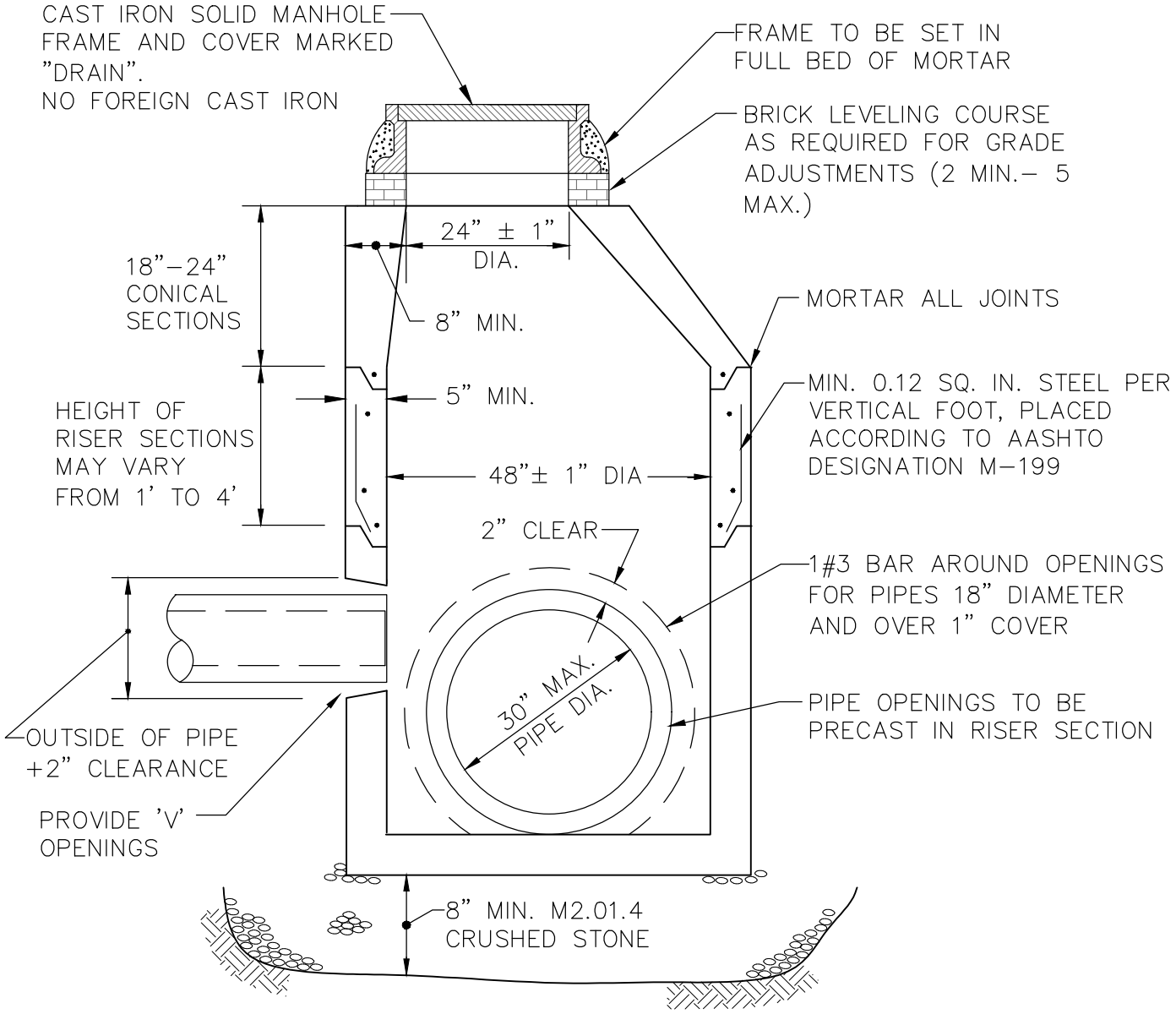
PRECAST CONCRETE CATCH BASIN

ENG-02

FEBRUARY 25, 2025



NOTES:
MANHOLE DIAMETER TO BE INCREASED AS REQUIRED TO ACCOMMODATE THE NUMBER OF PIPES ENTERING OR DISCHARGING FROM THE MANHOLE.

PRECAST CONCRETE DRAIN MANHOLE

SCALE: NONE

ENG–03_PRECAST CONCRETE DRAIN MANHOLE.dwg

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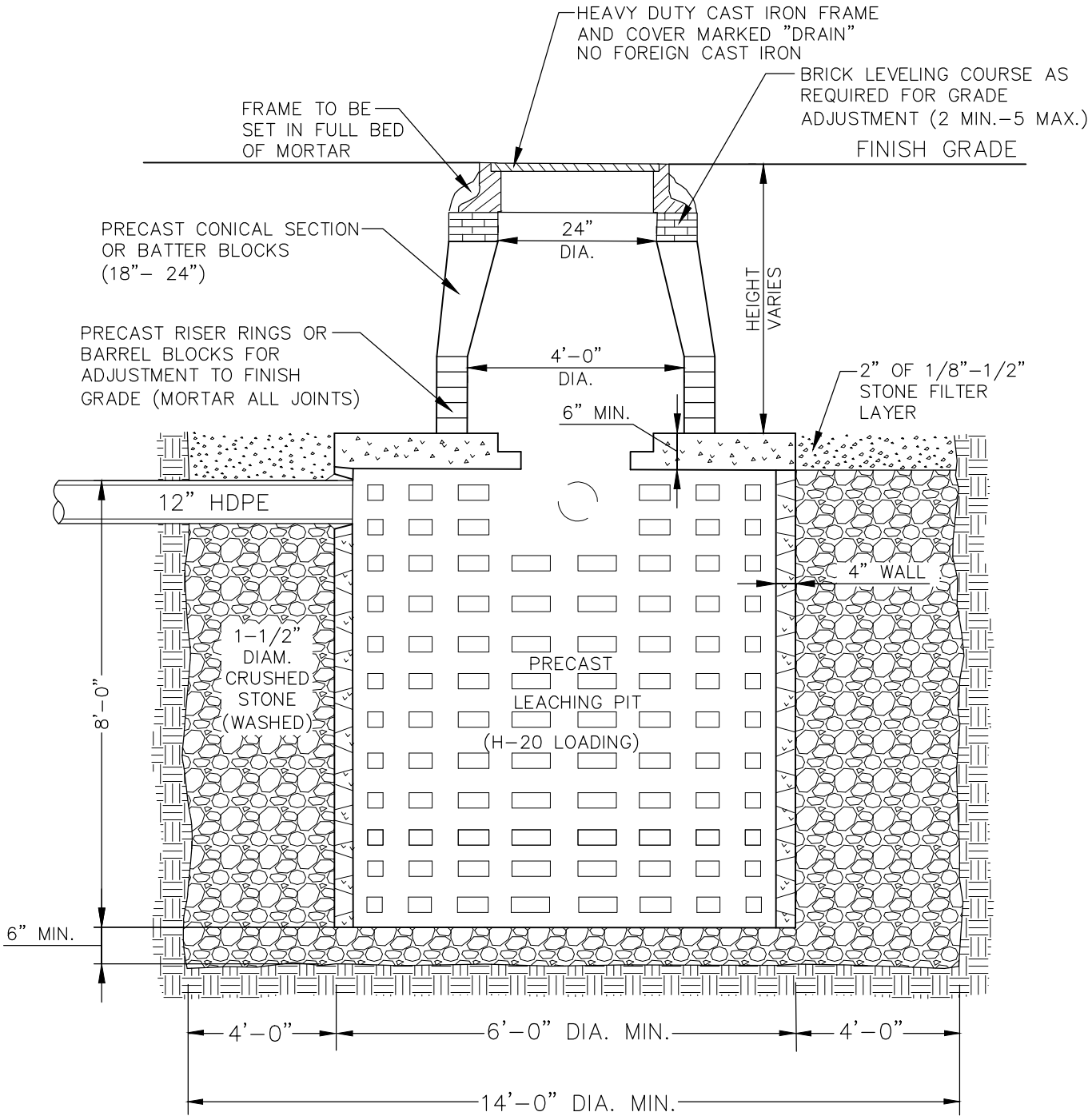
PRECAST CONCRETE DRAIN MANHOLE

ENG-03

FEBRUARY 25, 2025



LEACHING PIT

SCALE: NONE

ENG–04_LEACHING PIT.dwg

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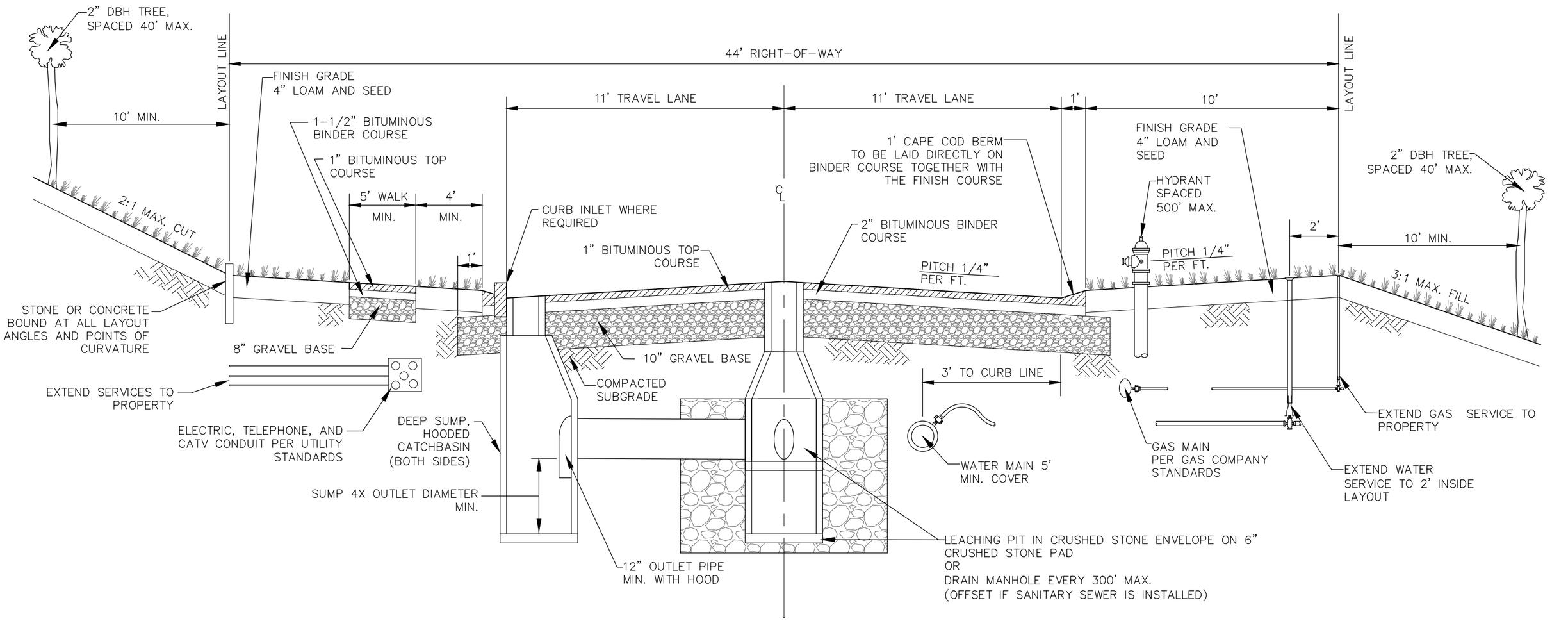
LEACHING PIT

ENG-04

FEBRUARY 25, 2025



NOTES:

1. ALL WORK SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE TOWN OF FALMOUTH SUBDIVISION REGULATIONS.
2. ALL REQUIRED UTILITIES SHALL BE INSTALLED UNDERGROUND WITHIN THE ROAD LAYOUT BUT OUTSIDE THE EDGE OF PAVEMENT.
3. ALL SERVICE CONNECTIONS TO BE EXTENDED TO THE LOT LINES BEFORE PLACEMENT OF THE GRAVEL ROAD BASE.
4. SIDEWALKS SHALL BE CONSTRUCTED TO CURRENT AAB OR ADA STANDARDS.
5. THE APPLICANT SHALL NOTIFY THE APPROPRIATE DEPARTMENT IN WRITING AT LEAST 24 HOURS BEFORE WORK BEGINS AND TO REQUEST ANY INSPECTIONS REQUIRED EITHER BY § 305-42. INSPECTIONS OR THE SUBDIVISION APPROVAL CONDITIONS.
6. FAILURE TO OBTAIN THE REQUIRED INSPECTION APPROVALS MAY RESULT IN FORFEITURE, IN WHOLE OR IN PART, OF ANY GUARANTIES.
7. WATER AND SANITARY SEWER TO MAINTAIN 10' HORIZONTAL SEPARATION.
8. IF SANITARY SEWER IS INSTALLED, IT WILL IN THE CENTERLINE OF THE TRAVELED WAY.
9. ASPHALT WORK SHALL FOLLOW CURRENT MASSDOT SPECIFICATIONS.

ROAD CROSS-SECTION - MINOR STREETS

SCALE: NONE

ENG-05_MINOR STREET CROSS SECTION.dwg

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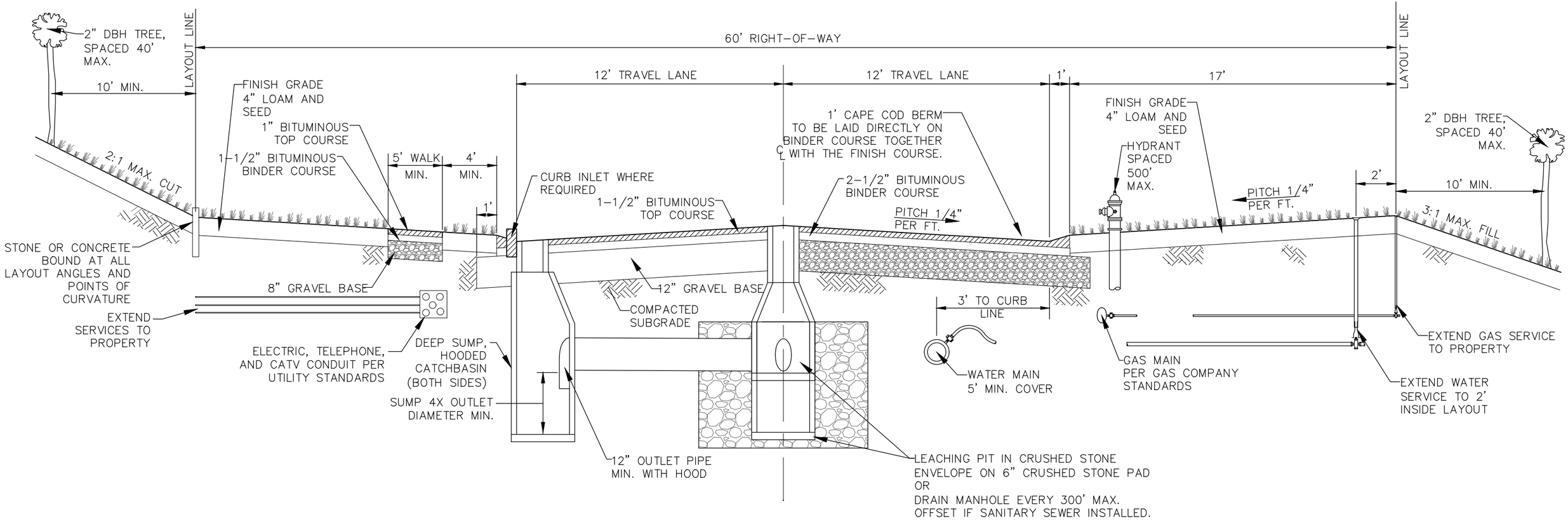
MINOR STREET CROSS SECTION

ENG-05

FEBRUARY 25, 2025



NOTES:

1. ALL WORK SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE TOWN OF FALMOUTH SUBDIVISION REGULATIONS.
2. ALL REQUIRED UTILITIES SHALL BE INSTALLED UNDERGROUND WITHIN THE ROAD LAYOUT BUT OUTSIDE THE EDGE OF PAVEMENT.
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8. IF SANITARY SEWER IS INSTALLED, IT WILL IN THE CENTERLINE OF THE TRAVELED WAY.
9. ASPHALT WORK SHALL FOLLOW CURRENT MASSDOT SPECIFICATIONS.

ROAD CROSS SECTION - MAJOR STREETS

SCALE: NONE

ENG-06_MAJOR STREET CROSS SECTION.dwg

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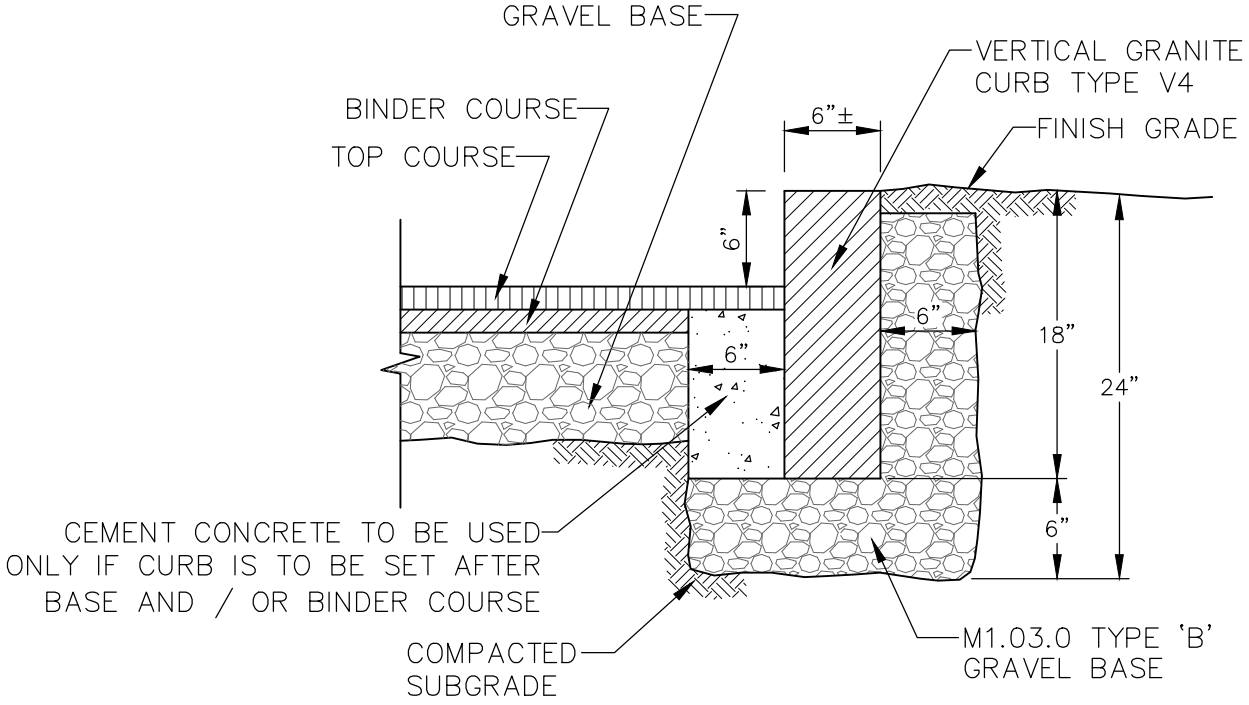
MAJOR STREET CROSS SECTION

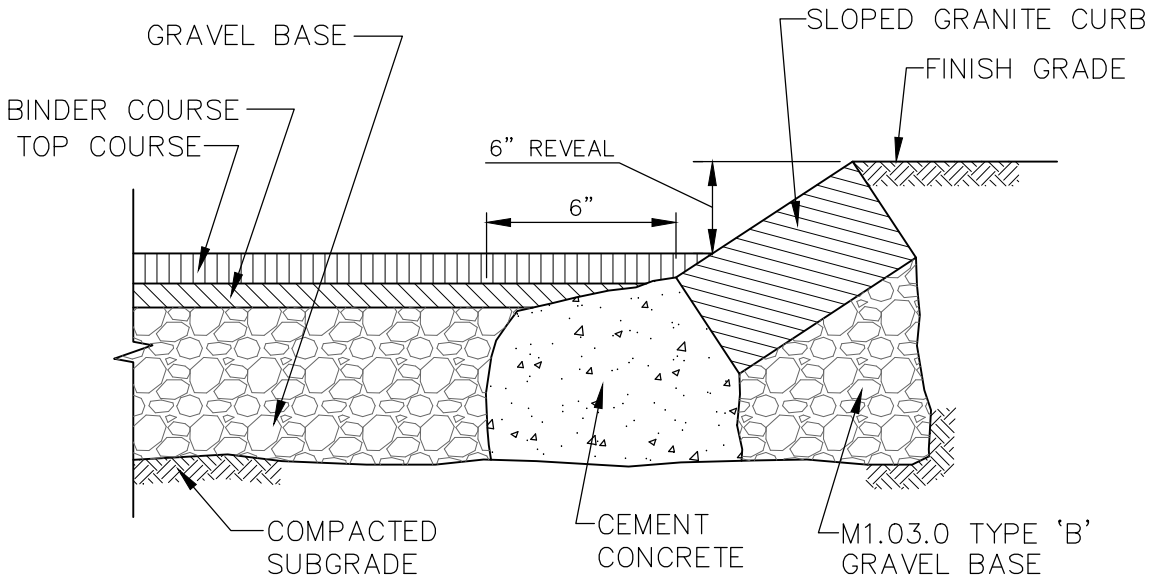
ENG-06

FEBRUARY 25, 2025



VERTICAL GRANITE CURB

NOT TO SCALE



SLOPED GRANITE CURB

NOT TO SCALE

GRANITE CURB

SCALE: NONE

ENG-07_GRANITE CURB.dwg

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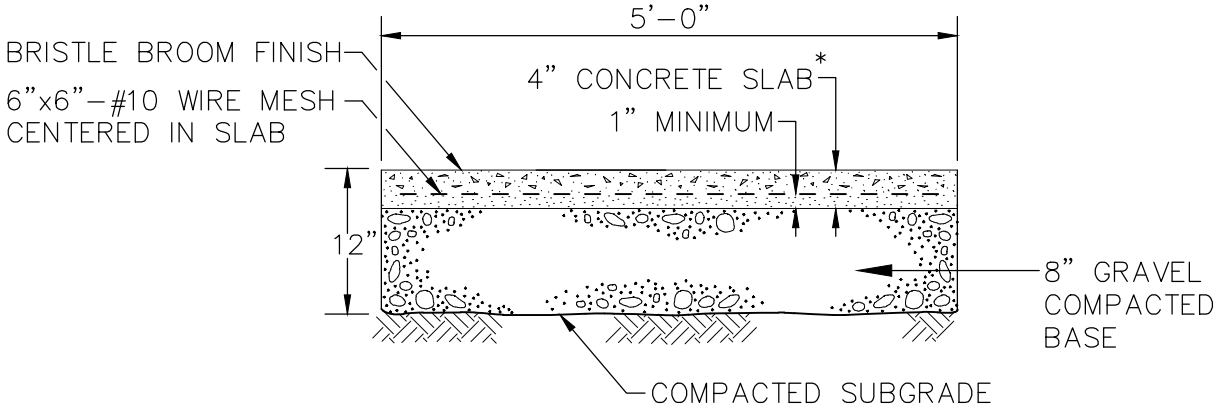
GRANITE CURB

ENG-07

FEBRUARY 25, 2025

PLEASE CALL ENGINEERING FOR AN INSPECTION:
1. WHEN COMPACTED BASE COMPLETE AND WIRE MESH INSTALLED WITH BLOCKING
2. WHEN PLACING THE CONCRETE
3. AFTER FORMS REMOVED



*8" CONCRETE SLAB ACROSS DRIVEWAYS (SEE DETAIL)
IF REPLACING A PANEL, MATCH EXISTING WALK THICKNESS

NOTE:
WIRE MESH LOCATION SHALL BE MAINTAINED BY MEANS OF STAYS, PRECAST BLOCKS, TIES, HANGERS, METAL CHAIRS, OR OTHER APPROVED SUPPORTS. THE USE OF PEBBLES, PIECES OF BROKEN STONES OR BRICK, METAL PIPE OR WOODEN BLOCK SHALL NOT BE PERMITTED.

CEMENT CONCRETE WALK

SCALE: NONE

ENG–08_CEMENT CONCRETE WALK.dwg

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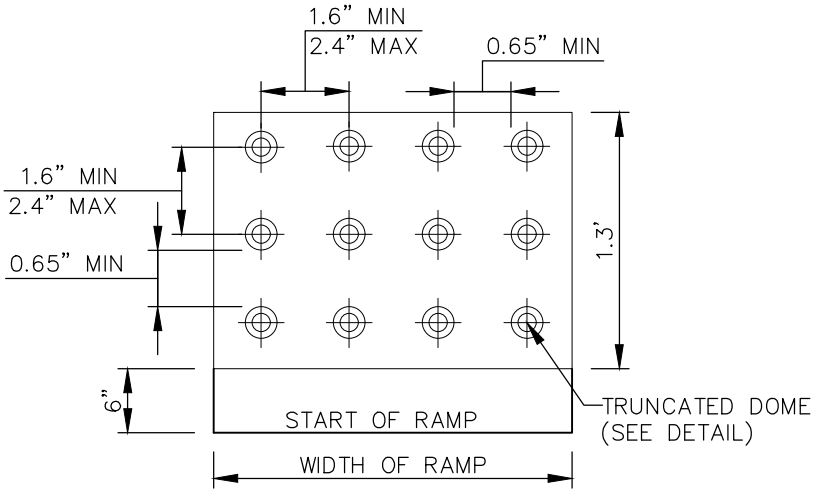
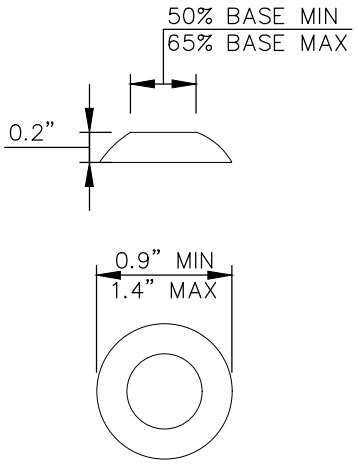
CEMENT CONCRETE WALK

ENG-08

FEBRUARY 25, 2025



TILE DETAIL



TRUNCATED DOME DETAIL

NOTES:

1. COLOR OF DETECTABLE WARNINGS SHALL BE YELLOW.
2. CONTRACTOR SHALL INSTALL DETECTABLE WARNINGS PER MANUFACTURER'S SPECIFICATIONS.
3. DETECTABLE WARNINGS SHALL BE REPLACEABLE (WET-SET) COMPOSITE TACTILE BY ADA SOLUTIONS, INC. OR APPROVED EQUAL.
4. DETECTABLE WARNINGS SHALL COMPLY WITH CURRENT ADA STANDARDS FOR ACCESSIBLE DESIGN.

DETECTABLE WARNING

SCALE: NONE

ENG-09_DETECTABLE WARNING.dwg

TOWN OF FALMOUTH
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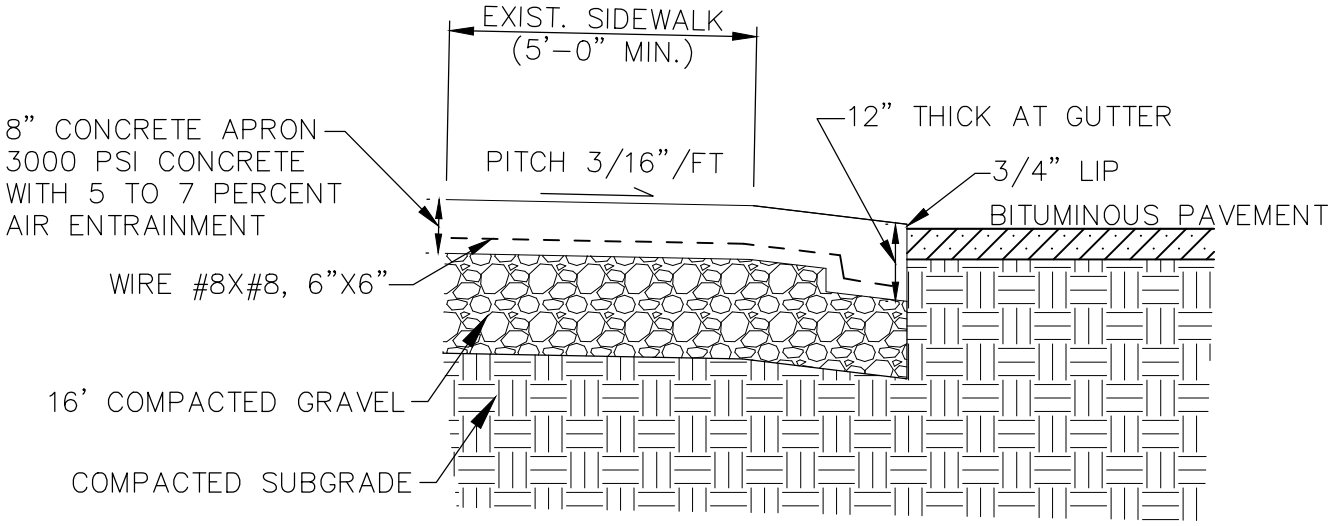
DETECTABLE WARNING

ENG-09

FEBRUARY 25, 2025

PLEASE CALL ENGINEERING FOR AN INSPECTION:
1. WHEN COMPACTED BASE COMPLETE AND WIRE MESH INSTALLED WITH BLOCKING
2. WHEN PLACING THE CONCRETE
3. AFTER FORMS REMOVED



NOTE:
WIRE MESH LOCATION SHALL BE MAINTAINED BY MEANS OF STAYS, PRECAST BLOCKS, TIES, HANGERS, METAL CHAIRS, OR OTHER APPROVED SUPPORTS. THE USE OF PEBBLES, PIECES OF BROKEN STONES OR BRICK, METAL PIPE OR WOODEN BLOCK SHALL NOT BE PERMITTED.

CONCRETE DRIVEWAY APRON

SCALE: NONE

ENG–10_CONCRETE DRIVEWAY APRON.dwg

TOWN OF FALMOUTH
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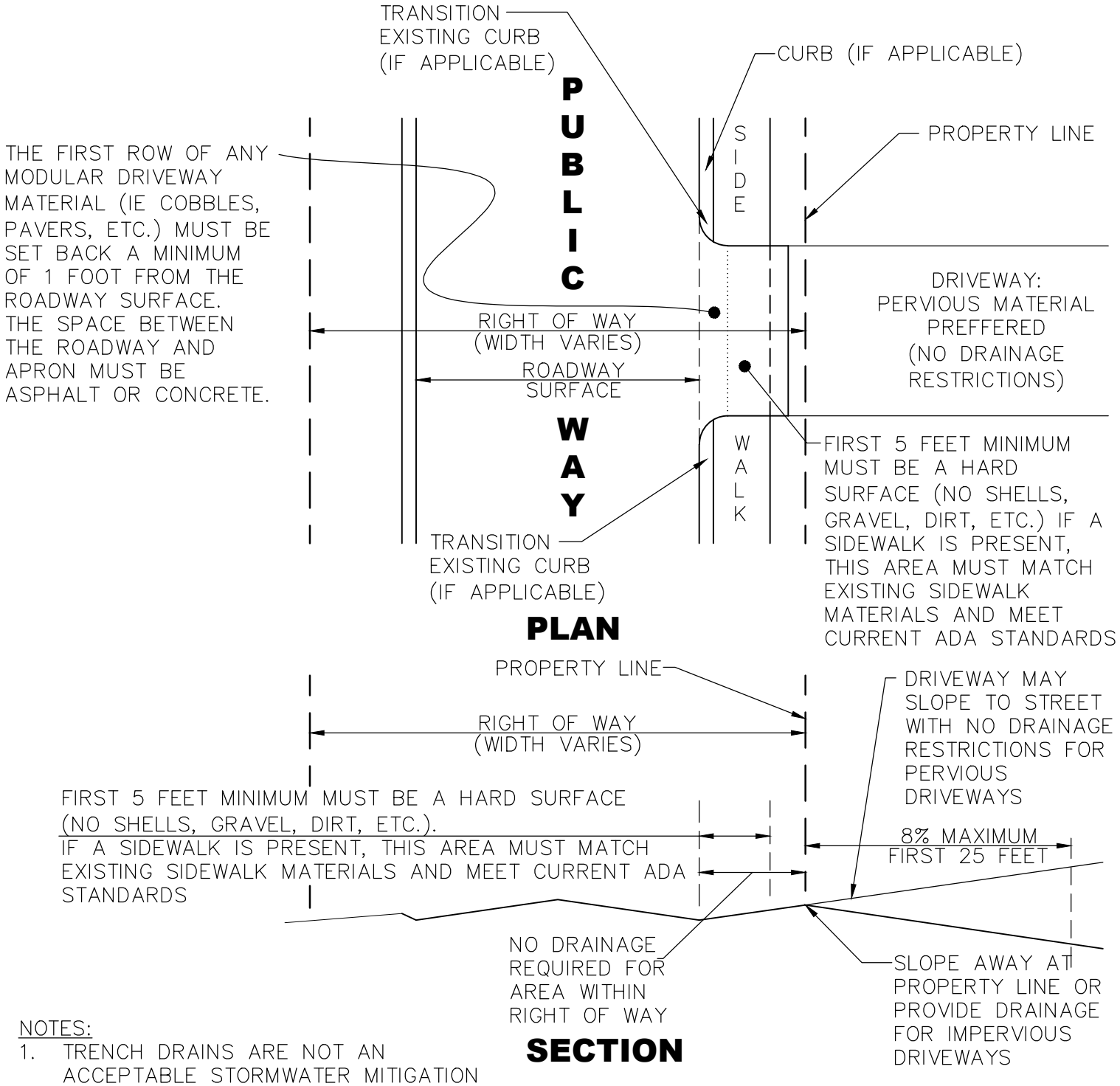
CONCRETE
DRIVEWAY APRON

ENG-10

FEBRUARY 25, 2025



NOTES:

1. TRENCH DRAINS ARE NOT AN ACCEPTABLE STORMWATER MITIGATION DEVICE.
2. EROSION AND SEDIMENT CONTROLS ARE REQUIRED IF SITE SLOPES TOWARDS RIGHT OF WAY, OR IF OTHERWISE REQUIRED.

DRIVEWAY PERMIT DETAIL FOR PUBLIC ROAD

SCALE: NONE

ENG-11_DRIVEWAY PERMIT DETAIL FOR PUBLIC ROAD.dwg

TOWN OF FALMOUTH
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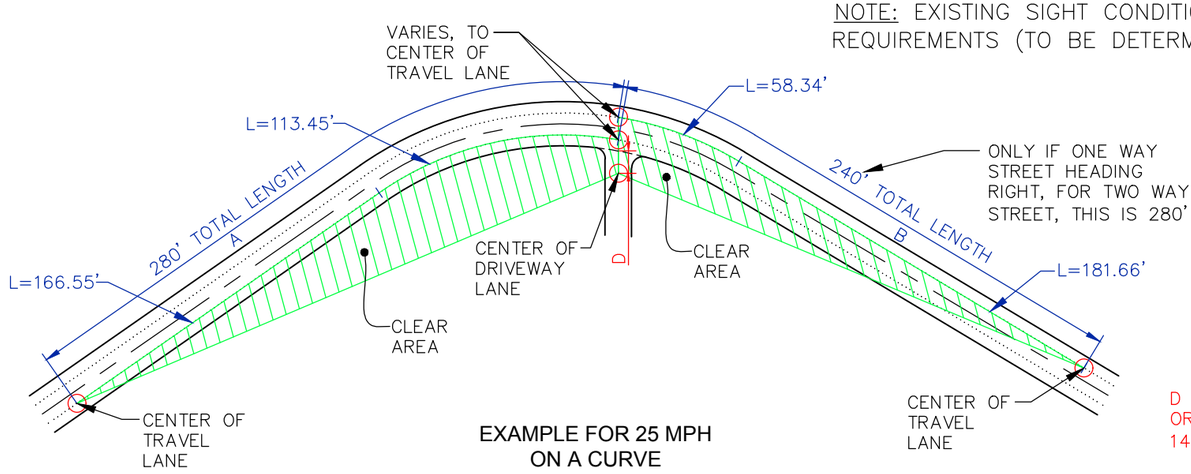
DRIVEWAY PERMIT DETAIL FOR PUBLIC ROAD

ENG-11

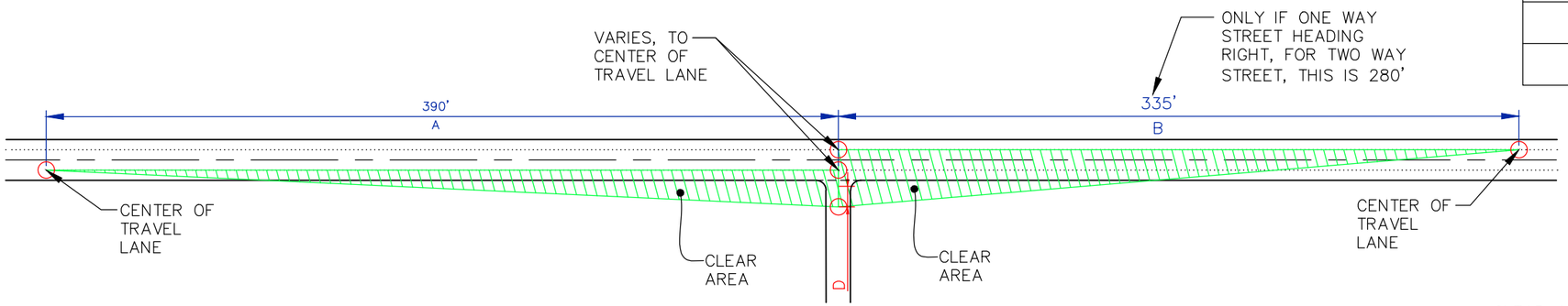
FEBRUARY 25, 2025

NOTE: EXISTING SIGHT CONDITIONS MAY DICTATE STRICTER REQUIREMENTS (TO BE DETERMINED ON A CASE BY CASE BASIS)



EXAMPLE FOR 25 MPH
ON A CURVE

D = 12' FROM BACK EDGE OF SIDEWALK
OR
14.4' FROM EDGE OF ROAD WITHOUT SIDEWALK



EXAMPLE FOR 25 MPH
ON STRAIGHT SECTION

Length of Sight Distance Legs (ft)		
Street Design Speed (mph)	Left Turn A (ft)	Right Turn B (ft)*
15	170	145
20	225	195
25	280	240
30	335	290
35	390	335
40	445	385
45	500	430
50	555	480
55	610	530

* FOR TWO WAY INTERSECTING STREET, BOTH DIRECTIONS SHALL HAVE THE LEFT TURN SIGHT DISTANCE LENGTH.

PER SECTION 3.7.4.1 OF THE MASSACHUSETTS HIGHWAY DEPARTMENT PROJECT DEVELOPMENT & DESIGN GUIDE FOR STOP CONTROL ON MINOR STREET.

CLEAR AREA DIMENSIONS:
3 FEET ABOVE THE CENTER LINE SURFACES OF THE INTERSECTION STREETS AND SHALL CONTINUE TO BE UNOBSTRCUTED TO A HEIGHT OF 7 FEET ABOVE SUCH SURFACES. THE TRUNKS OF TREES, UTILITY POLES, POSTS OF SIGNS, IF SUCH SIGNS ARE OTHERWISE LEGAL OR SIGNS OR OTHER DEVICES ERECTED BY THE TOWN OR STATE FOR THE DIRECTION AND CONTROL OF TRAFFIC SHALL NOT BE CONSIDERED AS OBSTRUCTIONS.

CLEAR SIGHT TRIANGLE EXAMPLES PURSUANT TO § 199-3 DIMENSIONS OF OBSTRUCTED VIEW

SIGHT DISTANCE

SCALE: NONE

ENG-12_SIGHT DISTANCE.dwg

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SIGHT DISTANCE

ENG-12

FEBRUARY 25, 2025