CITY OF NEW BEDFORD

DEPARTMENT OF PUBLIC INFRASTRUCTURE

CONSTRUCTION STANDARDS AND SPECIFICATIONS

Revision March 2025

**This manual is updated annually during the first quarter of the calendar year. The latest version is available digitally at the City of New Bedford Department of Public Infrastructure Engineering Division's web page (https://www.newbedford-ma.gov/public-infrastructure/engineering/).*

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SECTION I
DEFINITIONS

Unless the context specifically indicates otherwise, the meaning of terms used in these Specifications shall be as follows:

"**Shall**" and "**Will"** are mandatory.

"**May**" and "**Should**" are permissive.

"**City"** shall mean the Commissioner of Public Infrastructure of the City of New Bedford, City Engineer or its duly authorized deputies, agents, representatives, or others having jurisdiction with regard to enforcement of these Specifications or acting for the City of New Bedford, Massachusetts.

"**Commissioner**" shall mean the Commissioner of Public Infrastructure or his duly authorized agents, representatives, or others having jurisdiction with regard to enforcement of the Specifications or acting for the City of New Bedford, Massachusetts.

"Contractor" means the Party of the Second Part to the Contract, acting directly or through an authorized lawful agent or employee.

"DPI" shall mean the City of New Bedford's Department of Public Infrastructure.

"**Engineer**" shall mean the City Engineer or his duly authorized agents, representatives, or others having jurisdiction with regard to enforcement of the Specifications or acting for the City of New Bedford, Massachusetts.

"**Hot Mix Asphalt"** shall mean Bituminous Concrete.

"**Inspector**" shall mean any person acting as a duly appointed agent of the DPI to ensure compliance with all Specifications and Rules and Regulations governing construction within the City of New Bedford, Massachusetts.

"MassDOT Standards" means the Massachusetts Department of Transportation – Highway Division Standard Specification for Highways and Bridges – 2025 Edition including all Massachusetts Department of Transportation – Highway Division (MassDOT) revisions and supplemental changes and/or information.

"Moratorium" shall mean the timeframe in which a person or contractor is not allowed to work in city rights of ways. The following moratoriums apply:

- No work shall occur in City Streets or Rights of Ways from December 15th to April 1st without prior written approval of the Commissioner.

- The City of New Bedford does not allow excavating on streets resurfaced (excluding crack sealing or fog sealing) within five years unless approved in writing

by the DPI Commissioner or his/her designee. Additional requirements are specified herein should permission be approved.

"Municipal Storm Drain System" The system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system, street, gutter, curb, inlet, piped storm drain, pumping facility, retention or detention basin, natural or manmade or altered drainage channel, reservoir, and other drainage structure that together comprise the storm drainage system owned or operated by the City of New Bedford.

"Sewer Main" shall mean, a drain or pipe that is underground and used to carry away surface water or sewage in a Public Way.

"Sewer Service" shall mean, an individual pipe that comes off the public sewer main to service a private house or business. Property Owners are responsible for a sewer service from their house or business to the connection at the Public Main.

"Stormwater Service" shall mean, an individual pipe that comes off the municipal main to service a private house or business. Property Owners are responsible for the stormwater service from the connection point at the municipal main to the collection system of the house or business.

"Water Main" shall mean, a water supply system in a public way used to distribute water to residential or commercial properties.

"Water Service" (Domestic or Fire Supply), shall mean, the lateral pipe from the public water main to primary service shut off valve, except when the meter is inside, then it is to the curb stop. Property Owners are responsible for the service from the property line to the meter.

SECTION II
GENERAL PROVISIONS

CONSTRUCTION & SPECIFICATIONS MANUAL

The latest version of this manual is available digitally at the City of New Bedford Department of Public Infrastructure Engineering Division's web page (https://www.newbedford-ma.gov/public-infrastructure/engineering/).

INTENT OF THE SPECIFICATIONS

The intent of these standard specifications is to clarify and advise the Contractor of his/her responsibility to perform all work and services as outlined. If, for any reason, a particular phase or phases of any or all of the operations has been omitted, it is not intentional, and it is to be understood that the Contractor must perform the work as fully as if it were described and delineated.

The Commissioner shall, in the case of any discrepancies or questions, interpret the plans and details and direct the Contractor accordingly.

These regulations govern construction within the geographical limits of the City of New Bedford. They include, but are not limited to, old and new subdivisions and where applicable, complement the "Rules and Regulations Governing the Subdivision of Land" by the Planning Board.

CONTRACTOR'S LEGAL RESPONSIBILITY UNDER STATE LAWS

Attention is hereby directed to the provisions of Section 40, Chapter 82 of the General Laws requiring Contractors to notify public utility companies in writing at least 48 hours before excavating a public way to prevent accidental damage; and to Chapter 131, Section 40, the Wetlands Protection Act.

It shall be the Contractor's responsibility to familiarize themselves with and abide by any applicable local, state and federal laws governing his intended activities.

CERTIFICATES OF COMPLIANCE

The Contractor shall furnish all Shop Drawings, Catalog Cuts, and a statement, certifying that all materials to be used in the work comply with the requirements of the specifications upon request. These statements shall be prepared by the manufacturer, an approved commercial laboratory, or any other agency acceptable to the Commissioner. In case of question or failure, it shall be the responsibility of the Contractor to arrange any required sampling and testing of the materials at no additional cost to the City.

Unless otherwise approved in writing by the Commissioner, only new materials and equipment shall be incorporated in the work.

REFERENCE TO SPECIFICATIONS

Where specifications of the American Association of State Highway and Transportation Officials (AASHTO), The American Society of Testing and Materials (ASTM), The American National Standards Institution (ANSI), the Massachusetts Department of transportation (MASSDOT), the American Water Works Association (AWWA), the National Association of Sewer Service Companies (NASSCO), or any other agency are called for, the latest edition of these specifications including all addenda shall be used, unless otherwise noted.

LAYOUT AND CONTROL OF WORK

The Contractor shall lay out his own work and be responsible for the execution of the work to such lines and grades indicated on the drawings, prescribed in the specifications, or directed by the Commissioner. In no case shall construction be performed without plans that have been approved by the DPI. The Contractor shall furnish, at his expense, all stakes, templates, range markers and other equipment, material and labor as may be required in laying out any part of the work.

The Contractor shall maintain and preserve horizontal and vertical control stakes being used for construction. Control stakes and markers originally set by the City Engineering Division for purposes of establishing horizontal and vertical control that are disturbed will be re-set by the City Engineering Division at the expense of the Contractor.

For property line monuments including City bounds that are to remain in place, the Contractor shall implement best practices to preserve the monuments located within the limits of construction including area used for access to the construction site. In the event that a property line monument, including city bounds, is uncovered by the Contractor and requires removal and replacement, the Contractor shall notify the City and allow sufficient time for the City Engineering Division to locate the monument by instrument survey prior to disturbance. In the event that a property line monument or city bound is disturbed as a result of construction work, the City will re-set the monument in conjunction with a Registered Land Surveyor as needed, at the expense of the Contractor.

PROTECTION OF PERSONS AND PROPERTY

Contractors are to erect such structures around the locations as may become necessary to allow pedestrians to travel by the locations and to fence in any danger area or other place adjoining the streets where the work is performed constituting a hazard to persons or property, and to properly light and maintain lights at night around the locations in question.

Contractors must obtain Street Disturbance and Obstruction (D&O) permits before work commences. D&O permits will be issued once the property owner (or applicant) has obtained the coordinating permit (e.g. driveway, sewer service, etc.).

SAFETY PRECAUTIONS

The Contractor shall provide fences, barriers, warning lights, police officers, signs and any other safety features as may be necessary for the protection of the public. These precautions shall apply particularly for open excavations.

Where the Contractor performs work on any public roads or thoroughfares, they shall first obtain permits from the City and then perform the work in accordance with said permits. The Contractor shall be responsible for maintaining traffic control with police officer details, signs, etc. If roads are disturbed, the contractor shall maintain the work until such time that they restore the road base and surface to the satisfaction of the City of New Bedford.

The Contractor shall take all necessary precautions to protect their work from damage by vandalism, storms, ground water infiltration, etc. In case of damage, the Contractor shall make such repairs,
replacements, or rebuild such parts of the work as the Commissioner may require in order that the finish work may be completed as required by the drawings, specifications, and/or permit.

DIG SAFE REQUIREMENTS

Dig Safe mark outs for all City owned utilities (water, sewer, drainage, streetlight, fiber optics, etc.) will not be marked out until Street Disturbance permits have been signed and administered back to the applicant.

If work is to be performed solely within private property, therefore not requiring D&O permits, Dig Safe mark outs for all City owned utilities will not be marked until the Trench permit has been signed by DPI and administered back to the applicant.

All pre-marks for Dig Safe requests within the downtown area will require chalk paint be used in lieu of standard spray paint. The downtown area is bound by County Street to MacArthur Drive and Elm Street to Walnut Street.

MATERIALS AND WORKMANSHIP

Contractors shall be responsible for defects in Materials and Workmanship for a period of two (2) years following the completion with of any Driveway, Sidewalk, Sewer Main or Service, Low Pressure System, Water Main or Service, or any other work which requires permits from the Department of Public Infrastructure.

It is the sole responsibility of the contractor to conduct a pre-construction survey for existing conditions (including photographed evidence and clear documentation of any pre-existing concerns or issues), of the work zone and adjacent properties. Upon completion of construction, the contractor will be held responsible, and required to repair at their expense, any damage the DPI Inspector deems a result of negligence (including, but not limited to, score marks from equipment tracks, tooth marks from back-hoe buckets and damage to grass ribbons or landscaped areas).

All castings (i.e, manhole covers, frames, grates, cleanouts, boxes and covers, etc.) shall be manufactured in the United States. Materials shall be new and unused. Cast iron shall conform to ASTM A48, Class 30. Contractors may be required to submit certified compliance statements from manufacture verifying compliance with American made products.

USE OF EXISTING WATER AND SEWER SERVICES

The use of existing water and sewer services shall be at the Owner's own liability. The City does not warrant that existing service connections are in proper working condition nor meet current local, state or federal standards for safe operable and working condition. The following shall apply to all new development or redevelopment property proposing to utilize existing service connections:

1. Any water service smaller than 1-inch shall be replaced and upgraded from the corporation tap at the main to the meter.
2. Any water service identified as having lead (main to curb stop and/or curb stop to meter) shall be fully replaced from the main to the meter in accordance with these construction standards.
3. Any sewer service constructed of vitrified clay pipe, transite pipe or orangeburg pipe shall be replaced from the sewer main to the property line.
4. Documentation in the form of CCTV inspection data, in PACP/LACP format, shall be provided to the DPI for review and to document the condition of any existing service proposed to be reused. Upon review of the CCTV inspection data, the DPI will specify whether the service line must be replaced or provide an approved rehabilitation method. Any defects or identified sources of infiltration shall be repaired by the Contractor prior to use.
5. If a sewer service is being replaced or repaired and the existing water service is located closer than 10-ft horizontally or has less than 18-inch of vertical separation from the sewer service then the sewer service shall be concrete encased. See "Sewer Service Crossing Water Main or Storm Drain" detail for concrete encasement requirements.
6. The use of reducers is prohibited. Water services must be consistent size from main to meter. Sewer services cannot vary in size from main to building.
7. The connection of service laterals into one common, joint line is prohibited. New and/or existing services shall not connect into one another prior to entering the City's main.

PERMITS

No Contractor shall, in any manner, disturb the surface of any public right of way within the City of New Bedford without first obtaining a permit. Only "City Bonded Contractors" approved by the City of New Bedford are allowed to do work on public right of ways.

No work shall occur in City Streets or Rights of Ways from December 15th to April 1st without prior written approval of the Commissioner.

Any work that occurs in a paved surface or roadway that was paved or improved (excludes crack sealing or fog sealing) within the previous five years shall have written approval of the Commissioner or his/her designee to complete the work and shall have additional requirements for restoration as specified herein which shall be included on the required permit. The City reserves the right to reject any and all requests regarding work in streets, roadways, or rights of ways that have been paved or improved in the previous five year.

Depending on the location, type and extent of work, additional requirements may be mandated and shall be specified by DPI signee on the approved permit.

The following permits are under DPI authority:

1. Street Obstruction: Required when working within the City Right of Way.
2. Street Disturbance: Required when excavating within the City Right of Way.
3. Trench Safety: Required when excavating on private property.
4. Sidewalk/Driveway: Required when installing or reconstructing sidewalks and/or driveways.
5. Sewer: Required when installing new or reconstructing sewer mains or sewer service connections.
6. Stormwater: Required when installing new or reconstructing stormwater mains, service connections or self-contained stormwater mitigation systems.
7. Water: Required when installing water mains or service connections.

Trench Safety & Permits:

TRENCH SAFETY/DISTURBANCE PERMITS for EXCAVATION & TRENCH SAFETY REGULATIONS - 520 CMR 14.00 Effective March 1, 2009

This PUBLIC SAFETY regulation is required by statute and is designed to prevent the public from falling into an unattended trench and suffering an injury or fatality.

Under the regulation, a trench is defined as a subsurface excavation greater than 3 feet in depth and is 15 feet or less between soil walls, as measured at the bottom.

All regulated trenches must be attended, covered, barricaded, or backfilled. Covers must be road plates at least ¾" thick or equivalent, barricades must be fences at least 6' high with no openings greater than 4" between vertical supports and all horizontal supports required to be located on the trench side of the fencing.

This applies to all construction-related trenches on public ways, public property, or private property.

Under the regulation, the DPI will be the designated permitting authority, which will issue the required permits for trenches on public ways or private property within the municipality.

The DPI will have the authority to act, if there is any potential violation, including an immediate shutdown, if violations of the new regulations are identified. Excavators may also be subject to administrative fines issued by the Department of Public Safety for violations.

This new regulation in no way modifies or supersedes existing trench worker safety regulations. Workers in trenches must comply with the existing OSHA Excavation Standard, 29 CFR 1926, Subpart P. This new public safety regulation is entirely separate from and has no relationship to the existing trench worker safety standard.

This is only a summary of the regulation. Please read the full regulation and obtain further information at www.mass.gov/dps or www.mass.gov/dos.

The City of New Bedford has combined the trench permit with the current Street Disturbance Permit to reduce the number of permits required for each site.

INSPECTION

The Contractor shall notify the DPI or Engineering at least twenty-four hours prior to the construction of any public improvement so that the City can have an Inspector present if the work requires inspection. In general, inspection will be required.

1. For Driveways, Sidewalks and Wheelchair Ramp Construction:

    a. When base course is graded, prior to paving, and
    b. When forms are set and base course is graded, prior to pouring cement concrete.

2. For Drainage, Water and Sewer Construction:

    a. While laying pipe, stormwater infiltration units, stormwater treatment structures or other stormwater Best Management Practices but before backfilling., and
    b. During backfilling operations. (In the case of water main installations, final pressure testing will be required by the Department of Public Infrastructure to assure pipe tightness), and
    c. All water mains must be chlorinated and tested prior to acceptance.

3. For Roadway Construction (i.e. new subdivision to be a City accepted ROW):

    a. When the sub grade is established, and
    b. While placing gravel, and
    c. When final grade of the base course is established, and
    d. During paving operations.

4. Installation of New or Resetting of Existing Curbing

    a. When alignment is established and prior to concrete curb lock placement, and
    b. When concrete curb lock is installed and prior to backfilling.

5. Installation of New or Resetting of Brick, Belgian Pavers, and Bluestone Pavers

    a. When forms are set and base course is graded, prior to pouring cement concrete, and
    b. During the installation of brick, Belgian pavers and bluestone pavers.

Notes:

1. Contractor must be present for all scheduled inspections. Failure to notify DPI of a cancellation or a "No-Show" by the contractor will result in a re-inspection fee of up to $70.00/per violation.
2. Should the inspection of work result in a FAILED inspection, the contractor will be responsible for the payment of a $70.00/re-inspection fee which may be assessed multiple times depending on the number of failed inspections.
3. DPI may, at anytime, conduct an inspection of the Contractor's site, without notice, for the purposes of inspecting any and all work including stormwater sedimentation and erosion controls. Refer to the City's Stormwater Management Rules and Regulations for specific requirements regarding compliance and ability for the City to issue any fines or enforcement action.

SAMPLING AND TESTING

All sampling and testing shall be done by a commercial testing laboratory approved by the City Engineer at the Contractor's expense. The City will require an Inspector at the plant and an Inspector at the site, to record air temperature and material temperature, during the pavement installation. Sampling and materials for tests shall be taken by the testing laboratory, under the direction of the City Engineer and/or his/her authorized representative. Test results shall be reported to the Commissioner in duplicate.

CONCRETE CONSTRUCTION DURING HOT OR COLD WEATHER

Section 901.64 "Protection from Adverse Weather" of the MassDOT Standard Specifications shall apply to cement concrete sidewalk, driveway construction or other cement concrete items installed.

Any concrete placed during adverse weather shall be placed at the Contractor's risk and any damaged or unsatisfactory concrete shall be removed and replaced at the Contractor's expense. Concrete mixed or placed when the air temperature is below 40° F will be considered cold weather concrete and will require special treatment. The temperature of concrete at the point of discharge shall not exceed 90° F and will require special treatment.

DEWATERING OPERATIONS

The Contractor is responsible for the proper design and implementation of methods for controlling surface water and groundwater during construction. The Contractor shall lower groundwater to at least 2-feet below the lowest level of the excavation to ensure the excavation is stable with no ponded water, mud, or muck, is able to support construction equipment without rutting or disturbance and is suitable for the placement and compaction of fill material, pipe or concrete foundations. Excavation dewatering shall maintain the subgrade in a natural undisturbed condition and until the fill, structure or pipes to be built therein have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

Water from dewatering operations shall be treated by filtration, settling basins, or other method approved by the Engineer to reduce the amount of sediment contained in the water to allowable levels that do not exceed 15 standard turbidity units (STU) or 25 ppm TSS. The Contractor must notify DPI- Permits/Repair office of dewatering activities prior to discharging. Under no circumstances shall water from dewatering systems be discharged into an existing or new sanitary sewer. The Contractor shall be responsible for damage to properties, buildings or structures, sewers and other utility installations, pavements and work that may result from dewatering or surface water control operations. Do not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands or surface water.

The Contractor shall provide inlet protection for catch basins using “Silt Sacks” manufactured by ACF Environmental or approved equal. The Contractor shall provide inlet protection for Bradley head inlets using hay waddles. The Contractor shall comply with all other sediment and erosion control requirements in accordance with the City’s Stormwater Rules and Regulations.

SECTION II – A
CURB REMOVAL

When necessary to remove existing curb from a City Street to construct or widen a driveway the Contractor will be required to leave a deposit of $40 per foot of curbing to be removed at time of Street Disturbance Permit being issued and sign a forfeiture slip. The Contractor will have 30 days to deliver all removed curbing to the DPI Stock Yard on Liberty Street. The Contractor must call the DPI office 24-hours prior to delivery of curb to schedule arrangements for a DPI operator to offload the curb and sign for the linear feet of curb returned to the City yard. Curbing must be full length pieces, any pieces less than three (3) feet in length will not be accepted unless proven with pre-existing condition site photos that the curb was less than three feet prior to the contractor beginning work on the site. The Contractor will be issued a refund check for the linear feet of curb returned in good condition.

Failure to deliver the curbing or provide the receipt as required will result in the following:

1.) Removal of the Contractor's name from the City's list of contractors allowed to work on City streets and sidewalks.
2.) Deduction of the value of the curbing from the surety deposit (or a claim against the Contractor's Bonding Company should the value exceed the deposit.
3.) Rejection of the driveway by the City Inspector, which, in the case of a new building, will prevent the owner from obtaining a Certificate of occupancy. A surety deposit will be required and held for a period of 3 years in the amount to be determined by the size of the driveway calculated in the amount of square yards, based on the City Contractor's costs.
4.) Any Homeowner requesting the installation of a stamped concrete driveway brow will need the approval of the Commissioner of Public Infrastructure. If approved, the contractor will be required to install a sand-based sealant over the stamped concrete for the purpose of slip resistance.

CONTRACTOR'S RESPONSIBILITIES

Please be advised that Contractors are responsible for the size of each driveway they install. The applicant has been given a copy of the Driveway Permit approved by the Engineering Dept. Any driveway apron installed larger than what is listed on the permit or differs from the lines marked in the field by the DPI inspector will result in reinstallation by the Contractor.

Notes:

1. Contractor must be present for all scheduled deliveries of curb being returned to a DPI facility. DPI staff will wait on site for approximately 30 minutes after the scheduled start time. Failure to notify DPI of a cancellation or a "No-Show" by the contractor will result in a re-scheduling fee of up to $70.00/per violation.

SECTION II – B
FLOWABLE FILL REQUIREMENTS

The City requires that Controlled Low Strength Materials (flowable fill) shall be the standard backfill material whenever working within City Right of Way.

It is mandatory to use flowable fill for the backfill in all trench cuts within the paved or gravel road surface.

All work shall conform to the relevant provision of the MassDOT Standards.

Flowable Fill shall meet the requirements of Subsection M4.08.0 Controlled Low-Strength Materials – Excavatable. Flowable Fill shall not contain fly ash.

Contractor is to install ¾" stone conforming to M2.01.4 to a level one (1) foot above the crown of the pipe. Flowable fill will be placed over the ¾" stone.

Trench shall be plated for a minimum of 24-hours after placement of flowable fill. Flowable fill shall be firmly set prior to removal of plates.

Copy of the slips are to be turned into the Inspector or the DPI Repair Shop Office.

SECTION III
ROAD CONSTRUCTION

CLEARING AND GRUBBING

The work shall conform to the relevant provisions of Section 101 of the MassDOT Standards, supplemented by the following:

The entire area of each street right-of-way shall be cleared of all stumps, brush, roots, boulders, like material and all trees not intended for preservation. Individual trees, groups of trees, and other vegetation to be left standing will be marked by the Engineer and shall be thoroughly protected from damage incidental to construction operations.

Care shall be taken by the Contractor to protect all trees to be preserved, and adjacent trees and property of others from damage caused by his clearing or burning operations.

Where individual trees in fill areas are to be saved, the Contractor shall provide adequate tree wells or other protection so that no fill covers the original ground around the tree trunk.

EXCAVATION

The work shall conform to the relevant provisions of Section 120 of the MassDOT Standards, supplemented by the following:

General The Contractor shall perform all excavation and grading of every description, regardless of the material encountered, within the limits of work, in conformity with the lines, grades and dimensions shown on the drawings.

Before rough grading commences, all trees or groups of trees, which are to be left standing, shall be given any additional protection required to prevent damage. Care shall be taken to avoid damaging trunks, branches and roots during construction. All protection shall be removed at the time of landscaping to permit finish grading and seeding around trees.

Stripping Topsoil All topsoil shall be stripped from areas to be paved, excavated, or filled and stockpiled for future landscaping. Care shall be taken that loam or topsoil will not be mixed with sand, gravel or clay during stripping operations.

Unsuitable Material Unsuitable material, including peat, muck, and soft clay, shall be excavated to such widths and depths as necessary to obtain a firm and stable foundation. Unsuitable material shall be disposed of at an off-site area acquired by the Contractor for such purpose. Where surface or ground water is encountered, provisions shall be made for adequate drainage of the area. Backfilling shall consist of clean sandy material approved by the Engineer.

Rock Excavation Rock excavation shall be completed by non-explosive methods only including rock splitting, ripping, expansive chemical slitting or hoe-ramming. When rock excavation requires blasting, the Contractor shall provide written notice requesting permission from the Commissioner prior to initiating any blasting. Blasting shall only be completed upon

written approval from the Commissioner or his/her designee. Contractor shall exercise care not to overshoot and shall remove any material outside the authorized cross section which may be shattered or loosened by such blasting. Blasting operations shall conform to the latest issue of the Corp. of Engineers' Safety Regulations and shall be done by licensed blasters after a blasting permit has been obtained from the Fire Chief having jurisdiction over the area and completing the required pre-blast survey. Any damage to the work or property of others caused by blasting operations shall be repaired at the expense of the Contractor.

Compacted Earth Fills Materials for fill shall be obtained from roadway excavation, borrow pits or other approved sources. The material used shall be free from vegetable matter and other deleterious substances and shall not contain rocks larger than 12 inches in any direction.

Areas to be filled shall be scarified to a reasonable depth in order to insure proper bond. The fill material shall be placed in layers which, when compacted, shall not exceed 8 inches. The moisture content of the fill material shall be such that the fill can be compacted to 95-percent of maximum dry density as determined by ASTM D1557, Method D.

After each layer has been placed and evenly spread, it shall be thoroughly compacted to 95-perecnt of maximum dry density as determined by ASTM D1557, Method D. Compaction shall be by means of flat plate compactors, forward and reversible multiple-wheel pneumatic-tired rollers or other types of rollers, which will be able to compact the fill to the desired density.

No fill material shall be placed, spread or rolled while the ground or fill is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until the moisture content and density of the fill are as previously specified.

Dust Control Proper dust control measures shall be taken by the Contractor to abate dust nuisance to abutting properties of the work site. Calcium chloride shall be furnished and applied, only to areas to be paved, by the Contractor unless this requirement is waived, in writing, by the Engineer. In other areas, sprinkling shall be used and repeated at such intervals as to keep all parts of the disturbed area damp at all times. Calcium chloride shall be commercial grade, furnished in 100 lb., 5-ply bags, stored under a weatherproof cover and stacked alternately for ventilation. Application shall be at the rate of about one-half pound per square yard, unless otherwise directed by the Engineer. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

SUBGRADE PREPARATION

Work shall conform to the relevant provisions of Section 170 of the MHD Standards, supplemented by the following:

The subgrade shall be prepared to the full width of the road right-of-way and any adjacent bank easements, in conformity with the lines, grades, slopes and cross-section of the approved plans. Grades under paved areas shall be held to a tolerance of plus or minus one-tenth (1/10) foot. The shoulders shall be shaped and landscaped so that the entire right-of-way presents a neat and pleasant appearance, but shoulder loaming and seeding shall be postponed until all paving work has been done.

Soft or otherwise unsuitable material in the sub grade, under paved areas, shall be removed and replaced with approved material. All low sections, holes or other depressions shall be brought to grade. After the sub grade is properly shaped, it shall be thoroughly compacted with an approved roller weighing not less than 10 tons. Wetting or settling the sub grade by blading, required along with the rolling of the sub grade, shall be included to obtain proper compaction.

The top six (6) inches of sub grade in paved areas shall be compacted to a minimum of 95 percent of maximum density as defined and measured in ASTM D1557.

The finished sub grade shall pitch from the centerline of road to the edge of pavement at a rate of one quarter (1/4) inch per foot as shown on the typical road cross-section.

GRAVEL BASE COURSE

Work shall conform to the relevant provisions of Section 150 of the MHD Standards, supplemented by the following:

General **The gravel base course shall consist of an eight (8) inch total compacted thickness for sidewalks and a twelve (12) inch total compacted thickness for roadway pavements.** The gravel base course shall be placed only on a sub grade approved, in writing, by the Engineer.

The lines and grades shall be established by the Contractor, in conformity with the drawings and shall be maintained by means of grade stakes, placed in lines parallel to the centerline of the areas to be paved, and spaced a minimum of fifty (50) feet on center and at other locations deemed appropriate so that string lines may be stretched between the stakes.

Material Gravel borrow/bank run gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious material and shall conform to MassDOT Standard M1.03 Type “B”. The use of Processed Glass Aggregate is not allowed. Gradation requirements shall conform to AASHTO T11 and T27.

Placing and Mixing Gravel base courses shall be placed and spread uniformly in layers not exceeding 6 inches after compaction. Care shall be taken while spreading the gravel to rake forward and distribute the largest stones so that they will be at the bottom of the gravel course and be evenly distributed, but under no circumstances will stones larger than three (3) inches be permitted.

The material shall be mixed evenly with blade graders until each layer of gravel is uniform throughout its depth. During this operation, water shall be added by sprinkling equipment in such amounts as are required to obtain optimum moisture for the required density. When uniform, the mixture shall again be spread smoothly to the cross-section as shown on the approved drawings.

Compaction Immediately following final spreading and smoothing, all materials placed shall be compacted to the full width by rolling with a self-propelled power roller, weighing not less than ten (10) tons, and having a minimum weight of three hundred (300) pounds per inch width of rear wheel. Rolling shall progress gradually from the sides to the center, parallel with the centerline of

the road and lapping uniformly each preceding track by one-half the width of such track and shall continue until all the surface has been rolled and satisfactory compaction obtained.

Each layer of gravel base course shall be compacted to a minimum of 95 percent of modify proctor density for roadways and sidewalks, as defined and measured in ASTM D1557.

Smoothness Test The surface of the top layer of gravel base course shall show no deviations in excess of three-eighths (3/8) inch when tested with a ten (10) foot straight edge applied both parallel with and at right angles to the center line of the area to be paved. Any deviation in excess of this amount, shall be corrected by loosening, adding, or removing material, re-shaping, and compacting to the satisfaction of the Engineer. The surface of underlayers shall be finished to a reasonably even contour as approved by the Engineer. To accomplish a smooth and even surface, the top twelve (12) inches of gravel base shall be placed with processed gravel having no greater gradation than three quarters (¾) inch stones.

SURFACE COURSE

The work shall conform to the relevant provisions of Section 460 of the MassDOT Standards, supplemented by the following:

Hot Mix Asphalt Standard binder for hot mix asphalt surfaces shall be a PGAB meeting the requirements of AASHTO M320. The standard PGAB Grade of PG64-28 shall be used.

Tack coat (RS-1) shall conform to the MassDOT Standards meeting M3.03. Tack coat shall be applied per the requirements of Section 450.43.G.

The surface shall consist of two (2) courses; 2 ½" hot mix asphalt intermediate course and 1 ¾" hot mix asphalt surface course over asphalt emulsion for tack coat cover totaling 4 ¼" of hot mix asphalt for roadways. All materials and workmanship shall conform to Section 460 of the MassDOT Standards.

- Surface Course – SUPERPAVE Surface Course – 12.5 (SSC – 12.5-P)
- Intermediate Course – SUPERPAVE Intermediate Course – 19.0 (SIC – 19.0)

Hot mix asphalt joint sealer shall be applied to all cold joints, longitudinal and traverse and at frames and curbing prior to paving.

Depending on the estimated or measured truck traffic, Engineer may require additional pavement thickness and/or a polymer-based pavement.

Special attention shall be given to the temperature of pavement prior to placement. Any pavement not meeting the required temperature will be rejected and not eligible for payment and shall be immediately removed from the site. Any pavement placed at the incorrect temperature shall be removed and replaced at no cost to the City. In accordance with MassDOT Standards, provide to Engineer prior to the start of construction a QC Plan and any and all information on the mix design including but not limited to the liquid asphalt being used within the manufacture of the hot mix

asphalt. QC Plan shall clearly denote the proper temperature at delivery to the site and placement (i.e., behind the screen). The difference between the highest and lowest temperature measurement shall not exceed 20-degrees F.

CURBING

Unless otherwise noted herein, curbing shall conform to MassDOT Standards Sections 501 and 580.

Curbing must be sourced from a quarry approved by the MassDOT, color, texture and finish shall be within the range of samples approved by the Engineer. Submit samples to DPI Engineering for review.

Vertical granite curbing shall be 6-inch curbing Type VA-4 as specified in Sections M.9.04.0 and M.9.04.1 of the MassDOT Standards.

Transition curbing for curb ramps and driveways or for varying the curb reveal shall be as specified in Section 501.68 of the MassDOT Standards.

Curbing shall be installed in accordance with Sections 501 and 580 of the MassDOT standards. Installation shall be in accordance with the City's Standard Details including the extra curb lock for support in areas where curb does not directly abut concrete sidewalk or wheelchair ramp (i.e., grass strip or tree well).

PATCHING TRENCHES

All material for backfilling the trench shall be suitable and free from organic substances, large stones, frost and other deleterious material. Twelve (12) inches of Gravel Borrow Type B conforming to M1.03 shall be compacted to a minimum of 95 percent of modify proctor density (ASTM D1557) for roadway and sidewalk trenches, before permanent patch is applied.

Pavement repairs shall be made by the contractor in accordance with "HMA Pavement Restoration Detail". **All trenches running parallel to roadway must be paved from gutter line to centerline. Perpendicular patches (services) must be paved from gutter to centerline and span two (2) feet beyond the width of the excavation trench on both sides.** All patches shall be of a rectangular shape and not traverse diagonal nor jogged in any way. No material shall be placed over Flowable Fill that has not yet firmly set.

Temporary Patches

1. It is the responsibility of the contractor to maintain the patch.
2. The patch shall be installed within five (5) days of backfilling the trench.
3. Before placing the patch, the edges of the existing pavement shall be saw cut or blade-cut to a smooth, straight edge, back from the edge of the trench far enough to expose a minimum of twelve (12) inches of undisturbed gravel sub-base.

4. In warm weather, the temporary patch shall be regular hot mix asphalt base course. In cold weather, the temporary patch shall be "Cold Patch" hot mix asphalt or cement concrete as specified in Section III – A, with a minimum thickness of six (6) inches, poured flush with the wearing surface of the adjacent paving.
5. In either case, the temporary patch shall be replaced with a permanent hot mix asphalt repair, not less than thirty (30) or more than sixty (60) days following the original backfilling or upon the opening of the asphalt plant, whichever occurs first.
6. Contractor shall have 150 days from start date of Disturbance Permit to finish all site restoration work.

Permanent Patches

Contractors shall contact DPI at 508-979-1550 ext. 67305 to arrange for an inspection at least one full day in advance of placing the permanent paving. Patch paving shall be rolled flush with the surface of the existing pavement. No "feathered" overlap of paving will be allowed.

1. When installing a permanent patch to a pavement cut, the edges of the existing cut shall be "tack" coated to ensure a water-proof seal with the new patch and existing pavement. Tack coat shall conform to and be installed as specified above.
2. The patch paving shall be a minimum thickness of 4 ¼", installed in 2 ½" hot mix asphalt intermediate course and 1 ¾" hot mix asphalt surface over asphalt emulsion for tack coat cover, compacting thoroughly between layers. Must match existing pavement conditions if greater than 4 ¼" inches in depth.
3. Seams shall be sealed with hot mix asphalt joint sealer after the patch is placed.
4. Emphasis is also placed, on the requirement calling for compacted Gravel Borrow Type B (M1.03) as shown in accordance with "HMA Pavement Restoration" detail.

Infrared Pavement Treatment

Infrared pavement treatments shall be performed by a fully qualified, experienced paving subcontractor.

Contractor shall supply an approved infra-red pistol thermometer capable of reading between 0 and 750 degrees F.

Infra-red treatment of permanent pavement shall not be performed in less than 120 days after installation of permanent pavement unless otherwise directed by the Engineer.

1. The area to be repaired shall include approximately two feet on either side of the saw cut line (i.e., two feet of existing pavement and two feet of new pavement).

2. Pavement areas to be repaired shall be swept and hosed clean to remove all loose and foreign materials.

3. An approved infra-red heater, not to exceed 15,000 BTU's per square foot per hour, shall be positioned over the areas to be repaired for the period of time required to soften the existing pavement to a depth of two or more inches.

    a. Oxidation of the pavement, caused by excessive heat as determined by the Engineer, shall be avoided.

    b. Remove all unsuitable material in the event of oxidation and replace it with new bituminous concrete at his own expense.

4. The area to be repaired shall be thoroughly scarified to a depth of at least 2-inch.

5. A recycling agent admixture shall be added to the softened area after scarification, in the amount recommended by the manufacturer or approved by the Engineer, and shall be raked to a uniform, workable condition.

6. Any additional bituminous concrete mix (MARIMIX or equal) needed shall be obtained from an infra-red heated storage unit required to keep asphalt at near constant temperature throughout the working day.

    a. The storage unit shall be made entirely of metal (no canvas), shall be thoroughly insulated to reduce the amount of heat required and the contents shall be kept heated with an air circulation system.

    b. Under no circumstances is any asphalt mix to be used that registers a temperature of under 200 degrees F.

7. After the paving mixture has been properly admixed and raked to grade, it shall be compacted by means of a steel-wheeled roller of sufficient weight to establish a uniform density comparable to that of adjacent surface within the work area. The finished patch shall be level with no depression retaining water on any of its surface and shall be perfectly flush with the existing, surrounding pavement.

8. The edges around the perimeter of the newly repaired areas shall be sealed with a suitable asphalt emulsion.

9. A cationic asphalt emulsion shall then be hand-sprayed on the patched area and adjacent edges at the approximate rate of 0.1 gallon per square yard to offset the effects of oxidation and seal the entire newly treated area.

10. Stone dust shall be spread over the newly sealed area.

Contractors may elect to have their pavement repairs completed by a second or sub paving contractor (who must also be bonded as per City requirements), but the contractor initially cutting the pavement shall nevertheless remain responsible for the completion of the pavement repairs within the time periods specified above under temporary patches.

Contractors must notify DPI when all Right-of-Way repairs have been completed (including HMA patches, cement concrete sidewalks/driveways and restoration by loam and seed) for a final inspection. DPI will inspect final repair work and immediately report finish work that is non-compliant with these Construction Standards and Specifications. Contractor is solely responsible for taking corrective action(s) necessary to repair non-compliant work by the deadline specified by DPI.

No work will be allowed in City streets or City rights of ways between December 15 and April 1 without prior approval of the Commissioner.

If a proposed excavation or trench work falls within a cobblestone street or a brick/bluestone sidewalk, the Contractor must:

1. Notify the Department of Public Infrastructure on type and scope of proposed work to be performed.
2. Department of Public Infrastructure will schedule inspections of the removal of said materials.
3. Upon work completion, the Contractor shall properly backfill to the sub-grade elevation of a 4" concrete slab for sidewalks and walkways and 6" concrete slab for roadways or driveways.
4. The Contractor will then be required to safeguard the unfinished surface with steel plates and barriers or as deemed necessary by the City of New Bedford.
5. The Contractor must use brick and paver specifications. See Construction Standards Details.

If a proposed excavation or trench work falls within a roadway, paved surface or right of way that has been improved within the last five years and permission has been granted by the DPI Commissioner or his/her designee to excavate, the following additional requirements shall apply:

1. Limits of paving shall be defined on the Trench Permit or Obstruction and Disturbance Permit. The limits shall be based on the type and extent of work required and shall be at the discretion of the DPI Commissioner or his/her designee.
2. Infrared pavement repairs shall be completed no later than 120 days following completion of the patch.
3. Pavement markings disturbed shall be fully replaced with new thermoplastic pavement markings in accordance with MassDOT Standards.

SECTION III – A
CEMENT CONCRETE SIDEWALKS, WHEELCHAIR RAMPS, AND DRIVEWAYS

SCOPE OF WORK

Concrete sidewalks, wheelchair ramps, and driveways shall be constructed in one course on prepared foundation of gravel in accordance with Section 701 of the MassDOT Standards. In case of conflict between the MassDOT Standards, and the following specifications, the following specifications shall govern. All concrete sidewalks, wheelchair ramps, and driveways shall be constructed in conformity with lines, grades, and typical cross sections shown on the plans or approved by the Engineer.

General The Contractor shall be responsible for notification to "Dig Safe" at locations where excavation is scheduled and to call DPI-Repair at 508-979-1550 ext 67305 for water, sewer and drain mark-outs.

The Contractor shall schedule and execute reconstruction operations so as to maintain pedestrian access to abutting property, particularly to the commercial establishments.

See "Protection of Persons and Property" in Section II- General Provisions

The Contractor's attention is called to the fact that driveway and wheelchair ramp construction shall be in accordance with the provisions of the current MassDOT Standards and Americans with Disabilities Act (ADA) Standards. The precise location and dimensions of individual wheelchair ramps shall be reviewed by the Engineer following final determination of profile grades at driveway and ramp locations.

No construction of sidewalks, wheelchair ramps or driveways, shall be allowed from December 15 to April 1 without prior approval and approved in writing by the DPI Commissioner. If approved, then the Contractor must comply with the requirements specified in Section II – General Provisions: Concrete Construction during Cold or Hot Weather

Contractor must notify the DPI twenty-four (24) hours in advance for a pre-inspection before the placement of concrete. Failure of notification for pre-inspection may result in Non-Acceptance of said work. Placement of concrete must be completed within forty-eight (48) hours of the pre-inspection or the Contractor will be required to schedule another pre-inspection.

Materials Materials shall meet the requirements specified in the following subsections of Division III. Materials of the MassDOT Standards:

1. Gravel Borrow M1.03.0 Type B or M2.01.7 Dense-graded crushed stone for sub-base.

2. Cement Concrete (air-entrained 4,000 psi. ¾", 610) M4.02.00 with a 4" +/- 1" maximum slump.

3. Preformed Expansion Joint Filler M9.14.0 – Must be grey.

4. Grey, Flexible Joint Sealer

5. Reinforcing mesh. Shall be 6” x 6” 10-gauge, welded wire mesh.

CONSTRUCTION METHODS

Sub grade – The sub grade for the sidewalks shall be shaped parallel to the proposed surface of the walks, wheelchair ramps, and driveways be thoroughly rolled and tamped. All depressions occurring shall be filled with suitable materials and again rolled or tamped until the surface is smooth and hard.

Foundation – An (8) inches thick foundation shall be placed upon the prepared sub grade. After being compacted to a minimum of 95 percent of modified proctor density as defined and measured in ASTM D1557, the foundation shall be (4) inches below the proposed surface for sidewalks and (6) inches below the proposed surface for wheelchair ramps and driveways.

Wire fabric 6 x 6 mesh, 10 gauge or fibers can be substituted for wire mesh, shall be installed in all commercial driveways and all wheelchair ramps.

Forms – Side forms and transverse forms for sidewalks shall be smooth, free from warp, of sufficient strength to resist springing out of shape, of the proposed walk, wheelchair ramps, and driveways, and of a type satisfactory to the Engineer or Inspector.

All mortar and dirt shall be completely removed from forms and from those that have been previously used. The forms shall be well staked and thoroughly braced and set to the established lines with their upper edge conforming to the grade of the finished walk, which shall have sufficient pitch to provide for transverse surface drainage, but which shall not exceed 3/16” per foot of width.

Cement driveway brows at the gutter line shall be ½ inch higher than street surface (plus or minus 1/8”). Driveway brows shall conform to the slopes shown on “Sidewalk Through Driveways” detail. Driveway brows exceeding these limits shall be replaced at the Contractor’s expense.

Saw cuts of concrete sidewalks shall be made in the scored joints and/or in the tooled longitudinal or transverse joints so as to best preserve the tooled edge on the side of the cut to remain. Saw cuts shall be made clean and vertical and care shall be taken to prevent over cutting, spalling, cracking, or other damage.

Reconstruction work limits will most always abut the existing sidewalks at a control joint. Should the Contractor find a fracture at this location or otherwise decide to forego the above procedure, he does so at his own risk, and will be required to replace any sidewalk damaged (to the next control joint) at his own expense.

Delivery and transport of concrete shall be in accordance with MassDOT Standards.

CONCRETE

The concrete for sidewalks shall be poured in alternate slabs of 30 feet in length except as otherwise ordered. The slabs for the sidewalk shall be separated by transverse preformed expansion joint fillers ½ inch in thickness.

Preformed expansion joint filler shall be placed adjacent to or around existing structures in sidewalks where directed. A flexible joint sealer shall be installed along joints where cement concrete abuts hot mix asphalt, retaining walls, foundations or in other similar circumstances as directed by DPI.

On the foundation as specified, the concrete shall be placed in such quantity that after being thoroughly rammed in place it shall be four (4) inches in depth. At driveways, and wheelchair ramps the sidewalks shall be six (6) inches in depth. The concrete shall be worked and floated. Broom the surface perpendicular to the street, removing the tooled edges (smooth surfaces).

In conveying the concrete from the place of mixing to the place of disposal the operation shall be conducted in such a manner that no mortar will be lost and the concrete shall be so handled that the concrete will be of uniform composition throughout, showing neither excess nor lack of mortar in any one place.

The surface of concrete sidewalks shall be uniformly scored into block units of areas of not more than thirty-six (36) square feet as directed. The depth of the scoring shall be at least one quarter of the thickness of the sidewalk.

The finishing of concrete surface shall be done by experienced and competent cement finishers, approved by the Engineer or Inspector.

Boundstones, water shutoff gates, sewer cleanouts, gas shutoff gates, handholes, manholes and catch basin frame and covers shall be carefully set to the proposed finished grade, with 3" of document concrete to underside of flange where applicable.

Utility frame and covers must be covered with plastic or tape with sufficient adherence to prevent concrete from adhering to the covers. The plastic must be removed when the clean up is performed the following day. DPI will not allow removal of concrete from the frame and cover by method of hammer and chisel.

BOUNDSTONES

Notify DPI at least 24 hours prior to excavation, to allow DPI's Engineer to mark approximate locations where records indicate City boundstones may exist; the Contractor shall use extra caution when excavating these areas and uncover the boundstone without damaging or displacing. Should boundstones be found that are damaged or require resetting to grade, the Contractor will notify DPI, which will complete the resetting. **Exposed City boundstones or street line property bounds destroyed, displaced, damaged, or buried by the Contractor, will be replaced by a Registered Professional Land Surveyor in the Commonwealth of Massachusetts (an outside hire from the Contractor's organization) at the Contractor's expense.**

PROTECTION OF WORK

During the procedure of the work, the contractor shall be held entirely responsible for the protection and result of the work and damage to the work that may occur through any cause and shall be repaired by the contractor at his expense.

The Engineer may order random concrete testing by the methods specified in Subsection M4.02.13 of the MassDOT Standards.

Stop signs are not to be removed and left lying on the ground at any time. If they are to be relocated for a wheelchair ramp, they must be immediately relocated or replaced with a temporary stop sign in an area outside the wheelchair ramp.

SECTION III – B
HOT MIX ASPHALT SIDEWALKS AND DRIVEWAYS

SCOPE OF WORK

Hot mix asphalt sidewalks and driveways shall be constructed in two courses on a prepared foundation of gravel in accordance with Section 701 of the MassDOT Standards. In case of conflict between the MassDOT Standards, and the following specifications, the following specifications shall govern.

All hot mix asphalt sidewalks and driveways shall be constructed in conformity with lines, grades and typical cross sections shown on the plans or approved by the Engineer. All driveways installed without transition curb must be perpendicular to the road's edge of pavement, no radius curvature at entrance corners off the street's gutter line. Driveway curb cuts are to be a minimum of three (3) feet from the face of any utility pole, five (5) feet from hydrants and/or street light poles and ten (10) feet from the trunk of a tree.

GENERAL

The Contractor shall be responsible for notification to "Dig Safe" at locations where excavation is scheduled and to call DPI-Repair at 508-979-1550 ext 67305 for water, sewer and drain mark-outs.

The Contractor shall schedule and execute reconstruction operations so as to maintain pedestrian access to abutting property, particularly to the commercial establishments.

See "Protection of Persons and Property" Section

The Contractor's attention is called to the fact that driveway construction shall be in accordance with the provisions of the current MassDOT Standards and Americans with Disability Act (ADA) Standards. The precise location and dimensions of individual wheelchair ramps shall be reviewed by the Engineer following final determination of profile grades at driveway locations.

No construction of sidewalks, or driveway constructions shall be allowed from December 15th to April 1st without prior approval and approved in writing by the DPI Commissioner.

Contractor must notify DPI, for pre-inspection of the site 24 hours before placing the hot mix asphalt.

MATERIALS

Materials shall meet the requirements specified in the following subsections of Division III. Materials of the "MassDOT Standards.

- Gravel Borrow M1.03.0 Type B or M2.01.7 Dense-graded crushed stone for sub-base.
- Refer to Section III – Road Construction for Hot Mix Asphalt requirements with the following modifications:

- 1 ½" Surface Course – SUPERPAVE Surface Course – 9.5 (SSC – 9.5)

- 2 ½" Intermediate Course – SUPERPAVE Intermediate Course – 12.5 (SIC – 12.5)

CONSTRUCTION METHODS

Sub-grade – The sub-grade for the sidewalks shall be shaped parallel to the proposed surface of the walks and driveways, are to be thoroughly rolled and tamped. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

Base Course – After the sub-grade has been prepared as herein before specified a sub-base of gravel shall be placed upon it which, after being wet and thoroughly rolled and tamped, shall be at least four 4 inches in thickness and three (3) inches below and parallel to the proposed finished surface of the sidewalk and at least six (6) inches in thickness and four (4) inches below and parallel to the proposed finished surface of the driveway.

Hot Mix Asphalt Sidewalks

Forms – Where walls, curbing or other suitable permanent supports are not present or where an approved mechanical spreader is not used, satisfactory forms shall be installed to assist in securing proper alignment and adequate compaction of the base and surface courses.

Placing Hot Mix Asphalt – The hot mix asphalt walk surface shall be laid in 2 courses to a depth after rolling of four (4) inches. The bottom course shall be 2 ½ inches in thickness after rolling shall. The top course shall be 1½ inches in thickness after rolling.

The surface shall have a pitch towards the gutter line in accordance with ADA regulations (+/- 1.5%) to provide for proper drainage.

The courses shall be constructed in accordance with the applicable requirements of Section 460 of the MassDOT Standards and the following provisions:

1.) Spreading Mixture – The mixture shall be dumped, as needed, in wheelbarrows or on approved steel dump sheets outside the areas on which it is to be placed. It shall then be immediately distributed into place by means of shovels and raked into a uniformly loose layer to the full width required and of such depth that, when the work is completed, it shall conform to the grade and surface contour required. An approved mechanical spreader may be used.

2.) Rolling – The surface shall be rolled with a self-propelled tandem roller weighing not less than 1 ½ tons and not more than five (5) tons. In places inaccessible to a power roller, compaction shall be obtained by means of mechanical rammers or by hand tampers weighing not less than fifty (50) pounds and having a tamping face not exceeding one hundred (100) square inches.

3.) Testing Surface – When tested with a 10-foot straightedge placed parallel to the centerline of the courses, there shall be no deviation from a true surface in excess of ¼ of an inch.

Hot Mix Asphalt Driveways

A. NO FORMS WILL BE REQUIRED

B. PLACING BITUMINOUS CONCRETE – The Bituminous Concrete driveway surface shall be laid in 2 courses to a depth, after rolling of 4 inches unless otherwise designated on the plans. The Bottom Course shall be 2-½ inches in thickness, and its surface after rolling, shall be 1 ½ inches below and parallel to the proposed grade of the finished surface. The top course shall be 1-½ inches in thickness after rolling.

1.) Spreading Mixture – The mixture shall be spread with an approved spreader. In areas not accessible to a spreader, the mix shall be placed as specified in Subsection 702.42.E of the MassDOT Standards.

2.) Rolling – The surface shall be rolled with a self-propelled tandem roller weighing not less than 3 tons nor more than 5 tons, or an approved roller as designated by the Engineer.

3.) Testing Surface – When tested with a 10-foot straightedge placed parallel to the centerline of the courses, there shall be no deviation from a free surface in excess of ¼ inch.

Boundstones, water shutoff gates, sewer cleanouts, gas shutoff gates, handholes, manholes and catch basin frame and covers shall be carefully set to the proposed finished grade.

BOUNDSTONES

Prior to excavation, the Engineer will mark approximate locations where records indicate City boundstones may exist, the Contractor shall use extra caution when excavating these areas and uncover the boundstone without damaging or displacing. Should boundstones be found that are damaged or require resetting to grade, the Contractor will notify DPI, which will complete the resetting. Exposed City boundstones or street line property bounds destroyed, displaced, damaged, or buried by the Contractor, will be replaced by the at the Contractor's expense.

PROTECTION OF WORK

During the procedure of the work, the contractor shall be held entirely responsible for the protection and result of the work and damage to the work that may occur through any use and shall be repaired by the contractor at this expense.

Stop signs are not to be removed and left lying on the ground at any time.

PROTECTION OF PERSONS AND PROPERTY

Contractors are to erect such structures around the locations as may become necessary to allow pedestrians to travel by the locations and to fence in any danger area or other place adjoining the

streets where the work is performed constituting a hazard to persons or property, and to properly light and maintain lights at night around the locations in question.

SECTION III - C
BRICK SIDEWALKS

DESCRIPTION

This item of work shall consist of setting brick sidewalks on a sand cushion on a concrete base course in accordance with these specifications and in close conformity with the lines and grades established by the Engineer. No bricks will be allowed to be stored at the site when the contractor is not working.

MATERIALS

Materials shall meet the requirements specified in the following Subsections of Division III. Materials of the MassDOT Standards:

3,000 psi, 1 ½" 470 Cement Concrete	M4.02.00
Expansion and Contraction Joints	
Preformed Filler	M9.14.0
Hot Poured Joint Sealer	M3.05.0
Cement Mortar	M4.02.15

CONSTRUCTION METHODS

The sub-base below the concrete base course shall be fine graded and thoroughly compacted after forms are in place; it shall be placed on compacted fill as required under Section 170 of the Standard Specifications.

A. FORMS

Forms shall be placed if directed to the full depth of the combined bricks and concrete base. They shall be of wood, not less than nominal 2 – inch thickness and dressed on all four sides. Forms shall be securely staked and braced and shall be constructed and set so as to resist the pressure of the concrete without springing out of alignment. They shall be oiled before use.

B. PLACING CONCRETE

The concrete base course shall have a minimum depth of 4 inches.

Concrete shall be deposited with minimum rehandling and in one layer. Hand spreading and spading shall be done adjacent to forms and joints.

The concrete shall be struck off and float-finished. Protection and curing shall be done as required in Section 901 of the MassDOT Standards. Laying of bricks shall not be done until at least 24 hours after the final curing period of the concrete base course.
The forms shall remain in place until the bricks are laid, in order to confine the cement mortar.

C. JOINTS IN CONCRETE

Weakened plane transverse contraction joints shall be constructed in the concrete base course every 30 feet or as directed by the Engineer. These joints shall consist of surface slats 2 inches deep, varying in width from ½ inch at top to ¼ inch at bottom.

D. LAYING BRICKS

Bricks shall be carefully laid in 1-inch-thick mortar bed, flat side in a running bond pattern, transversely laid from curb to property line over the concrete foundation as directed and shall be solidly placed in position. Joints between bricks shall be a maximum of 1/4 inch in width. Bricks shall be kept perfectly clean and joints between bricks shall be clean and open to the full depth of bricks until the joint is filled with cement mortar.

After a sufficient area of bricks has been laid, the surface shall be tested with a 10-foot straightedge laid parallel with the curb line and any variation exceeding ¼ inch shall be corrected and brought to proper grade.

Each section of brick surfacing must be acceptable to the Engineer before joints in that section are filled with mortar.

E. FILLING JOINTS

Cement mortar shall be placed and worked in such a manner as to fill the joint to a depth of ¼ inch below the surface. The top surface of bricks shall be kept clean of mortar stains. Immediately after the mortar joints have set sufficiently the brick sidewalks shall be swept clean and any marks on the top surface removed. A spray retarder will be applied to the top finish of the brick sidewalk if directed by the Engineer.

SECTION III - D
BELGIAN PAVERS PAVEMENT

GENERAL

The City of New Bedford reserves the right to claim any items or materials in the roadway or sidewalk which the Contractor must remove to make proper repairs.

These items include but are not limited to: cobblestones, Belgian Paving blocks, curbing, railroad tracks, trolley tracks, loam, Boston pavers, flagstones, and bluestone slates.

DESCRIPTION

This item of work shall consist of setting Belgian Pavers pavement on a sand cushion on a concrete base course in accordance with these specifications and in close conformity with the lines and grades established by the Engineer. Belgian Pavers shall be provided by the City of New Bedford and to be picked up by the Contractor at the City Yard. No Belgian Pavers will be stored at the side when the contractor is not working.

MATERIALS

Materials shall meet the requirements specified in the following Subsections of Division III. Materials of the MassDOT Standards:

For Sidewalks	
3,000 psi, 1 ½" 470 Cement Concrete	M4.02.00
For Roadways, Driveways and Wheelchair Ramps	
4,000 psi, ¾" 610 Cement Concrete	M4.02.00
Expansion and Contraction Joints	
Performed Filler	M9.14.0
Hot Poured Joint Sealer	M3.05.0
Cement Mortar	M4.02.15
Sand Borrow	M1.04.0 Type b

CONSTRUCTION METHODS

The sub-base below the concrete base course shall be fine graded and thoroughly compacted after forms are in place; it shall be placed on compacted fill as required under Section 401 of the Standard Specifications.

A. FORMS

Forms shall be placed if directed to the full depth of the combined Belgian Pavers, sand cushion, and concrete base. They shall be of wood, not less than nominal 2 – inch thickness and dressed on all four sides. Forms shall be securely staked and braced and shall be constructed and set so as to resist the pressure of the concrete without springing out of alignment. They shall be oiled before use.

B. PLACING CONCRETE

The concrete base course shall have a minimum depth of 4 inches for sidewalk applications and 6 inches for roadway, driveway, or wheelchair ramp applications.

Concrete shall be deposited with minimum rehandling and in one layer. Hand spreading and spading shall be done adjacent to forms and joints.

The concrete shall be struck off and float finished. Protection and curing shall be done as required in Section 901 of the MassDOT Standards. Placing of 3-inch-thick sand cushion and laying of Belgian Pavers shall not be done until at least 24 hours after the final curing period of the concrete base course.

The forms shall remain in place until the Belgian Pavers are laid, in order to confine the sand cushion and mortar.

C. JOINTS IN CONCRETE

Weakened plane transverse contraction joints shall be constructed in the concrete base course every 30 feet or as directed by the Engineer. These joints shall consist of surface slats 2 inches deep, varying in width from ½ inch at top to ¼ inch at bottom.

D. LAYING BLEGIAN PAVERS

Belgian Pavers shall be carefully laid in a running pattern, transversely curb to curb on a sand cushion over the concrete foundation as directed and shall be solidly rammed in position. Joints between Belgian Pavers shall be a maximum of 1 inch and a minimum of ½ inch in width. Belgian Pavers shall be kept perfectly clean and joints between stones shall be clean and open to the full depth of Belgian Pavers until the joint is filled with mortar.

After a sufficient area of Belgian Paver pavements has been laid, the surface shall be tested with a 10-foot straightedge laid parallel with the centerline and any variation exceeding ½ inch shall be corrected and brought to proper grade.

Belgian Pavers disturbed in making replacements or correcting variations shall be settled into place by carefully ramming or tampering to grade by use of a hand tamper applied upon a 2-inch plank.

Each section of cobles surfacing must be acceptable to the Engineer before joints in that section are filled with cement mortar.

E. FILING JOINTS

Cement mortar shall be placed and worked in such a manner as to fill the joint to a depth of ¼ inch below the surface. The top surface of Belgian Pavers shall be kept clean of mortar stains. Immediately after the mortar joints have set sufficiently the Belgian Pavers

pavement shall be swept clean and any marks on the top surface removed. A spray retarder will be applied to the top finish of the Belgian Pavers pavement if directed by the Engineer.

SECTION IV
STORMWATER MAIN CONSTRUCTION

SCOPE OF WORK

Effective January 25, 2017, all site drainage must comply with the City's new "Storm Water Management Rules and Regulations". Refer to the City's website under Public Infrastructure's Wastewater Division for a copy of the regulations. (http://www.newbedford-ma.gov/public-infrastructure/wastewater/)

The work shall conform to the relevant provisions of Sections 201, 220 and 230 of the MHD Standards, supplemented by the following:

The Contractor shall furnish all materials, perform all work and services necessary for the complete construction of the storm drainage system, e.g.: installation or construction of all storm drains, perimeter, and conductor drains, catch basins, manholes, headwalls, etc., including all related work such as excavation, backfilling and compaction.

The Contractor shall perform his work in accordance with plans approved by DPI.

MATERIALS

Pipe. The type of pipe allowable for storm drains shall be limited to:

1. Reinforced concrete pipe conforming to Section M5-M5.02.1 Reinforced Concrete Pipe of the MHD Standards.

2. Polyvinyl chloride pipe (PVC pipe) shall conform to ASTM Standard D 1784 and D 3034-SDR 35.

    a. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusion or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.
    b. All fittings and accessories shall have dimensions as recommended by the manufacturer and have bell and/or spigot configurations compatible with that of the pipe.
    c. Pipe shall pass impact resistance test in accordance with ASTM D 2444 and minimum pipe stiffness test at 5% deflection in accordance with ASTM D 2412.
    d. The normal length of twelve (12) inch size and smaller shall be twelve and one-half (12 ½) feet and fifteen (15) inch size shall be no longer than twenty (20) feet.
    e. Pipe and fittings shall be manufactured in the United States of America and shall be accompanied by the manufacturer's certificate compliance, in addition to meeting the performance tests specified hereinafter.
    f. No less than three (3) feet of cover from top of pipe to finish grade.

The type of pipe allowable for conductor or perimeter drains shall be a minimum of four (4) inches in diameter and limited to:

1. Cast iron pipe, not less than Class 24, conforming to ANSI A21.8.
2. Ductile iron pipe, not less than Class 52.
3. Polyvinyl chloride pipe conforming to ASTM Standard D 1784 and D 3034-SDR 35.
4. HDPE pipe not allowed within City Layout.

Structures Bricks shall conform to ASTM C-32, Grade MA. Radial concrete blocks shall be not less than eight (8) inches in length and of such shape that the joints can be effectively sealed and bonded with mortar. They shall conform to ASTM C-139. Precast concrete rings shall conform to ASTM C-14.

Concrete for headwalls, footings, and other structures shall have a minimum compressive strength of twenty-five hundred (2500) psi at twenty-eight (28) days.

Reinforcing steel shall conform to ASTM A-305 for bar reinforcement and ASTM A-185 for wire mesh.

Mortar for masonry work and pipe joints shall consist of one (1) part Portland cement to two (2) parts sand. Portland cement shall conform to ASTM C-150, type II. Sand shall conform to ASTM C-144. The mortar shall be used within thirty (30) minutes from the time that the ingredients are mixed with water. Water shall be clean and free from impurities.

See details section “Manhole Frame and Cover”.

EXCAVATION AND BACKFILLING

Excavation. The Contractor shall excavate whatever material encountered to the depths shown on the drawings. In open cut excavation, the trench width at the top of the pipe shall be no wider than the outside diameter of the pipe, plus one and one-half (1 ½) feet, unless permission is granted by the inspector. The trench above the top of the pipe shall have sufficient slope so that the banks will not slide. Sheeting of trenches will be at the Contractor’s discretion and as may be required by applicable governmental laws and regulations.

Excavation for manholes, catch basins, headwalls or other structures shall be sufficient to leave at least twelve (12) inches in the clear between their outer surfaces and the embankment or timber which may be used to hold and protect the banks. Any over-depth excavation below the footings of such structures shall be filled with concrete or as directed by the Engineer and will be at the Contractor’s expense.

Care must be taken not to damage water pipes, storm drains, sanitary sewers, gas mains, electric conduits, or other structures encountered on the lines of the work. In case of damage to any structures, the Owner of the structures and the DPI shall be notified immediately by the Contractor so that the proper steps may be taken to repair, at the expense of the Contractor, any and all damage done.

Rock Excavation. Rock excavation shall be completed by non-explosive methods only including rock splitting, ripping, expansive chemical slitting or hoe-ramming. When rock excavation requires blasting, the Contractor shall provide written notice requesting permission from the DPI Commissioner prior to initiating any blasting. Blasting shall only be completed upon written approval from the DPI Commissioner or his/her designee. Contractor shall exercise care not to overshoot and shall remove any material outside the authorized cross section which may be shattered or loosened by such blasting. Blasting operations shall conform to the latest issue of the Corp. of Engineers' Safety Regulations and shall be done by licensed blasters after a blasting permit has been obtained from the Fire Chief having jurisdiction over the area and completing the required pre-blast survey. Any damage to the work or property of others caused by blasting operations shall be repaired at the expense of the Contractor.

Whenever the bottom of the trench is rock or boulders, it shall be excavated eight inches below grade and refilled to grade with gravel rammed in place. The sides of the trench in rock shall be excavated to such width that no rock shall be closer to the pipe barrel or other structures than eight inches when the pipe is laid in the trench with a normal alignment or 12-inches from a structure or manhole wall.

Bedding. For drain mains, trenches shall be shaped to give the pipe a continuous and even bearing. Where the bottom of the trench has been taken out to a greater depth than above specified, it shall be refilled with earth, properly compacted and shaped. The Contractor shall undercut unsuitable material and replace it with suitable material.

For drain services, when indicated by the Engineer, bedding shall be comprised of a six (6) inch layer of peastone, three quarter (3/4) inch crushed stone, for proper support and protection from settling.

Backfilling. For drain mains, all materials for backfilling the trench shall be suitable and free from organic substances, large stones and frost. No stones weighing over fifty (50) pounds shall be backfilled anywhere into the pipe trench.

For drain services, when indicated by the Engineer, the pipe shall be completely encased in an envelope of peastone, three quarter (3/4) inch crushed stone, approximately six (6) inches on each side and twelve (12) inches on the top. Stones larger than three (3) inches in diameter shall not be closer than twelve (12) inches to the pipe. Over that, materials for backfilling the trench shall be suitable and free from organic substances, large stones and frost. No stone weighing over fifty (50) pounds shall be backfilled anywhere into the trench.

Compaction shall be either by puddling or by mechanical means as approved by the Commissioner. If compaction by the puddling method is desired, the Contractor shall obtain permission from the Department of Public Infrastructure, who will install a hydrant meter. Charges for water used, shall be made by the Water Division. Care must be taken to prevent excessive run-off or silt infiltration into the pipes or below the discharge end, any materials so deposited must be removed by the Contractor at no cost to the City. While puddling is underway and afterwards, until puddled areas have sufficiently hardened, the Contractor must protect the trench and the public by suitable barriers, lights, etc.

INSTALLATION

Pipe Laying. All pipe before being lowered into the trench shall be clean and free from defects. The Contractor shall remove, by pumping or other means, any water accumulated in the trench during the pipe laying period and keep the trench dry until the joints are properly connected.

The pipe shall be laid with bell ends upstream, beginning at the lower end of the pipeline. The pipeline shall be laid to the grades and alignment indicated on the drawings. During construction, precautions are required to protect downstream structures from excess sediment washout e.g. hay bales, silt fence, etc.

Joints.

a. Concrete Pipe (Bell and Spigot, or Tongue and Groove)

The interior surface of the bell (groove) shall be carefully cleaned with a wet brush, and a layer of soft mortar shall be applied to the lower half of the bell (groove). The spigot (tongue) of the second pipe shall then be cleaned carefully with a wet brush, covered with a layer of soft mortar to its upper half, and inserted in the bell (groove) end of the first pipe. Sufficient mortar shall be used to completely fill the joint and to form a bead on the outside. The interior surface at the joint shall be finished smooth and the mortar bead on the outside shall be protected from the air and sun until the mortar is satisfactorily cured. For a tighter joint, the Contractor shall use a jute string in each joint, unless specifically waived in writing by the Engineer.

b. Cast Iron, Ductile Iron Pipe

Joints shall be made in accordance with the latest directions and specifications of the manufacturer.

c. Polyvinyl Chloride Pipe

Joints shall be bell and spigot. The bell shall consist of an integral wall section with a solid cross section rubber ring factory-assembled, securely locked in place to prevent displacement. Joints shall conform to ASTM Standard D 3212.

Structures. All structures shall conform to the dimensions shown on the typical details. When field conditions warrant, as determined by the Engineer, manholes, catch basins, and headwalls shall be constructed on a six (6) inch slab of cast-in-place concrete placed on undisturbed earth; over-excavation shall be compensated for with additional concrete at the Contractor's expense. If a six (6) inch slab is not used, four (4) inch pre-cast sectional plates shall be used for the base and shall conform to the dimensions shown on the typical details. Walls, where not specified, shall be concrete, brick, radial concrete blocks or pre-cast concrete rings. Manholes shall have shaped channels connecting main lines.

Brick and concrete blocks shall be clean and thoroughly wetted before laying. All joints shall be completely filled with mortar and struck to a smooth finish. Brick shall be laid in stretcher courses

with every sixth course laid radially. The outside of brick and concrete block and concrete block structures, and the inside, if required by the Engineer, shall be plastered and troweled smooth with five eights (5/8) inch of mortar.

The bottom section of pre-cast manholes shall be jointed to the concrete footing with mortar, and successive sections shall be jointed together with mortar. The joint space shall be completely filled with mortar and finished smooth on the inside and outside. A tapered section four feet in height shall be placed on top of the uppermost straight section as shown on the typical detail.

Frame castings for catch basins and manholes shall be set in full mortar beds true to the lines and grades.

Stone for Pipe Ends and Rip-rap. Stone for pipe ends shall be sound, durable rock, which is angular in shape. Rounded stones, boulders, sandstone or similar stone or relatively thin slabs will not be acceptable. Each stone shall weigh not less than fifty (50) pounds nor more than one hundred twenty-five (125) pounds and at least 75% of the volume shall consist of stone weighing not less than seventy five (75) pounds each. The remainder of the stones shall be so graded that when placed with the larger stones, the entire mass will be compact. No stone shall have a minimum thickness less than one-third (1/3) of its length or width.

Aprons shall be provided at all headwalls and where necessary, the Contractor shall excavate a ditch, at a slope of 0.5 percent, to existing ground.

Ditches. Drainage ditches shall have a bottom width at least equal to the diameter of the outfall pipe, with side slopes of one (1) vertical to two (2) horizontal. Soil from ditches shall not be deposited along the sides so as to create ponding. Care must be exercised to eliminate water pockets over and adjacent to such ditches.

Storm Water Recharge Systems. Prior to installation of roof leaders and Storm Water Recharge Systems, a plan and stormwater report stamped by a Registered Professional Engineer in the Commonwealth of Massachusetts is required to be submitted to DPI for review and approval. All designs shall conform to the requirements of the MassDEP and the City's Stormwater Management Rules and Regulations – where conflicts exist, the more stringent shall apply.

In accordance with Massachusetts Department of Environmental Protection (MassDEP) requirements, file the appropriate Underground Injection Control (UIC) permit. Notice of application and a copy of the permit shall be submitted to the DPI along with the required stamped plans and stormwater report.

SECTION V
SANITARY SEWER MAIN CONSTRUCTION

SCOPE OF WORK

The Contractor shall furnish all materials and perform all the work and services necessary for the complete construction of the sanitary sewer system, i.e., - installation or construction of all sewer mains, service connections, manholes, encasements, etc., including all related work such as excavation, de-watering, backfilling, testing and flushing of lines.

The Contractor shall perform his/her work in accordance with the plans and specifications, on file with the associated permit that have been approved by the DPI. Any deviation from the approved plan needs authorization from the DPI Engineering prior to installation or request for inspection.

Any new connection or extension where proposed flows exceed 15,000 gallons per day, the Contractor shall submit a plan to the DPI for review addressing compliance with 314 CMR 12.04(d).

Sanitary sewer mains shall be designed in conformance with the latest version of the TR-16 manual and the specifications provided herein – where conflicts occur the more stringent shall apply. Adherence to the requirements of the design plan being built shall be verified and attested to by an as-built plan signed and stamped by a Professional Engineer. The submittal of a stamped as-built shall be required prior to any service connection permits being released by the City.

MATERIALS

Pipe.

All sanitary sewer piping shall be Polyvinyl chloride (PVC) SDR-35.

1. Polyvinyl Chloride Pipe. PVC sewer pipe for gravity sewers and service connections shall conform to ASTM Standard D 1784 and D 3034-SDR 35, and shall meet the following specific requirements and exceptions:

    a. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusion or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.

    b. Joints shall be bell and spigot. The bell shall consist of an integral wall section with a solid cross section rubber ring factory-assembled, securely locked in place to prevent displacement. Joints shall conform to ASTM Standard D 3212.

    c. All fittings and accessories shall have dimensions as recommended by the manufacturer and have bell and/or spigot configurations compatible with that of the pipe.

d. Pipe shall pass impact resistance test in accordance with ASTM D 2444 and minimum pipe stiffness test at 5% deflection in accordance with ASTM D 2412.

e. The normal length of twelve (12) inch size and smaller shall be twelve and one-half (12 ½) feet and fifteen (15) inch size shall be no longer than twenty (20) feet.

f. Pipe and fittings shall be manufactured in the United States of American and shall be accompanied by the manufactures certificate of compliance, in addition to meeting the performance tests specified hereinafter.

Service connections shall consist of a wye and a six (6) inch diameter pipe from the sewer main to the property line.

Fittings and special couplings for connecting different pipe sizes or materials shall be made by pipe manufacturers and used according to manufacturer's recommendations.

Manholes.

All manholes shall be precast concrete, conforming to standard dimensions or those shown on the typical detail. Brick and concrete block manholes shall not be permitted unless approved by the Commissioner.

Precast manhole cones and sections shall be constructed of reinforced concrete pipe sections, conforming to ASTM C-478.

Concrete for encasements or other uses shall have a minimum compressive strength of twenty five hundred (2500) PSI at twenty-eight (28) days.

Manhole diameter shall be determined based on pipe connection diameter as follows:

Pipe Diameter (inches)	**Manhole Barrel Diameter (feet)**
Up to 21	4
24 - 30	5
36 - 42	6

For manholes connecting more than 2 pipes, consideration shall be given to increasing the manhole barrel diameters noted above. For pipes forty-eight inches and larger in diameter, use of a tee section should be considered. Both scenarios to be approved by DPI.

Brick shall conform to ASTM C-32, grade SS. Mortar for masonry work shall consist of one part Portland Cement and two parts washed sand. Portland Cement shall conform to ASTM C-150, Type II. Sand shall conform to ASTM C-144. The mortar shall be used within thirty (30) minutes from the time the ingredients are mixed with water. Water shall be clean and free from impurities.

See details section "Manhole Frame and Cover".

Flexible sleeve –Integrally cast sleeve in precast manhole section or install sleeve in a formed or cored opening. Fasten Pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion. Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or Dampproofing shall be Hydrocide 648 by Sonneborn Building Products; Dehydratine 4 by A.C. Horn, Inc.; RIW Marine Liquid by Toch Brothers or equal.

Paint outer surface of manholes and structures with two coasts of bituminous dampproofing at the rate of 30 to 60 sq. ft per gallon, in accordance with manufacturer's instructions.

EXCAVATION AND BACKFILLING

Excavation.

The Contractor shall excavate all materials encountered to the depths shown on the drawings. In open cut excavation, the trench width at the top of the pipe shall be no wider than the outside diameter of the pipe, plus one and one-half (1 ½) feet on either side of the pipe, unless permission is granted by the Inspector. The trench above the top of the pipe shall have sufficient slope so that the banks will not slide. Sheeting of trenches will be at the Contractor's discretion and as may be required by applicable governmental laws and regulations.

Excavation for manholes shall be sufficient to leave at least twelve (12) inches in the clear between their outer surfaces and the embankment or timber, which may be used to hold and protect the banks. Any over-depth excavation below the footings of such manholes shall be filled with concrete or clean selected material and will be at the Contractor's expense.

Care must be taken not to damage water pipes, storm drains, sanitary sewers, gas mains, electric conduits or other structures encountered on the lines of the work. In case of damage to any structures, the Owner of the structures and the DPI shall be notified immediately by the Contractor so that the proper steps may be taken to repair, at the expense of the Contractor, any and all damage done.

All sewer and water installations must be separated by a minimum of ten feet (10). Refer to Watermain Construction – Pipe Installation and Appurtenances for additional specific requirements.

Rock Excavation.

Rock excavation shall be completed by non-explosive methods only including rock splitting, ripping, expansive chemical slitting or hoe-ramming. When rock excavation requires blasting, the Contractor shall provide written notice requesting permission from the DPI Commissioner prior to initiating any blasting. Blasting shall only be completed upon written approval from the DPI Commissioner or his/her designee. Contractor shall exercise care not to overshoot and shall remove any material outside the authorized cross section which may be shattered or loosened by such blasting. Blasting operations shall conform to the latest issue of the Corp. of Engineers' Safety Regulations and shall be done by licensed blasters after a blasting permit has been obtained from the Fire Chief having jurisdiction over the area and completing the required pre-blast survey.

Any damage to the work or property of others caused by blasting operations shall be repaired at the expense of the Contractor.

Whenever the bottom of the trench is rock or boulders, it shall be excavated eight (8) inches below grade and refilled to grade with selected material rammed in place. The side of the trench in rock shall be excavated to such width that no rock shall be closer to the pipe barrel or other structures than eight (8) inches when the pipe is laid in the trench with a normal alignment or 12-in from a manhole or structure wall.

Bedding.

The Contractor shall undercut unsuitable material and replace it with selected material composed of screened gravel with stones not larger than one and one-half (1 ½) inches.

When indicated by the City Engineer, the bedding shall be comprised of a six (6) inch layer of peastone, three quarter (3/4) inch crushed stone, spread to give the pipe a continuous and even bearing. This bedding shall be required for both the sewer main and for all service connections.

Concrete Cradle and Encasement:

Where indicated on the plans or directed by the City Engineer, concrete cradle or concrete encasement shall be built in accordance with the typical detail. In general, a concrete cradle shall be used where the depth of cover over the pipe is from fourteen (14) to twenty-two (22) feet. For sewers having greater depths of cover than twenty-two (22) feet, full concrete encasement shall be used.

Backfilling:

ALL sewer pipe shall be completely encased in an envelope of peastone, three quarter (3/4) inch crushed stone six (6) inches on each side and twelve (12) inches on top. No stones larger than three (3) inches in diameter shall be closer than twelve (12) inches to the pipe. Over that, materials for backfilling the trench shall be suitable and free from organic substances, large stones and frost. No stone weighing over fifty (50) pounds shall be backfilled anywhere into the trench. Compaction shall be either by machine or by the puddling method. If puddling is used, a charge for water will be made by the Department of Public Infrastructure. While puddling is underway and afterwards, until puddled areas have sufficiently hardened, the Contractor must protect the trench and the public by suitable barriers, lights, etc.

INSTALLATION

Pipe Laying:

The Contractor shall remove by pumping or other means any water accumulated in the trench during the pipe laying period and keep the trench dry until the joints are properly connected.

All pipe before being lowered into the trench shall be clean and free from defects. The pipe shall be laid to grades and alignment indicated on the approved plan but shall maintain self-cleansing velocities of 3 feet per second, and the minimum grades in Table 1 shall apply.

TABLE 1 SEWER DESIGN FOR SELF-CLEANSING VELOCITIES

Sewer Size	Minimum Slope
6”	.020
8” (terminal sewers only)*	.008
8”	.004
10”	.0028
12”	.0022
15”	.0015

*Terminal sewers require greater minimum slopes because of the low flows and velocities at the head of a terminal line.

A minimum cover of four (4) feet is required over-all sanitary sewer pipes. All sanitary sewer pipes, that cross water mains, shall be placed a minimum of eighteen (18) inches below the water main. Where this is not possible, review is required by the Engineering Department prior to installation.

Changes in direction (vertical or horizontal) shall require a manhole at the point of direction change unless otherwise directed by the Engineer.

When processing from a smaller diameter pipe to one of larger diameter, inside arch surfaces of the pipes shall be made flush (Differences in diameters shall be accommodated by dropping the invert of the larger pipe. Care shall be taken to ensure retention of pitch when so doing).

Pipe shall be properly and uniformly supported in the trench and shall be bedded in coarse sand or processed gravel, which shall have been compacted to a depth of four (4) to six (6) inches below the pipe. Blocking shall not be used to bring pipe to grade, nor shall there be present in the bedding any stone, hard lumps, chunks of frozen material or similar debris having maximum dimension greater than three-quarter (3/4) inch. If trench conditions require three-quarter (3/4) inch, crushed stone may be used for bedding. Such substitution of crushed stone must be approved by the Engineer prior to placing same. Whichever bedding material is used shall be brought to a height of one-half (1/2) the outside diameter of pipe and thoroughly compacted, as shown on the City Standard Details. Initial cover and backfill shall also be as shown on the City Standard Details.

All work must be inspected, prior to backfilling, for adherence to City specifications and requirements with respect to materials, workmanship, type of pipe and appurtenances, proper backfill and compaction, etc.

Manholes:

All manholes shall be precast concrete constructed on a base with a five (5) inch wall and an eight (8) inch slab poured monolithically. The base shall be placed on six (6) inches of selected material. Over-excavation shall be compensated for with additional concrete at the Contractor’s expense.

The joints between sections shall be made using the approved mastic joint material.

Joints between the manhole and pipes shall be made using the approved jointing materials in accordance with the manufacturer’s instructions.

Lifting holes shall be filled solid with non-shrinking mortar.

The top of the cone shall have a minimum of two layers and a maximum of six layers of brick to allow for adjustments of the frames casting. The frame casting shall be set in a full mortar bed, true to line and final grade.

There shall be a minimum of a 0.1 ft drop between the invert in and invert out.

Selected Material:

Selected material shall be screened gravel, consisting of hard, durable particles meeting the requirements of M2.01.4 of the MassDOT Standards

TESTING

An important part of said inspection shall be a leakage test to verify water tightness of the pipe and appurtenances. Such test may be made with water as an infiltration/ex-filtration test, or a compressed air test may be made. Testing and measuring shall be made in the following manner.

A. Water Testing of Manholes and Pipelines

1. Plug all pipes and other openings into the manhole and brace to prevent blow out. Fill manhole with water to the top of the cone section. Of the excavation has not been backfilled and no water is observed moving down the surface of the manhole, the manhole is satisfactorily watertight. If the test, as described above is unsatisfactory as determined by the Engineer, or if the manhole excavation has been backfilled, continue the test. A period of time many be permitted to allow for absorption. Following this period, refill manhole to the top of the cone again, if necessary and allow at least 8 hours to pass. At the end of the test period, refill the manhole to the top of the cone again, measuring the volume of water added. Extrapolate the refill amount to a 24-hour leakage rate. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed three gallons per vertical foot per day, repairs by approved methods may be made as directed by the Engineer. Retest the manhole and, if satisfactory, fill and paint the interior joints.
2. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorptions, etc. It will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
3. An infiltration test may be substituted for an exfiltration test if the ground water table is above the highest joint in the manhole. If there is no leakage into the manhole as determined by the Engineer, the manhole will be considered watertight. If the Engineer is not satisfied, testing shall be performed as previously described.
4. The Engineer supervising the test may, at his discretion, require that manholes and other appurtenant structures be tested separately. Such test shall consist of plugging all pipe openings in the structure and filling the structure with clean water to a point above the highest horizontal seam in the structure (in a manhole, usually the joint between the top cone section and the topmost barrel section). Maximum allowable leakage rate shall be the same as for the sewer piping itself, as hereinbefore specified.

5. The Contractor shall furnish all plugs, water and other appurtenances to construct such weirs or other means of measurement as many be required, provide all labor, and do all necessary pumping in enable the test to be properly made.

B. Air Testing of Manholes and Pipelines

1. Testing of sewers with low pressure compressed air is becoming more widespread, and in many cases, may be preferable to water testing, as excessive test pressures resulting from water head in steep sloped sewers is not a factor.
2. Acceptable air testing procedures are presented in American Society of Testing and Materials Standard #C28-90T "Standard Test Method for Low Pressure Air Test of Vitrified Clay Pipe". In lieu of that Standard, the following test procedure is acceptable:

    a. Plug all openings in the section of sewer piping to be tested.
    b. Pressurize the system to be tested to an air pressure of five (5) PSIG (pounds per square inch gauge). Shut off the pressurized air source.
    c. Allow the pressure to stabilize for a minimum of five (5) minutes.
    d. Record the stabilized pressure in the test section. Record the test start time. The minimum test pressure is four (4) PSIG. The minimum test time is five (5) minutes. At the end of the pressure testing time period, record the test pressure and test termination time. If the pressure drop is greater than one (1) PSIG during the duration of the test, the tested section has failed the test.

C. Vacuum Testing of Manholes

A vacuum test may be substituted for a leakage test as follows:

1. Where the excavation has not been backfilled, the filling and pointing of exterior joints shall not be necessary prior to performing this test.
2. The vacuum test shall be conducted as follows:
    a. The compression band shall be inflated to affect a seal between the vacuum base and the top of the manhole. The vacuum pump shall then be connected to the outlet port with the valve open and a vacuum of 10" Hg (20" of Hg absolute) drawn. The valve shall then be closed.
    b. The following test criteria shall apply to 4-ft and 5-ft diameter manholes:
3. A drop of 1" Hg shall be allowed over a 2-minute period of manholes 0-10 feet deep.
4. A drop of 1" Hg shall be allowed over a 2 ½ -minute period for manholes 10-15 deep.
5. A drop of 1" Hg shall be allowed over a 3-minute period for manholes 15-30 feet deep.
6. If the pressure drop exceeds the acceptable limits the Contractor shall be allowed to make necessary repairs, as approved by the Engineer. The manhole shall then be re-tested.
7. If the manhole fails to meet the minimum requirement of the vacuum test when re-tested, it may be water tested as outlined in Section A.
8. Modifications in the procedure may be made as required and approved. But in any event, the Contractor shall be responsible for the ultimate water tightness of the line within the above test requirements.
9. The Contractor shall notify the DPI Office at least two (2) working days in advance of the date on which proposes to perform such tests.

D. Leakage Tests for Drain Manholes and Catch Basins

1. The Engineer will visually inspect drain manholes and catch basins for possible leaks before backfilling is allowed. All joints shall be sealed to the satisfaction of the Engineer.
2. The Engineer may require an exfiltration test as described for sewer manholes on any structure for which he/she deems appropriate.

E. As-Builts

Before final acceptance by the City of any sewer and/or storm drain, the Contractor shall furnish to the City, at no expense to the City, a complete set of drawings showing the location and alignment in plan and profile of all such sewers and/or storm drains, together with such branches, stubs, and connections to individual buildings as have been installed therewith. Such drawings shall show the installations as actually constructed, shall contain sufficient information as will provide the City with a record of the exact location and depth of the pipes and manholes in order to facilitate future maintenance and repair, and shall bear the stamp and signature of a professional engineer registered in the Commonwealth of Massachusetts.

F. Internal CCTV Inspection

1. All sewer pipe and manholes shall be thoroughly cleaned prior to acceptance. Cleaning shall be completed using a combination jetter and vactor.

2. All pipe shall be CCTV inspected in accordance with NASSCO PACP Standards. Manhole identifications shall be provided to the Contractor prior to the start of CCTV work. Coordinate with DPI to obtained required information. Sewer service laterals do not need to be CCTV inspected.

SECTION VI
SEWER & STORMWATER SERVICE CONNECTIONS

GENERAL

Storm Water Recharge Systems. Prior to installation of roof leaders and Storm Water Recharge Systems, a plan and stormwater report stamped by a Registered Professional Engineer in the Commonwealth of Massachusetts is required to be submitted to DPI for review and approval. All designs shall conform to the requirements of the MassDEP and the City's Stormwater Management Rules and Regulations – where conflicts exist, the more stringent shall apply.

In accordance with Massachusetts Department of Environmental Protection (MassDEP) requirements, file the appropriate Underground Injection Control (UIC) permit. Notice of application and a copy of the permit shall be submitted to the DPI along with the required stamped plans and stormwater report.

SCOPE OF WORK

It shall be the contractor's responsibility to familiarize himself with these requirements, and to keep himself informed of all additions and changes thereto, as well as any special conditions or requirements called for on the sewer/drain permit being acted upon.

Sanitary sewer service connections shall be designed in conformance with the latest version of the TR-16 Manual and the specifications provided herein – where conflicts occur the more stringent shall apply.

MATERIAL

Pipe shall be of a type and material approved by the Commissioner of Public Infrastructure. High-Density Polyethylene (HDPE) shall not be permitted within the City Right of Way. Any use of HDPE within private property must change in material prior to entering City layout.

Minimum sizes permitted shall be six (6) inch diameter for sanitary sewer services and four (4) inch diameter for storm drain services. Storm drains shall be laid with a cover depth not less than thirty-six (36) inches except that, where ledge is encountered, different depth and pipe materials may be used as determined by the Department of Public Infrastructure. Any exception to these minimums must be approved by the City Engineer. Sewer services cannot vary in size from main to building.

A clean-out must be installed with a cast iron "Clean-out" cover with the word "Sewer" or "Drain" accordingly at finish grade, two (2) feet from the property line. See proposed Sewer Stub Diagram in the City Standard Detail Section.

CONSTRUCTION METHODS

Pipe shall be laid in a workmanlike manner, in as straight a run as possible, with a uniform pitch of at least one-quarter (1/4) inch per foot of horizontal run for sanitary sewer service and one-eighth

(1/8) inch per foot of horizontal run for stormwater service connection (any service pipe installed at a lower slope than specified herein must be approved by the City Engineer prior to installation). A minimum cover of at least four (4) feet is required over all sanitary sewer pipes in City streets and ways.

Changes in direction shall be made with suitable smooth curved pipe sections. So-called "cocked" angle joins shall not be acceptable. Service connections shall be made with suitable saddles or ductile iron wye branch. Service connections at manholes shall enter the manhole at the shelf elevation. In the case of an existing manhole, the connection pipe shall be brought to the edge of the main flow channel, with the top half of the pipe cut back to the manhole wall and the shelf area surrounding the pipe built up with concrete to the level of the cut edge to provide an invert. When a new manhole is being built as a part of the connection, the connection pipe shall be cut off at the wall, and an invert formed in the shelf in such a manner as to receive the discharge from the service connection and channel it in a curved downward sweep to blend into the flow of the main sewer.

Where the depth of the sewer main with respect to the depth required for satisfactory flow in the service connection exceeds three (3) feet, a drop-type connection shall be constructed in order to bring the service into the manhole at the proper elevation (see Inside Drop Connection Detail). An internal drop connection requires a minimum of a five (5) foot manhole. Any connection to a manhole in which the flow from the service pipe exceeds three (3) feet in a freefall drop to the bottom of the manhole shall not be acceptable. External manhole drop connections are not permitted.

Where service connections are made directly to the main, chimneys shall be installed when:

a. The drop between the foundation sill and sewer main invert is thirteen feet or greater.
b. The drop between the house service connection and the main is greater or equal to three feet.

Pipe shall be properly and uniformly supported in the trench. All such pipe laid in City streets and/or sidewalks shall be bedded in three-quarter (¾) inch crushed stone. Substitution of crushed stone must be approved by the Engineer prior to placing same. Whichever bedding material is used shall be brought to a height of one-half (1/2) the outside diameter of the pipe and thoroughly compacted, and initial cover and backfill are performed, as shown on the City Standard Details - Typical Trench Detail.

In all cases where the installation in question is in an area having a so-called "Two-Pipe System" i.e., where separate storm and sanitary mains exist (as indicated on the permit), corresponding separate service connections must be installed and connected at the building. Exception to this policy will be allowed only when, in the opinion of the Commissioner of Public Infrastructure, existing field conditions make such storm drain connection physically impossible due to insufficient pitch or depth, or where the storm main is not ultimately connected to the City's storm drain system.

In all cases where sanitary sewer lateral cross potable water pipes or storm drains, refer to City Standard Details.

INSPECTIONS

All work must be inspected before backfilling, whether in City streets or in private property. Failure to secure this inspection shall require re-excavation at the contractor's expense so that inspection can be made and/or be fined $1000. Contractors shall notify DPI, at least **one full workday** in advance of the day the work is expected to be ready for inspection in order that an inspection may be scheduled, and an inspector assigned. Inspectors are not available on Saturdays, Sundays, and Holidays, and contractors should plan their work accordingly. A minimum charge will be assessed if contractors are not prepared for scheduled inspections.

Refer to Section III, Road Construction, in the sub-section on the City Standard Details "Patching Trenches" for methods of repairing and patching trenches.

When working in multiple-building developments in which sewer and storm drain mains are being constructed as part of the overall project, such mains, with attendant manholes, structures, etc., must be completed, tested, and approved before any structures will be allowed to be connected thereto. Individual building services may be run from such mains to the abutting lots in order to complete work in the street, but they must be capped and tested as part of the mains construction.

Building Permits for structures along the line of such mains will not receive Department of Public Infrastructure endorsement unless or until the above-described work has been satisfactorily completed.

SECTION VII
SEWER SERVICE CURED IN PLACE PIPE (CIPP) LINING

SCOPE OF WORK

These specifications include the minimum requirements for the rehabilitation of lateral connections and their interface with the main line sewer via cured-in-place pipe (CIPP).

CIPP lining shall only be permitted on service laterals (service lateral lining) that have been approved by the City Engineer for a CIPP lining treatment. Prior to completing any sewer pipe rehabilitation, CIPP lining contractors shall become bonded with the City and familiarize themselves with the requirements specified here.

Contractors are to submit to the City Engineer, upon request, the following which will be attached to the approved permit:

1. System material type and manufacturer to be used including catalog cut sheets, ASTM references, material composition, manufactures recommended specifications, component physical properties and chemical resistance,
2. Manufacturers detailed description of the recommended system installation procedures, including flow management in both mainline and lateral sewers.
3. Manufacturers recommended procedures for handling and storage of materials,
4. Copies of independent testing reports performed on the CIPP liner composite verifying the product meets the requirements specified herein and the manufactures design,
5. CIPP wall thickness design calculations performed based upon ASTM F1216 assuming **fully deteriorated conditions**. The design shall be stamped by a Registered Professional Engineer in the Commonwealth of Massachusetts,
6. Wetout/cure logs per liner providing details pertaining to the resin type and quantity, catalyst type and quantity, tube type, installation pressures, temperatures and times.
7. Warrantee information documenting a two (2) year period from the date of acceptance by the City. During this period, serious defect discovered in the CIPP lining as determined by the City or property owner and which may materially affect the integrity, strength, function and/or operation of the pipe, shall be removed and replaced as recommended by the manufacture in a satisfactory manner at no cost to the City of property owner.

If a sewer flow by-pass is necessary, the Contractor shall submit a by-pass pumping plan to the City Engineer for review. The Contractor shall be responsible for notifying and coordinating with residents if a by-pass is deemed necessary.

The Contractor is responsible for control of the work zone, in accordance with specifications herein and other approved City permits. Police details for traffic control shall be hired, and obstruction permits obtained by the Contractor at the expense of the Contractor, should the work require interruptions in traffic patterns.

If approved for CIPP rehabilitation, the installation of a sewer clean out on the existing sewer lateral will be required where one does not already exist, as specified in SECTION VI.

Pre-rehabilitation and post rehabilitation CCTV documentation in LACP format including the LACP exchange database will be required for final acceptance as specified herein.

MATERIALS

The Contractor is responsible for proper, accurate and complete installation of the CIPP as specified herein and on the approved permit.

The system shall seal the point of connection from a main line pipe to a connecting lateral pipeline and is normally installed without excavation by the install of resin-impregnated, flexible laminate installed into the existing service lateral, lapping over the main line pipe, sealing the connection.

The minimum length of lateral to be lined shall be determined by the City Engineer based on the pre-inspection video provided by the Contractor. This information will be noted on the approved permit.

Lining shall be completed from the main line sewer. The system to be used shall as follows:

1. Tee/full wrap section with a full circumferential CIPP liner inside the main line pipe and a tube which shall extend continuously from the sewer main into the lateral. This shall be used when main line pipes are 18" and smaller.
2. Flange/brim CIPP connection seal and tube which shall extend continuously from the main line sewer into the lateral. This shall be used for main line pipes larger than 18".
3. A system that is similar to the above and approved by the City Engineer.
4. Lining from a cleanout may be approved by the City Engineer in lieu of the main line sewer.

The system shall be capable of sealing a combination of "tee" and "wye" of varying angles. The resin shall be cured to form the tube into a hard impermeable pipe within-a-pipe.

Systems that use polyester and vinylester resins shall include a method of sealing the connection and the end of the lateral liner as recommended by the manufacturer of the system. The product used in the sealing method shall be installed in accordance with manufacturer recommendations.

Systems that use silicate or epoxy shall prepare the host pipe in accordance with manufacturer's recommendations.

The liner shall extend in a continuous tight fitting, joint-less, watertight new pipe-within-a-host-pipe to eliminate any visible leakage between the lateral and main line and shall provide a leak proof seal to prevent root intrusion, infiltration, and exfiltration between the liner and host pipe.

Actual cured liner thickness shall be -5/+10 percent of approved design thickness and shall not include thickness of any non-structural membrane (inner/pre-liner).

Non-Woven Fabric Tube

Service lateral lining fabric tube shall be a resin-impregnated, one-piece flexible polyester felt, non-woven textile tube, needle punched felt, circular knit or circular braid, glass fiber reinforced plastic or equivalent material tube and meet the requirements of ASTM F1216, ASTM F1743, ASTM D5813 and ASTM F2019. The lining shall be cured-in-place by an acceptable curing method and provide a water-tight liner within the host pipe after wet-out. The liner shall have a service life of 50-years.

The fabric tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure. The thermo-set synthetic resin shall be suitable for the design conditions as well as the curing process.

The lining shall have the minimum structural properties listed below.

Mechanical Property	Polyester Resin	Vinylester/Epoxy
Flexural Strength (ASTM D790)	4,500 psi	5,000 psi
Flexural Modulus of Elasticity (ASTM D790)	250,000 psi	400,000 psi

The service lateral lining shall be designed, fabricated, and installed for the actual conditions encountered for the application, including the material and condition of the host pipe, in accordance with ASTM F1216, and shall meet the following minimum design conditions:

8. AASHTO H-20 live load with two trucks passing.
9. Soil weight 120 pounds per cubic foot. Coefficient of friction Ku'=0.13.
10. Estimated ground water level at ground surface.
11. Fully detoriated pipe with 2 percent (min.) ovality. If ovality of existing pipe is found to be worse, use actual percent up to 5 percent (max.).
12. Soil modulus 1,000 psi.
13. Factor of Safety = 2.
14. Depth of Cover will be determined by field measurements.

When cured, the service lateral lining shall be manufactured to a size that when installed forms a continuous, tight fitting, hard, impermeable liner which is chemically resistant to domestic sewage over the expected life of the rehabilitated pipe. The tube shall be properly sized to the diameter of the host pipe and the length to be CIPP rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends.

The liner material and resin shall be completely compatible. The outside and/or inside layer of the fabric tube (before inversion/pull-in, as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

The lateral service liner may need to be capable of blind terminations within the service line and capable of navigating bends or other transitions in alignment.

Wall color of the interior pipe surface of the CIPP after installation shall be a light reflective color so that a clear detailed examination with CCTV may be made. No material shall be included in the fabric that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between the tube fabric and the activated resin containing a colorant. Hue of color shall be dark enough to distinguish a contrast between fully resin saturated felt fabric and dry or resin lean areas.

The installed liner shall be marked every 5-feet with the name of the manufacturer or CIPP lateral lining system, manufacturing lot and/or production footage on the inside of the cured liner. The print must be visible during the final CCTV inspection.

Seams in the fabric tube, if applicable shall meet the requirements of ASTM D5813 H.

Resin

Resin, when properly cured in the tube composite, shall meet the requirements of ASTM F1216, ASTM F1743, or ASTM F2019. The resin installed shall produce a service lateral liner that complies with the structural requirements specified herein and provides chemical resistance for the flow media in the gravity pipe. The resin shall be compatible with the rehabilitation process, shall be able to cure in the presence or absence of water, and shall have an initiation temperature for cure as recommended by the resin manufacturer. Provide a general purpose or enhanced strength unsaturated, thermosetting polyester, vinylester, or epoxy or silicate resin and a catalyst system compatible with the installation process.

Resins may contain pigments, dyes, or colorants, which shall not interfere with the visual inspection of the cured liner. Quantity of resin used for tube impregnation shall be sufficient to fill volume of air voids in tube with additional allowances for polymerization shrinkage and loss of resin through cracks and irregularities in host pipe.

The method of cure may either be manufacturer recommended heat source, light cure or by ambient temperature.

Lateral Seals

Service lateral connections shall be sealed. An epoxy-sealing component may be used to form a sealing bond between the service lateral liner and the host pipes. However, if the seal utilizes gaskets, the portion of the liner in the mainline pipe shall be embedded with hydrophilic O-rings and an epoxy-sealing component is not required. Use of caulking, rope or band type of an end seal shall not be allowed.

If the service lateral connection is NOT under the phreatic surface, seal the service lateral connection by injecting a chemical hydrophilic grout into the space between the connection and the main line. Chemical grouts shall be with an acrylic based gel chemical sealing material and shall be Avanit AV-118 or approved equal. Grout shall be installed using a pipeline packer than can pneumatically expand and seal the area to isolate it from the rest of the pipeline. No joint shall be considered sealed unless, while under pressure, a minimum of ¼ gallon per inch of pipe diameter has been applied.

If the service lateral connection IS under the phreatic surface, seal the service lateral connection by installing a hydrophilic rubber connection seal. Rubber connection seals shall be composed of a hat made of hydrophilic polymeric neoprene rubber designed with a specified wall thickness to provide a compression seal at the connection of a lateral and a mainline pipe. Acceptable hydrophilic rubber seals are Insignia™ Hydrophilic Connection Hat by LMK Enterprises, or approved equal.

Styrene Reducing Agent

Gelatin, water soluble, biodegradable, non-toxic, FDA approved powder and/or capsule.

Add in a calculated amount according to manufacturer's recommendations into the down-tube for water curing or directly into the water holding tank for steam curing.

StyRedux by Integrated Chemical and Equipment Corporation or approved equal.

CONSTRUCTION METHODS

The CIPP rehabilitation will be performed from the main line sewer. If approved by the City Engineer, CIPP rehabilitation may be allowed from a cleanout in lieu of the main line.

Lateral service liners shall be pre-measured to line the specified distance identified on the permit as determined by the City Engineer.

If allowed by the City Engineer, lateral service liners installed from a clean out is installed using a blind termination at the mainline connection. In such case, the termination shall allow the CIPP to effectively terminate at or near the mainline without protruding by measuring the lateral length prior to installation.

Lining from the main line shall be coordinated with the City. Contractor will be allowed to use the nearest adjacent sewer manhole to access the main line. A minimum of seven days notice shall be given to the City before the start of work.

If no cleanout exists on the service to be rehabilitated in the public right-of-way, Contractor shall install a cleanout at the location approved by the City Engineer on the approve permit and as specified herein.

The Contractor shall schedule, through the DPI, an inspector that will be present during CIPP liner installation process.

Preparation

The Contractor shall clean the interior of the host service pipe prior to the installation of CIPP liner. Debris and obstructions that will affect the installation and the final CIPP liner, shall be removed and disposed of off-site in accordance with all local, state and federal requirements. Precaution shall be taken by the Contractor in the use of cleaning equipment to avoid damage to the host pipe. Post cleaning and pre-lining CCTV footage shall be completed by certified PACP/LACP personnel and submitted to the City Engineer in standard PACP/LACP format. The LACP exchange database shall also be submitted to the City Engineer. The CIPP lining shall only proceed upon approval by the City Engineer and with an approved permit.

It is the Contractor's responsibility to determine the presence of any lateral or wye branches that exist along the service lateral line to be CIPP rehabilitated.

Existing break-in services and/or hammer tapped services shall be cut flush with the main line sewer using a robotic cutter. Contractor shall proceed with caution to not damage the main line pipe during removal.

Installation

Conduct flow management activities to by-pass or temporarily stop flow during the CIPP lining process.

The service lateral liner shall be vacuum-impregnated with resin (wet-out) under controlled conditions, installed and cured-in-place in the host pipe per the manufacturer's specifications, and in accordance with ASTM standards.

The CIPP shall be installed from the main line pipe using a carrier transport. If approved by the City Engineer, it may be installed from an access pit or cleanout.

1. Main Line Pipe: The system shall be loaded inside and/or on a pressure apparatus. The pressure apparatus, attached to a robotic device, shall be positioned in the main line pipe at the service connection. The robotic device, together with a CCTV camera shall be used to align the lateral portion of the system with the service connection opening. Air pressure, supplied to the pressure apparatus through an air hose, shall be used to invert or expand the resin impregnated CIPP into the lateral pipe, and push the main line portion of the system against the main line pipe. Adjust pressure to manufacture's recommendations.

2. Cleanout or Access Pit: The wet-out tube shall be positioned in the host pipe using the method specified by the manufacturer. Care shall be taken to prevent damage to the tube during installation. The tube shall be pulled-in or inverted through the access pit or cleanout and fully extend up the host pipe from the main to the termination point. When installing from an access pit or cleanout, Contractor shall follow manufacture procedures for terminating the CIPP blind. This approach shall only be used upon approval of the City Engineer.

The volume of resin used shall be sufficient to fill all voids in the textile lining material at nominal thickness and diameter. The volume shall be adjusted by adding 5% to 10% excess resin for the change in resin volume due to polymerization and to allow for any migration of resin into the cracks and joints in the original pipe. No dry or unsaturated area in the main line sheet or lateral tube shall be acceptable upon visual inspection.

For lateral liners with gaskets, the main bladder shall be inflated causing the main sheet to unwrap and expand, embedding the hydrophilic O-rings between the main liner and the main pipe as the main liner is pressed tight against the main pipe.

After insertion is completed, recommended pressure must be maintained on the impregnated service lateral liner, pressing the liner firmly against the inner pipe wall for the duration of the curing process. The liner is chemically cured at ambient temperatures or by a suitable heat source. In no instance will sewage be used to invert or cure liners or calibration tubes.

Temperature sensors or gauges may be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing.

Thermoset resins shall have a cool down period in accordance with the manufacturer's recommendation and noted as part of the cure log.

The finished CIPP shall be free of dry spots, lifts, and delaminations. The system shall not inhibit the CCTV post video inspection of the mainline or service lateral pipes. Frayed ends of the system shall be removed prior to acceptance. For lateral liners with mechanical end seals, the CIPP shall taper at each end providing a smooth transition for accommodating video equipment and maintaining proper flow in the main line. In all cases, the finished product must provide an airtight/water tight verifiable non-leaking connection between the main line sewer and sewer service lateral.

ACCEPTANCE OF WORK

The installed CIPP shall be continuous over the specified length of the lateral and shall be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and de-lamination. Any defect, which will or could affect the structural integrity or water tightness of the CIPP shall be repaired by the Contractor. All coupons and excess resin shall be removed from the sewer lateral prior to the acceptance of the CIPP lining. Any identified defects shall be repaired by the Contractor.

The beginning and end of the CIPP shall be sealed to the host pipe. The sealing material shall provide a watertight seal. Ground water infiltration through the wall of the liner shall be zero.

Post lining CCTV shall be completed by PACP/LACP certified personnel and submitted to the City Engineer for final approval and acceptance of rehabilitation work in accordance with the specifications herein.

SECTION VIII
LOW PRESSURE SEWER SYSTEMS

SCOPE OF WORK

The Contractor shall furnish all materials and perform all the work and services necessary for the complete construction of the low-pressure sewer system, i.e., - installation or construction of all low-pressure sewer pipes, service connections, valves, etc., including all related work such as excavation, de-watering, backfilling, testing and flushing of lines.

Prior to the installation of a low pressure sewer system or low pressure sewer service, a plan and supporting calculations stamped by a Registered Professional Engineer in the Commonwealth of Massachusetts is required to be submitted to the DPI for review and approval. The Contractor shall perform their work in accordance with the plans, approved by the DPI.

Should the work require the connection of a new low pressure grinder pump service into an existing low pressure sewer main or the connection of a new low pressure sewer system into an existing low pressure sewer system network (i.e., system expansion or extension), a plan and supporting calculations stamped by a Registered Professional Engineer in the Commonwealth of Massachusetts is required to be submitted to DPI for review and approval. The design should at a minimum:

1. Document that the proposed grinder pump and service and/or main line low pressure sewer system will operate under existing flow and system pressures,

2. That there are no negative impacts on the operation of the existing system (i.e., existing capacity is not impacted, pipeline pressures are not exceeded, or there are no impacts to existing grinder pump operations, etc.) and

3. That the connection of the new service or low pressure sewer main will not impact the operability or lifespan of the existing low pressure sewer system network.

MATERIALS

Pipe. All low-pressure sewer piping shall be Polyvinyl chloride (PVC) SDR – PR Non-Threaded: SDR 21 Material Class 12454 ASTM D 2241-80

Polyvinyl Chloride (PVC) pipe for the force main sewer shall be of the size indicated on the Plans and shall conform to the requirements of the AWWA C900-81 Standards for PVC C900 DR 18 Pressure Pipe for Water with cast iron pipe equivalent outside diameters. Solvent weld balls shall mean the requirements of ASTM D2122 and ASTM D2241.

1. The standard laying length shall not exceed twenty (20) feet. The minimum “pipe stiffness” (load divided by the change in inside diameter in direction of load application) at five (5) percent deflection shall be at least forty-six (46) psi for pipe tested in accordance with ASTM Specification D2412.

2. All bends and fittings on the force main shall be ductile iron compact mechanical joint type, conforming to AWWA C-153. Joint restraint materials shall be of a type suitable for PVC pipe and shall be used on mechanical joint connections.

3. All pipe and fittings shall be clearly marked on the outside indicating the name of the manufacturer, nominal diameter, and the ASTM or AWWA designation, or both.

4. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusion or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.

Valves. Valves shall be specifically designed for sewage service. Bronze construction one and one-fourth (1 ¼) inch, one and one-half (1 ½) inch, two (2) inch full ported ball valve with one hundred (100) percent opening, female ip x female ip, minimum one hundred twenty-five (125) psi, use Mueller H10284 or approved equal.

Three (3) inch – Use AWWA type body, double disc, parallel seat gate valve with mechanical joint or gasketed ends. Valves shall include all accessory fittings necessary for connection to PVC pipe. Use valves as manufactured by American Darling, U.S. Pipe Co., Mueller, or approved equal. Valves shall be compatible with valve box foot pieces.

For each type of valve operating nut installed, the Contractor shall supply an operating handle or wheel, according to the manufacturer's recommendation for the size of the valve involved.

Valve Boxes. Valve Boxes shall be of the extension type with arch pattern base. The castings shall be of gray cast iron true to pattern and free of flaws. They shall be thoroughly coated with two coats of asphaltum varnish. Covers shall be extra deep and marked with raised or engraved letters with the word **"SEWER"**. Letters shall be a minimum of one-half (1/2) inch high. Lids shall be provided with a brass pentagon plug. The Contractor shall provide two (2) pentagon wrenches compatible with the pentagon bolt installed in the cover ring.

***FOOT PIECES – Foot pieces shall be used with curb boxes to provide a firm level base for the valve and prevent valve from moving when valve is operated. Foot pieces shall be used on all valves located on PVC lines.

Pipe Clamps and Support. Pipe clamps, bolts, washers and nuts shall be stainless steel and be of the removable type.

Manhole pipe support cradle shall be 4000 psi concrete sufficiently keyed into the base of the manhole. The cradle shall be provided with a PVC half sleeve of suitable size to accommodate the placement of the Low-Pressure Main.

Thrust Blocking. Provide thrust blocking as directed by the Engineer at all bends, tees, and changes of direction.

CONSTRUCTION METHODS

Installation. Each pipe unit shall be inspected before being installed. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

Each pipe unit shall be handled into its position in the trench only in such a manner and by such means as the Engineer approves as satisfactory.

The pipe shall be supported by selected material placed in a three (3) inch layer to provide a cushion for the pipe. Suitable bell holes shall be provided, so that, after placement, only the barrel of the pipe receives bearing pressure from the supporting material.

All pipes shall be laid upon a trench bottom prepared as shown on the "Force Main Trench" detail.

Sand fill shall be placed twelve (12) inches above the force main pipe.

Ordinary backfill material shall be free of large stones or clods greater than one and one-half (1 ½) inch in diameter or frozen earth. Backfill shall be hand placed and carefully compacted by hand tamping.

At all times when pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs or by other approved means. If water is in the trench when work is to be resumed, the plug shall not be removed until all suitable provisions have been made to prevent water, earth, or other materials from entering the pipe.

Pipelines shall not be used as conductors for trench drainage during construction.

SERVICE CONNECTIONS

Low Pressure Sewer Service Connection One and one-fourth (1 ¼) inch / one and one-half (1 ½) inch sewer service connection shall extend from the low pressure main to grinder pump, as shown on the "Low Pressure Sewer Curb Stop" detail.

The service end shall be equipped with a one and one half (1 ½) inch curb stop. The curb stop shall be properly marked with a cast iron curb box marked **"SEWER"**.

Cleanouts Cleanouts shall be in the form of a wye or a tee and shall be located at the property line of each sewer service and at the terminus of the low-pressure sewer main as shown on the "Sewer Clean Out" detail.

Cleaning Care shall be taken to prevent earth, water and other materials from entering the pipeline. As soon as possible after the pipe is installed, the Contractor shall clean out the pipeline, being careful to prevent soil, water, and debris from entering the pipe.

Testing After the pipes of the force main sewers have been laid, secured in place and jointed as hereinbefore specified, the force main sewers shall be tested for strength and leakage. The tests shall be made when approved by the engineer.

1. The Contractor shall furnish all apparatus, material and labor and the necessary water for making the test.

2. Before testing pipelines having flexible joints, the Contractor must make certain that the pipelines are securely held to prevent movement.

3. The ends of the sections of force main to be tested shall be tightly closed by blank flanges or otherwise for the duration of each test.

4. Strength shall be tested at a pressure of one hundred (100) psi. The pressure for strength test shall be maintained for at least ten (10) minutes by pumping additional water into the pipeline.

5. Leakage shall be tested at fifty (50) psi. The test for leakage shall last for at least one (1) hour and may be required to last for two (2) hours. The additional water needed to maintain the required pressure shall be measured accurately in a manner approved by the Engineer.

    a. The rate of leakage for force main sewers shall not exceed one (1) gallon per day per linear foot of joint.

    b. The Contractor shall repair all leaks discovered.

6. Air testing of force mains will not be allowed.

GRINDER PUMP SYSTEMS (BUILDING SEWER DRAINS)

1. Individual building drains which cannot be discharged to the sewer by gravity flow due to elevation or excessive distance shall be discharged into a tightly covered and vented pump chamber, basin, or station, from which the contents shall be lifted (pumped) by automatic, grinder type, pumping equipment or by any equally efficient method approved by the Commissioner of Public Infrastructure and discharged into the gravity sewer system or to a Low Pressure Sewer System which shall discharge to a gravity sewer system.

2. Grinder pump stations shall be of the wet pit/dry type and shall consist of a grinder pump suitable mounted in a basin having a minimum capacity of sixty (60) gallons and constructed of fiberglass reinforced polyester (FRP) resin or corrugated high density polyethylene (CHDPE) with a smooth inner surface. Each basin shall be furnished with an EPDM grommet or PVC closet flange to accept a minimum four and one-half (4 ½) inch outside diameter PVC pipe. Discharge piping shall be 304 stainless steel and terminate outside the pump chamber with one and one-quarter (1¼) inch NPT fitting. All penetrations in the tank to be factory installed and sealed.

3. All outside installations shall be provided with a poured-in-place, concrete anti-floatation collar of sufficient size and weight to overcome buoyancy forces. Inlet and discharge piping shall be installed at a minimum depth of four (4) feet to assure maximum frost protection.

4. The Grinder Pump System shall be provided with a NEMA 4X electrical quick disconnect, pump removal system, shut-off valve, anti-siphon valve, and full ported check valve assembled within the basin, with remote NEMA 3R, UL listed electrical alarm/disconnect panel with all necessary internal wiring and controls. Pumps to have alarm light and bell with external silence push-button switch and be capable of connection to emergency power source. Duplex units shall have alarm lights which shall indicate which pump requires service. Pump systems must be capable of either inside or outside installation.

5. The grinder pumping equipment must include an integral grinder capable of handling any reasonable quantity of "foreign objects" such as plastic, wood, paper, glass, rubber and the like which find their way into a building sewer drain as a result of carelessness or accident on the part of the building occupants. The grinder pump must be capable of processing such foreign objects without jamming, stalling, overloading or undue noise. Grinder shall process these materials to particles, which will freely pass through the pump and the one and one-half (1 ½) inch pipe system. The grinder shall be of a configuration to provide a positive flow of solids into the grinding zone with sufficient action to scour the tank free of deposits or sludge banks which could otherwise accumulate and dislodge and impair the operation of the pump.

6. The grinder shall be direct driven by a single, one (1) piece stainless steel motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft. The grinder will be of the rotating type with a stationary hardened and ground chrome steel shredding ring spaced in accurate close annual alignment with the drive impeller assembly, which shall carry two (2) hardened type 400 series stainless steel cutter bars.

7. Pumps for low pressure sewer systems shall be semi-positive displacement, progressing cavity, type rated at eleven (11) gallons per minute against a total dynamic head of ninety-two (92) feet (40 psig) and nine (9) gallons per minute at one hundred thirty-eight (138) feet (60 psig). The pump(s) shall be capable of operating at negative heads without overloading the motor(s). Motor shall be a minimum of 1 HP, 1725 RPM, 240-volt, 60 Hertz, 1 Phase with a high starting torque of 8.4-foot pounds with U.L. certification with protection against locked rotor and overload conditions.

8. All maintenance functions for the Grinder Pump Station must be possible without entry of the grinder pump station under "OSHA 1910.146 Permit Required Confined Spaces". Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. Therefore, each pump and motor unit shall be provided with double lifting hooks with nylon lift-out harness to facilitate pump removal. Outside or underground installations shall provide access through an integral extension of the wet well assembly and shall be proved with a lockable fiberglass cover. All electrical and mechanical connections must be provided with easy disconnect accessibility.

9. Low pressure sewer systems shall have redundant check valves and anti-siphon valves. Multiple connections to a low-pressure sewer system may be permitted if designed by a qualified Professional Engineer and approved by the City.

10. No more than one (1) single family home may be connected to a single pump unit.

RECOMMENDED GRINDER PUMP DESIGN TABLE

Occupancy Type	**Flow** (gpd*)	**Pump Units**	**Storage** (gallons)
Single Family	0 - 500	1	60
Duplex	500 - 1200	1	120
Multi Family (3-6 Units)**	1200 - 1500	2	120

* gpd – Gallons per day

** Applications with greater than six (6) units shall be subject to review on a case-by-case basis.

11. Low pressure sewers shall have pressure sewer cleanouts provided if in excess of between 300 feet.

12. Connection of a low pressure sewer grinder pump service of main line to an existing pumping station force main is not allowed.

13. Drop connections shall be provided when connecting a low pressure force main to an existing manhole. Refer to the standard detail provided. Direct connection of a low pressure force main to a lateral gravity sewer is not allowed; a manhole shall be provided. Connection of a low pressure building service to an existing gravity line is permitted.

SECTION IX
WATER MAIN CONSTRUCTION

SCOPE OF WORK

The Contractor shall furnish all materials and perform all the work and services necessary for the complete construction of the water distribution system, i.e. installation of all pipes, gates valves fittings, hydrants, water services, thrust blocks, etc. including all related work such as excavation, backfilling, compaction, testing and disinfection.

The Contractor shall perform his work in accordance with the plans stamped, signed and dated by a Massachusetts Registered Professional Engineer (Civil), (locations and sizes) approved by the DPI/Water Board and /or the approving authority in the DPI.

GENERAL

Connection to City's System:

The DPI will inspect water main connections to the city's distribution system. The Contractor shall furnish all necessary materials and labor needed for such connection. All water work must be done under the supervision of the DPI inspector. Any work done without, will not be accepted by the DPI. Work done outside of normal working hours which are Monday thru Friday 7:30 AM to 4:00 PM, excluding holidays, will be charged at inspector's premium rate.

No water supply will be shut off without giving sufficient notice to the consumers and stating the time when the supply will be turned on. Permission to shut off water shall first be obtained from the DPI, who will shut the water off and turn it on again. Special care shall be taken so as not to damage consumer's appurtenances, if such damages occur, the Contractor shall repair such damages at his own expense.

Water main extensions will be shut off from the city's distribution system at the closest gate valve available. New mains are to be installed fourteen (14) feet from property line on the West side of North and South streets and fourteen (14) feet from property line on the South Side of East and West Streets.

All service connections must be installed perpendicular (90 degrees) from water main to property line and will have a minimum of four feet (4') to a maximum of five feet six inches (5.5') of cover and must not be laid in the same trench with other utilities, i.e., gas, electric, sewer. If the water service cannot be installed perpendicular from the water main, then detector tape must be used from the main to the building foundation. Domestic services and fire suppression services shall be separate piped connections from main to meter/backflow preventor. Services cannot be connected or be tapped off one another.

When installing new water services that have no foundations, the City will require the water service to be installed to the curb stop. Couplings will not be allowed at the property line nor on services less than one hundred (100) feet in length.

No new water services are allowed on the water transmission mains (any water main greater than or equal to 24-inches in diameter). Waiver of this requirement may be granted following a written request by the applicant at the discretion of the Commissioner or his authorized designee.

Any new service that is greater than 75-feet in length measured from the curb stop to the entry point of the building shall have a meter installed in a meter pit located 2-feet from the property line on private property. The meter pit shall be located in an easily accessible location and be designed for H-20 loading regardless of its location. The meter pit shall conform to City standards and requirements and be sized appropriately to handle the meter size of the service required. Meters on services 4-in and larger shall have a by-pass installed around the meter. Valves shall be installed before and after the meter to facilitate removal and installation of the meter. Blocking shall be provided as required to facilitate support of the meter. The City's MIU units shall be installed in a separate below grade structure and not in the meter pit. Plans shall be submitted to DPI Engineering for review and approval as part of the permit process.

All new water services will be kept closed until all testing requirements, are completed. Contractor will test water mains and fire supplies at 200 pounds P.S.I. for one (1) hour without any leakage and have water samples tested for bacteria. A written report must be submitted from the company conducting the pressure, and bacteria test.

All lead water service repairs are to be replaced with copper tubing from the main to the meter. There shall be no couplings between the main and curb stop and between curb stop and meter.

Contractors are required to be knowledgeable and use plumber rods, similar to Aqua-Stop, when renewing a service that has an inoperable curb stop. (Refer to the City Standard Details). Contractors responsible for curb stop cost if service is already copper.

MATERIALS

Main Pipe

Pipe to be no less than eight (8) inches in diameter and Class 52 Cast Iron Cement Lined, Ductile Iron, and Tyton Joint. Pipe shall be eighteen (18) feet Normal L/L cement lined, asphaltic coated inside and out, complete with standard joint accessories. Solid rubber rings are to be separate from each length of pipe. Ductile iron pipe shall be by U.S. Pipe and Foundry Co., Inc.; American Cast Iron Pipe co. or equal.
Conform to ANSI/AWWA C151/A21.51 Standards.

Pipe Joints

Solid rubber rings etc. shall be separated from each length of pipe. Ductile iron pipe shall have rubber- gasket push-on joints or rubber-gasket mechanical joints.
Rubber-gasket joints shall conform to AWWA C111 gasket shall be of SBR.

Restrained Joints

Restrained joints shall be "Locked – Type" joint manufactured by the pipe and fitting manufacture that utilize restraint independent of the joint gasket. Restrained joints shall be suitable for the specified 200 psi test pressure. Mechanical joint retainer glands as manufactured by EBAA Iron Inc. of Texas can be selected for restraining the mechanical joint of ductile iron pipe. Push - on

restrained joints as manufactured by the pipe supplier or manufacturer may be used subject to approval of the Commissioner.

Sleeve Type Joints

Sleeve type couplings shall be Dresser 38,138 or equal.

Fittings

Pipefittings shall be ductile iron with pressure rating of 350 psi for 24-in. and small piping and 250 psi for 30-in. and larger piping. Fittings shall meet the requirements of AWWA C110 or AWWA C153 as applicable. Fittings shall have the same pressure rating as a minimum, of the connecting pipe. All fittings shall conform to the latest revision of the City's specifications.

Closures shall be made with mechanical joint ductile iron solid sleeves and shall be located in straight runs of pipe at minimum cover outside the limits of restrained joint sections. Location of closures shall be subject to approval of the DPI.

Interior linings

Ductile iron pipe and fittings shall have the same type of lining; cement mortar lining and asphaltic seal coat in accordance with AWWA C104 double thickness.

Pipe Insulation

Pipe and fittings shall be insulated where ground cover above the pipe and fittings is less than 4-feet or as directed by the Engineer. Insulated pipe shall be properly restrained. The insulation shall be a foamed in place closed cell polyurethane which completely fills the annular space between the carrier pipe and the exterior casing. The insulation shall have the following physical properties:

Minimum Density (lb/cu. St.) 2.1	ASTM D-1622
"K" Factor BTU/Hr. sq.ft. °F/in. 0.147	ASTM C-518
90-95% Closed Cell	ASTM D-2856

The exterior casing shall be seamless, extruded white PVC Type 1, Class 12454-B per ASTM D-1784. No tape casings will be allowed. If required at field joints, all straight pipe with PVC jackets shall be covered with a PVC sleeve and wrap of polyken tape.

The pipe insulation shall be structurally strong, water-tight and entirely resistant to corrosive elements. The pipe insulation system shall be manufactured by Tricon Piping Systems, Inc. New York or approved equal.

Tapping Sleeves

Tapping sleeves shall be of split mechanical joint design, rating of 200 psi, High–Strength Cast Iron or Steel Bodies with a heavy coat of corrosion resistant coating and separate end and side gaskets. The side gasket shall extend the entire length of the tapping sleeve, forming a watertight joint. Mechanical Joints- for use in connection with pipe having an outside diameter not in excess of Class D pit cast pipe for cast iron. Tapping sleeves conform to ANSI/AWWA standards.

Tapping Sleeves used shall be: A.P. Smith, Darling, Mueller H-615, H-616, and JCM 414 or approved equal and shall be the type used by the City of New Bedford DPI.

Gate Valves and Valve Boxes

All valves and appurtenances shall be new and in perfect working condition. Valves shall be designed for continuous use with a minimum of maintenance and service required and shall perform the function without exceeding the safe limits for stress, strain or vibration. In no case will used or damaged valves be acceptable. Both workmanship and material shall be of the very best quality and shall be entirely suitable for the service conditions specified.

Gate valves shall be ductile iron Resilient Seat type, designed for 250 psi working pressure and test pressure of 500 psi.

Valves are to have Double O-ring stuffing box and a Non-Rising Stem. The design and machining of the valve shall allow replacement of O-rings without undue leakage, while the valves are fully opened and in service. Anti-friction washers are to be located above and below the thrust collar portion of the stem to reduce friction and provide more effective conversion or operating torques into seating loads.

Valves shall have 2 in. operating nut. Valve shall Open Right. Thin wall ductile iron valves will not be accepted. Resilient seat valves shall meet the most recent version of AWWA standard specification for gate valves in all respects, AWWA C509-87.

All inside and outside cast iron surfaces are to be Epoxy Coated. Epoxy coating 10 mils nominal. Non-toxic and imparts no taste to water and certified to NSF61(AWWA C550) Standards.

Standard Mechanical Joint ends for cast iron, with end dimensions complying with ANSI/AWWA C11/121.11 Standards.

Gate valves shall be manufactured by: A.P Smith, Darling, and Mueller Co. #A2360-20.

Tapping Valves: Resilient seated tapping valves shall be furnished with the tapping flange having a raised faced or lip designed to engage the corresponding recess in the tapping sleeve flange in accordance with MMS SP60. Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by misalignment shell cutter. The interior of the waterway body shall be full opening and capable of passing a full size shell cutter.

Butterfly Valves: Shall be in accordance with requirements of AWWA C504–Class 150-B Standard for butterfly valves, a Cast Iron Body design, with mechanical joint fittings (with Joint accessories), Cast Ni-resist disc, 304 Stainless Steel shafts, shaft locking pins to conform to ASTMA304, Gr.3650H Standards, Bronze thrush bearing, fiberglass reinforced Teflon shaft bearings, with Chevron type packing.

Butterfly valve shall be used in sizes 16in and greater, shall Open Right, with a 2 in. square operating nut with a maximum water temperature 125° degree (F), Maximum working pressure 200 psi, Test pressure 300psi, Maximum velocity rating of 16ft./sec.

Valve body exterior and interior shall have a fusion bonded epoxy coating in accordance with AWWA C-555 Standards.

The valve shall be designed so that during operation, or cycling of the valve, there is no friction or abrasion or rubbing together that could wear away any coating material and expose bare metal.

The interior of the valve body shall be free of pockets or ledges where sediment or debris can collect.

"O" ring seal shall be replaceable with the valve under pressure in the full-open position.

Valve shall be capable of operating through 500 full cycles with zero leakage and without regard to direction of valve discharge or operating pressure.

Shall be manufactured by Mueller Model # B-3200-20 and Muller Line Seal Model # B-3200-20 with Mechanical Joint Ends bolts, glands & rubber gaskets complete with operator.

Any proposed deviation to this specification shall be submitted as a special request, in writing, to the commissioner for review and final approval.

Gate Box:

Shall be a heavy-pattern cast iron, three (3) – piece, telescoping type box with dome base suitable for installation on the buried valves. Inside diameter shall be at least a 4 ½ inch barrel length shall be adapted to the depth of cover, with a lap of at least 6 inches when in the most extended position. Cover shall be cast iron with integrally-cast direction – to open arrow. Aluminum or plastic are not acceptable. A means of lateral support for the valve extension shaft shall be provided in the top position of the valve box.

The upper section of each box shall have a top flange of sufficient bearing area to prevent settling. The bottom of the lower section shall enclose the stuffing box and operating nut of the valve and shall be oval.

Shall be manufactured by Buffalo, two (2) piece design, Caldwell No. 10 Gate box – 5 ¼. (Five & one quarter) inch shaft used with 12-inch valves and smaller sliding type: Size – 664, extending from 38 inches to 60 inches, Top Section 26 inches, Bottom Section 36 inches, weight of 110 lbs.

Gate box shall conform to the latest revision of the City's specification.

Hydrants

Hydrants shall be designed, manufactured, and tested in compliance with the latest edition of AWWAC-502 "*Standard for Dry Barrel Fire Hydrants*" as published by the American Water works Association.

Hydrants shall be "*Traffic Type",* with a replaceable "breakable" unit immediately above the ground line for minimizing repairs due to traffic damage.

Hydrants shall be of the compression type, constructed such that the main valve closes with the water pressure to assure no loss of water in the event of damage to the upper portion of the hydrant.

The valve shall have a minimum diameter of *5 ¼ inches* to assure optimum flow.

Hydrant shall be of the dry top design with "O" ring seal to ensure that the operating threads will be protected from water entry. Dry top design is to include a factory lubricated operating mechanism, which allows supplemental lubrication to be added in the field without removal of the top section. Standard lubricant shall be oil/grease, suitable for a temperature range of –60 to +150 degree Fahrenheit and shall incorporate a system of forced lubrication of the thrust collar area each time the hydrant is operated.

All hydrants shall have a Weather Shield of an advanced elastomer material to protect the clearance area between the top casting and the operating nut from moisture and possible damage.

The operating nut shall be a one-piece bronze casting. Both the operating nut and nozzle cap nuts are to be pentagon in shape and measure 1 ½ inches from point to flat at the base of the nut and the overall height of the nut shall be not less than 1 inch. Caps are to be provided with rubber gaskets and "non-kinking," type chains and threads shall have a thin even application of a high temperature anti – seize and lubricating compound such as Never – Seize, or equal.

Hydrants shall have two (2) 2 ½ inch NST hose nozzles, and one (1) 4 ½ inch NST pumper nozzle. The threads are to be "National Standard Threads" (NST).

The Hydrant nozzle section shall be capable of rotation through 360 degrees with respect to the standpipe.

The minimum distance allowable between the centerline of the lowest nozzle and the ground line shall be eighteen (18) inches, Hydrants to have five (5) feet ***Bury***.

Each hydrant shall have permanent markings cast into the upper barrel assembly identifying the manufacture, name and size of main valve opening and the year of manufacture.

Each hydrant shall have an identification mark indicating direction of opening and shall be marked **"Open Right"**.

Hydrants shall have an automatic drain that is operated by the main valve rod. Drain valve is to open, as the main valve is closed and close as the main valve is open. The port and seat of the main valve is to be bronze.

The outside of the hydrant top section shall be painted a minimum of one coat of primer and one finished coat of enamel to be "Red". Bonnet to be reflective white and hose and steamer caps shall be painted per flow test results.

The shoe of the hydrant shall be provided with a (FLG) or (MJ) type of inlet six (6) inches in size that will fit old and new Cast iron pipe. The internal surfaces of the shoe, the lower valve plate, and cap nut shall be coated with a factory applied two-part, thermosetting epoxy coating with a minimum thickness of four (4) mils.

The bronze valve seat shall be threaded into a bronze drain ring or shoe housing to prevent electrolysis between these components. The drain channel shall be all bronze.

The hydrant shall have two drain outlets above the lower flange of the hydrant shoe assembly.

Hydrants shall be designed to permit the use of extension sections in a minimum of six (6) inch increments complete with rod extensions couplings, flanges gaskets, and hardware to facilitate raising of the hydrant where necessary and allow all parts to be removable from ground level without requiring excavation of the hydrant.

Installation shall be in accordance with standard detail 500 and testing shall be according to AWWA Standards C-600 and AWWA manual M-17.

All hydrants furnished under the terms of this specification must be accompanied by a certification, signed by an officer of the Manufacturing Co. that the furnished hydrants meet all aspects and standards contained within this specification.

All hydrants must have a standard test pressure of 200 psig Working Water Pressure and 500 psig Test Pressure and be certified as such by the manufacturer.

All hydrants furnished must have a standard ten (10) year warranty certified by the manufacturer.

Hydrants shall have UL-FM approval.

Hydrants shall be manufactured by:

5 ¼ inch AFC Darling B-62-B Fire Hydrant.
5 ¼ inch Mueller A423 Centurion 3-way Fire Hydrant

Automatic Flushing Hydrant shall be manufactured by:

Kupferle #9700

Hydrants shall be manufacturer painted red with white caps and white bonnet. Hydrants shall conform to the latest revision of the City's specification.

Concrete Thrust Blocks

Furnish all labor, materials equipment and incidentals required to install concrete thrust blocks for pipe fittings and hydrants as ordered by the Engineer, as shown on the Plans and as specified.

Concrete Quality

Unless otherwise specified or directed, concrete shall be designed for a minimum allowable compressive strength of 3,000psi at 28 days. Slump shall preferably be between 2 inches and 4

inches and shall not exceed 5 inches. Water shall be kept to a minimum, to obtain the concrete, which is as dense and watertight as possible. The maximum water content shall be 6 gallons per 94 lb. sack and the minimum cement factor shall be 5.7 (94 lb) sacks per cubic yard. The above ratios shall be revised for sacks of cement weighing different from 94 lb. per sack.

Ready-mix concrete shall conform to ASTM C94 and the requirements herein, or as otherwise approved by the engineer. If ready-mix concrete is to be used, the manufacturer shall furnish a statement to the engineer for his approval giving the dry proportions to be used with evidence that these will produce concrete of the quality specified.

Concrete shall be mixed until there is a uniform distribution of the material and shall be discharged completely before the mixer is recharged. The mixer shall be rotated at a speed recommended by the mixer manufacturer and mixing shall be continued for at least one and one-half minutes after all the materials are in the mixer. Concrete shall be placed within 1½ hours of the time at which water was first added; otherwise, it shall be rejected. Concrete which has been remixed or re-tempered or to which an excess amount of water has been added, shall also be rejected.

Domestic Services

Corporation Taps, Curb Stop, Couplings & Curb Stop Boxes

Service pipe size shall not be less than 1 inch and shall be soft, annealed seamless copper tubing conforming to ASTM B88, Type K from main to connection point inside of foundation wall. The name and trademark of the manufacturer shall be along the pipe.

Service Saddles

Bodies: Double Strap Ductile Iron ASTM-A536, CC Outlets.
Straps: Carbon Steel ASTM-A108 (61018) Electro –galvanized with di-chromate seal ASTM-B633.
Studs: Type 304 - 5/8” Stainless Steel.
Nuts: Cold formed semi-finished heavy hex steel A563 Electro-galvanized with di-chromate seal ASTM-B633, or Type 304 Stainless Steel Teflon coated for stainless steel.
Washers: Carbon steel ASTM-A108 Electro-galvanized with di-chromate seal ASTM-B633 or Type 304 Stainless Steel for stainless steel.
Gaskets: Grade 60 compounded to resist oil, natural gas, acids, alkalies most (aliphatic) hydrocarbons fluids water and many chemicals.
Finish: Fusion bonded nylon to a minimum thickness of 12 mls or optional topcoat enamel.

Corporation stop for service connections shall have standard shop threads conforming to AWWAC800 on inlet end and with required joint or coupling for connection to copper pipe and shall be Muller Style AWWA types H-1500 & H-15008, Red Head style 438 or equal.

Curb stops shall be Water Works inverted-ground-key type, oval or round flow way, tee handle, without drains. Pipe connections shall be suitable for the type of service pipe used. All parts shall be of bronze with female iron-pipe-size connections or compression-pattern tube couplings and shall be designed for a hydrostatic test pressure not less than 200 psi. curb stops shall be Mueller style H-1504-2, Red Heb Style B415G or equal.

Brass Specification

Material: Material shall be of bronze containing not less than 85% copper; bronze to be known as 85-5-5 metal. Castings to be clean and free from roughness both inside and outside.

Waterway: Shall be full size- orifice is to be round- smooth and free from obstructions.

Washer: Washers shall be of cast bronze containing not less than 85% copper finished on both sides to true faces.

Nuts: Shall be of commercial bronze not less than 89% copper and finished on both sides to true faces.

Plugs: All plugs of corporations and curb stop to be solid (except for waterway) size to and including 1½ inches. The bronze in all plugs shall be of a composition harder than that of the body. The material to be known as ingot # 345 Navy M metal with not less than 87% copper.

Adjusting Nuts: The adjusting nuts shall also come to a true facing against the bottom of bronze washer and proper adjustment shall be made to assure easy turning and freedom from leakage. The adjusting nuts shall be properly locked to the stop plug to avoid change in position in operation of stop.

Stop: The stops shall be subject to a sustained hydraulic pressure of 200 lbs.; tested in both the open and closed position.

All curb stops and corporation must be of compression type. All brass goods must fully conform to specifications and no inferior workmanship or material will be accepted.

Corporation Taps, Curb Stop & Curb Stop Boxes shall conform to the latest revision of the City's specification.

Adapter Couplings:

Adaptor couplings for connecting new copper tubing to existing service connection at a point two (2) feet inside the property line shall be standard straight coupling fittings conforming to AWWA C800 manufactured by Mueller, Red Hed or Dresser Type coupling with epoxy coating and all ductile iron construction or equal. When encountering different pipe materials such as steel, brass, lead etc. couplings used to connect new to existing services shall electrically isolate the two materials and be comprised of corrosion resistant materials.

Line fittings:

Line fittings, if required on new or old service line, shall be standard three-part unions conforming to AWWAC800; shall be Mueller, Red Hed or equal.

Curb Stop Box:

Service boxes shall be cast iron. Service boxes shall be installed for all new curb stops where directed by the Engineer. Curb stop boxes shall be located 1.5-ft back from the curb line. Curb stops shall be furnished with curb boxes of the extension type with stationary rod and arch pattern base. Service boxes of the required length and having a slide-type adjustment shall be installed at all service box locations. The boxes shall have housings of sufficient size to completely cover the curb stop and shall be complete and identifying covers. Service boxes shall be furnished with the cover which reads "WATER".

Curb stop boxes shall be 2 ¾-inch Tyler Union Service Box, adjustable 6500 series, screw type. The top section shall be 30-in and the bottom section shall be 39 inches with an overall adjustable length of 41-in to 64-in. Box shall accommodate curb stops up to 1-1/4-inch. An enlarged base should accommodate curb stops up to 2-inch if required. Top section of the service box shall be recessed to receive the cover.

INSTALLATION

Excavation and Backfilling

Scope of work

The contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all trenching for pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces and easements.

Excavation shall extend to the width and depth shown on the Plans or as specified and shall provide suitable room for installing pipe, structures and appurtenances.

Furnish and place all sheeting, bracing, and supports and shall remove from the excavation all materials which the DPI may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry and in all respects, acceptable. If conditions warrant, deposit gravel for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever. The length of the open trench shall be related closely to the rate of pipe laying. All excavation shall be made in open trenches.

Contractors installing by-pass piping must have a minimum trench width of one (1) foot.

All excavation, trenching and sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.560Subpart P) and the State requirements. Where conflict between OSHA regulations exists, the most more stringent requirement shall apply.
Trench Excavation

While excavation and backfilling is in progress, traffic shall be maintained or in instances when traffic cannot be maintained a police detail will be required at the contractor expense. Care must be taken not to damage water pipes, drains, sewers gas mains, electric & cable TV conduits, or other structures encountered on the lines of the work. In case of damage to any structures, the structures owner and the DPI shall be immediately notified by the Contractor, so proper steps may be taken

to repair the damage, at the expense of the Contractor, any and all damage. All utilities and other property shall be protected.

Trenches shall be excavated to the depth indicated on the Plans or to allow for a minimum of four (4) feet and no more than five feet-six inches (5.5') cover over the top of the pipe. In open cut excavations, the trench width at the top of the pipe shall be no wider than the outside diameter of the pipe, plus 1.5 feet, or in widths sufficient for laying the pipe, bracing and for pumping and drainage facilities The bottom of the excavation shall be firm and dry and in all respects acceptable to the Inspector. The trench above the top of the pipe shall have sufficient slope so that the banks will not slide. Sheeting of trenches will be at the contractor's discretion and may be required by applicable governmental laws and regulations.

Excavation and dewatering shall be accomplished by methods, which preserve the undisturbed state of sub-grade soils. The trench may be excavated by machinery to, or just below the designated sub-grade. Provide that material remaining in the bottom of the trench is no more than slightly disturbed. Sub-grade soils, which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by screened gravel fill as required by the DPI at the Contractor's expense.

Clay and organic silt soils are particular to disturbance due to construction operations. When excavation is to end in such soils, use a smooth-edge bucket to excavate the last one-foot of depth.

Bedding

Pipe shall be bedded to its side centerline in compacted granular material. Granular materials are defined per the AASHTO Soil Classification System (ASTM D3282) or the Unified Soil Classification System (ASTM D2487), with the exception that gravel bedding/backfill adjacent to the pipe is limited to 2" maximum particle size per ANSI/AWWA C600. Compacted granular or select material shall be used to top of pipe. Loose soil or select material is defined as "native soil excavated from the trench, free of rocks, foreign materials, and frozen earth." Approximately 90 percent shall pass Standard Proctor, AASHTO T-99 "Standard Method of Test for the Moisture Density Relations of Soils Using a 5.5 lb (2.5 kg) Rammer and a 12 in. (305 mm) Drop." Available from the American Association of State Highway and Transportation Officials, 444 N. Capital St. N.W., Washington, DC 20001. The clean earth shall be hand shoveled and properly tamped beneath the pipe so that the pipe shall have a continuous and even bearing. The trench may be excavated by machinery to the normal depth of the pipe provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

Where pipe is to be laid directly on the trench bottom, final excavation at the bottom of the trench shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.

Excavation Below Grade and Backfill

Whenever the nature of unstable material is encountered, or when groundwater conditions exist the trench drainage shall be complete and effective. If the Contractor excavates below grade through error or for the contractor's own convenience, or through failure to properly dewater the trench, or disturbs the sub grade before dewatering is sufficiently complete, he may be directed by the

Engineer to excavate below grade as set forth in the following paragraph, in which case the work of excavating below grade and furnishing and placing the refill shall be preformed at his own expense.

If the material at the level of the trench bottom consists of fine sand, sand and silt or soft earth which may work into the screened gravel notwithstanding effective drainage, the sub-grade material shall be removed to the extent directed and the excavation refilled with 6 in. layer of course sand, or a mixture graded from course sand to the fine pea stone, as approved by the Engineer, to form a filter layer preserving the voids in the gravel bed of the pipe. The engineer prior to placement shall approve the composition and gradation of gravel. Screen gravel shall then be placed in 6 in. layers thoroughly compacted up to the normal grade of the pipe. If directed by the Engineer, bank-run gravel shall be used for refill of the excavation below grade. Geotextile filter fabric may be substituted for filter layer if approved by the Engineer. Filter fabric shall be Mirafi 140N, Supac equivalent, or equal.

Backfilling

As soon as practicable after the pipe has been laid, jointed, and inspected, backfilling shall begin and thereafter be prosecuted expeditiously. Bedding gravel, as specified for the type of pipe installed, backfill shall be deposited by hand evenly on both sides to the centerline of the pipe and tampered with suitable tools, then filled in by hand up to 1 foot over the pipe before backfilling with a machine. All materials for backfilling shall be suitable and free from organic substances, large stones and frost. No stone weighing over fifty - lbs. shall be backfilled anywhere into the trench. Stones larger than 3 inches in diameter shall not be closer than 6 inches to the pipe Fill shall not be dropped into the trench in a manner to endanger the pipe. The water into the new mains shall not be turned on until fill material is placed to the proper grade over the pipelines and around hydrants. Flowable Fill will be required during the winter season or when required by the City.

An impervious dam or bulkhead cutoff of clay or other impervious material shall be constructed in the trench as directed; to interrupt the unnatural flow of groundwater after construction is completed. The dam shall be effectively keyed into the trench bottom and sidewalls. Provide at least one clay or other impervious material dam in the pipe bedding between each manhole where directed or every 300 feet, whichever is less.

Where the pipes are laid cross-country, the remainder of the trench shall be filled with common fill material in layers not to exceed 3 feet and mounded 6 inches above the existing grade or as directed. Where a loam or gravel surface exists prior to cross country excavations, it shall be removed, conserved and replaced to the full original depth as part of the work under the pipe items. In some areas it may be necessary to remove excess material during the clean-up process, so that the ground may be restored to its original level and condition.

To prevent longitudinal cracking of the pipe, dumping backfill material into the trench and then spreading will not be permitted until material or screened gravel has been placed to a level 1foot over the pipe.

Backfill shall be brought up evenly on all sides. Each layer of backfill material shall be thoroughly compacted by rolling, tampering, or vibrating with mechanical compacting equipment or hand

tamping, to 92 percent compaction. If rolling is employed, it shall be used of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

Water jetting or puddling may be used unless the refill contains too great a proportion of clay or loam to permit satisfactory drying. Water jetting shall consist of using a suitable length of pipe at least 1¼ inch in diameter fitted with quick acting valve and sufficient hose to connect to a hydrant or pump having adequate pressure and capacity. The full depth of backfill shall be thoroughly inundated by thrusting the pipe into the fill at frequent intervals with the valve open until all slumping ceases. Where backfill is compacted by puddling it shall be done by depositing it in water. Water for jetting or puddling may be obtained from owner hydrants where possible. The owner of the hydrant may furnish water if reasonable care is exercised in its use and when approved by the DPI. If water restrictions are in force, obtain water elsewhere, or compact the backfill by other approved methods.

Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lbs. The material being deposited shall be spread and compacted in layers not over 6in thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

Backfill around structures shall be selected common fill material, may be compacted by puddling where approved by the Engineer. All Backfill shall be compacted, especially under and over pipes connected to the structures.

While puddling is underway and afterwards, until the puddle areas have sufficiently hardened, the Contractor must protect the trench and the public by suitable barriers, lights, etc. Refer to Section III, Road Construction, in the sub-section on “Patching Trenches” (page 9) for methods of repairing and patching trenches.

Installation of Pipe & Appurtenances

Scope of work

Contractor to furnish all labor, materials, equipment, and incidentals required install disinfect and test ductile iron pipe, fittings, for distribution system piping. Piping shall be located substantially on drawings. The DPI reserves the right to make such modifications in locations as may be found desirable to avoid interference between pipes or for other reasons.

Installing Cast and Ductile Iron pipe and fittings

Care shall be taken in loading, transporting, and unloading to prevent damage to the pipe or coatings. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before laying and no piece shall be installed which is found to be defective. Damaged to the pipe coating shall be repaired per manufacturer’s recommendations.

If any defective pipe is discovered after it is layed, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work and when installed or laid, shall conform to the lines and grades required.

Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, except as otherwise specified herein. A firm even bearing throughout the length of the pipe shall be provided by digging bell holes at each joint and by tampering backfill materials at the side of the pipe to the spring line. Blocking will not be permitted.

All pipes shall be sound and clean before laying. The contractor shall remove, by pumping or other means, any water accumulated in the trench during the pipe laying period and keep the trench dry until the joints are properly connected. When pipe laying is not in progress, open ends of the pipe shall be closed by a watertight plug or other approved means. Sufficient backfill shall be placed to prevent flotation. Any pipe lengths, which have floated, shall be removed from the trench and relayed to the satisfaction of the inspector. The deflection at joints shall not exceed 75percent of allowable deflection recommended by manufacturer.

All ductile pipe underground shall have a minimum of 3-ft. of cover unless otherwise shown on drawings. Pipe shall be laid such that the invert elevations show on the drawings is not exceeded.

Fittings shall be provided where required, in crossing utilities, which may be encountered upon opening the trench. Solid sleeve closures shall be installed at locations approved by the Engineer.

The pipe interior shall be maintained dry and broom clean throughout the construction period. When cutting pipe is required cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall be undamaged. Field cut ends shall be sealed with approved epoxy in accordance with manufacturer’s instructions.

Cutting of restrained joint pipe will not be allowed, unless approved at specific joints in conjunction with the use of restrainer glands by EBAA Iron of field adaptable restrained joints.

Wedges supplied with the pipe shall be used according to the manufacturer’s recommendation to effect electrical continuity.

Sewer line and water main separation shall conform to guidelines in TR-16, Guides for the Design of Wastewater Treatment Works, 2011 Edition. Sewers shall be kept remote from public water supply wells or other potable water supply sources and structures. Wherever possible, sewers shall be laid at a minimum of at least 10 feet, horizontally, from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet, a sewer may be laid closer than 10 feet to a water main if it is laid in a separate trench and the elevation of the crown is at least 18 inches (18in) below the invert of the water main.

Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the crown of the sewer is at least 18 inches below the invert of the water main. When the elevation of the sewer cannot be varied to meet this requirement, the water main shall be relocated to provide this separation or constructed with mechanical-joint pipe for a distance of 10 feet (10 ft) on each side of the sewer. One full length of water main shall be centered over the sewer so that both joints will be as far from the sewer as possible.

When it is impossible to obtain horizontal and/or vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical-joint cement-lined ductile iron pipe or equivalent that is watertight and structurally sound. Both pipes should be pressure tested to 200 psi to ensure that they are watertight.

Refer to City Standard Details when a sewer service connection is in direct invert conflict with an existing watermain or storm drain.

All dead ended mains shall end with a hydrant assembly and automatic flushing unit approved by the Commissioner and shall discharge into a grated drainage system. If no drainage system exists in the vicinity of the proposed hydrant, contact DPI Engineering.

Thrust Blocks

The contractor shall be responsible to supply and install concrete thrust blocks at all bends, tees, and hydrants as shown on standard detail plans the concrete shall be composed of one part Portland cement, two parts sand and four parts coarse aggregate. The concrete shall be mixed and placed in a manner satisfactory to the inspector. In placing the concrete, care shall be taken not to disturb the alignment of the pipes around or adjacent to the concrete being placed.

Concrete encasements shall be placed as shown and as directed by the Plans. Backfill shall not be placed on the concrete until permitted by the DPI.

The backs of the thrust blocks anchors shall be placed against undisturbed earth. The sides of thrust blocks shall be formed. The Minimum bearing area shall be as called out on the plans or as determined by the Engineer. Felt roofing paper shall be placed to protect pipe joints and hydrant drain ports. Concrete shall not be placed over bolts or nuts, or to prevent the removal of the joints.

Jointing Ductile Pipe

Push-on joints shall be made in accordance with manufacturer's instructions and AWWA C600 standards. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the pipe. The joint surfaces shall be cleaned and lubricated, and the plain end of the pipe shall be aligned with the bell of the pipe to which it is to be joined and pushed home.

Mechanical joints shall be assembled in strict accordance with the manufacturer's instructions and AWWA C600 Standard. Pipe shall be laid with bell ends looking ahead. To assemble the joints in the field; thoroughly clean and lubricate the joint surfaces and rubber gasket. Bolts shall be tightened to the specified torques. Under no condition shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

Bolts in mechanical or restrained joints shall be tightened alternately and evenly.
Restrained joints shall be installed according to pipe manufacturer's instructions.

All blow-offs, outlets, valve, fittings, and other appurtenances required shall be set and jointed as indicated on the Drawings in accordance with the manufacturer's instructions.

Gate Valves and Boxes

Buried valves shall be cleaned and manually operated before installation. Buried valves and boxes shall be set with the stem vertically (plumb), aligned in the center of the valve box. Gate valves shall be located not more than 500 feet apart in commercial districts and 800 feet in all other areas. Valves shall be set on a firm foundation and supported by tamping pipe bedding material under the sides of the valve and shall be connected with short lengths of pipe when needed.

Valve Box

The valve box shall be supported during backfilling and material in vertical alignment with the top flush with finish grade. The valve box shall be set so as not to transmit traffic loads to the valves. Before Backfilling, all exposed portion of any bolts shall be coated with two coats of bituminous paint.

Adjustments of water gates that disturb the Bituminous Concrete Binder surface, will need to have nine (9) inches of concrete placed around the structure. City of New Bedford Engineers on-site will make the determination. See Mass DPW Specifications – March 1977, Concrete Collars Detail 202.9.0.

Installing Pipe Insulation

The Contractor shall install insulated pipe where ground cover is less than 4-feet or as directed by the Engineer. The Contractor shall handle the piping system in accordance with the directions furnished by the insulated piping system manufacturer and as approved by the Engineer. All insulated pipe shall be properly restrained. The Contractor shall exercise appropriate care when installing the insulated pipe.

The field application of pipe insulation of fittings and pipe connections shall be in accordance with the manufacturer's instruction and as directed by the manufacturer's trained personnel. Insulated piping systems shall not be installed in standing water. Trenches shall be maintained dry until final closure is complete.

A minimum 4-inch layer of sand or fine gravel, less than ½ inch in diameter shall be placed and tamped in the trench to provide uniform bedding for the insulated piping system. Once the insulated piping system is in place, the trenches shall be carefully backfilled with material as specified and directed by the Engineer and hand tamped in 6-inch layers until a minimum of 12-inches above the top of the insulated piping system has been achieved. The remainder of the backfill shall be flowable fill, as specified.

The water main pipe shall be tested in accordance with "Water Main Filling and Testing" in Section IX.

Hydrant Installation

Fire hydrants shall be set at a maximum of 500 feet apart unless otherwise specified by DPI. Hydrants shall be bedded on a firm foundation. The hydrants and connecting pipes shall have at least the same depth of cover as the water-distributing pipe.

Hydrants shall have the steamer nozzle facing the roadway. 6 inch diameter cast iron or ductile pipe shall be used for hydrant laterals. Each hydrant must have a 6-inch gate valve, box and cover on the lateral.

A drainage pit as detailed on plans, or it shall be at least 12 inches in depth below the bottom of the hydrant and at least 18 inches in radius shall be dug at each hydrant. This pit and space around the hydrant shall be refilled with ¾" crushed stone compacted. During backfilling, additional crushed stone shall be brought up around and 6 inch over drain port. Each Hydrant shall be set in true vertical alignment and properly braced.

Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil bank at the end of the trench. Minimum bearing area shall be shown on the plans. Felt roofing paper shall be placed around the hydrant elbow before placing concrete care shall be taken to ensure that concrete does not plug the drain ports.

The hydrant shall be tied to the pipe with suitable rods or clamps, galvanized, painted, otherwise rustproof treated. Hydrant paint shall be touchup as required after installation.

Fire hydrants shall be painted in accordance with New Bedford DPI standard practice, red body and white bonnets.

Automatic Flushing Hydrants shall have a locking device, for water discharge to open air to 4 inch concrete pad or pipe with air-gap drainage system, and discharge into a grated drainage system.

Water Main Filling and Testing

After installation, the pipe shall be tested for compliance as specified herein. Furnishing all necessary equipment and labor for the pressure test and leakage test on the pipeline'(s). Submit plan for testing to the DPI for review at least 10 days before starting the test.

Testing shall be conducted in accordance with AWWA C600 standard. Pressure pipelines shall be subject to a hydrostatic pressure of 200 psig or 1.5 times the working pressure at the highest point along the test segment. This test pressure shall be maintained for a minimum of 2 hours. The leakage rate shall not exceed those indicated in AWWAC600 standard. Provide suitable restrained bulkheads as required to complete the hydrostatic test specified.

All valves and valve boxes shall be properly located and installed and operable prior to testing. Bulkheads shall be provided with a sufficient number of outlets for filling and draining the line and for venting air.

Hydrostatic pressure and leakage tests shall conform to Section 4 of AWWA C600 standard. Furnish gauges, meters, pressure pumps, and other equipment needed to fill the line slowly and perform the required hydrostatic tests.

The DPI will provide a source of supply from the existing treated water distribution system for Contractor's use in filling the lines. An air brake shall be maintained at all times between the distribution system and the Contractor's equipment to prevent cross-connection.

The line shall be slowly filled with water (so not to disturb existing lines) from the low end if possible; expelling air from the hydrants and taps at the beginning and end of the line. The line shall be shut down and left filled for 24 hours.

Testing

After the line is filled and all air has been expelled and the valves segregating the portion of the system to be tested are secure closed, pressure is applied by pump water into the isolated section until 200 psi is obtained. The pressure should be maintained for not less than (2) two hours. If the line does not have any leakage, then it will maintain the test pressure for the specified time.

All lines that connect to a sprinkler system shall be tested to a pressure of 200 p.s.i. with the same procedure as detailed below.

Specified test pressure shall be maintained in the pipe for the entire test period by means of a pump furnished by the Contractor. Provide accurate means for measuring the quantity of water to maintain this pressure. The amount of water required is a measure of leakage.

The duration of the pressure test shall not be less than Two (2) hours. The leakage test shall be a separate test following the pressure test and shall not be less than two (2) hour duration. All leaks evident at the surface shall be repaired and leakage eliminated regardless of the total leakage as shown by test.

If the pressure drops, the test pressure must be maintained by pumping from calibrated (marked) containers to hold the test pressure for the length of the test period to determine the amount of leakage. If the rate of leakage is greater than that is allowed in the following table, it shall be understood that the test has failed and appropriate repairs should be made before the test is again conducted.

Table I **Allowable Leakage per 1,000 Feet of Pipeline (Gallon Per Hour)**

Average Test Pressure 200 p.s.i.

Nominal Pipe Diameter in Inches									
4in	6in	8in	10in	12in	14in	16in	18in	20in	24in
0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21

Water lines that fail to meet the test standard shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipe, valves and accessories shall be removed and replaced.

The general procedure for chlorination shall be first to flush all dirty or discolored water from the lines and then introduce chlorine in approved dosages through a tap at one end, while water is

being withdrawn at the other end of the line. The disinfectant shall be mixed with water in proper proportions to provide a minimum of 50 ppm throughout the main. The chlorine solution shall remain in the pipeline for 24 hrs.

Water Main Disinfection

The DPI shall be notified at least 48 hours prior to chlorination and shall witness the procedure. If no one from the DPI is available, the procedure shall be rescheduled to accommodate the DPI.

Before being placed in service, all new water pipelines shall be chlorinated using the continuous feed method specified in AWWA C651. The procedure shall be approved by the DPI.

The location of the chlorination and sampling points shall be taken in intervals of approximately 200 feet; and from the end of the line to assure safe water to all consumers on the line. The locations are to be determined in the field by the Contractor and the DPI. The contractor shall install the chlorination and sampling taps and shall uncover and backfill the taps as required.

Table II **Chlorine Dosage per 100 Feet of Pipe**

Pipe Size	100% Chlorine /lb.	1% chlorine solution /gal.
4in	.013	.16
6in	.030	.36
8in	.054	.65
10in	.085	1.02
12in	.120	1.44
16in	.217	2.60

Solutions of 1% chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires 1 pound (lb.) of calcium hypochlorite in 8 gallons of water.

Following the 24 hr chlorination period, a minimum residual of 10 ppm shall be present. All treated water shall be slowly (so as not to disturb the existing lines) flushed from the lines at their extremities, residual reading shall be taken at hydrants and taps until or the chorine residual is no higher than that generally prevailing in the system, or the residual has dropped to minimum of 0.3ppm and replaced with water from the distribution system. The main will be kept isolated from the system.

All treated water flushed from the lines shall be disposed of by discharging into the nearest sanitary sewer or by approved means. No discharge to any storm drains or natural watercourse will be allowed.

24 hours after flushing is completed a sample shall be taken of the water that has stood in the isolated main. A chlorine residual test will be measured prior to the collection of a sample. If the residual measures less than 0.10mg/l, then a heterotrophic plate count (48-hour test) will be performed in addition to the coli form bacteria.

Bacteriological sampling and analysis shall be collected in a sterile bottle treated with sodium thiosulfate in accordance with procedures of Standard Methods for the Examination of Water and Wastewater 18th edition. A sample of the replacement water may then be made by the DPI in full accordance with AWWA C651.

A copy of the test report shall be given to the Contractor and the DPI foreman. If the chlorination test fails the Contractor will be required to re-chlorinate, if necessary and the line shall not be placed in service until the requirements of the Commonwealth of Massachusetts are met.

Special disinfecting procedures shall be used in connection to existing mains and where the method outlined above is not practical.

Domestic Service Installation

Services from main to the property line shall be set perpendicular (90 degrees) to the water main. Shall have a minimum of 4 feet cover and shall not be laid in the same trench with gas, electric or sewer. Water services within the street Cul-de-sac area, these water services are not allowed to have bends. If the water service cannot be installed perpendicular from the water main, then detector tape must be used from the main to the building foundation. The water service cannot be under any structure from the curb stop to the mechanical room. The area where the water service enters through the foundation shall be 3 feet away from the main circuit breaker panel. Meter stops, meter connection and blanks will be furnished, but not installed, by the DPI. Requests for meters to be set and water turned on shall be made to the DPI at least 48 hours in advance. Water service numbers will be required before turning on the water service. Well water residents converting from septic to sewer will be required to have a city water meter installed for billing purposes. When laterals are reconnected to existing services, a Reconnection Fee (same as new service fee) is required prior to work commencing.

Tapping Saddle Installation

Saddle shall be made from coated stainless steel and designed for a working pressure of at least 200 psi. Outlets shall be CC tapping outlets. The watertight seal shall be accomplished by the use of a gasket placed in a recess between the sleeve body and pipe barrel. Coating on steel sleeve/saddles shall be **Thermo-set Epoxy coating, 8-10 mil D.F.T.,** and free of holidays.

Taps for all services up to 2 inches shall be made with a double-strap service saddle tapped to the desire size with a corporation and a gooseneck in the copper, close to the corporation stop for expansion. Taps shall be made in the upper quadrant of the pipe. All services domestic or fire ¾ inch and larger that are tapped on Transite, Asbestos Cement Pipe etc., shall be made with a double strap service saddle.

No Person is allowed to Shut-off or Turn-on a water service. It is required that you call into the DPI Repair Shop for a representative to perform this function. Anyone caught using the curb stops shall be fined $50.00, per the Water Board.

Corporation Stop Installation

Corporation stops shall be installed for connecting all services to the new water mains. Keep a record of the locations of all corporations stops installed and shall indicate on the record those corporation stops that have not been connected to service piping. A copy of this record shall be given to the Water Foreman at the completion of the work. Copper tubing, curb stops and necessary adapters shall be used to make connections between new corporation stops and new and existing service piping.

The tapping machine shall be rigidly fastened to the pipe as near the horizontal diameter as possible. The length of travel of the tap should be so established that when the stop is inserted and tightened with a 14 inch wrench, not more than one to three threads would be exposed on the outside.

When a wet tapping machine is used, the corporation cock shall be inserted with the machine while it is still in place. Stops shall be tightened only sufficiently to give water tightness and care must be constantly exercised not to over tighten them.

Installation of Straight Couplings

Install straight couplings to existing water mains of the sizes required in the locations designed by the Engineer. Utilize the manufacturer's recommended installation procedures while performing the work. Care shall be taken to ensure a watertight connection.

Couplings shall have a protective wrapping of "Denso" material by DENSO Inc. of Texas or approved equal. Where Denso material is used, the joint shall be packed up with "Densyl mastic" to give an even contour for wrapping with "Densopol" tape. A 1.5mm thick coating of "Denso" paste shall be applied followed by 100mm or more wide "Densopol" tape wound spirally around the joint with at least 50 percent overlap.

Curb Stop Installation

Shall be installed 1.5 feet from the curb line or pavement limit. Install the curb stops and boxes in a workman like manner as described herein.

Curb Box Installation

Shall be set true vertical position and if they are within the limits of the roadway or within limits where the plowing of snow will take place in the winter, top of the boxes shall be set about ½ inch below the top of the finished grade. In locations where these boxes are not likely to be disturbed, the tops shall be set flush with the adjoining ground.

Installation of Copper Tubing

Care shall be exercised in the placing and laying of copper tubing to be sure that the pipe does not have kinks or sharp bends and to assure against it being in contact with sharp stones or ledge which would cause damage to the pipe. At least 6 in. of selected fill shall be placed adjacent to and

above the pipe and no stones shall be placed over the pipe until the depth of backfill above the latter is in excess of 1ft.

Installation of Fire Services

The tap for a fire service shall be inspected by the DPI. The Contractor shall furnish all necessary materials and labor needed for the installation. Between the main and the property line, the service shall not be less than six (6) inch in diameter and shall be controlled at the tee by a gate valve, box and cover. Property owners may submit a Certified Engineer's Report to be reviewed by the DPI, for use of a smaller size fire supply service.

Fire supply lines shall be considered water main extensions and require proper testing, flushing and chlorination as described in these specifications.

Lead Service Renewals

When lead services are replaced or repaired, Contractor shall provide all residents connected to service with Lead Education letter from DPI. Contractor shall notify DPI when lead services are replaced or repaired and confirm delivery of letter to residents.

PIPING PLANS

Main Pipe Plans

All main pipe extension plans shall be stamped signed and dated by a Massachusetts Registered Professional Engineer (Civil). (Prints shall be stamped individually and submitted in duplicate.)

All plans shall show all existing and proposed utilities and pertinent construction details with materials of construction.

When contract is completed the DPI shall receive AS BUILT drawings stamped, signed and dated by a Massachusetts Registered Professional Engineer.

Looping/Easement Requirements:

15. It is required to loop all new main extensions.

16. All private easements necessary for this purpose shall be acquired prior to final approval.

17. If easements are un-acquirable reason(s) and proof of the same are requires to be submitted prior to final approval.

18. Installation of automatic flushing devices will be required where looping cannot be achieved.

Department of Public Infrastructure

Jamie Ponte
Commissioner

CITY OF NEW BEDFORD
Jonathan F. Mitchell, Mayor

Water
Wastewater
Highways
Engineering
Cemeteries
Park Maintenance
Forestry
Energy

HYDRANT METER RENTAL FORM

Meter Information

Meter Number: _____

Date Out: _____ Out Reading:_____

Date Returned: _____ In Reading: _____

Applicant Information

Name: _____

Address: _____

Telephone Number: _____

Billing Name & Address if different: _____

Location of hydrant used: _____

What will the water be used for: _____

Date you plan on having meter set: _____

Length of time you need the meter: _____

The purpose of this policy is to clearly define the rules and charges for any person when renting a hydrant meter.

Policy Statement:

Hydrant meters are rented on a first come, first serve basis from the DPI. Twenty-four (24) hours notice shall be required prior to needing the meter set. Meters may not be set due to adverse weather conditions, i.e. freezing temperatures or drought conditions. Hydrant meters shall not be issued for a seasonal account or where the use of the fire hydrant meter in obtaining water is not temporary in nature (unless approved by the Commissioner). Meter shall require renewal every six (6) months, penalty for failure to renew or return shall be in the amount of the surety deposit. DPI shall be responsible to install the meter on the fire hydrant and provide any requested standard connection fitting when available. DPI shall also be responsible to provide an operating in-line valve at the meter for the Renter to use. DPI and not the Renter shall operate the main valve on the fire hydrant. The service call fee will be charged per meter install and uninstall. During freezing temperatures, the meter is required to be uninstalled at the end of each work day to prevent freezing over night, the fee will be charged for each day of installation/uninstallation needed. It shall be the responsibility of the Renter to protect the meter from damage, loss and tempering. The Renter shall be responsible to provide all hoses and special fittings needed for utilizing the water supply. The Renter shall be responsible for notifying the Police and the Fire Department when Public Safety is affected, i.e. by use of hoses crossing the public way or extended sole use of the hydrant. The Renter will also be responsible for all water, which passes through the meter, whether it is used or wasted.

The schedule of fees is as follows:

Surety Deposit (separate check)	**$3,000.00**
Monthly Rental Fee	**$150.00**
Service Call – Fee for each install or uninstall activity	**$150.00**
After Hours Service Call- Fee for each install or uninstall activity	**$200.00**
Water Consumption Charge	**Call office for current rate**

Sign Out:

_____ _____

Signature of Renter/Agent: Date:

_____

Print Name:

Returned:

_____ _____

Signature of Renter/Agent: Date:

_____

Print Name:

DEMOLITION PERMIT REQUIREMENTS

1. Demolition Permit is brought to D.P.I. – it may be attached to Building Permit Application.

2. Demolition Form signed and dated as received by D.P.I.

1. Petitioner to be instructed to seal sewer stub 10 feet from existing foundation or at property line in order to keep demolition debris out of the system.

2. All abandoned water services 2" and less must be cut and disconnected at corporation cock located on the main line for lead services. For services larger than 2" and up to and including 12", the gate valve and the tee must be removed completely. Services larger than 12" will need to be determined by the Department of Public Infrastructure.

   All copper services shall be cut off at the main, if there is no immediate use for the service. Copper services can be disconnected inside the property line if the service is going to be reused within 1 year.

   A letter written by the owner to the Commissioner to request the reuse of the service is required along with a surety deposit of $2500.00 for services 2" and smaller and $5000.00 for services larger than 2".

   If the service is not reused within 1 year of the request, the water service is to be removed at the corp. tap by the owners' Bonded Contractor. After the water service is removed then the surety deposit will be returned.

SECTION X
LANDSCAPING

Qualifications

The Contractor shall hire an arborist with an International Society of Arboriculture (ISA) certification and/or a Massachusetts Certified Arborists for any tree plantings within the City's right of way. All work for this section will conform to the relevant provisions of the ISA best management practices.

Planting: Shall be done by experienced workmen familiar with planting procedures under the supervision of a qualified foreman.

Warranty

The Contractor will provide a 1-year warranty on all plantings from the date of install.
At the end of this period, any plant that is missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by the City Arborist, shall be replaced. In case of any question regarding the condition and satisfactory establishment of a rejected plant, the City Arborist's decision is final. Furnish a guarantee for all replacement plants for at least one full growing season.

All replacements shall be plants of the same kind and size as specified. They shall be furnished and planted as specified herein. The cost of replacement shall be borne by the Contractor except where it can be definitely shown that loss resulted from vandalism.

Location

Tree planting(s) must be a minimum distance of 5' from all sewer and/or water lines. Tree(s) will be planted a minimum of 10' from all driveway openings and street intersections. Tree planting(s) shall be placed no closer than 30' from any other tree within the City's right of way. Tree planting(s) shall be placed no closer than 10' from canopy to canopy from any other tree.
Plants shall be set in center of pits plumb and straight and at such a level that after settlement, the crown of the plant ball will be at the surrounding finished grade.
(It is recommended to keep plantings a minimum distance of 5' from ALL underground utilities.)

Tree Specification

Trees will be planted with a caliper between 2" and 3" measured at breast height. The contractor will only be permitted to plant trees from the list of Open Space Tree Species. The allowance of alternate trees is at the discretion of the City Arborist and Engineer. No other plantings are allowed in place of tree(s) within the City right of way. The contractor shall plant the tree in native parent soil. If there is insufficient parent material onsite, loam will be allowed. The contractor shall tag the tree with a metal name tag which will include the species and plant date.

A GatorBag tree watering bag shall be provided for each tree installed.

Plants shall be nursery grown under climatic conditions similar to those in the locality of the project. All plants shall be freshly dug. No heeled-in plants or plants from cold storage shall be used. All plants shall be typical of their species or variety and shall have a normal habit of growth. Plants shall be sound, healthy and vigorous, well-branched and densely foliated when in leaf; shall be free of disease, insect pests, eggs or larvae and shall have healthy, well-developed root systems. All parts of the plant shall be moist and shall show active green cambium when cut.
Plants shall be accompanied by State Nursery inspection certificates.
Roots or balls of plants shall be adequately protected at all times from sun and from drying winds. Plants which cannot be planted immediately upon delivery shall be set on the ground and be well-protected with soil, wet moss, bark mulch, or other acceptable material.
All tree plantings proposed underneath existing overhead wire(s) must be of a species from the list Overhead Wire Tree Species:

Overhead Wire Tree Species

- Ostrya Virginiana-Hop Horn
- Cercis Candensis-Eastern Red Bud
- Prunus-Cherry
- Cretagus-Hawthorn
- Prunus Cerasifera-Purple Leaf Plum
- Parrotia persica-Persian Ironwood

Open Space Tree Species

- Platanus Acerfolia-London Plane
- Ulmus Americana-Elm
- Quercus Palustrus-Pin Oak
- Quercus Palustrus-Green Pillars
- Gleditsia Triacanthos-Locust
- Liquidambar Styraciflua-Sweet Gum
- Umlmus Parvifolio-Chinese Elm
- Tilia-Linden
- Ostrya Virginiana-Hop Horn
- Cercis Candensis-Eastern Red Bud
- Prunus-Cherry
- Cretagus-Hawthorn
- Prunus Cerasifera-Purple Leaf Plum
- Parrotia persica-Persian Ironwood

(If a contractor wishes to select a tree not on the list, a written request may be submitted to the City Arborist and City Engineer)

Planting Dates

The start of the planting season and therefore plantings will be dependent on weather patterns. It is the contractor's responsibility to contact the City Arborist to find out when planting can begin each

year. **(Planting start dates will change year to year).** Plantings are not allowed from June 30th to September 1st, planting may resume after September 1st and can continue planting until the first frost. If the season(s) are out of character of the average year and the City Arborist sees issue with planting during the allowed time period, a written notice will be supplied to the contractor asking planting(s) to be suspended until a later date.

Tree Box

The tree box planting area will be a minimum of 5' by 5'. If this minimum conflicts with ADA compliance standards or other specifications a 4' by 4' area may be used. Any tree box area smaller than the before mentioned shall require prior written approval to the City Arborist and/or the City Engineer.

Mulch will be placed in the area around the base of the tree known as the tree box. The mulch within a 1' radius of the tree trunk will have a depth of 1". The mulch in the remaining tree box will be a depth of 2" to 3". No mulch is to be placed at the direct base of the tree, leaving a 2" gap in mulch around the trunk. The mulch shall be natural, black in color, and organic.

Adequate drainage will be supplied for the tree and tree box. If sitting water is a concern to the contractor, it is the responsibility of the contractor to make the City Arborist and City Engineer aware of the concern.

Tree Filter Boxes

Shall be manufactured by StormTree (Model # ST-10X7). This is used throughout the City for consistency and maintenance purposes.

Tree Support

Tree plantings will be supported with a minimum of three 4' or 5' - 2"x2" wooden stakes. The tree will be secured to the wooden stakes using arbor lock, arbor tie or approved equal. Stakes shall be buried at a minimum depth of half of their length. After 1 full calendar year it is the contractor's responsibility to remove the stakes and ties from the city's right of way.

No plant shall be bound with wire or rope at any time so as to damage the bark or break branches. Plantings must be flooded with water twice within the first 24 hours of the time of planting and not less than twice per week until provisional acceptance.

After provisional acceptance the contractor will water the plantings at a minimum once per week during the months of June 30th, to September 1st, plantings will be watered on a biweekly schedule for the time period March 1st to June 30th and September 1st to the first frost, regardless of planting date. In lou of watering on a weekly/bi-weekly schedule the contractor can use a gator bag. It is the contractor's responsibility to refill the gator bag as necessary. The gator bag will be removed by the contractor at the time of the first forecasted frost.

General

Other sections in this construction spec book take precedence over this section.
The contractor will contact the City Arborist about dead or damaged trees or other vegetation concerns before construction begins.

Any neglect of the above-mentioned specifications will cause the Tree to remain the contractor's responsibility until the tree is either removed or replaced by the City or issues are resolved to satisfaction of the City Arborist at the contractor's expense.

SECTION XI
ELECTRIC AND TRAFFIC SIGNALS

SCOPE OF WORK

Electric equipment, materials and installation shall comply with the latest edition of the National Electric Code (NEC) and with the latest edition of the following codes and standards:

1. National Electric Safety Code (NESC)
2. OSHA
3. National Fire Protection Association (NFPA)
4. National Electric Manufacturers Association (NEMA)
5. ANSI
6. Insulated Cable Engineers Association (ICEA)
7. Instrument Society of America (ISA)
8. Underwriters Laboratories (UL)
9. Factory Mutual (FM)
10. National Electric Testing Association (NETA)
11. Massachusetts Electrical Code (MEC)

Excavations and installations of electrical or traffic structures/fixtures shall be completed by a Bonded Contractor. The Electrical Contractor performing work must be on the MassDOT approved contractor list and also be certified by the International Municipal Signal Association (IMSA) for Traffic Signal Electrician Level II or Level III if applicable.

All work to be buried, shall be inspected by the DPI prior to backfilling in accordance with the specifications herein. The City Electrician shall be present for connections to new and/or relocated electric or traffic structures/fixtures.

It is the Contractor's responsibility to obtain required permits and request work orders with local agencies and utility companies respectively.

Direct bury wires and/or splicing or wires between access structures is prohibited. When direct bury wires are encountered, they shall be replaced with new conduit and re-wired in accordance with the specifications herein. When a break in wires is encountered in between connection points or structures, the reach shall be replaced as a continuous run. Alternatively, a structure may be installed at the location of the break with approval from the DPI Comissioner.

Detectable warning tape, per APWA standards, shall be installed over conduit as specified in the details herein. An as-built is required for work that includes the installation of new features including light poles, traffic signals, conduit runs, etc. As-builts shall be submitted to the DPI. The Contractor must notify the DPI upon completion of work for final inspection of electrical work and testing of equipment.

MATERIALS

Conduits and Fittings

Conduit diameter shall be as designed and approved by the DPI. Conduit shall be a minimum of 1.5-in electrical trade size (smaller diameter conduit may be approved by the DPI for some applications). Conduit shall not have more than the equivalent of three 90 degree bends in any one run (handholes shall be provided as required or directed by the DPI). Conduit and fittings shall be Schedule 80 Electric Conduit Type NM-Plastic (UL), unless otherwise specified and approved by the DPI. Conduit fittings and connections shall be sealed and watertight.

Handholes

Handholes shall be polymer concrete and reinforced with heavy weave fiberglass, grey finish, open bottom and minimal dimensions of 18-in long by 12-in wide by 18-in deep. Handholes and covers shall be rated for H-20, covers shall be marked "ELECTRIC" for electrical or "FIBER" for fiber lines. Handhole boxes and covers shall be manufactured in the USA and stamped with "MADE IN THE USA". Handhole covers shall be secured with tamper proof screws.

Wire, Cable and Accessories

Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper. Conductors shall be stranded except that receptacle wiring may be solid.

Except for control, signal, and instrumentation circuits, wire smaller than No.12 AWG shall not be used. Wire for lighting, receptacles, and other circuits not exceeding 150 Volts to ground shall be NEC type THHN/THWN as manufactured by Okonite Co.; Southwire Co.; Pirelli Corp.; or approved equal.

Wire for circuits over 150 Volts to ground shall be NEC type XHHW for sizes upp to No. 4/0 AWG and type RHW for sizes greater than No. 4/0 AWG as manufactured by Okonite Co.; Southwire Co.; or approved equal.

Wire markers shall be "Omni-Grip" as manufactured by W.H. Brady Co.; Thomas & Betts Co.; 3M Co.; or approved equal.

Wire shall be color coded or coded using electrical tape in sizes where color insulation is not available. Where tape is used as the identification system, it shall be applied in all junction boxes and other accessible intermediate locations, as well as at each termination. The following coding shall be used:

System	Wire	Color
240/120 Volts	Neutral	White
1-Phase, 3-Wire	Line 1	Black
	Line 2	Red
208Y/120, Volts	Neutral	White
3-Phase, 4-Wire	Phase A	Black
	Phase B	Red
	Phase C	Blue

240/120 Volts 3-Phase, 4-Wire delta, center tap ground on phase coil A-C	Neutral Phase A Phase B (High) Phase C	White Black Orange Blue
480Y/277 Volts 3-Phase, 4-Wire	Neutral Phase A Phase B Phase C	White Brown Orange Yellow

Street Lighting

Lighting systems shall generally consist of the following:

1. Luminaires: Luminaires shall be CK 118R-B2AR-III-100 (SSL) by King Luminaire as detailed. Quick disconnect shall be provided.

2. Cast Aluminum Poles: Pole style shall be as specified by the DPI Comissioner on permit approvals or site plan review memorandums. Poles shall be black finish and may be: Washington 17 style, 10-ft height by Alloy Castings; Washington 21 style, 12-ft height by Alloy Castings; or, New Bedford style 10-ft height by Alloy Castings.

   When banner arms are required, they shall be bolt on type, suitable for 23-in by 4-ft banners and be black in color.

   Poles shall have a 120 Vac receptacle with in-use wet location cover designated “Holiday Lighting”.

   When required, poles shall have a 240 Vac receptacle mounted inside the base of the pole. The outlet shall be accessible through a second access plate in the building side of the post. Second plate shall have a cutout as specified by the DPI with a water-resistant guard.

3. Historic District Lighting: When specified by the DPI Dartmouth Style, 7-ft, 10-in height by Alloy Castings poles shall be used. Only “Copperhead” Historic Square Lantern Luminaires shall be installed on Dartmouth Style Poles as specified in the construction detail herein.

   Poles shall have a 120 Vac receptacle with in-use wet location cover designated “Holiday Lighting”.

Mast Arm, Pedestal and Light Pole Foundations

Foundations shall be cement concrete and as specified for the application based on the design drawings in accordance with the latest MassDOT standards and details herein. Foundation details for light poles are provided herein are to be used a reference. Site conditions may require modification to those details. A minimum of a 4-foot clear pedestrian pathway on the sidewalk must be maintained around foundations, mast arms, pedestals and poles.

Traffic Signals
Traffic Signal Controller shall include the installation of Eagle (Siemens) M60 Controller.

Video Traffic Detection shall be achieved via video components to include Iteris RZ4A-WDR cameras, Iteris Vantage Next video processor, a four-channel video encoder which shall be either an Avigilon 4 Port H.264 Analog Video Encoder (Part Number ENC-4P-H264) or Vantage Next video encoder plus recording device consistent with the city's current recording system.

All traffic signal equipment (mast arms, posts, pedestrian equipment, mounting brackets, traffic cabinets, etc) must be powder coated black per City standard.

An uninterrupted power supply (UPS) shall be provided.

Controller units shall include internal time of day, day of week, week of month programming and be programmed with the latest daylight savings time adjustments. Daylight savings time begins at 2:00 am on the second Sunday in March and reverts to standard time on the first Sunday in November (pending any changes to this approach).

Emergency preemption shall be provided. GPS capability shall also be provided.

Handholes and Pull Boxes for traffic signals will be constructed of precast concrete with cast iron frame and covers. The covers for traffic signals will include marking plates to designate "SIGNAL". Eversource handholes and Pull Boxes shall be in conformance with Eversource Standard Specifications.

CONSTRUCTION METHOD

All Eversource utility work must be performed by an Eversource approved contractor and will require a work order through the Eversource Electric office for connection.

Electric equipment shall be protected at all times against mechanical injury or damage by water.

Conduits and Fittings
Except where otherwise specified, all wiring shall be within PVC conduit. Conduit wall seals shall be used where underground conduits penetrate walls. Conduit sealing bushings shall be used to seal conduit ends exposed to the weather and ends of conduits shall be tightly plugged to exclude dust and moisture during construction.

No wire shall be pulled until the conduit system is complete.

Conduit supports shall be spaced at intervals of 8-ft or less. All conduit shall be run at right angles to and parallel with the roadway (no diagonal runs will be allowed). Bends in parallel runs shall be concentric.

Handholes
Pull boxes and handholes shall be placed at a finished grade level with the sidewalk surface (if placed within the sidewalk) or finished grade level if placed within loam and seed areas. Pull

boxes and handholes shall be placed on a 6" layer of ¾" crushed stone for proper drainage of the pull box/handhole. No pull boxes or handholes are to be constructed within the roadway.

Wire, Cable and Accessories

Use UL approved lubricants to facilitate wire pulling. No splices will be allowed in below grade located boxes. Splices shall not be made in push button control stations, control devices, conduit bodies, etc.

Shields shall be grounded as recommended by the instrument manufacturer and isolated at all other locations. Terminal blocks shall be provided for inter-connecting shield drain wires at all junction boxes. Where individual circuit shielding is required, each shield circuit shall be provided with its own block.

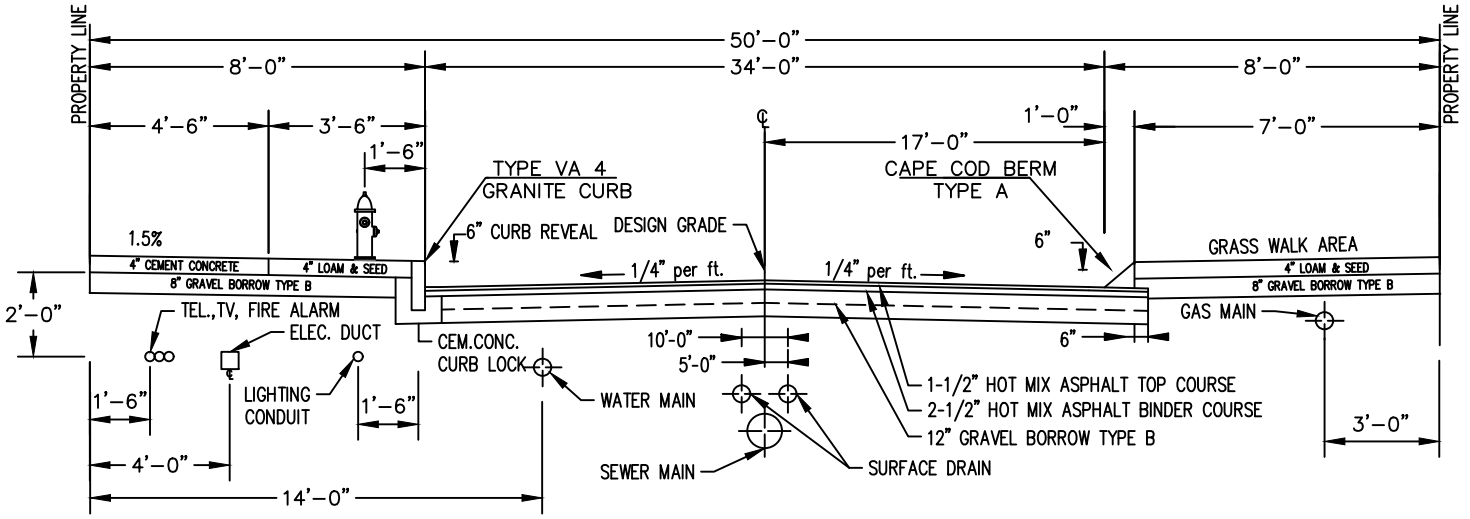
APPENDIX A

CONSTRUCTION STANDARD DETAILS

lighting the way
new bedford

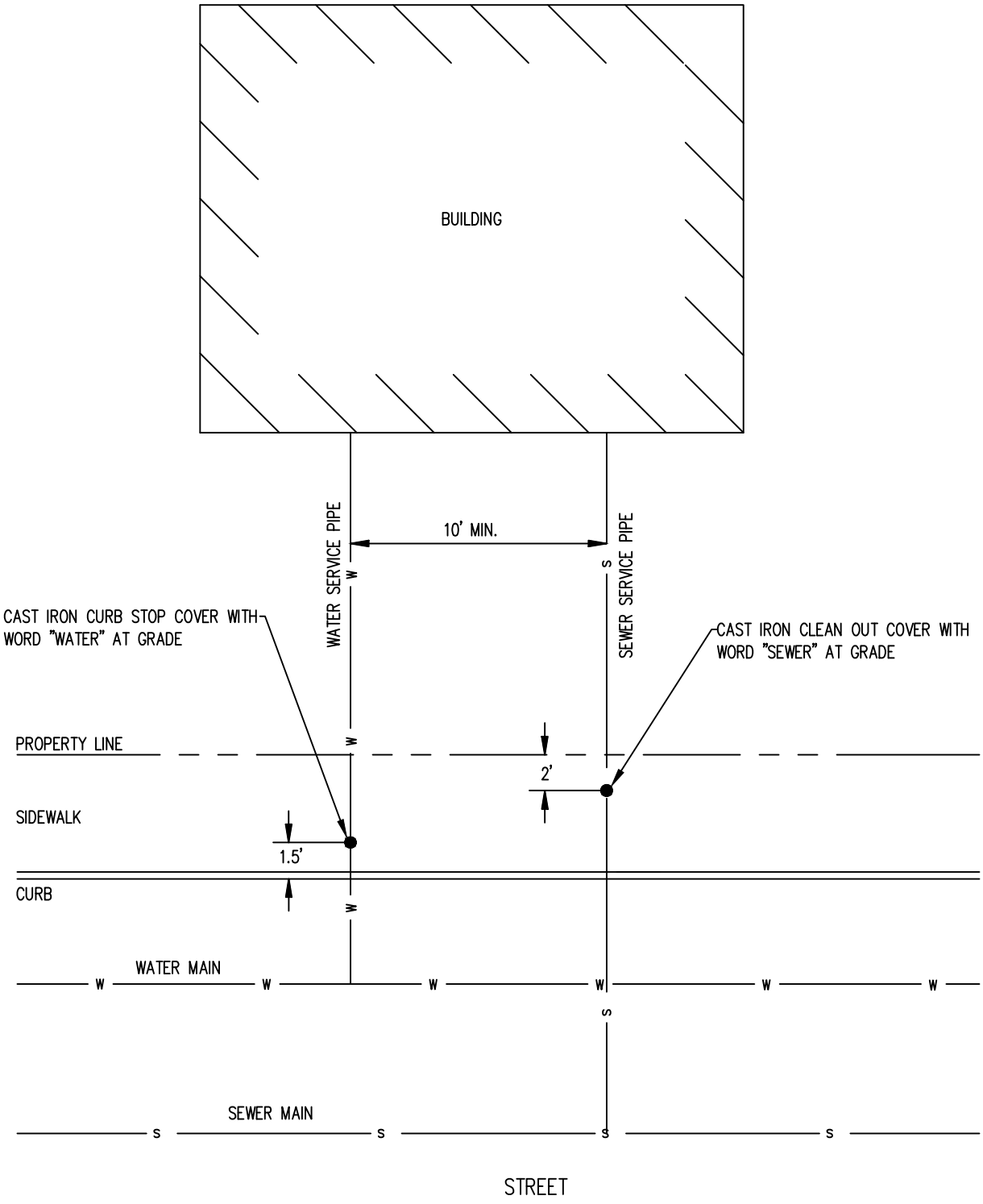
TYPICAL STREET SECTION

NTS



a. WATER MAIN TO BE 14' FROM SOUTH OR WEST PROPERTY LINE WITH 4' COVER (MINIMUM) & 5.5' COVER (MAX), (WATER DEPT. WRITTEN REQUIREMENTS).
b. CURB STOPS TO BE 1'–6" BEHIND FACE OF CURB LINE.
c. GAS MAINS TO BE 3' FROM NORTH OR EAST PROPERTY LINES WITH 4' OF COVER.
d. TELEPHONE LINES, CABLE T.V. & FIRE ALARM DUCT TO BE 1'–6" FROM SOUTH OR WEST PROPERTY LINES WITH 2' MIN COVER.
e. ELECTRIC LINES TO BE 4' FROM SOUTH OR WEST PROPERTY LINES WITH 2'–6" OF COVER (CONCRETE ENCASED).
f. SEWER MAINS TO BE ON CENTER LINE OF STREET WITH MINIMUM COVER OF 4'.
g. STORM LINES TO BE A MAXIMUM OF 5' EITHER SIDE OF SEWER MAIN WITH MINIMUM COVER OF 3'.
h. WATER HYDRANTS CENTER LINE OF HYDRANT TO BE 1'–6' FROM CURB LINE.
i. STREET PAVEMENT SHALL MEET CITY SPECIFICATIONS LAID IN TWO COURSES (1.5" TOP COURSE, 2.5" BASE COURSE).
j. TREES OF A VARIETY APPROVED BY D.P.I., IN ACCORDANCE WITH CITY OF NEW BEDFORD REGULATIONS (3" CALIPER).
k. UTILITY POLES, STREET LIGHTS (WITH ATTENDANT CONDUIT) CENTER LINE OF SAME TO BE 1'–6" FROM CURB LINE.
l. CAPE COD BERM AND GRASS WALK AREA SHOWN ON CROSS–SECTION TO BE USED ONLY IF WAVIER GRANTED BY PLANNING BOARD ON GRANITE CURB AND CONCRETE RIBBON WALKS.

DETAILED SPECIFICATIONS ON ROAD WIDTH, SIDEWALK WIDTH, PAVING, CURBING, TREES, ETC. ARE AVAILABLE FROM D.P.I. ENGINEERING DIVISION.



NOTES:

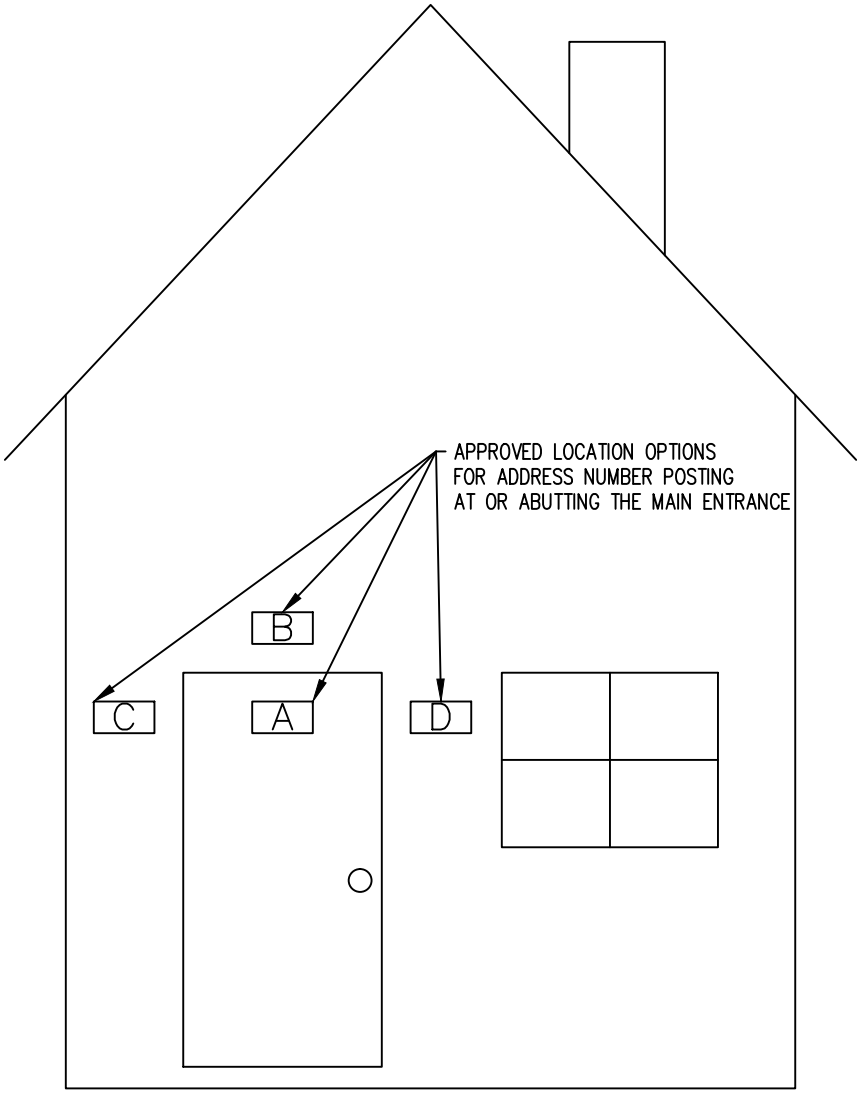
1. ALL CASTING SHALL BE MADE IN THE USA.
2. SEE "SEWER CLEAN OUT" AND "WATER SERVICE DETAIL".

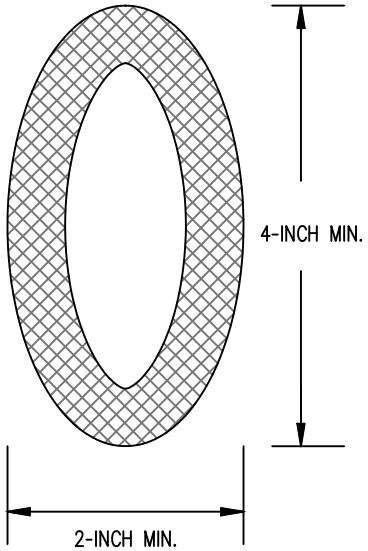
SEWER AND WATER SERVICE DIAGRAM

NTS

ADDRESS NUMBER DETAIL

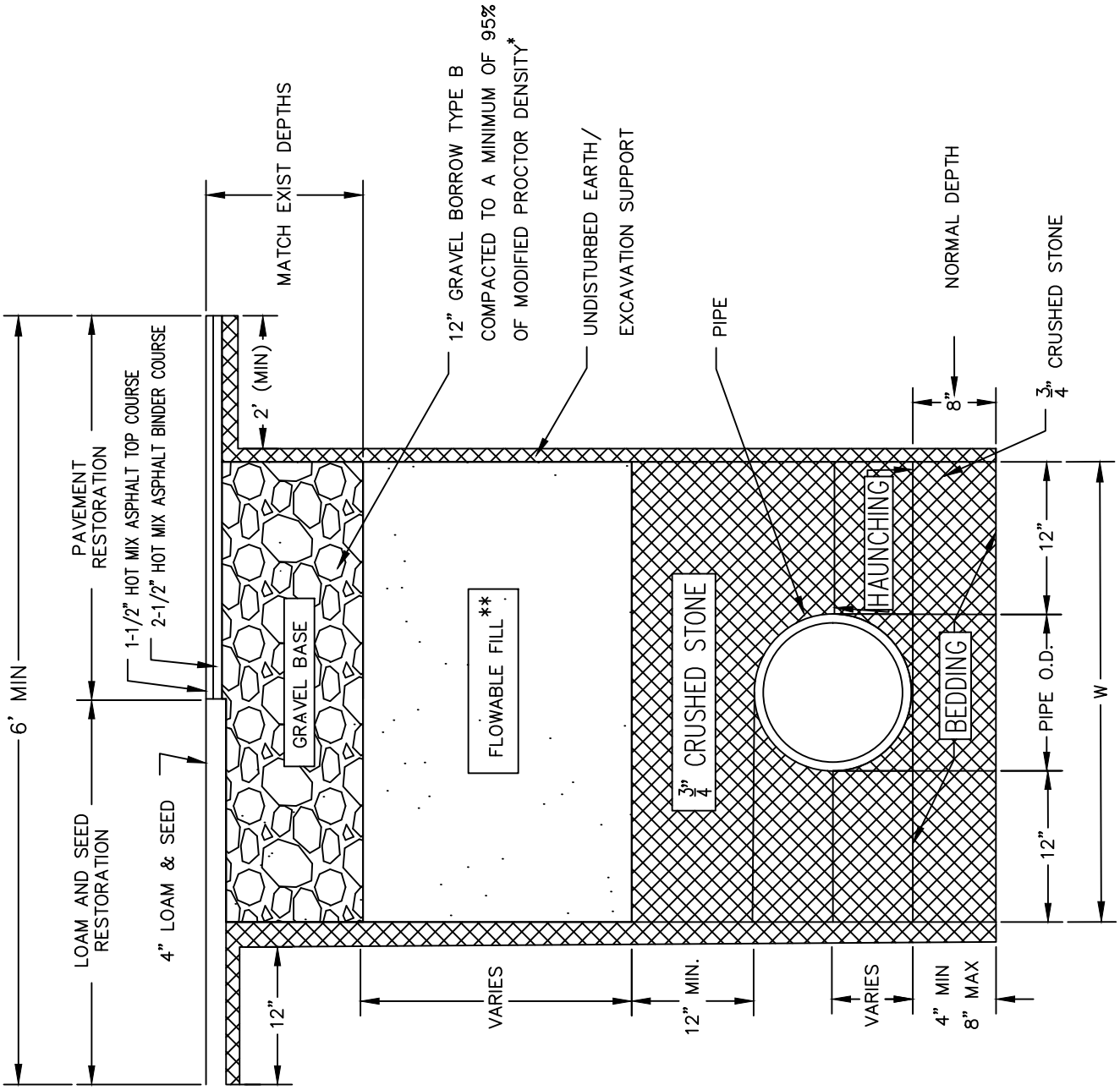
NTS





NOTES:

1. NUMBERS MUST BE PERMANENTLY AFFIXED TO THE STRUCTURE AS SHOWN.
2. COLOR OF NUMBERS MUST BE OF CONTRASTING COLOR FROM THE SURFACE THEY ARE BEING AFFIXED.
3. IF NUMBERS POSTED AT THE DOOR CAN NOT BE CLEARLY SEEN FROM THE ROADWAY, THEN A SECONDARY POSTING IS REQUIRED WITH THE DOOR POSTING. ALL SECONDARY SIGNS MUST BE INSTALLED ON PRIVATE PROPERTY, CONTACT DPI - ENGINEERING FOR SITE SPECIFIC REQUIREMENTS.
4. ADDRESS NUMBERS ARE ASSIGNED BY DPI-ENGINEERING. ONLY NUMBERS ASSIGNED BY THIS DEPARTMENT ARE LEGAL AND SHALL BE POSTED.
5. ADDRESS NUMBERS MUST ONLY BE POSTED AT THE ASSIGNED, MAIN ENTRANCE. NO OTHER DOORS ON THE STRUCTURE CAN CARRY THIS ADDRESS ASSIGNMENT.



NOTES:

1. CONTRACTOR MUST MATCH INTO EXISTING PAVEMENT DEPTH IF MORE THAN 4" TOTAL.
2. WHEN IN ROCK, 8" CLEARANCE SHALL BE PROVIDED.

*SEE SPECIFICATIONS IN SECTION III

**SEE SPECIFICATIONS IN SECTION II–B

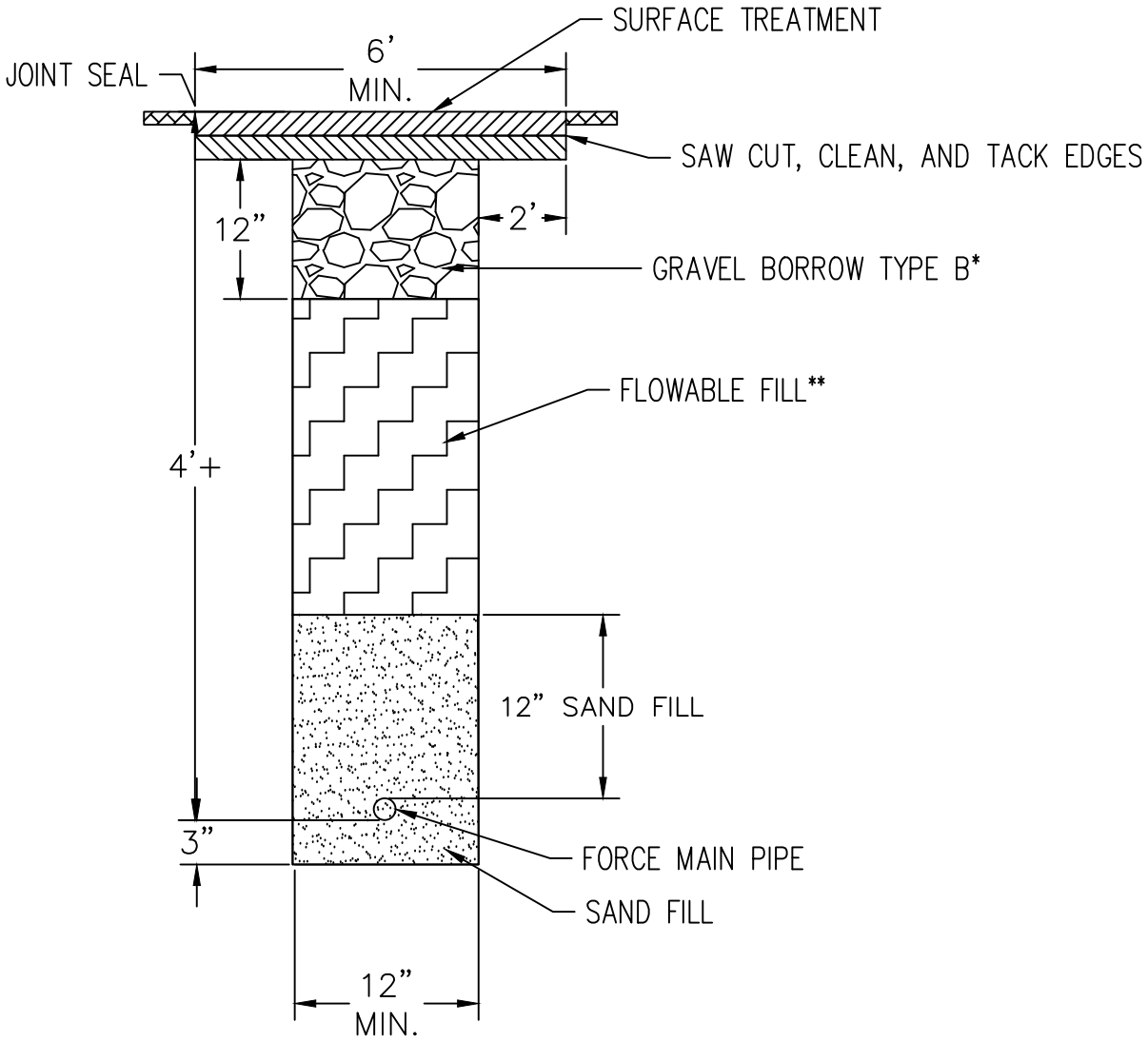
Depth from Ground Surface to Pipe Invert (D)	Excavation Width (W) [Nominal Pipe Diameter]		
	[0 to 6in]	[6in to 24in]	[Over 24in]
0 to 6ft	2ft	4ft	D + 3ft
6ft to 12ft	4ft	5ft	D + 3ft
12ft to 20ft	7ft	7ft	D + 5ft
20ft to 24ft	8ft	8ft	D + 5ft

TYPICAL TRENCH DETAIL

NTS

FORCE MAIN TRENCH

NTS



NOTES

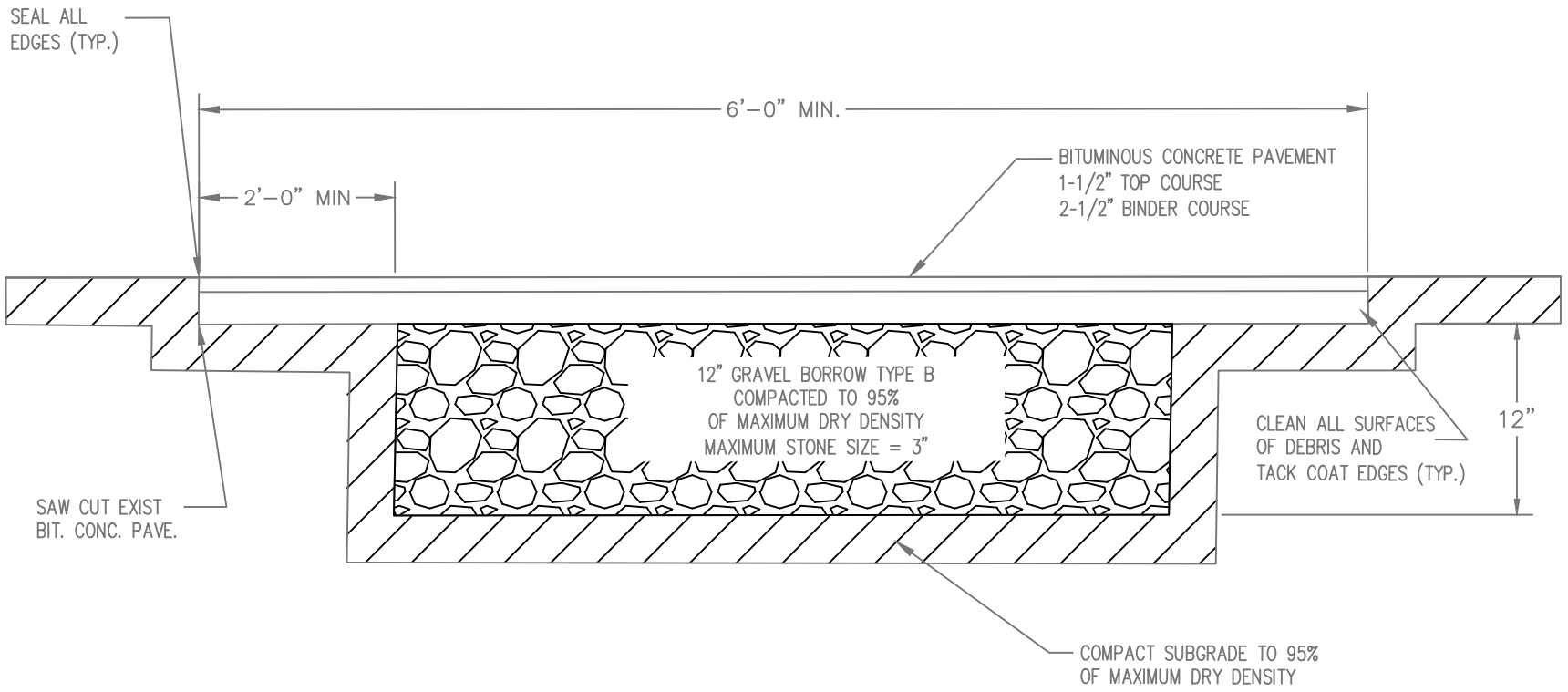
1. CONSTRUCT A FORMED INVERT FROM NEW SEWER LINE TO ALLOW FLOW TO THE EXISTING PIPE
2. POUR A SHELF TO THE LOWER HALF OF THE EXISTING PIPE
3. CUT AND REMOVE THE TOP HALF OF EXISTING PIPE TO WITHIN 6" OF THE MANHOLE WALLS AFTER THE INVERT AND SHELF HAVE BEEN FORMED AND THE MH HAS BEEN FULLY TESTED IN ACCORDANCE WITH THESE SPECIFICATIONS

*SEE SPECIFICATIONS IN SECTION III
**SEE SPECIFICATIONS IN SECTION II-B

lighting the way
new bedford

HMA PAVEMENT RESTORATION

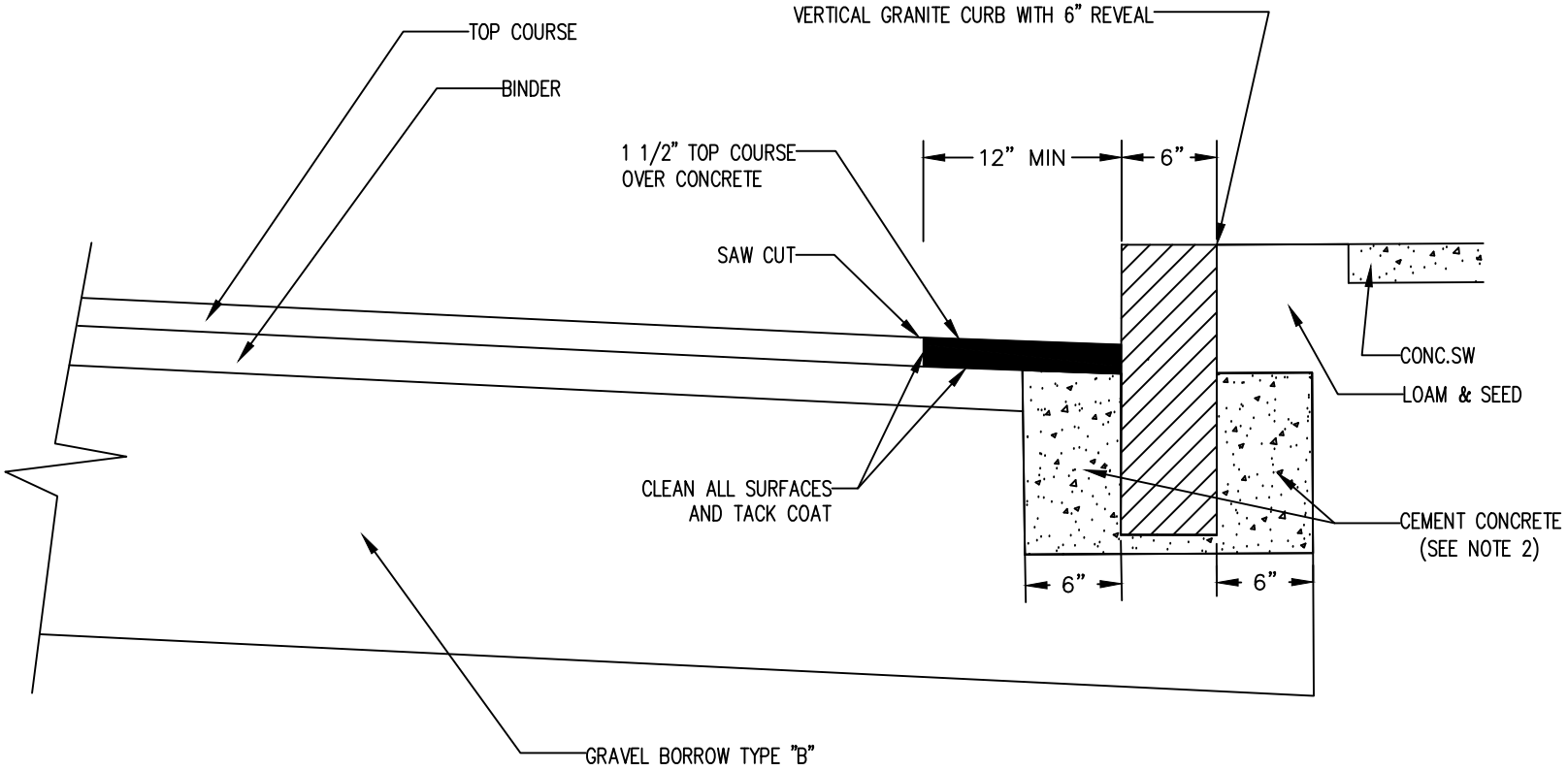
NTS



NOTE:
MUST MATCH INTO EXISTING PAVEMENT IF LARGER THAN 4" MIN.

METHOD OF SETTING VERTICAL CURB

NTS

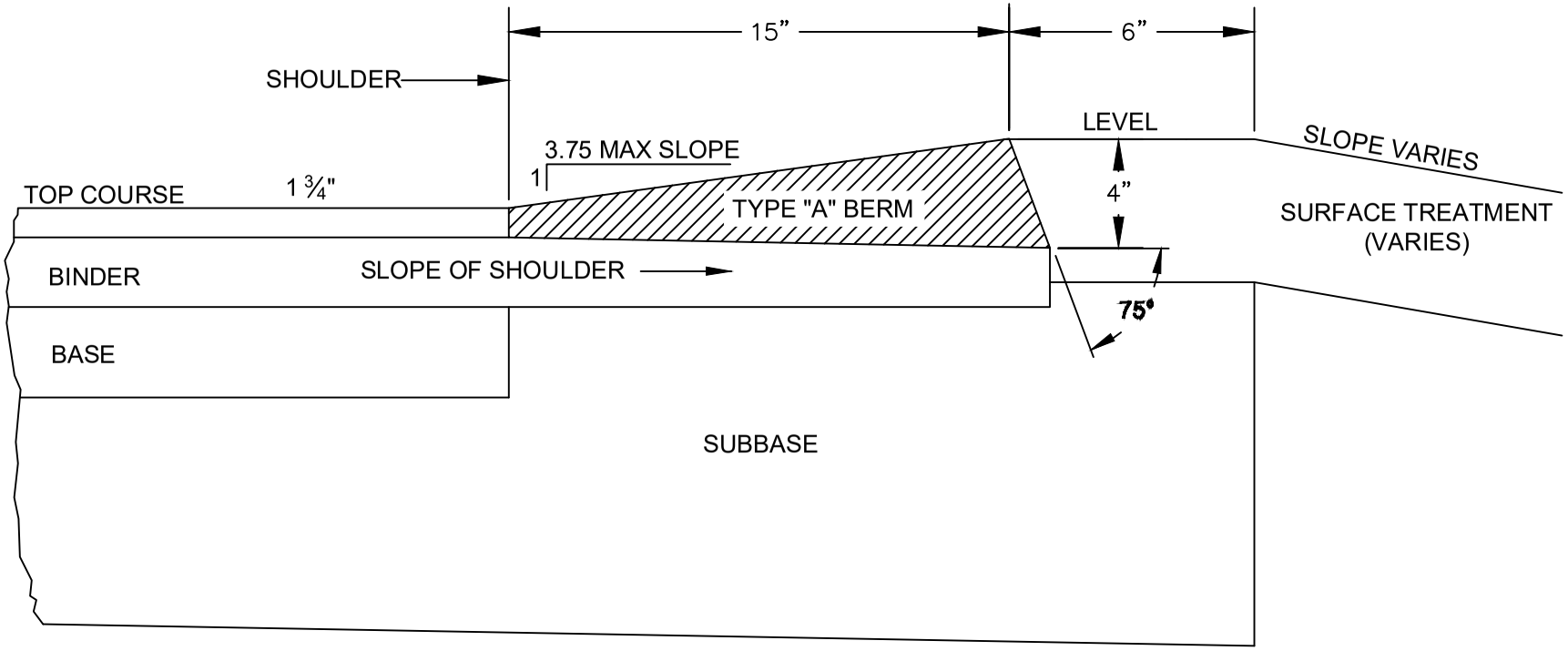


NOTES:

1. SAW CUT NEAT LINE 12" FROM CURB LINE AND REMOVE BINDER, BASE COURSE GRAVEL AND REPLACE WITH CONCRETE
2. ALL CEMENT CONCRETE TO MEET OR EXCEED SPECIFICATIONS OF THIS MANUAL.

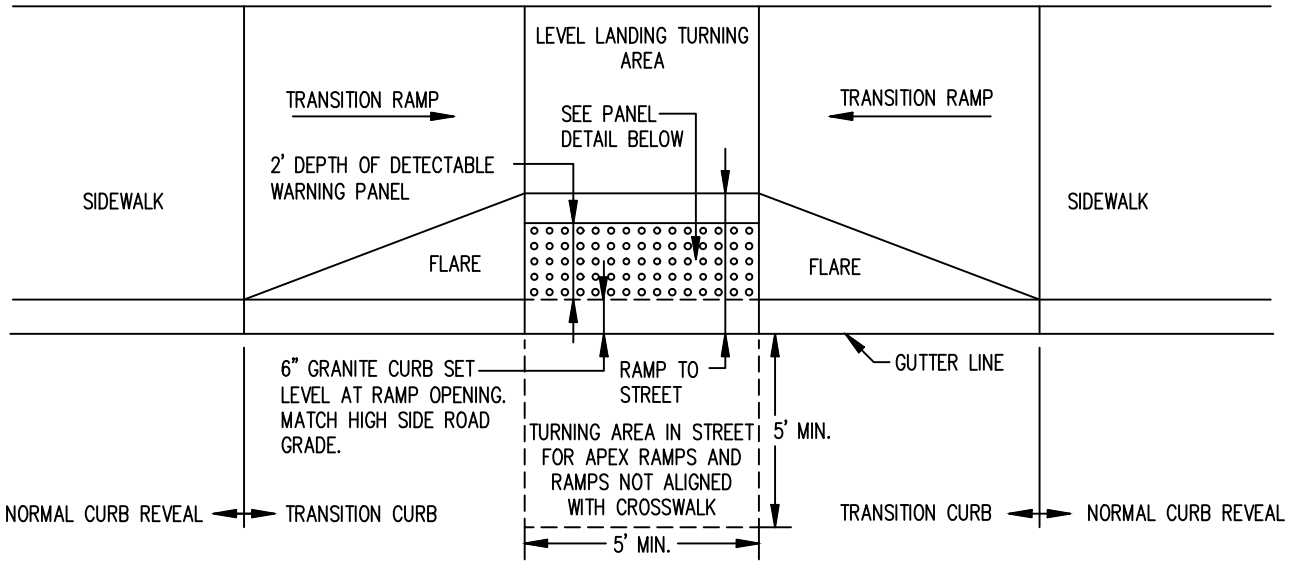
HOT MIX ASPHALT BERM TYPE A

NTS

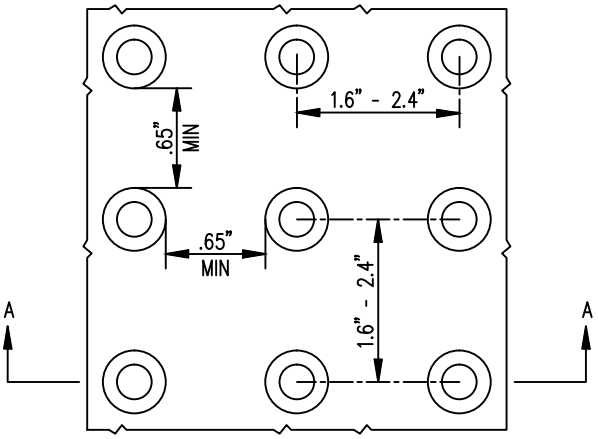


NOTES:

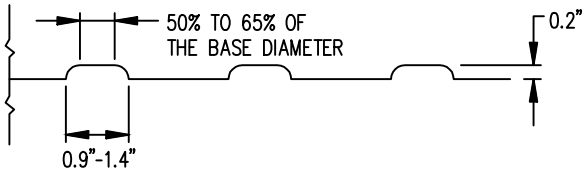
1. FOR MODIFIED BERM, THE SLOPE REMAINS CONSTANT AT 1 (V) TO 3.75 (H)
2. TO AVOID COLD JOINTS, INSTALLATION OF BERM IS TO BE COMPLETED WITH THE TOP COURSE PAVING. BERM SHALL NOT BE INSTALLED SEPARATELY FROM THE TOP COURSE.



TYPICAL INSTALLATION



DETAIL OF DETECTABLE WARNING PANEL



SECTION A-A

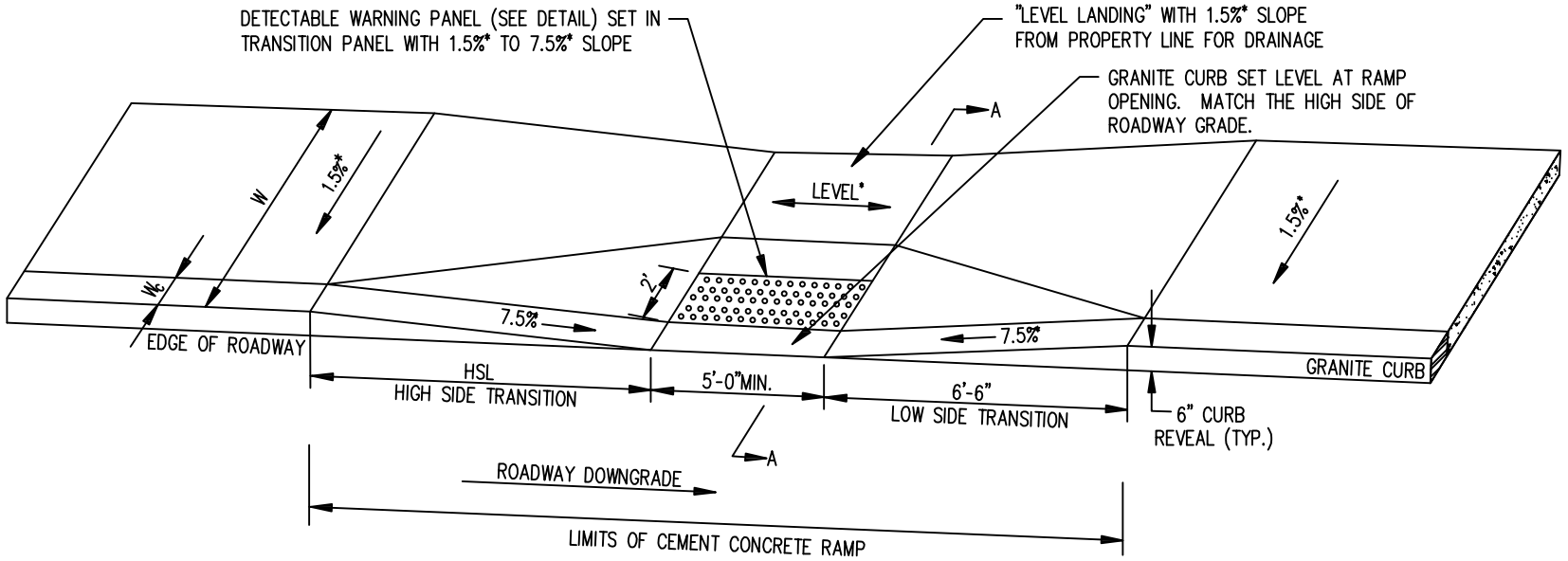
NOTE:
ALL DETECTABLE WARNING SURFACES SHALL BE YELLOW (UNLESS OTHERWISE SPECIFIED FOR THE HISTORIC DISTRICT) AND ORDERED OR FABRICATED TO MATCH THE WIDTH OF THE RAMP OPENING.

DETECTABLE WARNING PANEL FOR WHEELCHAIR RAMPS AND STANDARD RAMP TERMINOLOGY

NTS

WHEEL CHAIR RAMP (STANDARD)

NTS

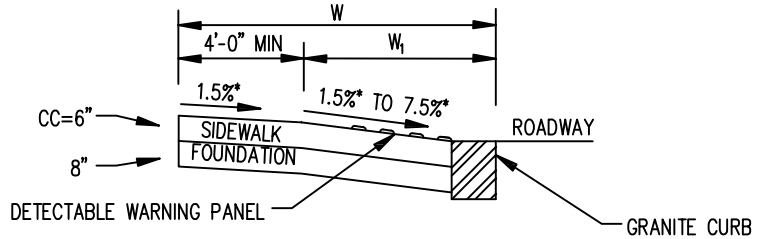


LEGEND

W = SIDEWALK WIDTH
W_C = CURB WIDTH
W_1 = PERPENDICULAR RAMP LENGTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%
HSL = HIGH SIDE TRANSITION LENGTH (SEE MASSDOT DRAWING E 107.9.0)

NOTES:

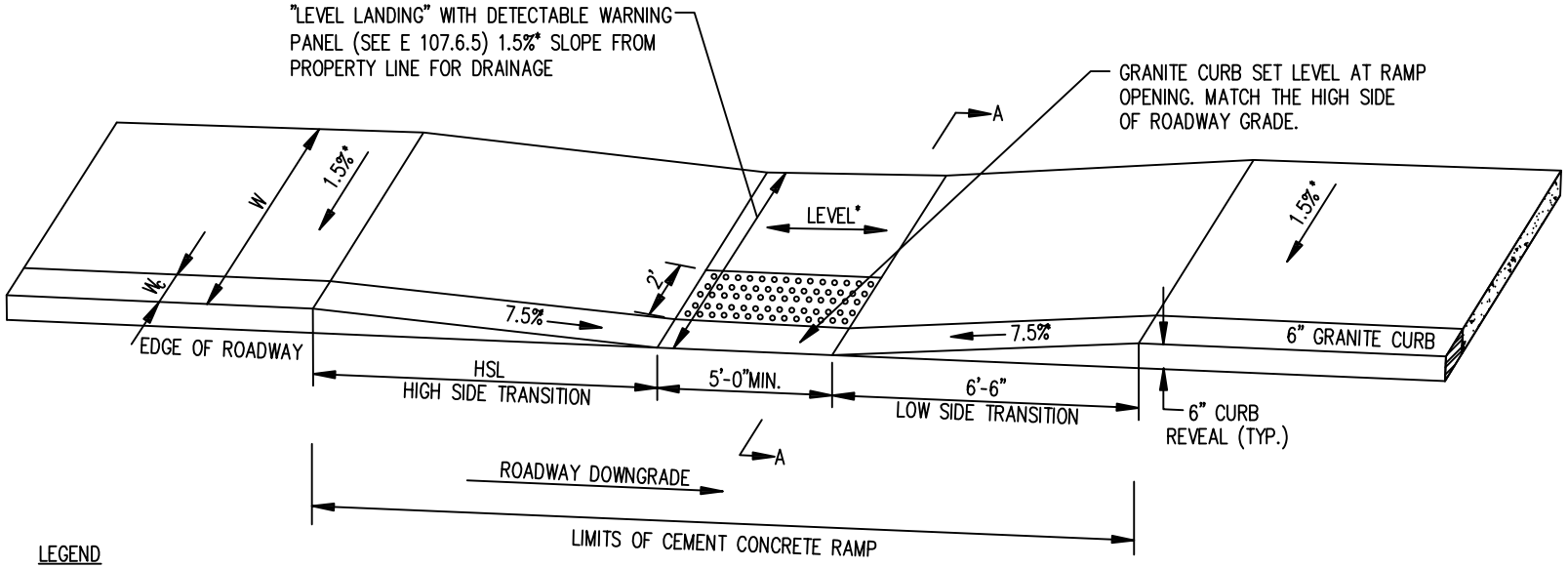
1. USABLE SIDEWALK WIDTH PER AAB = $W-W_C$
2. INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS) FOR ALL WHEEL CHAIR RAMPS



SECTION A-A

WHEELCHAIR RAMP
LESS THAN 6' SIDEWALK

NTS

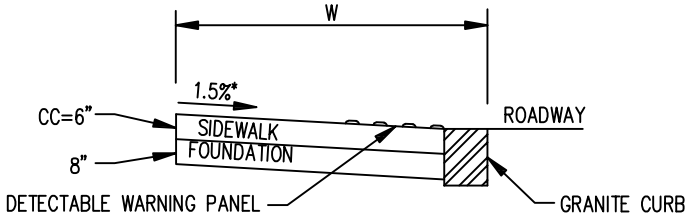


LEGEND

W = SIDEWALK WIDTH
W_C = CURB WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%
HSL = HIGH SIDE TRANSITION LENGTH (SEE MASSDOT DRAWING E 107.9.0)

NOTE:

1. USABLE SIDEWALK WIDTH PER AAB = W-W_C.
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'0".
3. ROADWAY, GUTTER AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.
4. INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS) FOR ALL WHEEL CHAIR RAMPS.



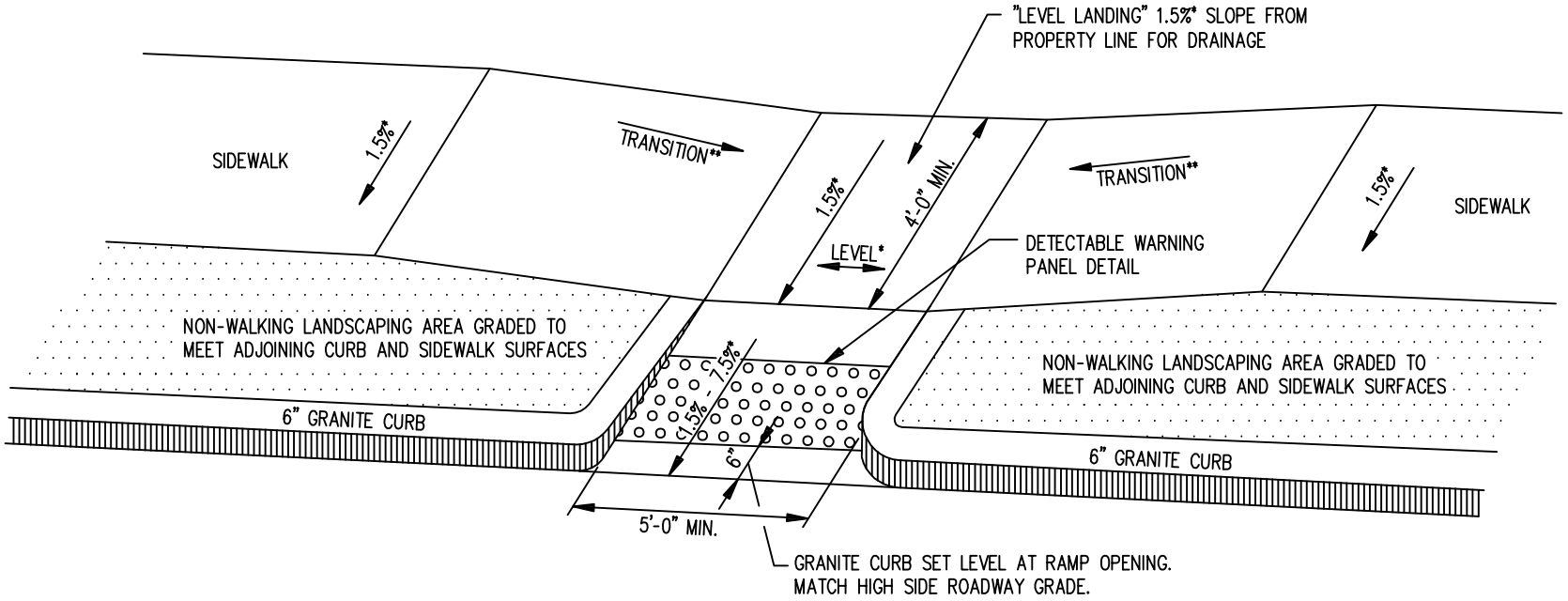
SECTION A-A

lighting the way NB new bedford

WHEELCHAIR RAMP WITH LANDSCAPING STRIP

SLN

NTS



LEGEND:

* = TOLERANCE FOR CONSTRUCTION ±0.5%
** = SEE MASSDOT DRAWING E 107.9.0 FOR TRANSITION LENGTH

NOTE:

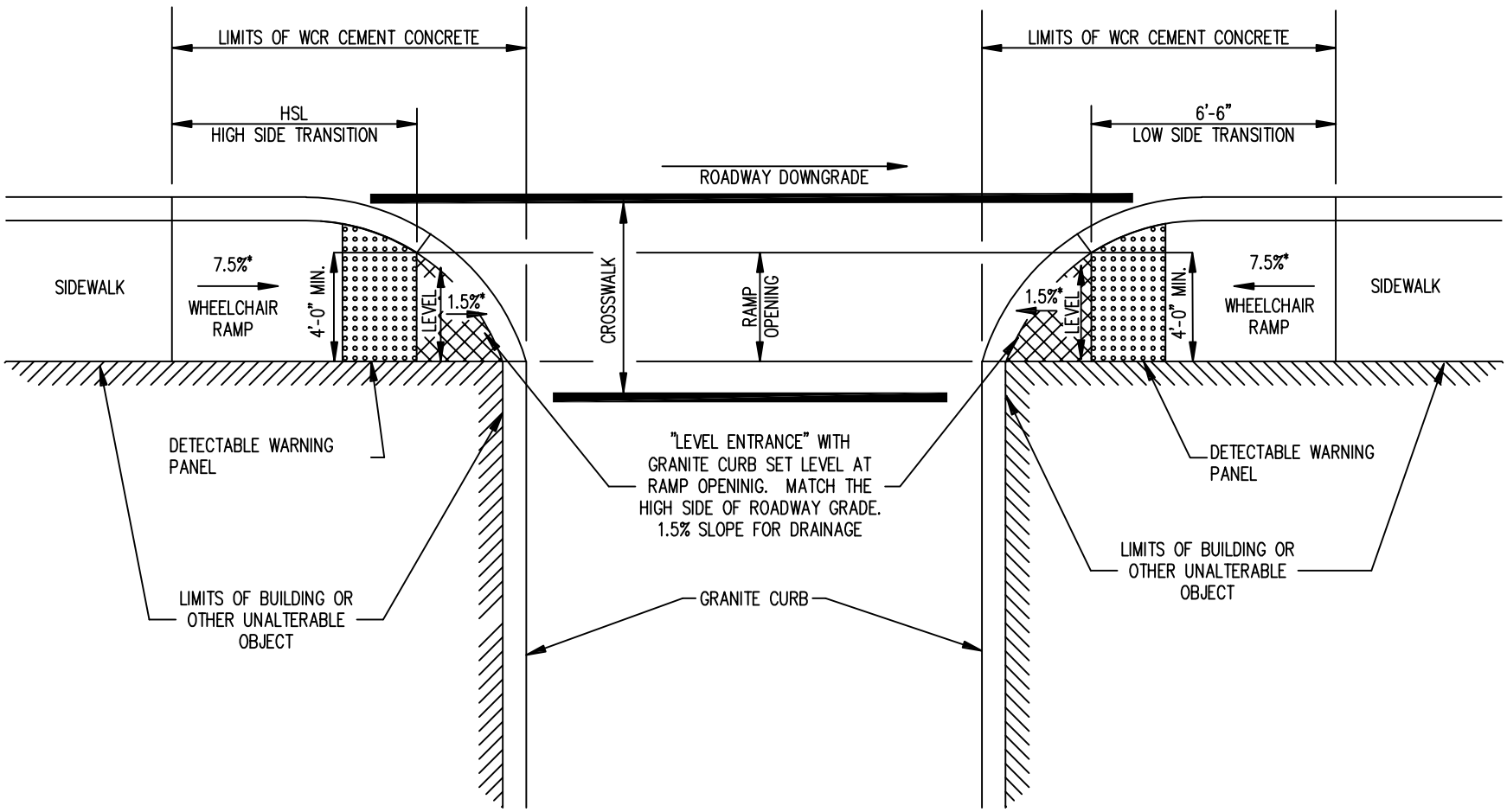
1. INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS) FOR ALL WHEEL CHAIR RAMPS

11

lighting the way
new bedford

WHEELCHAIR RAMP FOR ONE CONTINUOUS DIRECTION OF PEDESTRIAN TRAVEL

NTS

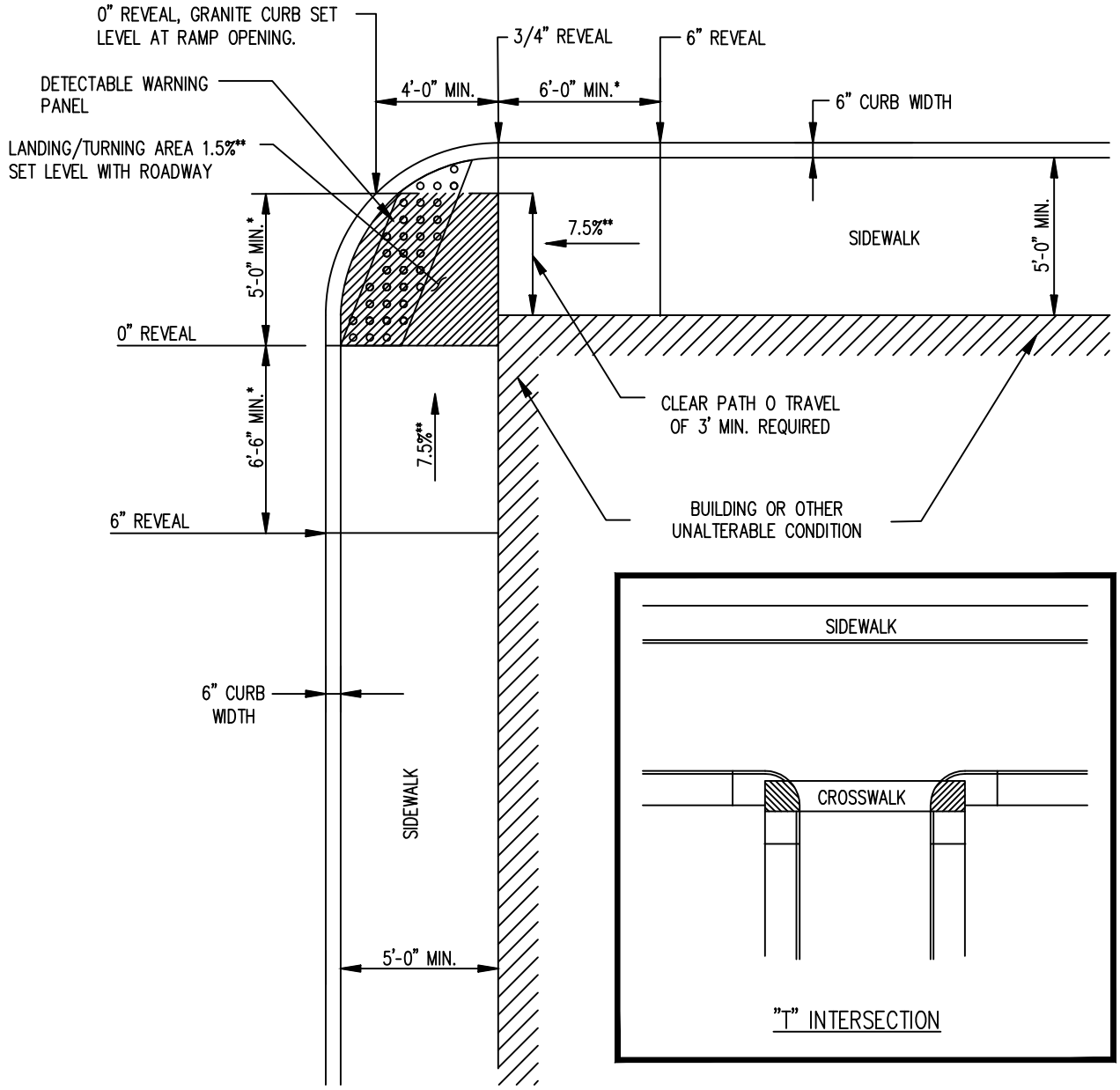


LEGEND

* = TOLERANCE FOR CONSTRUCTION ±0.5%
HSL = HIGH SIDE TRANSITION LENGTH (SEE MASSDOT DRAWING E 107.9.0)

NOTES:

1. DETECTABLE WARNING PANEL LOCATED NOT LESS THAN 6" OR MORE THAN 24" FROM ROADWAY EDGE (GUTTER LINE). TRUNCATED DOMES TO BE ALIGNED WITH DIRECTION OF TRAVEL.
2. FOR DETAILS OF TRUNCATED DOMES SEE MASSDOT DRAWING E 107.6.5 (DETAIL 5E).
3. ROADWAY, GUTTER AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.
4. INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS) FOR ALL WHEEL CHAIR RAMPS.



LEGEND:

** = TRANSITION LENGTH SHOWN IS MINIMUM (SEE MASSDOT DRAWING E 107.9.0)
** = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

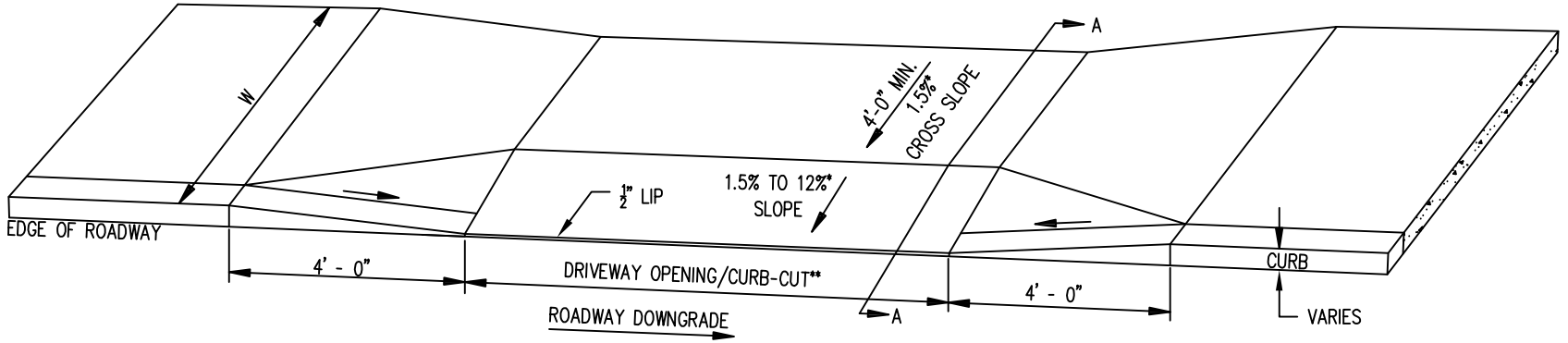
1. ROADWAY, GUTTER AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.
2. INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS) FOR ALL WHEEL CHAIR RAMPS.

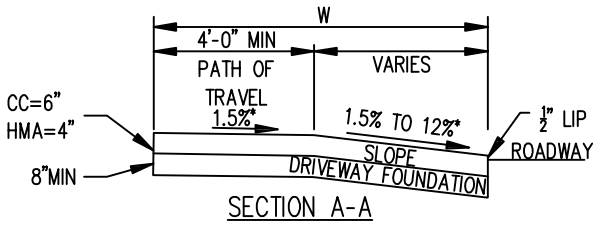
"T" INTERSECTION WHEELCHAIR RAMP

NTS

SIDEWALK THROUGH DRIVEWAYS

NTS





SECTION A-A

LEGEND

CC =CEMENT CONCRETE
HMA =HOT MIX ASPHALT
* =TOLERANCE FOR CONSTRUCTION ±0.5%
** =18' MAX. FOR RESIDENTIAL DRIVEWAYS. COMMERCIAL DRIVEWAYS REQUIRE TRAFFIC COMMISSION APPROVAL.

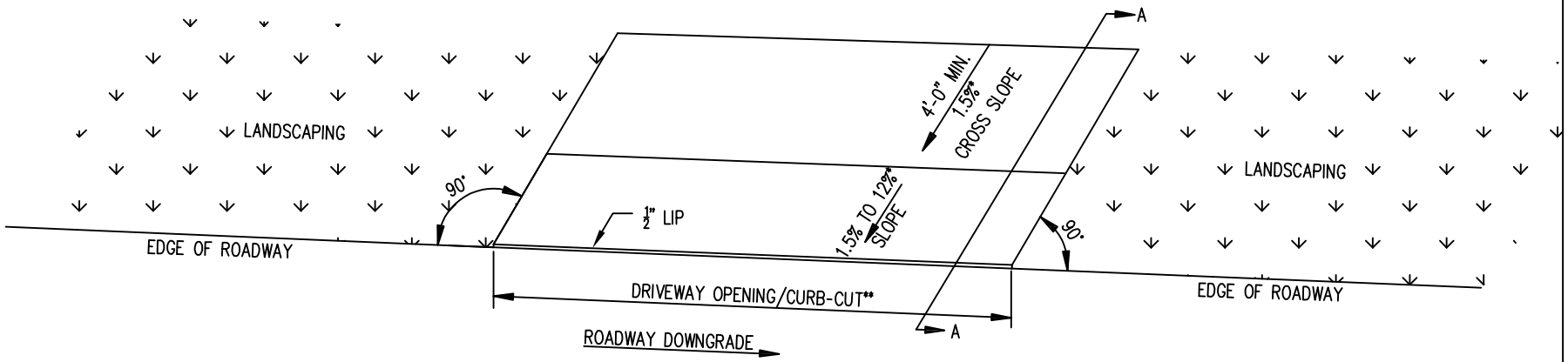
NOTE:

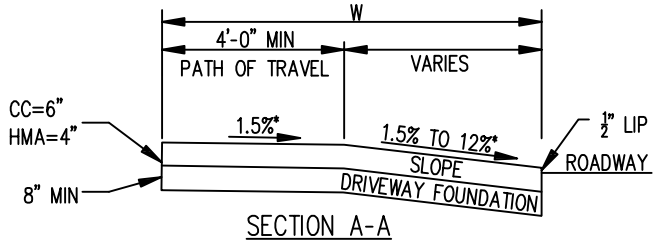
1. FOR COMMERCIAL DRIVEWAYS INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS).

lighting the way NB new bedford

DRIVEWAYS WITH NO CURB RETURN

NTS





SECTION A-A

LEGEND

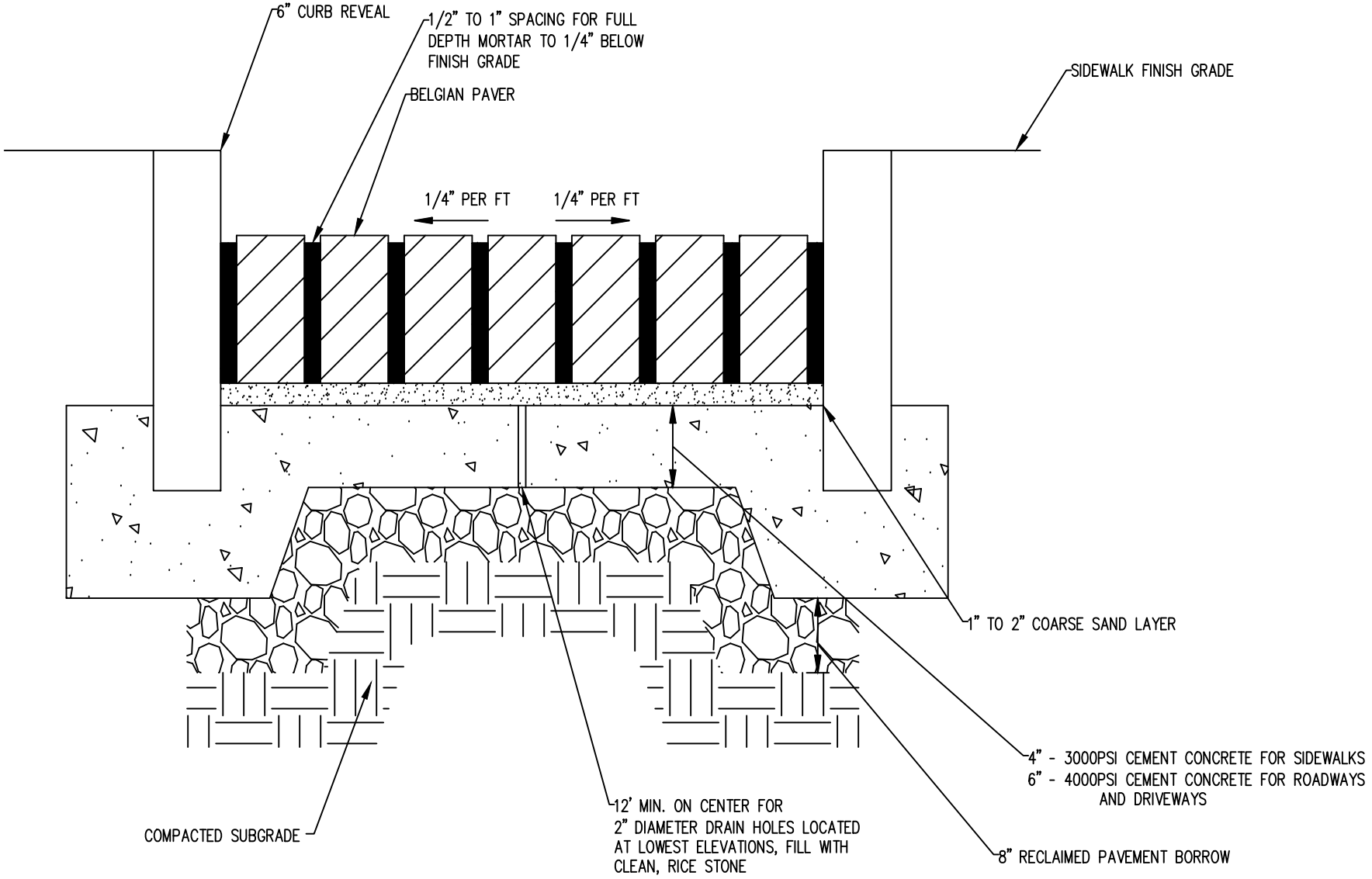
CC =CEMENT CONCRETE
HMA =HOT MIX ASPHALT
* =TOLERANCE FOR CONSTRUCTION ±0.5%
** =18' MAX. FOR RESIDENTIAL DRIVEWAYS. COMMERCIAL DRIVEWAYS REQUIRE TRAFFIC COMMISSION APPROVAL.

NOTES:

1. DRIVEWAY APRONS MUST BE PERPENDICULAR TO THE EDGE OF ROADWAY AND RECTANGULAR IN SHAPE.
2. FOR COMMERCIAL DRIVEWAYS INSTALL WIRE FABRIC (6 X 6 MESH = 10 OR FIBERS)

BELGIAN PAVERS

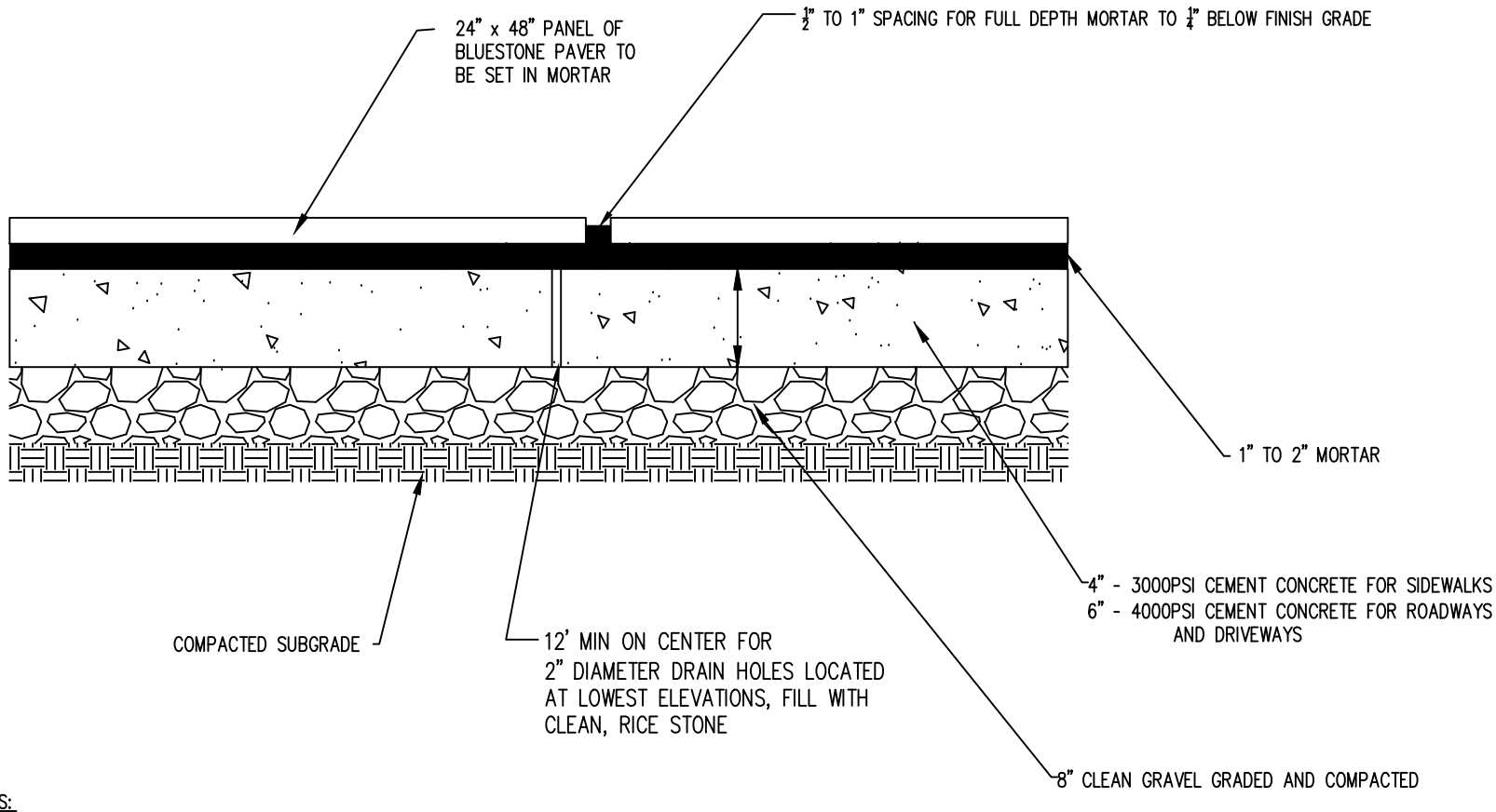
NTS



lighting the way NB new bedford

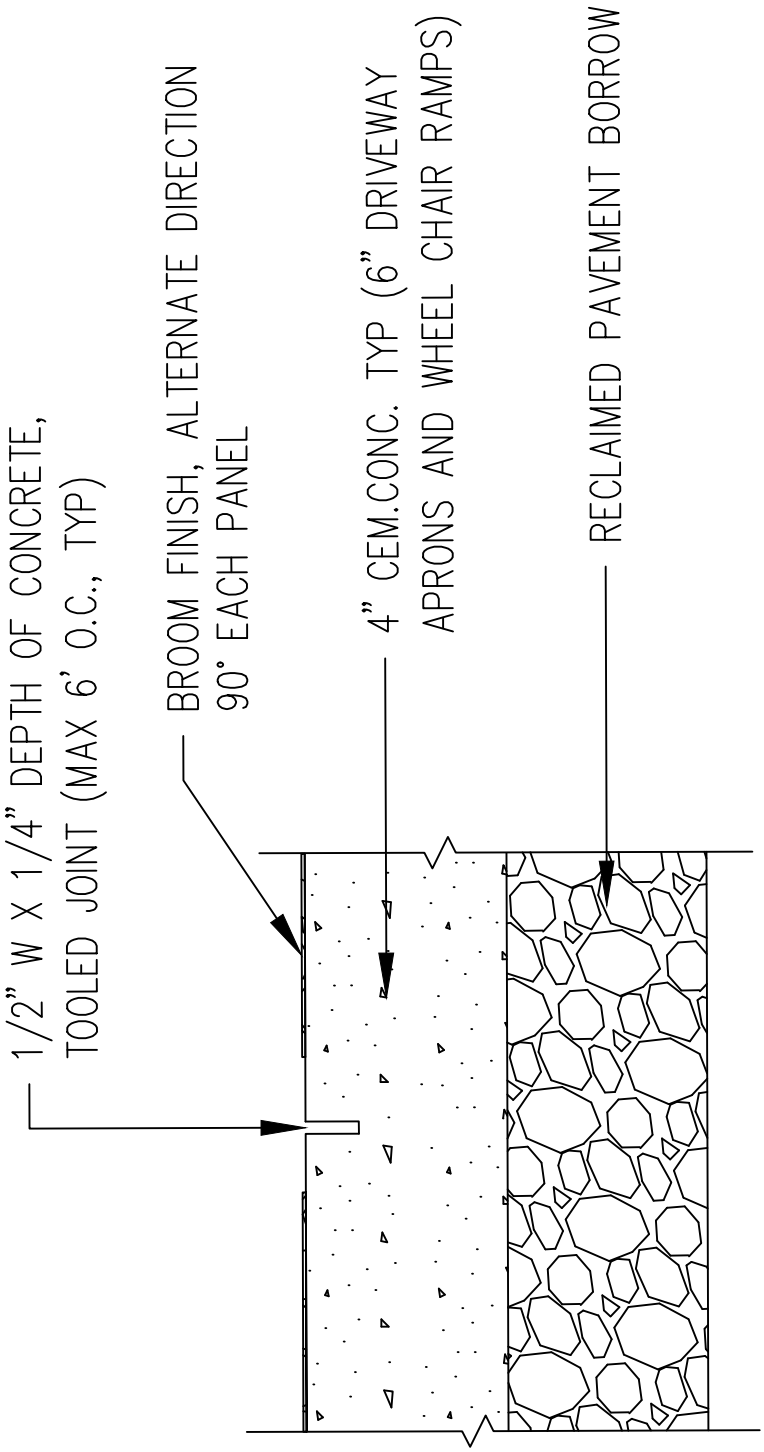
BLUESTONE PAVERS

NTS



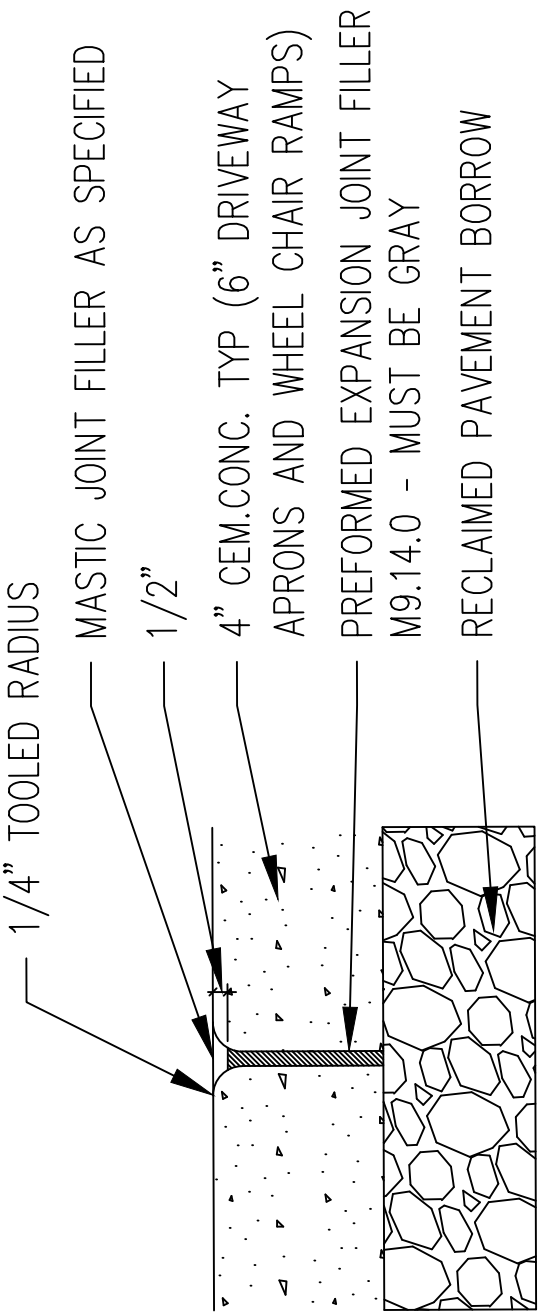
NOTES:

1. 2" THICK BLUESTONE PAVER FOR SIDEWALK APPLICATIONS AND 3" THICK BLUESTONE PAVER FOR DRIVEWAY, WHEELCHAIR RAMP AND ROADWAY APPLICATIONS.
2. 1.5% CROSS SLOPE AWAY FROM PROPERTY LINE FOR SIDEWALK PANELS
3. SEE "SIDEWALK THROUGH DRIVEWAYS" DETAIL FOR GRADING AND DIMENSIONAL REQUIREMENTS OUT A DRIVEWAY APRON.



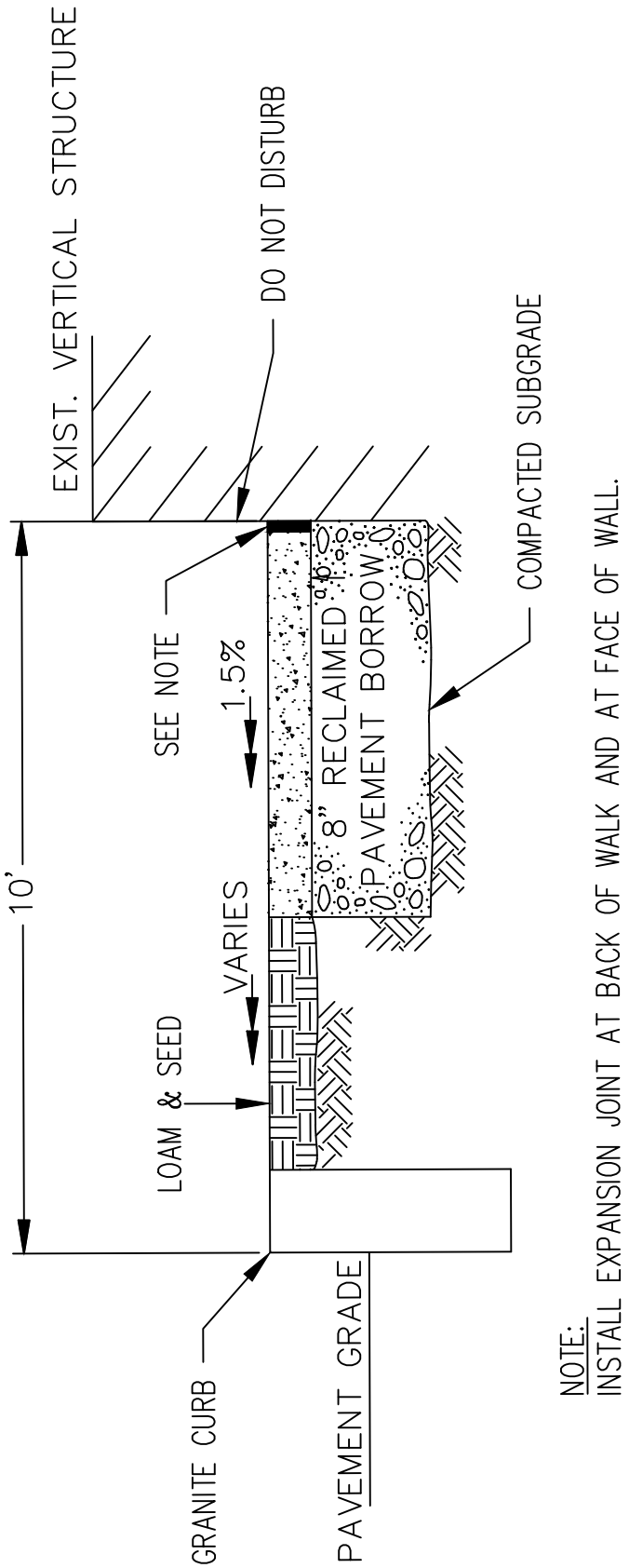
CONCRETE SIDEWALK EXPANSION JOINT

NTS



CONCRETE SIDEWALK CONTROL JOINT

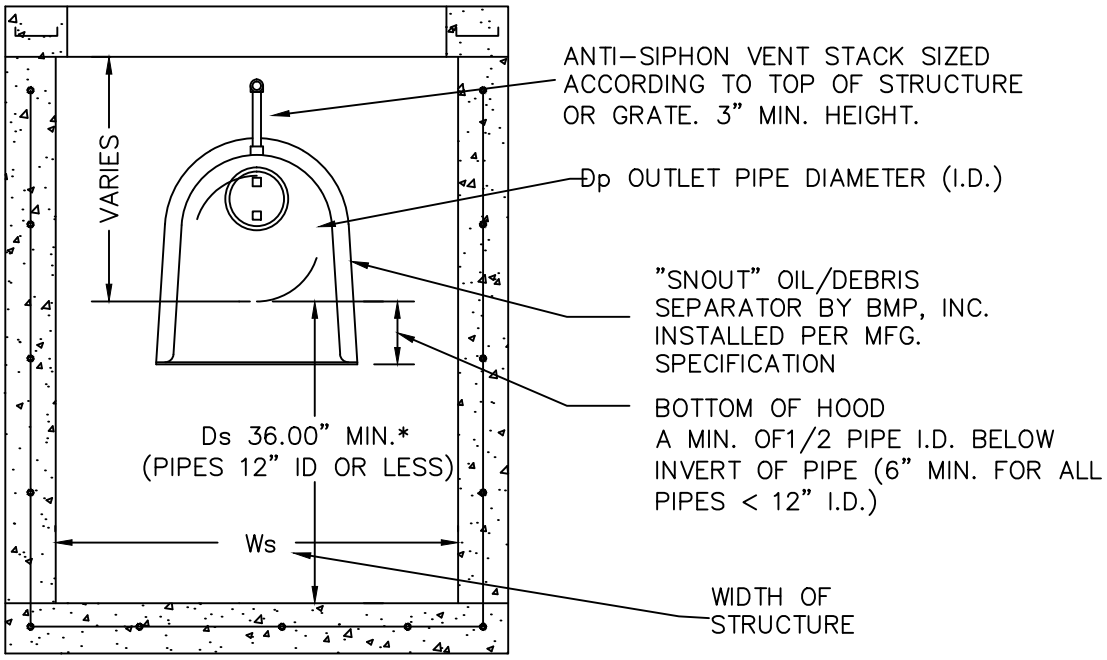
NTS



CEMENT CONCRETE SIDEWALKS AT WALLS

NTS

STRUCTURE DESIGN FOR WATER QUALITY IMPROVEMENT



RULE # 1- AT AN ABSOLUTE MINIMUM, STRUCTURE INTERNAL DIMENSIONS MUST BE AT LEAST LARGE ENOUGH TO ACCOMMODATE EXTERNAL DIMENSIONS OF THE SNOUT, AND ALLOW FOR A PERSON TO INSTALL IT. REFER TO BMP, INC. CAD DETAILS FOR PART DIMENSIONS. BMP RECOMMENDS STRUCTURE WALL TO BE AT LEAST 12" WIDER THAN MAXIMUM SNOUT WIDTH. FOR TRASHSCREEN, STRUCTURE MUST BE AT LEAST 6" WIDER THAN TRASHSCREEN WIDTH.

RULE #2- USE ONLY "F" SERIES SNOUTS FOR RECTANGULAR OR SQUARE STRUCTURES, AVAILABLE IN 12", 18", 24", 30", 36", 48", 72" AND 96" SIZES. USE ONLY "R" SERIES SNOUTS FOR ROUND STRUCTURES, AVAILABLE IN 12", 18", 24", 30", 42", 52" AND 72" SIZES.

***SUMP DEPTH (Ds)-** SUMP DEPTH SHOULD BE A MINIMUM OF 36" FOR ANY NEW CONSTRUCTION FOR PIPES 12" AND LESS. FOR 15"-18" PIPE MIN. DEPTH SHOULD BE 48". OPTIMAL SIZING IS AT LEAST 2.5X TO 3X OUTLET PIPE DIAMETER (Dp) FOR MAXIMUM POLLUTANT REMOVAL EFFICIENCY AND MINIMAL CLEANOUT FREQUENCY.

STRUCTURE DIMENSIONS- PLAN DIMENSIONS FOR A STRUCTURE SHOULD BE UP TO 7X AREA OF OUTLET PIPE FOR MAXIMUM POLLUTANT REMOVAL EFFICIENCY AND MINIMAL CLEANOUT FREQUENCY. FOR MANHOLES, SEE SIZING EXAMPLES BELOW FOR "R' SERIES SNOUTS.

IMPORTANT NOTICE: *DO NOT CONFUSE PIPE SIZE WITH SNOUT SIZE.* A SNOUT FITS OVER A PIPE, NOT IN IT. THUS, THE CORRECT SNOUT SIZE WILL ALWAYS BE BIGGER THAN THE PIPE SIZE. SNOUTS ARE AVAILABLE FOR ROUND STRUCTURES TO ACCOMMODATE PIPES OF 60" ID (71.9" OD). MAX. FOR PIPES 72" OD AND ABOVE, USE SQUARE STRUCTURES.

SIZING EXAMPLES:

OUTLET HOLE SIZE	SNOUT SIZE
11.9" O.D. OR LESS	12 F or R (R FITS 36"-48" DIAM STRUCTURE)
12.0"-17.9" O.D.	18 F or R (R FITS 48"-60" DIAM STRUCTURE)
18.0"-23.9" O.D.	24 F or R (R FITS 48"-60" DIAM STRUCTURE)
24.0"-29.9" O.D.	30 F or R (R FITS 60"-72" DIAM STRUCTURE)
30.0"-35.9" O.D.	36FTB
30.0"-41.9" O.D.	42RTB/60 (FITS 60" DIAM STRUCTURE ONLY)
30.0"-47.9" O.D.	48 FTB
30.0"-51.9" O.D.	52RTB/72 OR /84 (FITS 72" OR 84" DIAM STRUCTURE ONLY)
48.0"-71.9" O.D.	72FTB OR 72RTB/96 (FITS 96" DIAM STRUCTURE ONLY)
72"-95.9" O.D.	96 FTB OR 96FTBB

NPSNOUT (FOR PVC OR SMALL DIAM. STRUCTURE)

UP TO 12" PIPE IN 18" ID STRUCTURE NP1218
UP TO 15" PIPE IN 24" ID STRUCTURE NP1524
UP TO 18" PIPE IN 30" ID STRUCTURE NP1830
UP TO 18" PIPE IN 36-42" ID STRUCTURE NP1836
UP TO 24" PIPE IN 30" ID STRUCTURE NP 2430

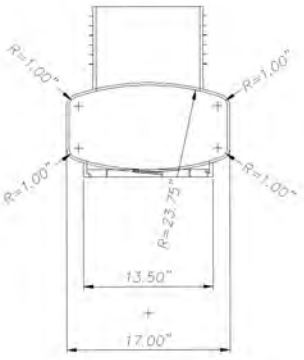
SNOUT ®

BMP, INC.
9 MATHEWS DR, UNIT A1-A2, E. HADDAM, CT
(800) 504-8008 FAX: (877)434-3197

DESCRIPTION	DATE	SCALE
SNOUT SIZING CHART	09/09/18	NONE
	DRAWING NUMBER	
	SP–SI	

THE SNOUT OIL CATCHER

NTS



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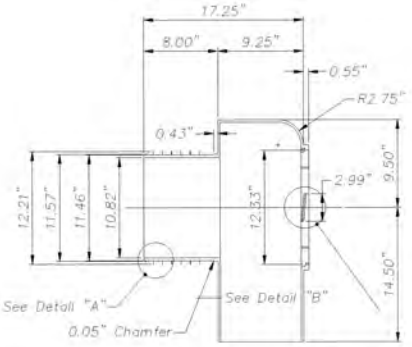
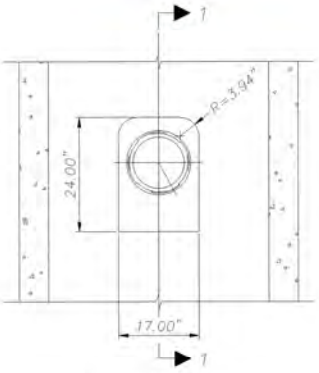
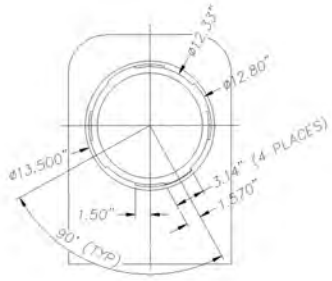


Enlarged Section 1–1



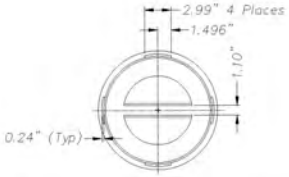
Front View

The Eliminator Catch Basin Oil & Debris Trap

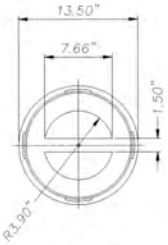


Enlarged Front View

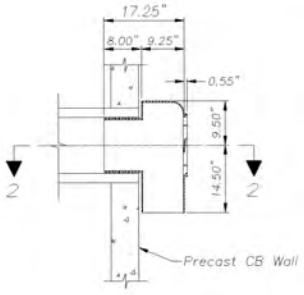
Side View of Cover



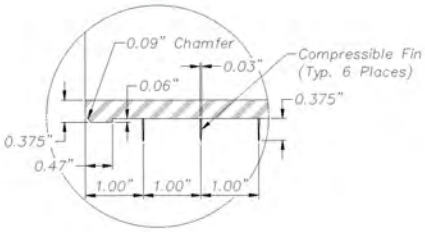
Rear View of Cover w/ Integral Handle



Front View of Cover w/ Integral Handle



Section 1–1



Detail "A"

Ground Water Rescue, Inc.
24 Ryden St., Quincy, MA 02169
Tel: 617-773-1128 Fax: 617-773-0510
www.kleanstream.com

MADE IN USA

Downstream Defender®

Downstream Defender® Design

Drainage Profile

The Downstream Defender® is designed with a submerged tangential inlet to minimize turbulence within the device. Turbulence increases system headlosses and reduces performance by keeping pollutant particles in suspension.

The inlet elevation of the Downstream Defender® is located one inlet pipe diameter lower than the elevation of the outlet invert (**Fig.2**). This arrangement ensures that influent flows are introduced to the treatment chamber quiescently below the water surface elevation, minimizing turbulence.

The unique flow-modifying internal components also minimize hydraulic losses. There are no internal weirs or orifices; large clear openings ensure low headloss at peak flow rates with little risk of blockages that cause upstream flooding.

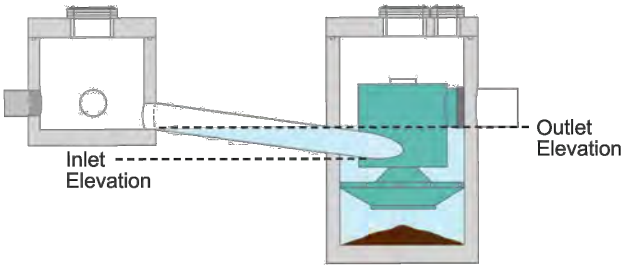


Fig.2 The Downstream Defender® has a submerged inlet that reduces headloss and improves efficiency of pollutant capture.

Sizing & Design

The Downstream Defender® can be used to meet a wide range of stormwater treatment objectives. It is available in 5 precast models that fit easily into the drainage network (**Table 1**). Selection and layout of the appropriate Downstream Defender® model depends on site hydraulics, site constraints and local regulations. Both online (**Fig.3a**) and offline (**Fig.3b**) configurations are common.

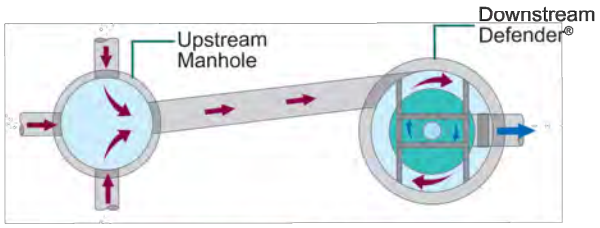


Fig.3a The Downstream Defender® in an online configuration.

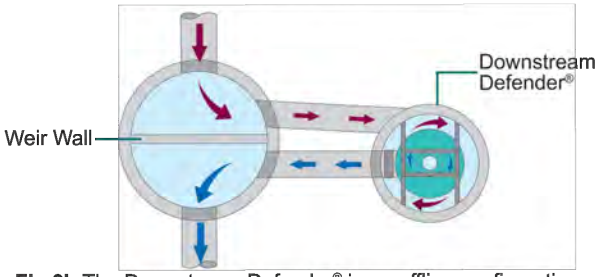


Fig.3b The Downstream Defender® in an offline configuration.

Free *Stormwater Separator Sizing Calculator* for Engineers

This simple online tool will recommend the best separatror, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

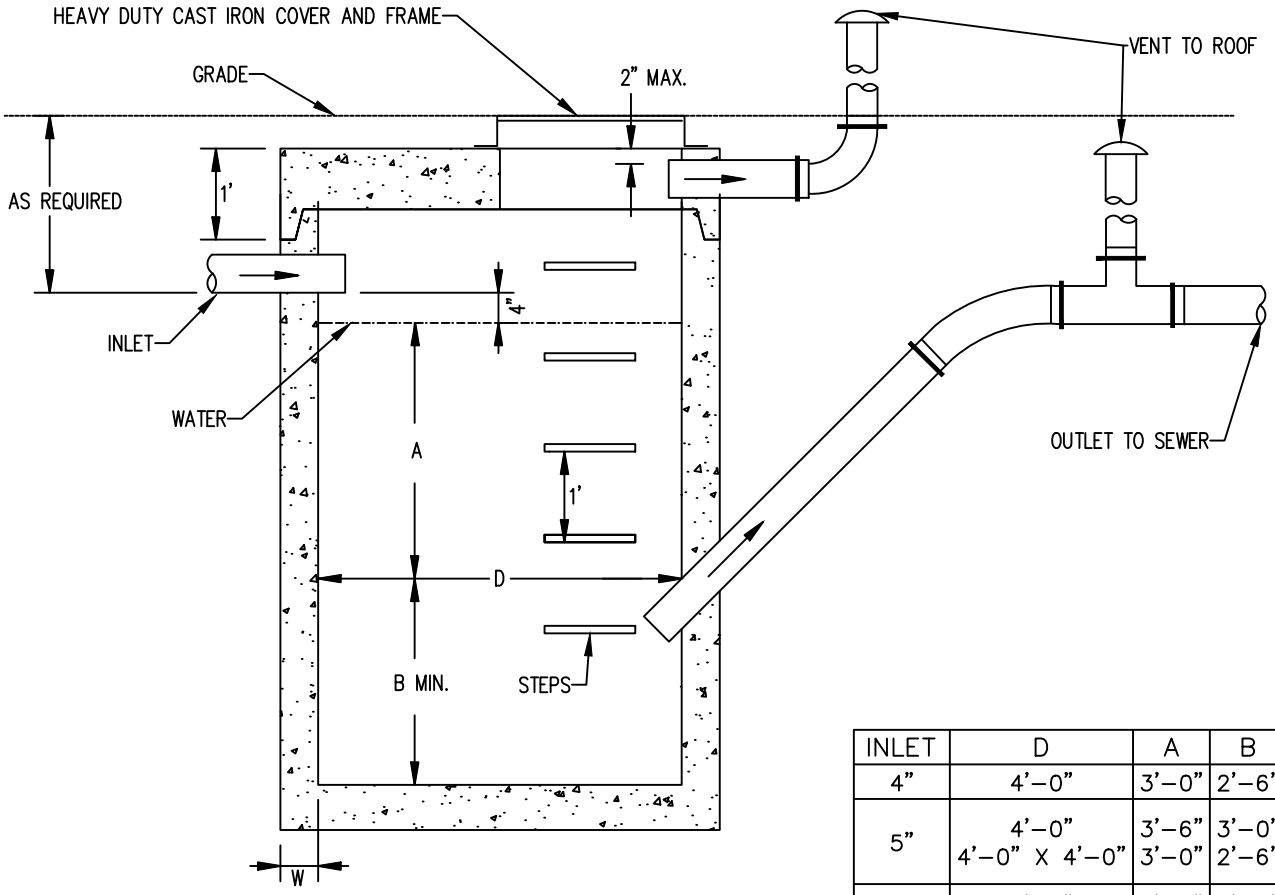
Table 1. Downstream Defender® Design Chart.

Model Number and Diameter		Peak Treatment Flow Rate		Maximum Pipe Diameter		Oil Storage Capacity		Sediment Storage Capacity		Minimum Distance from Outlet Invert to Top of Rim		Standard Height from Outlet Invert to Sump Floor	
(ft)	(m)	(cfs)	(L/s)	(in)	(mm)	(gal)	(L)	(yd^3)	(m^3)	(ft)	(m)	(ft)	(m)
4	1.2	3.0	85	12	300	70	265	0.70	0.53	2.8	0.85	4.1	1.25
6	1.8	8.0	227	18	450	216	818	2.10	1.61	3.2	0.98	5.9	1.80
8	2.4	15.0	425	24	600	540	2,044	4.65	3.56	4.2	1.28	7.7	2.35
10	3.0	25.0	708	30	750	1,050	3,975	8.70	6.65	5.0	1.52	9.4	2.85
12*	3.7	38.0	1,076	36	900	1,770	6,700	14.70	11.24	5.6	1.71	11.2	3.41

*Not available in all areas. Contact Hydro International for details.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

Stormwater Solutions
hydro-int.com/dsdefender
DDScreenSS1906



INLET	D	A	B	W
4"	4'–0"	3'–0"	2'–6"	5"
5"	4'–0" 4'–0" X 4'–0"	3'–6" 3'–0"	3'–0" 2'–6"	5" 6"
6"	4'–0" 4'–0" X 4'–0" 5'–0"	5'–0" 4'–0" 3'–6"	4'–6" 3'–6" 3'–0"	5" 6" 6"
8"	5'–0" 6'–0" 8'–0"	6'–0" 4'–0" 3'–0"	5'–0" 3'–6" 2'–6"	6" 7" 9"
10"	6'–0" 8'–0"	6'–6" 5'–0"	5'–6" 4'–0"	7" 9"

NOTES:

1. CONCRETE: 4,000 PSI MIN. AFTER 28 DAYS.
2. MANHOLE DESIGN SPECIFICATIONS CONFORM TO LATEST ASTM SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
3. BUTYL RESIN SECTION JOINT CONFORMS TO LATEST ASTM C443 SPEC.
4. STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTIC STEP CONFORMS TO LATEST ASTM C478 SPEC.
5. CONE SECTION AVAILABLE IN 4'-0" I.D. ONLY.
6. FOR INLETS LARGER THAN 10" THE DESIGN AND DIMENSION WILL BE DETERMINED FOR EACH PARTICULAR CASE.

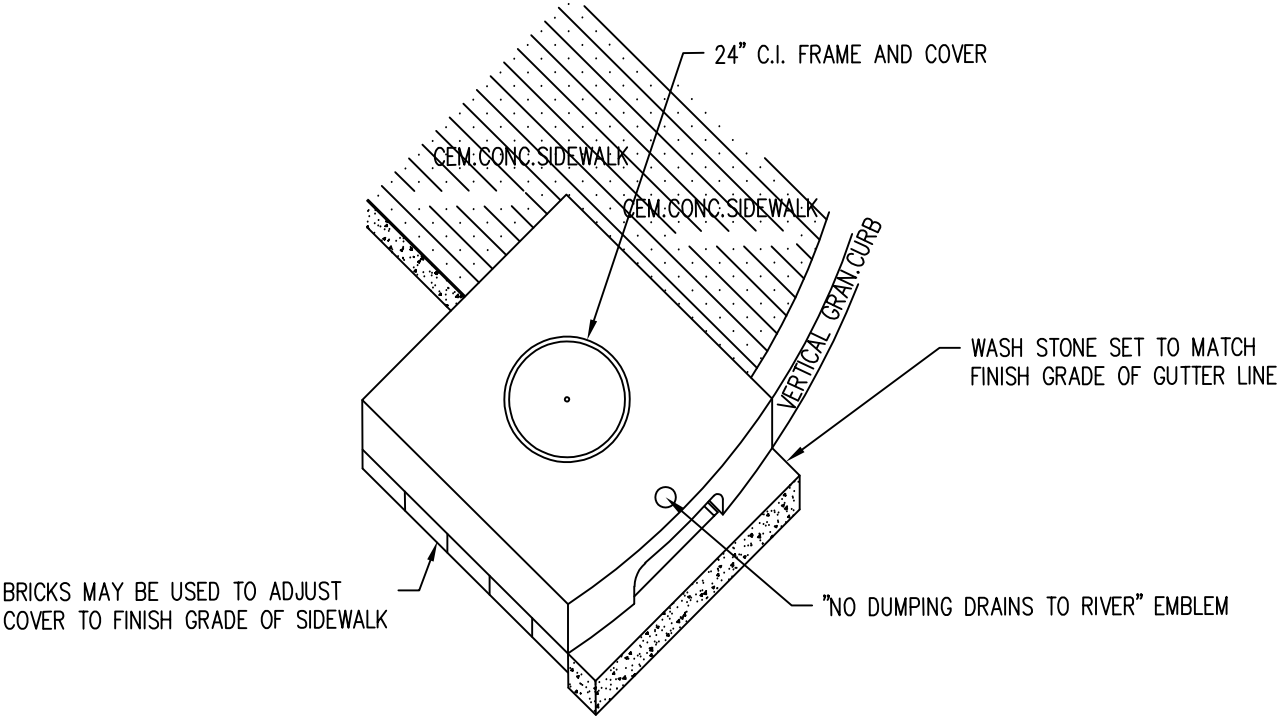
OIL AND GREASE SEPARATOR

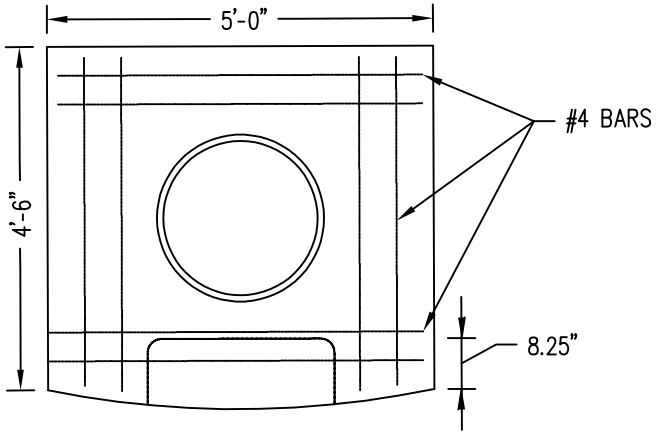
NTS

lighting the way
new bedford

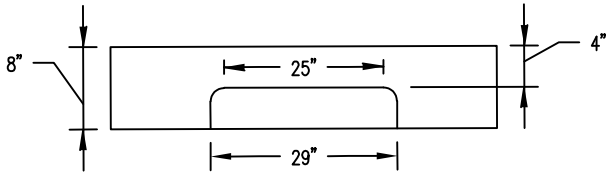
MUNICIPAL STANDARD
BRADLEY HEAD STYLE CATCH BASIN COVER

NTS

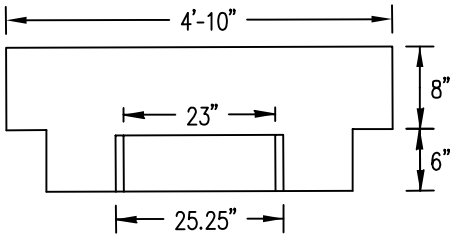




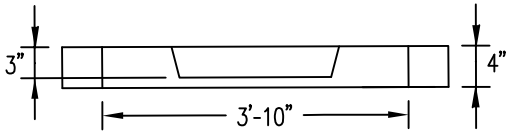
TOP VIEW BRADLEY HEAD COVER



FRONT VIEW BRADLEY HEAD COVER



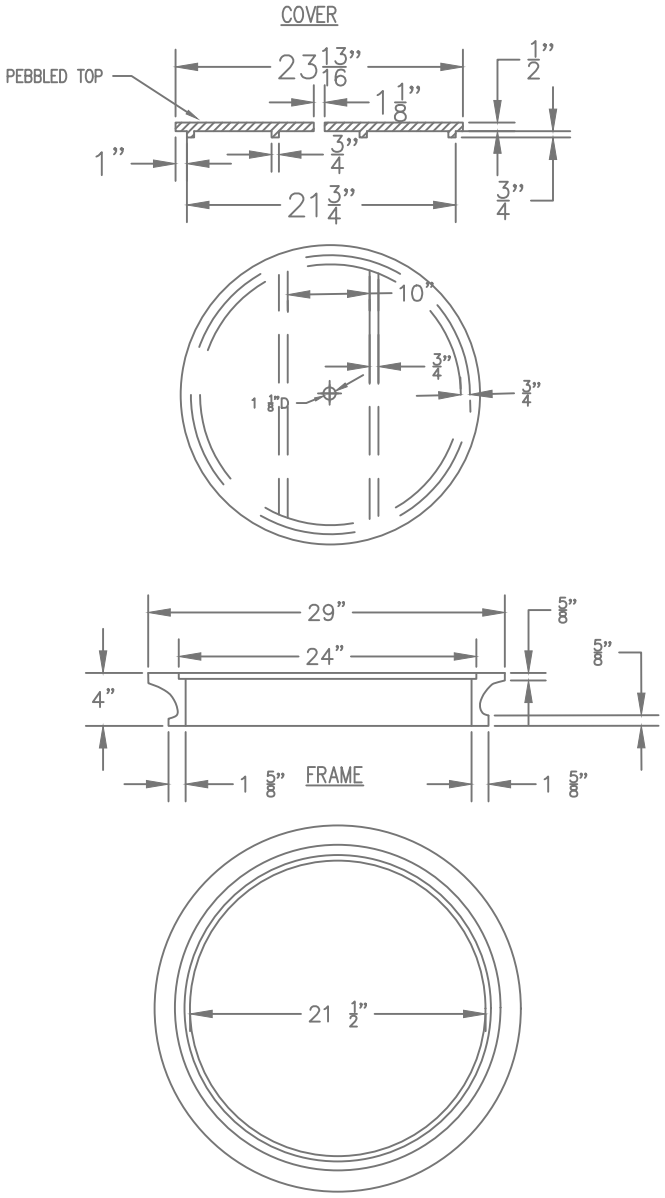
TOP VIEW WASH STONE



FRONT VIEW WASH STONE

NOTES:

1. MINIMUM COVER WEIGHT - 73 LBS
2. MINIMUM FRAME WEIGHT - 113 LBS
3. MATERIAL - CAST IRON
4. SIDEWALK AREA USE ONLY

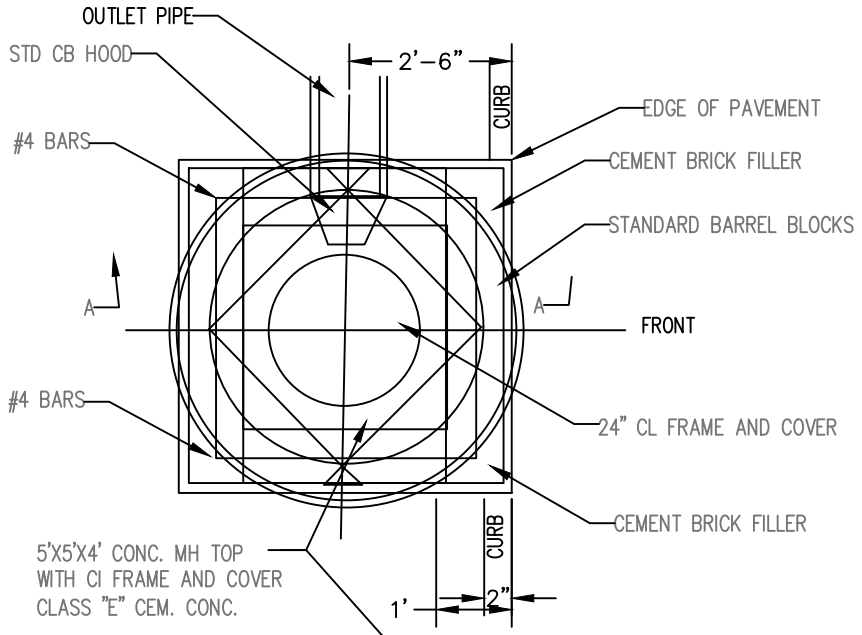


CAST IRON CATCH BASIN COVER FOR MUNICIPAL STANDARD (BRADLEY HEAD)

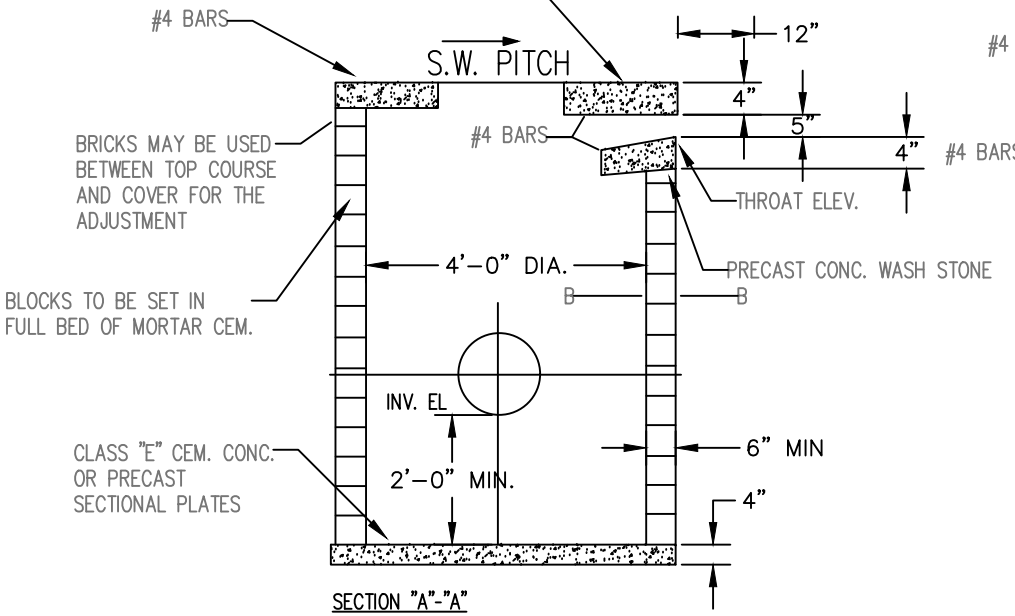
NTS

CATCH BASIN MUNICIPAL STANDARD

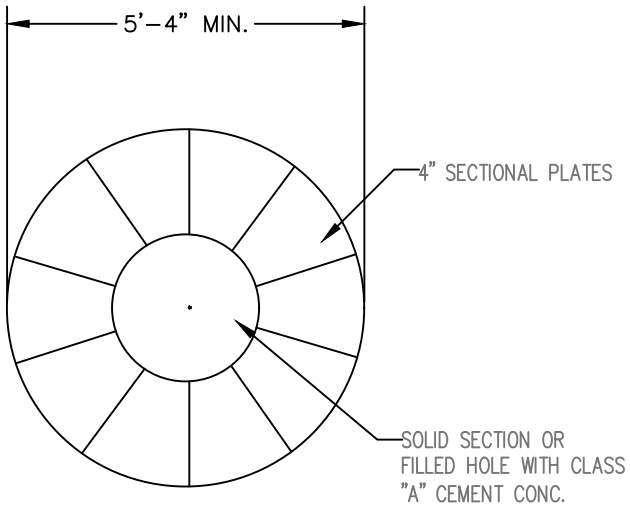
NTS



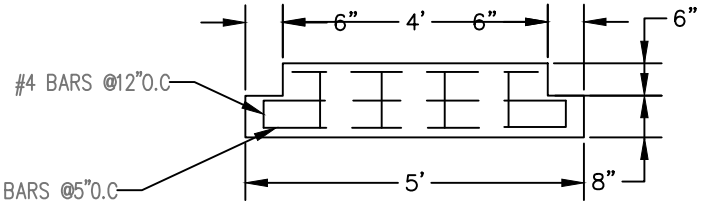
PLAN



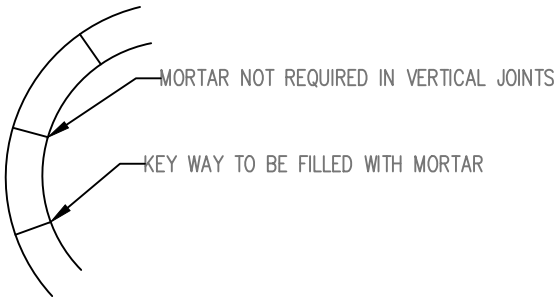
SECTION "A"-"A"



PLAN OF BASE



PLAN OF WASH STONE



SECTION "B"-"B"

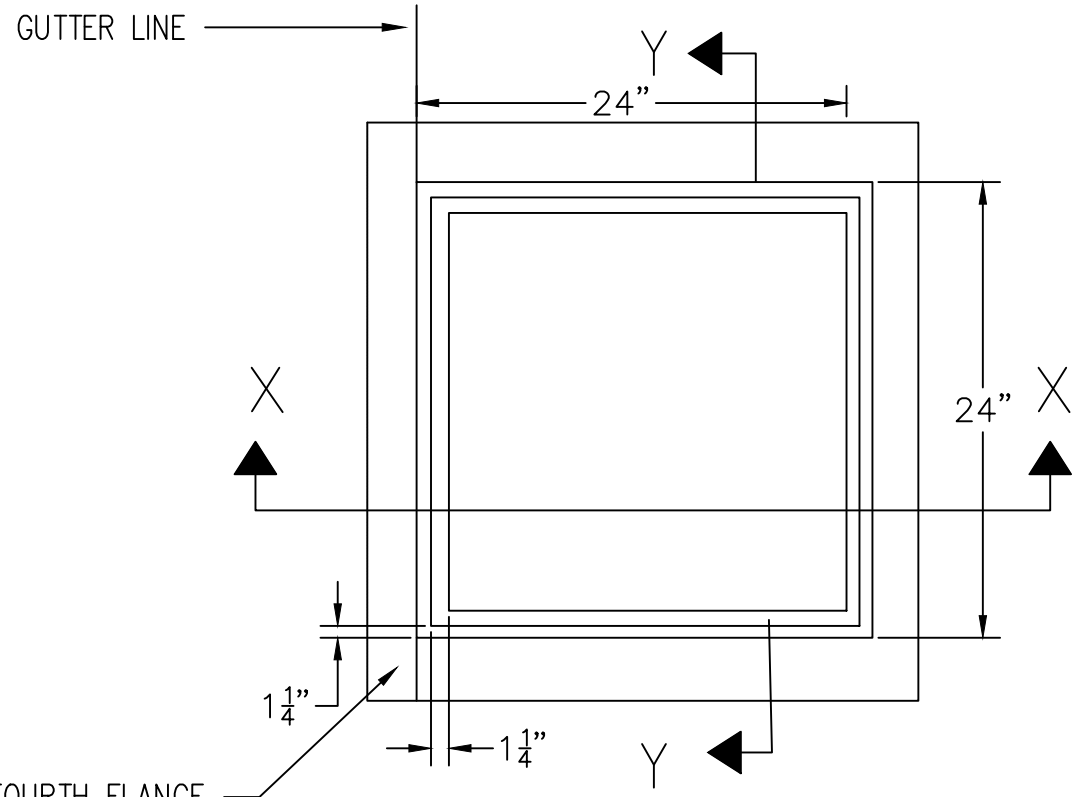
NOTES:
PRECAST SECTIONS ARE AN ACCEPTABLE EQUAL TO BLOCK SECTIONS.

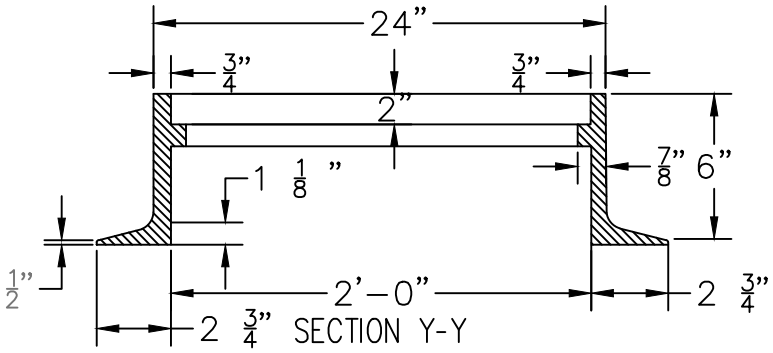
CATCH BASIN FRAME

NTS

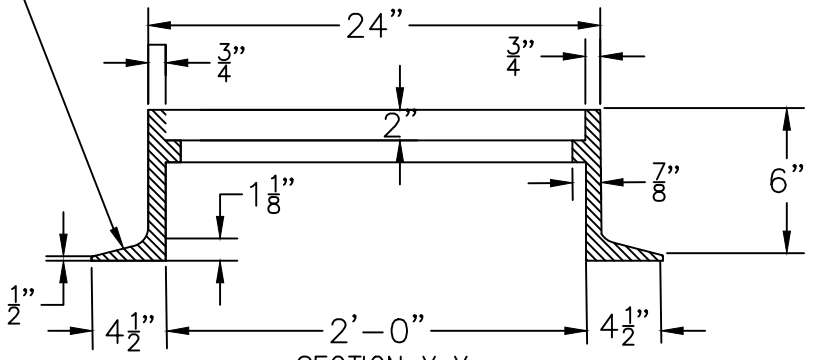
NOTES:

1. FRAME & COVER WEIGHT : 400 LBS
2. MATERIAL - CAST IRON
3. TO BE USED WITH SQUARE OPENING TYPE GRATE EAST JORDAN IRON WORKS MODEL# 5523 (3-FLANGE) OR 5524 (4-FLANGE) OR A APPROVED EQUAL.
4. ALL CASTING SHALL BE MADE IN THE USA.





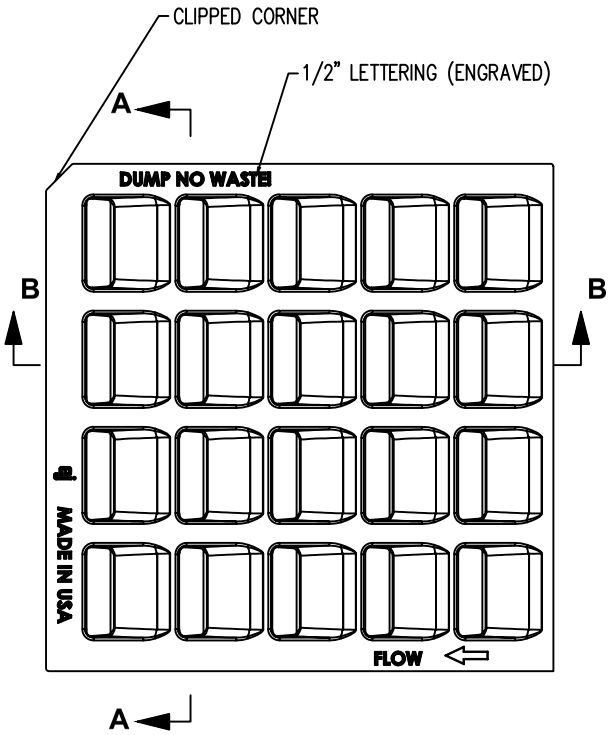
SECTION Y-Y

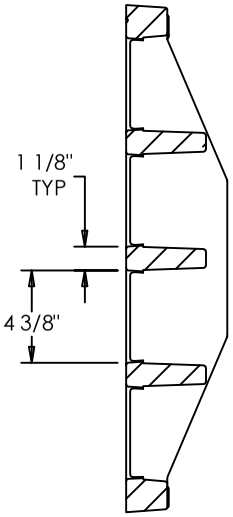


SECTION X-X

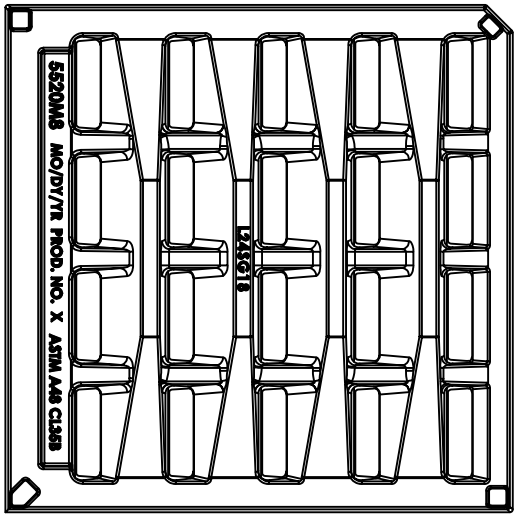
CASCADING GRATE DETAIL

NTS

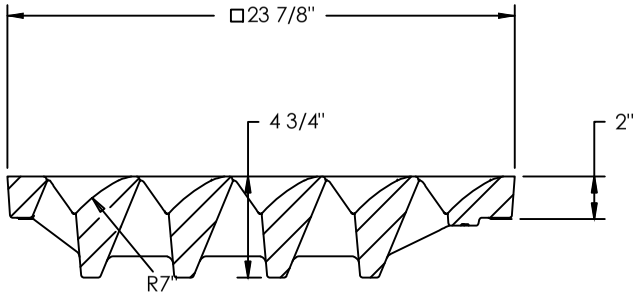




SECTION A-A



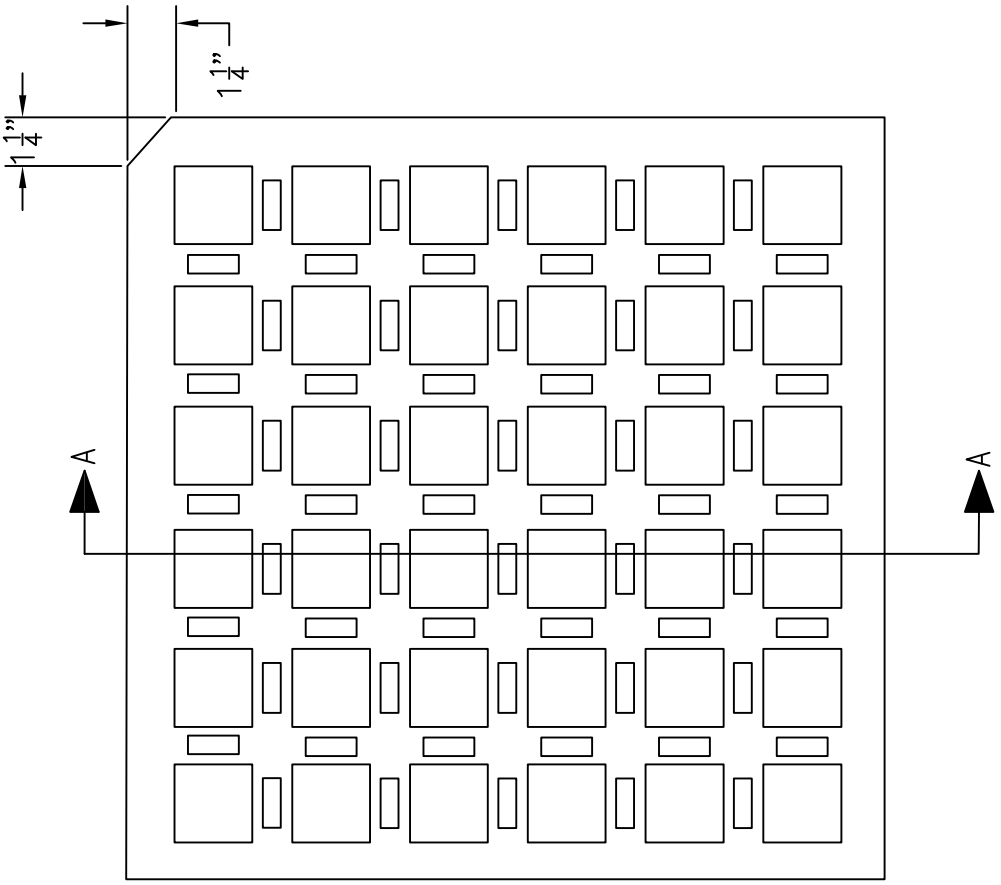
BOTTOM VIEW



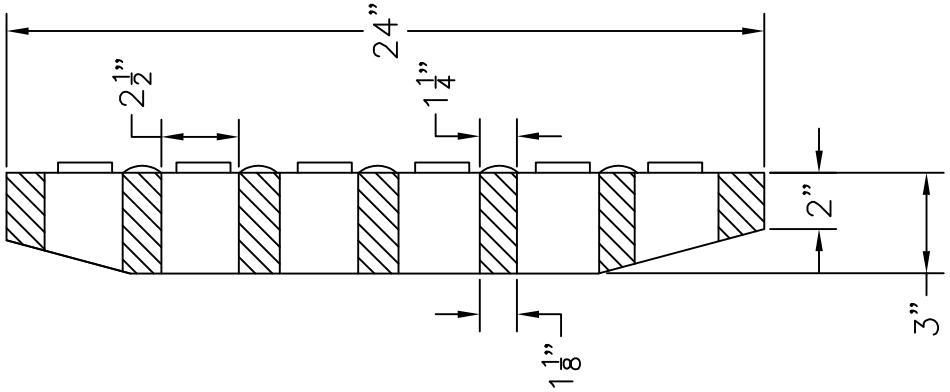
SECTION B-B

NOTES:

1. MINIMUM GATE WEIGHT - 220± LBS
2. MATERIAL - CAST
3. TO BE USED WITH STANDARD CATCH BASIN FRAME, EAST JORDAN IRON WORKS MOD# 5520M5 OR APPROVED EQUAL.
4. ALL CASTING SHALL BE MADE IN THE USA.
5. GRATE NOT TO BE USED IF LOCATED IN PEDESTRIAN ACCESS ROUTE



NOTES:
1. MINIMUM GATE WEIGHT - 220± LBS
2. MATERIAL - CAST
3. TO BE USED WITH STANDARD CATCH BASIN FRAME, EAST JORDAN IRON WORKS MOD# 5520M5 OR APPROVED EQUAL.
4. ALL CASTING SHALL BE MADE IN THE USA.
5. GRATE NOT TO BE USED IF LOCATED IN PEDESTRIAN ACCESS ROUTE

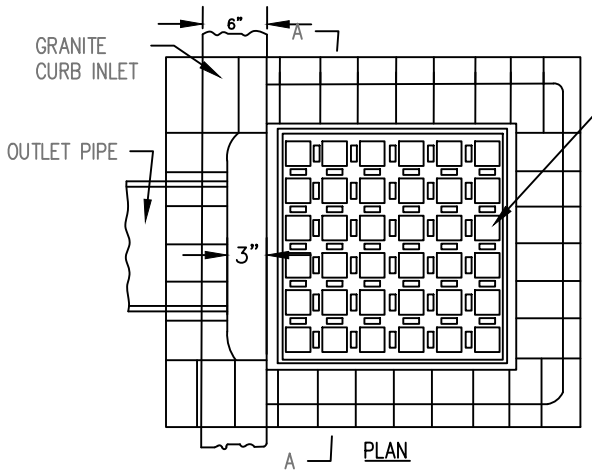


CATCH BASIN GRATE SQUARE OPENING

NTS

BRICK GUTTER INLET

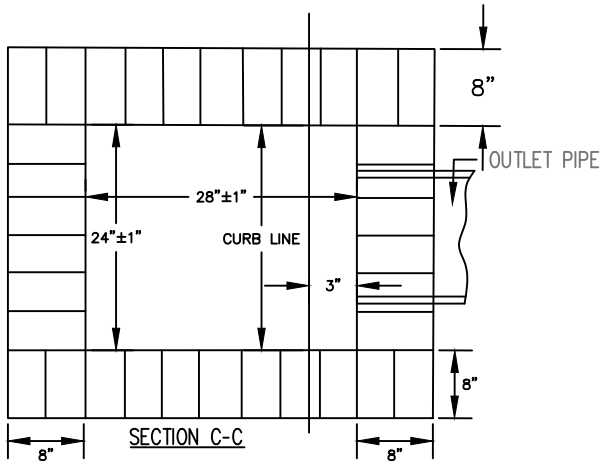
NTS

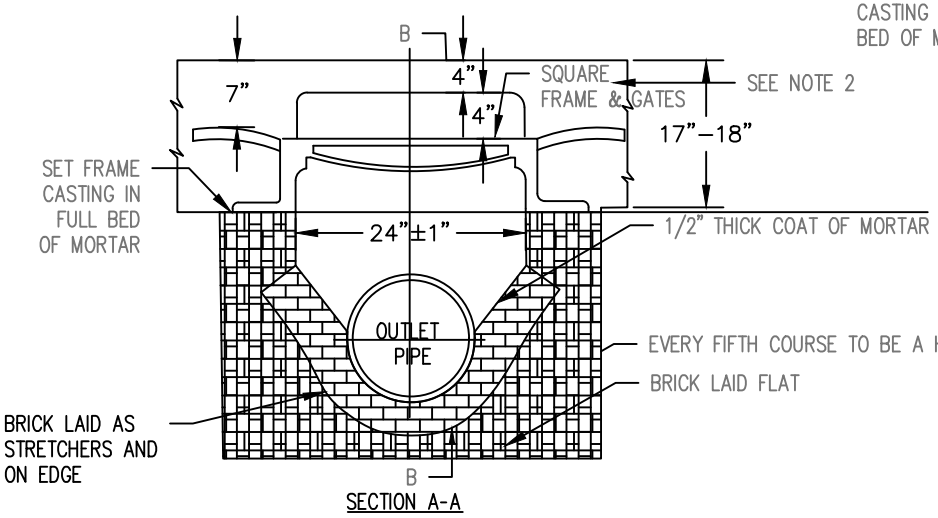


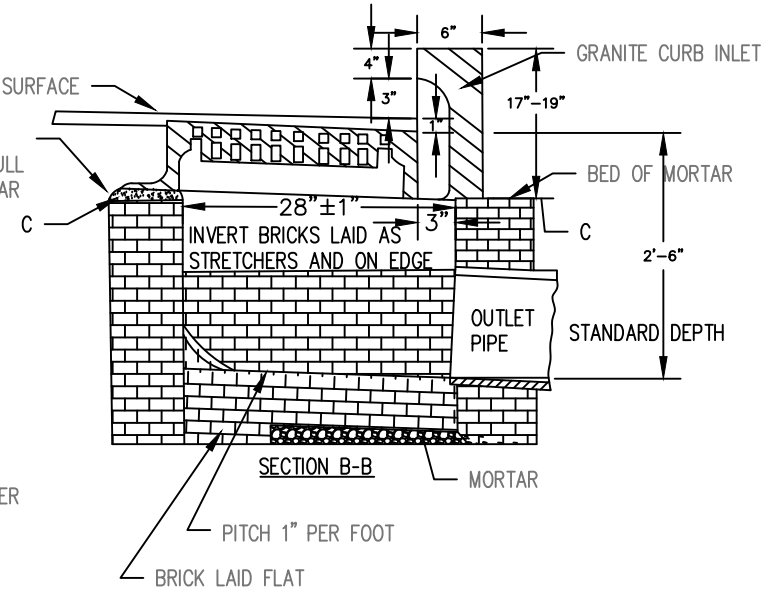
PARALLEL BAR GRATE SEE NOTE 2

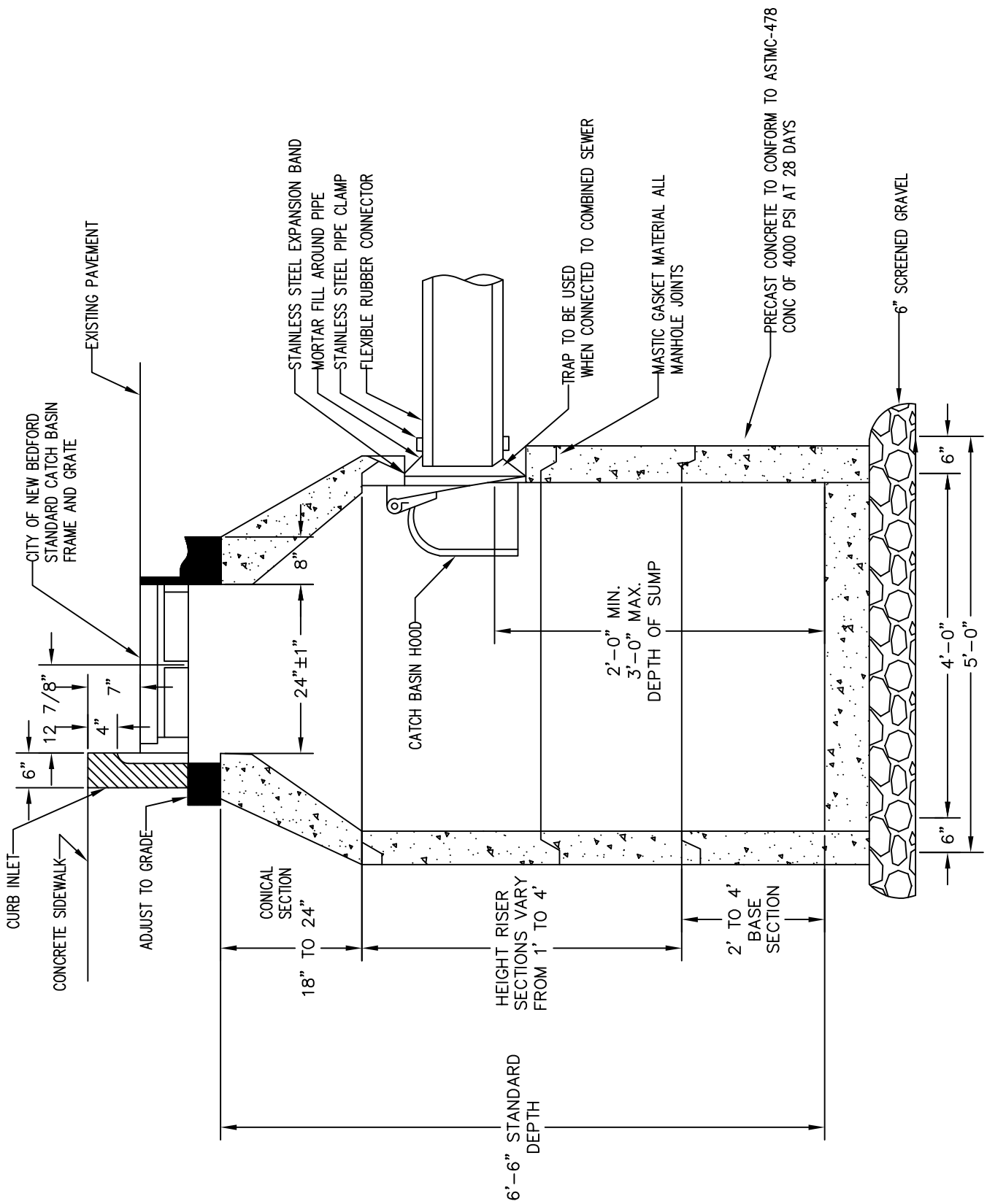
NOTES:

1. WHEN THE CURB INLET IS NOT USED THE INSIDE HORIZONTAL DIMENSION OF GUTTER INLET TO 24"±1"X24"±1" IN WHICH CASE AND UNLESS OTHERWISE DIRECTED, A STANDARD 4-FLANGE FRAME IS TO BE USED.
2. A CASCADE GATE IS TO BE USED WHERE BICYCLE TRAFFIC IS ALLOWED TO SEE 201.7.0 THROUGH 201.9.0
3. FOR DESCRIPTION, MATERIAL AND CONSTRUCTION METHODS SEE LATEST SPECIFICATIONS



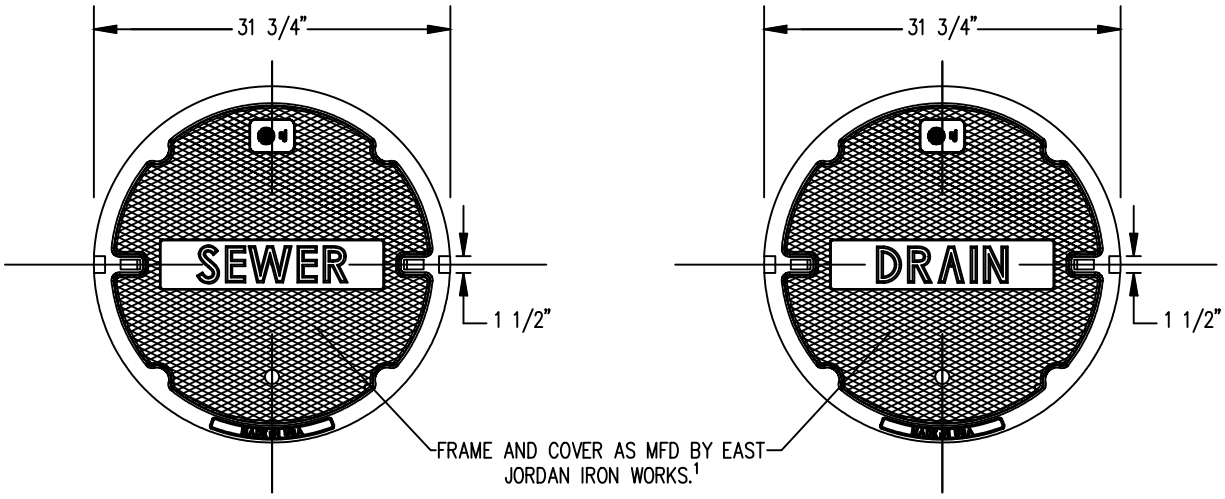




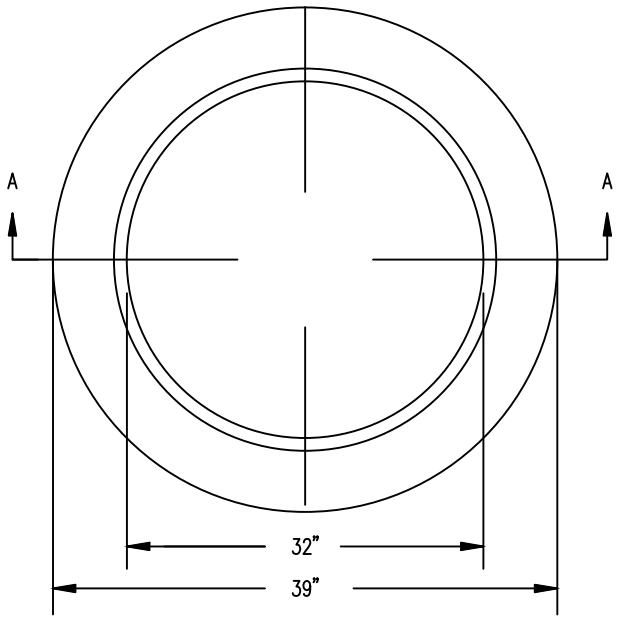


PRECAST CONCRETE CATCH BASIN

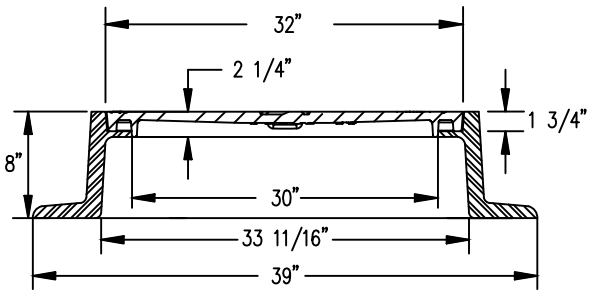
NTS



STANDARD COVER



FRAME TOP VIEW

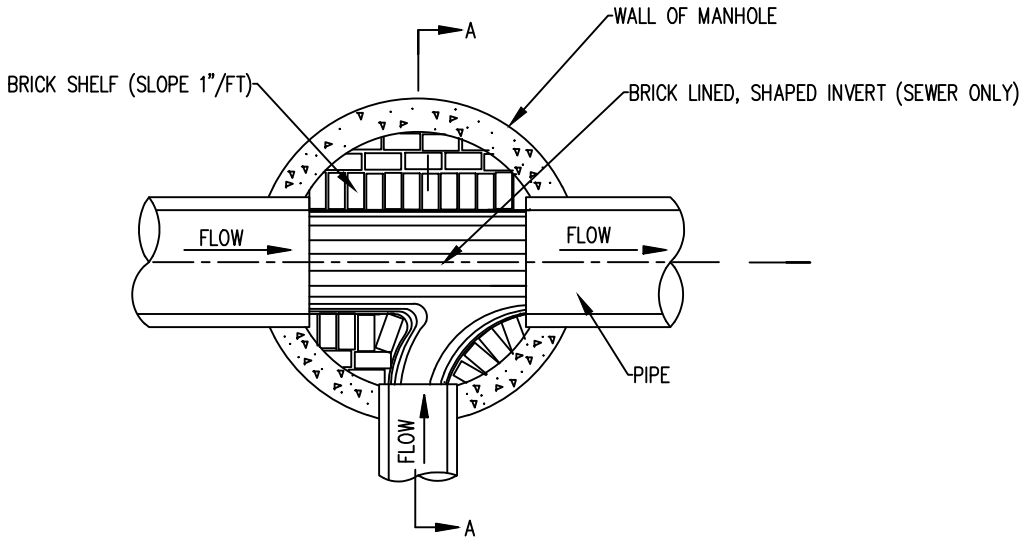


SECTION A-A

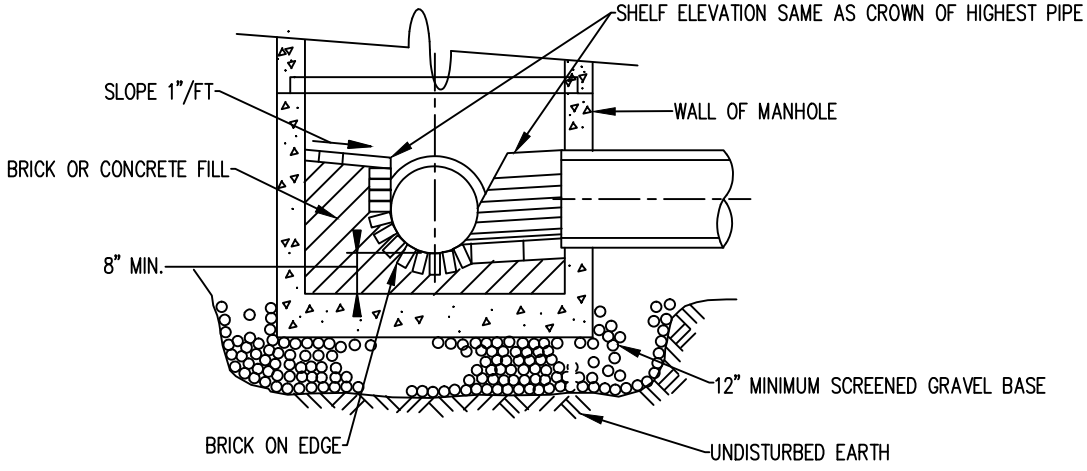
1. ORDER MANHOLE COVERS WITH THE WORD "SEWER" OR "DRAIN" CAST IN 3-INCH LETTERS IN THE CENTER OF THE COVER AS SHOWN AND TO PROPERLY LABEL THE UTILITY SERVICED BY THE MANHOLE.
2. ALL CASTINGS MUST BE MADE IN THE USA AND APPROVED BY CITY ENGINEER.

MANHOLE FRAME AND COVER

NTS



PLAN

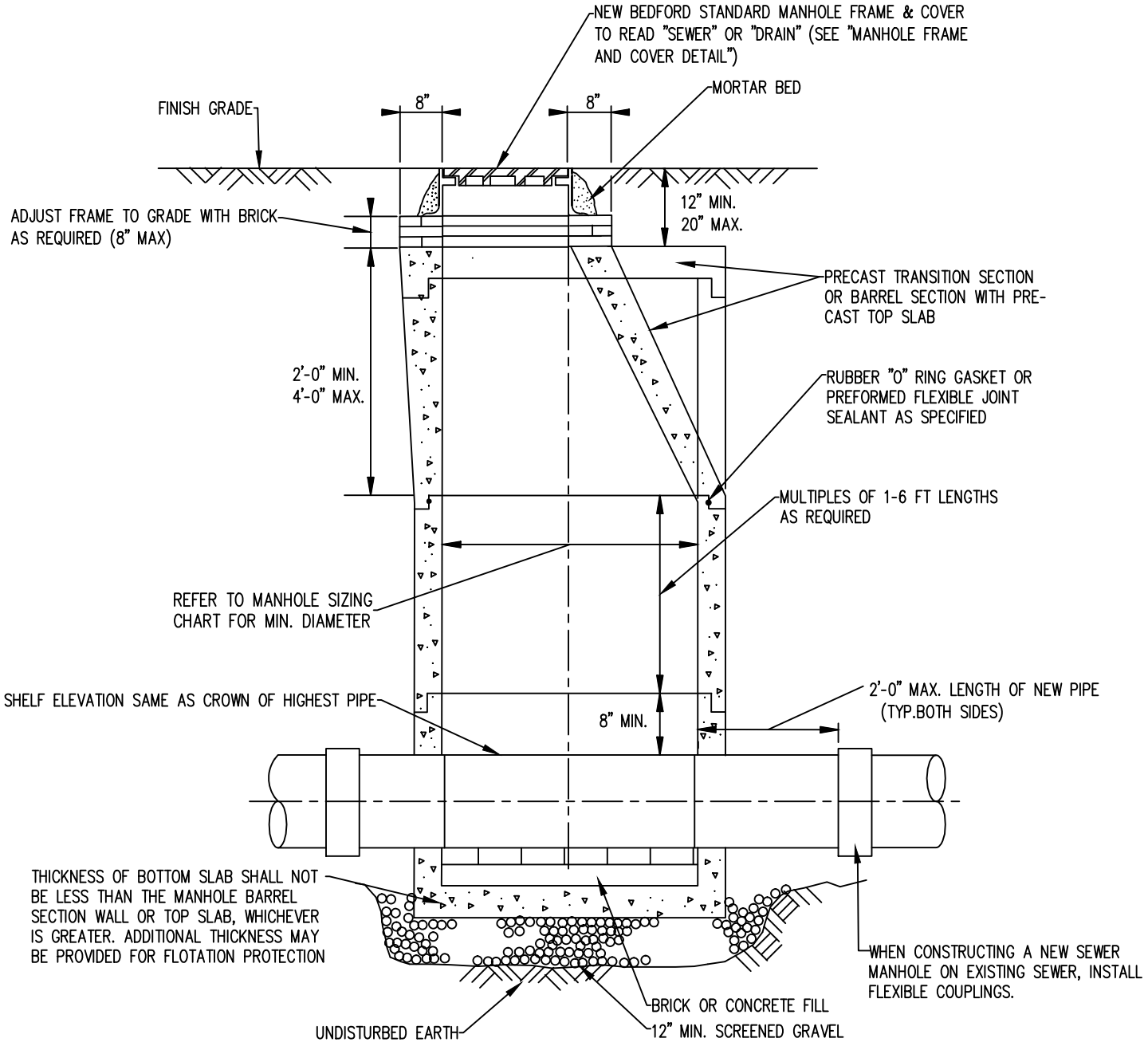


SECTION A-A

NOTE:
CHANNELS FOR DRAIN MANHOLES SHALL BE CONCRETE

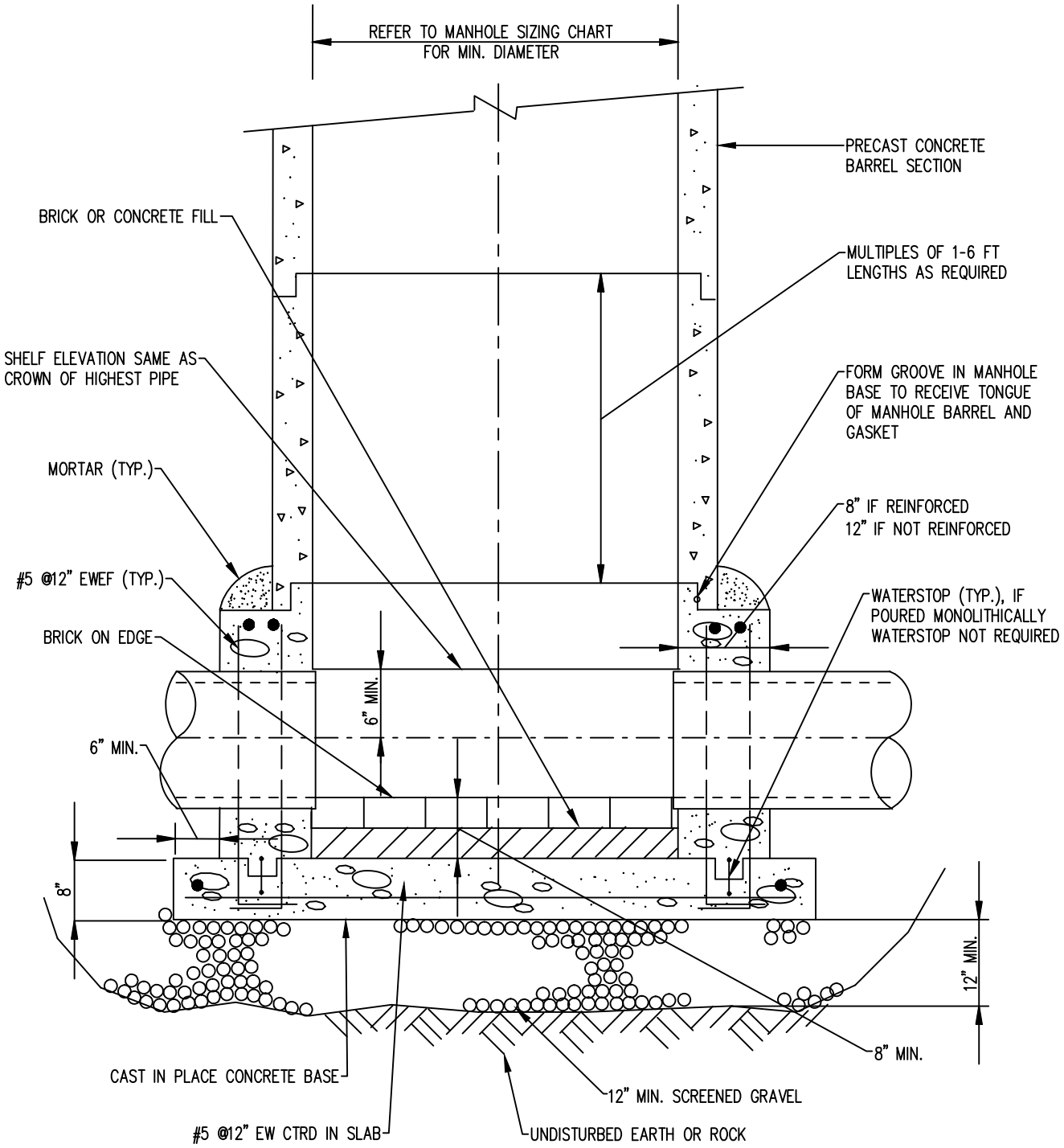
MANHOLE SHELF

NTS



PRECAST MANHOLE WITH PRECAST BASE

NTS



PRECAST MANHOLE WITH CAST-IN-PLACE BASE

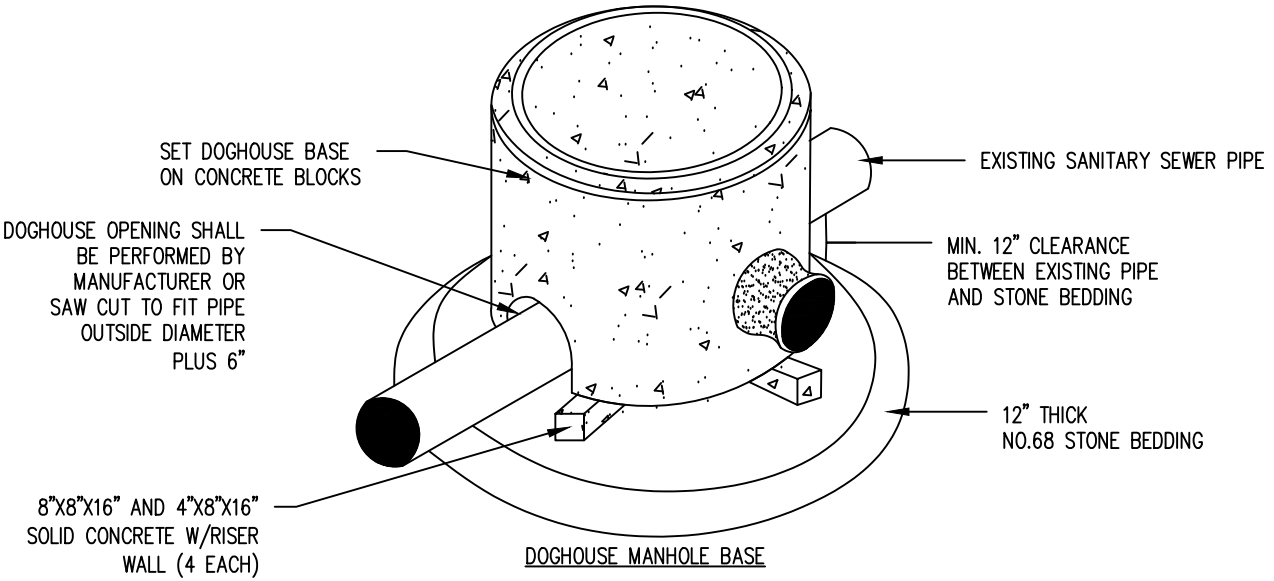
NTS

lighting the way
new bedford

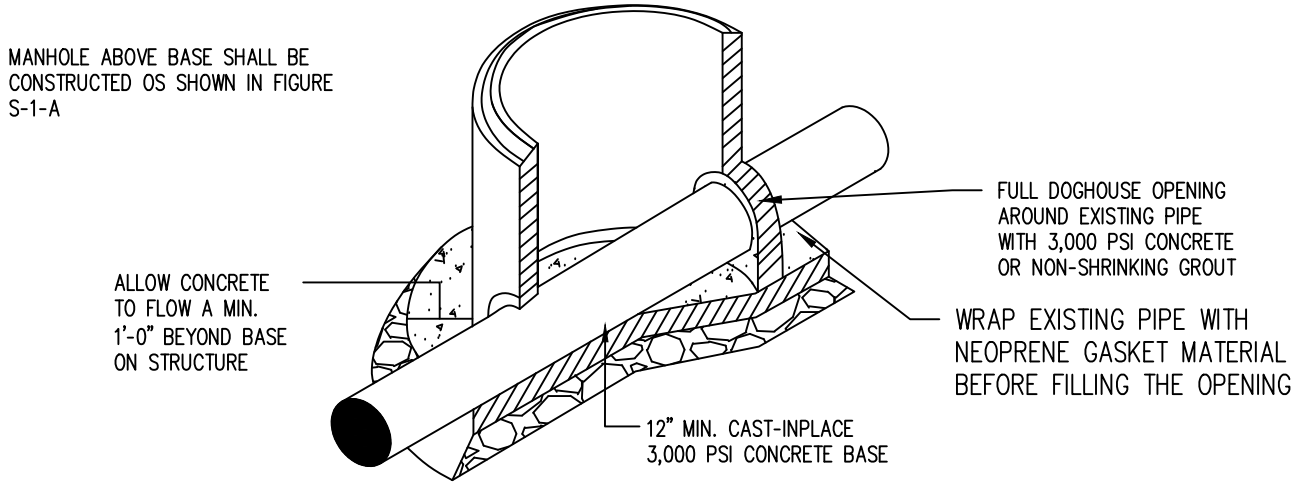
MANHOLE BASE DOGHOUSE INSTALLATION

SLN

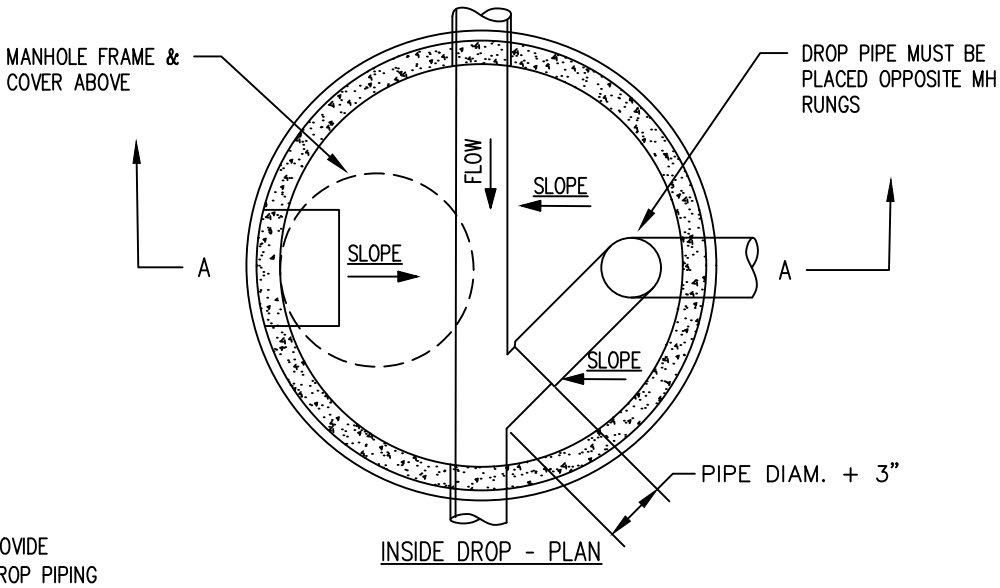
NTS



DOGHOUSE MANHOLE BASE

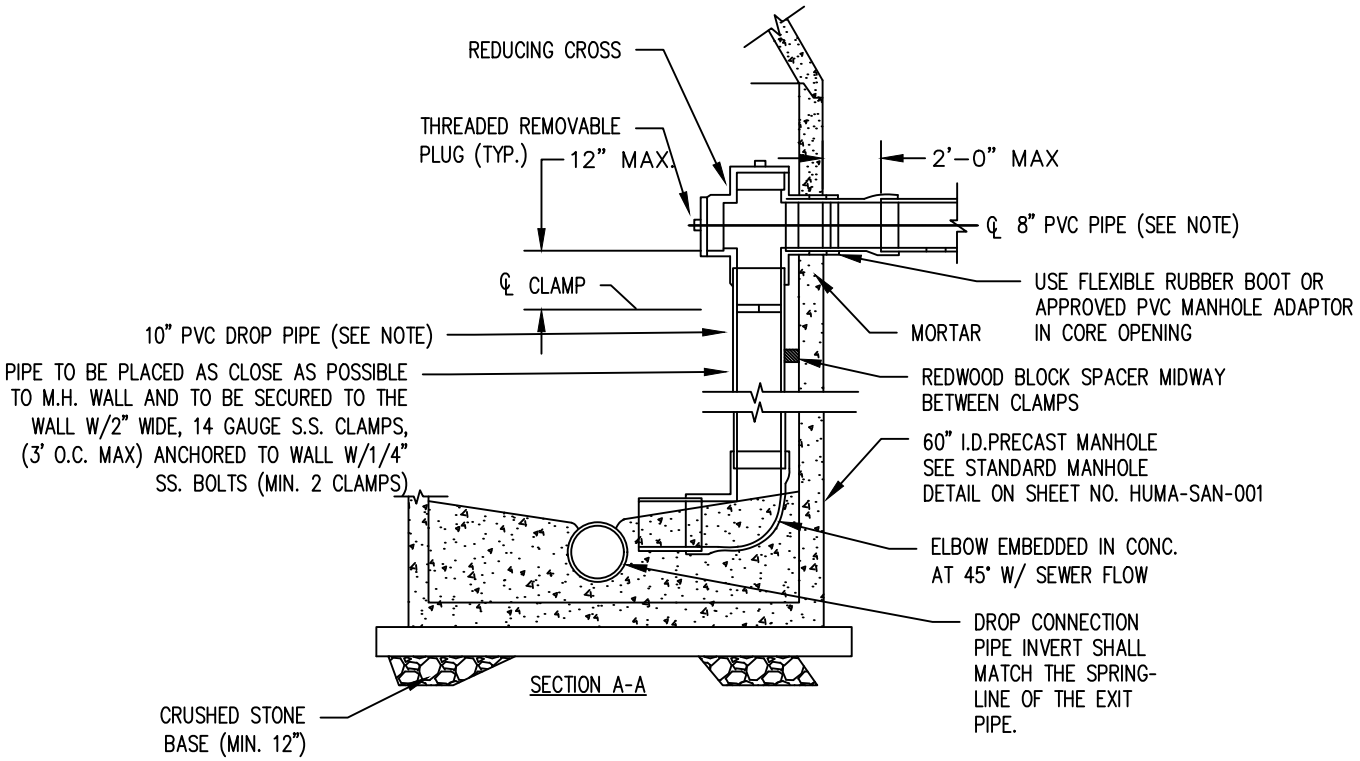


FOUNDATION SECTION VIEW



INSIDE DROP - PLAN

NOTES:
FOR 8" PVC PIPE PROVIDE
10" PVC INTERNAL DROP PIPING
12" PVC INTERNAL DROP PIPING



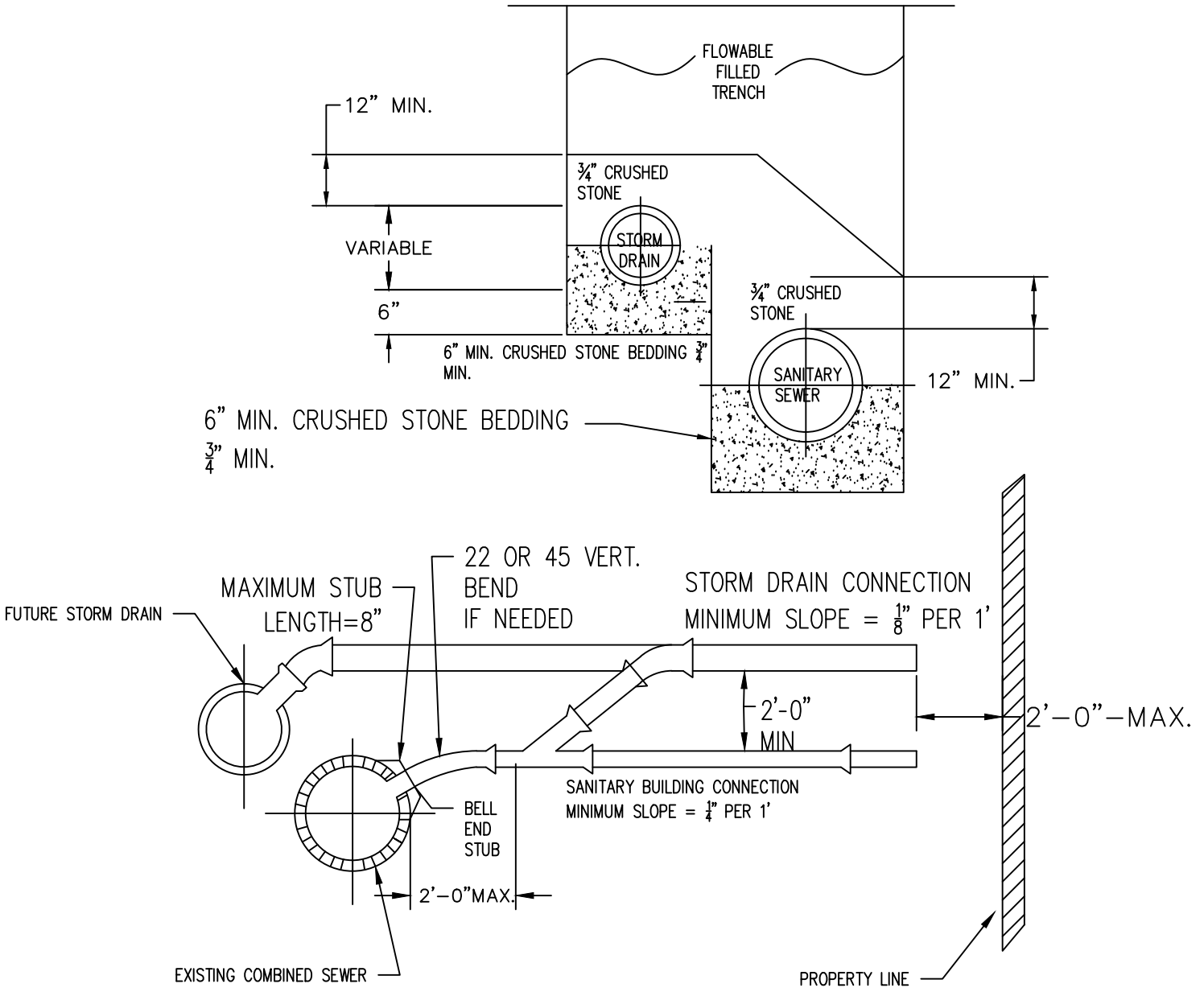
SECTION A-A

INSIDE DROP MANHOLE DETAIL

NTS

SEWER CONNECTION (DETAIL 1)

NTS

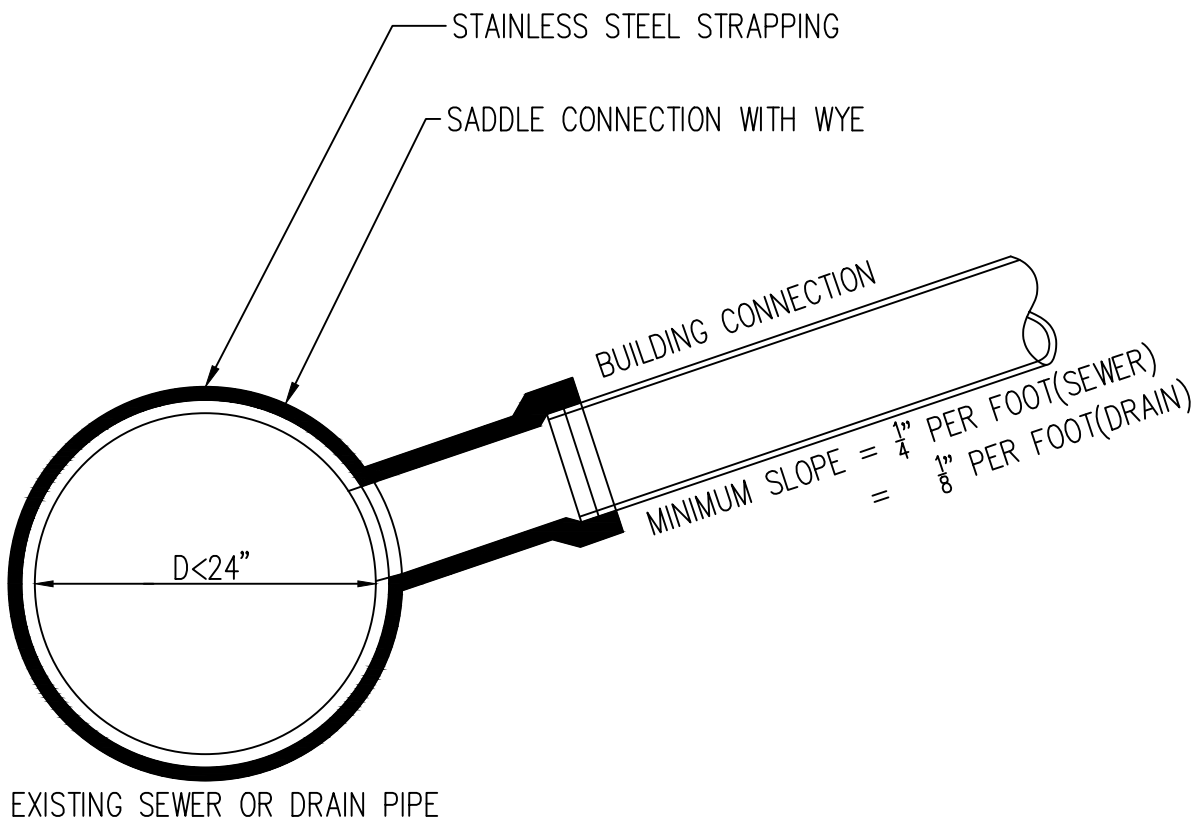


NOTES:

1. ENCASE SEWER IN CONCRETE ONLY IF UNABLE TO ATTACH SADDLE CONNECTION
2. CONNECTION TO CLAY, PVC, CONCRETE AND IRON PIPES SHALL BE MADE BY CORING EXISTING CONDUIT AS INDICATED BELOW OR BY USING AN APPROVED GASKET SADDLE

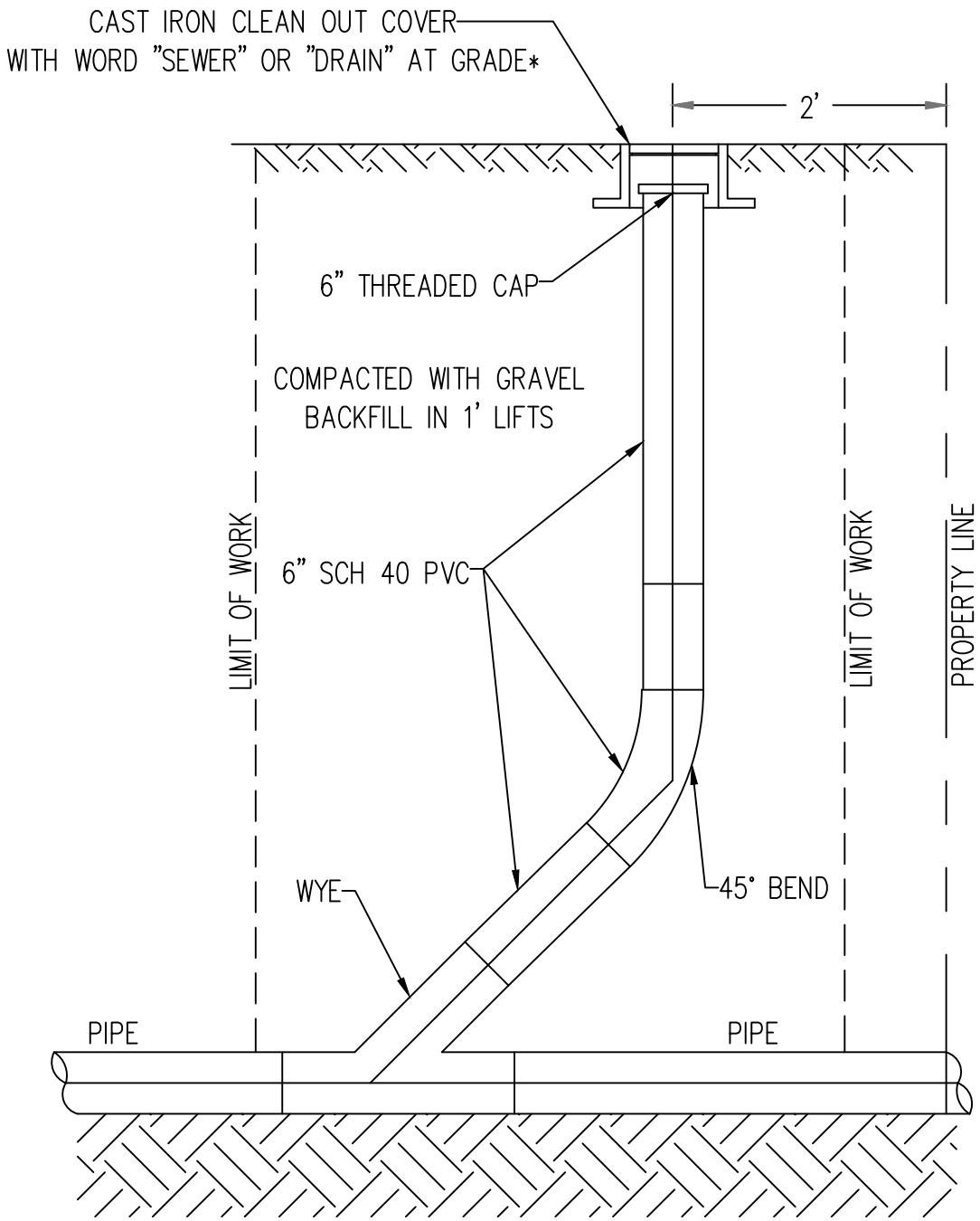
SEWER CONNECTION (DETAIL 2)

NTS



NOTES:

1. FULL PVC OR IRON SADDLE MAY BE USED TO CONNECT TO EXISTING PVC, CLAY, CONCRETE, OR IRON PIPE
2. SADDLES MUST HAVE RUBBER GASKETS AND SHALL BE TIGHTENED WITH STRAPS. SADDLES WILL NOT BE CEMENTED ONTO THE PIPE
3. FULL WYE CONNECTION FITTINGS MAY BE USED
4. PIPE SHALL BE CORED TO CONFORM TO THE OPENING IN THE SADDLE
5. CONNECTIONS DIRECTLY INTO THE EXISTING PIPE WITHOUT A SADDLE OR A FULL WYE FITTING ARE NOT ALLOWED, UNLESS APPROVED BY THE CITY ENGINEER



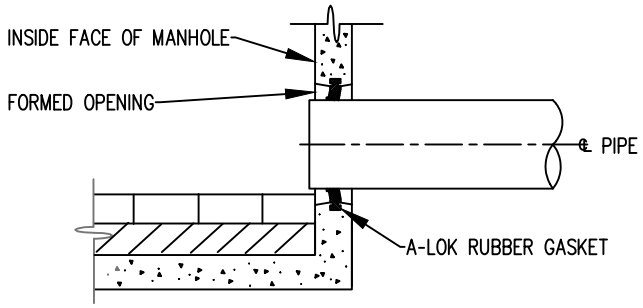
* All CASTINGS SHALL BE MADE IN THE USA

SERVICE CLEAN OUT

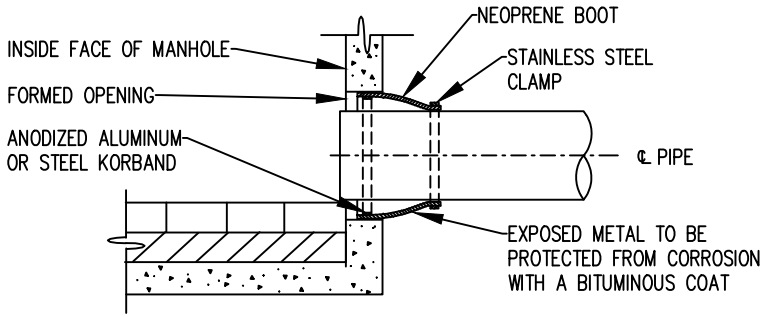
NTS

SEWER LINE CONNECTIONS

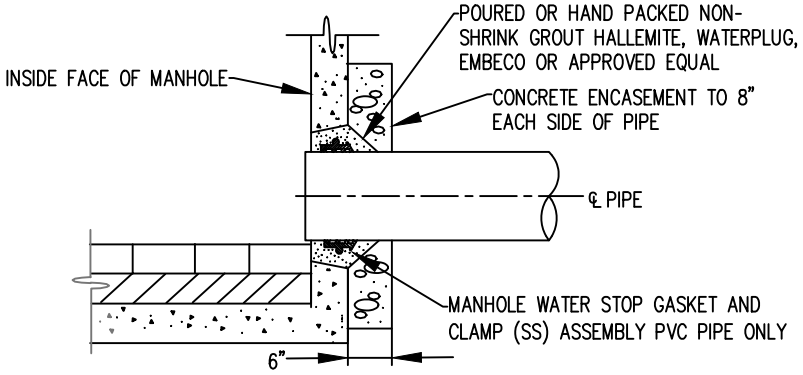
NTS



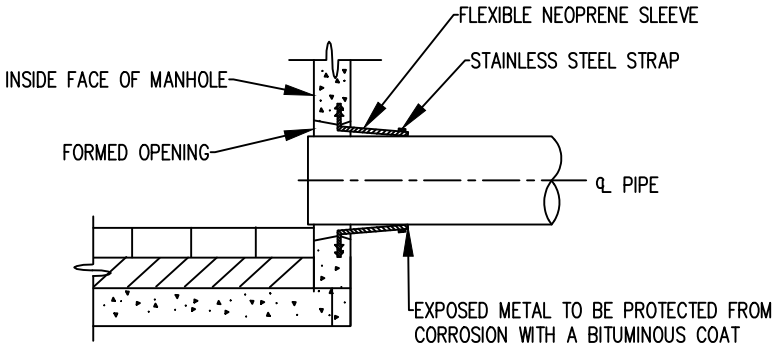
A-LOK SYSTEM



KOR-N-SEAL BOOT



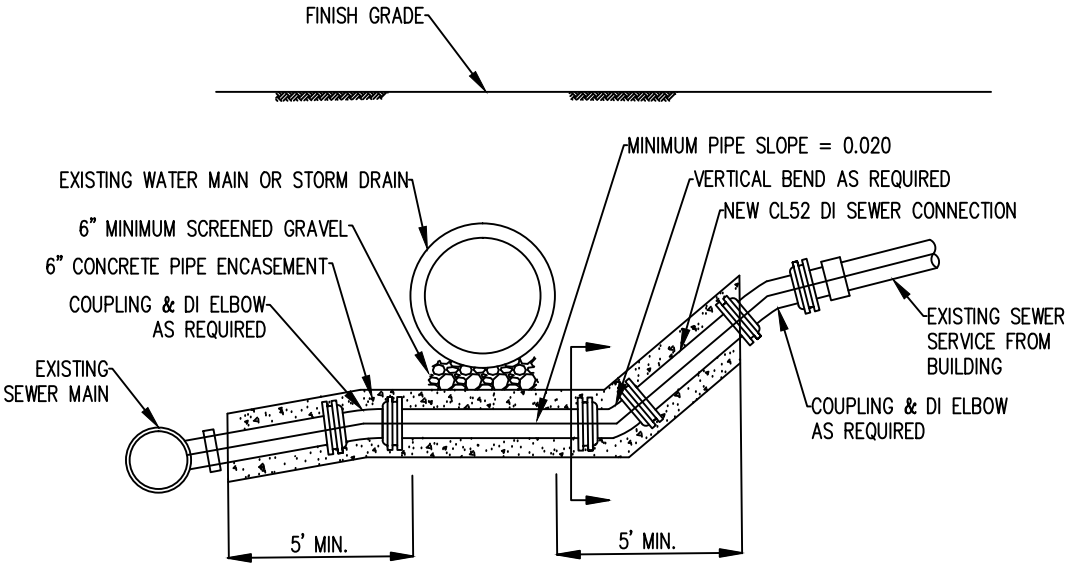
CONCRETE ENCASEMENT



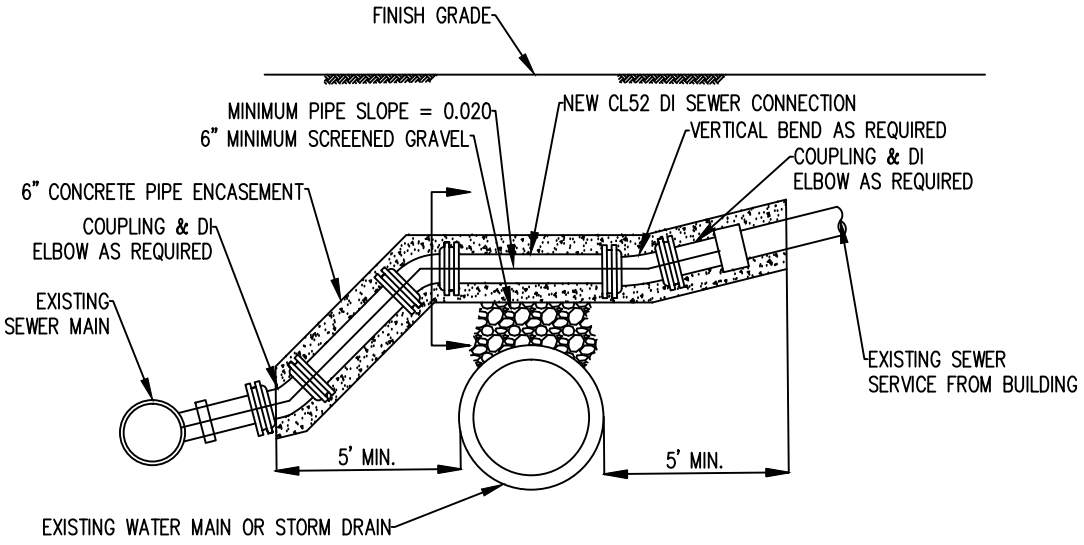
FLEXIBLE SLEEVE

SEWER SERVICE CROSSING
WATER MAIN OR STORM DRAIN

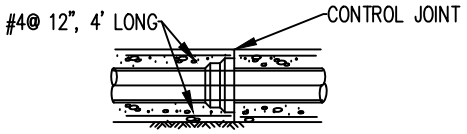
NTS



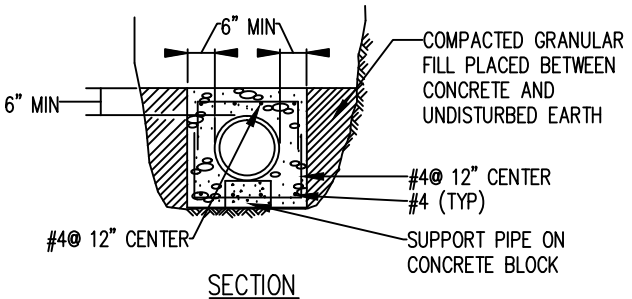
METHOD A



METHOD B



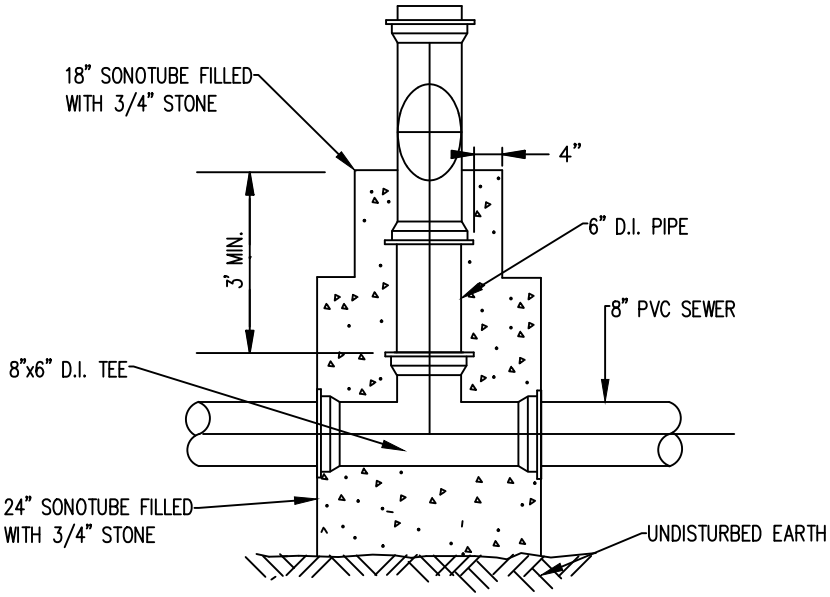
PLAN



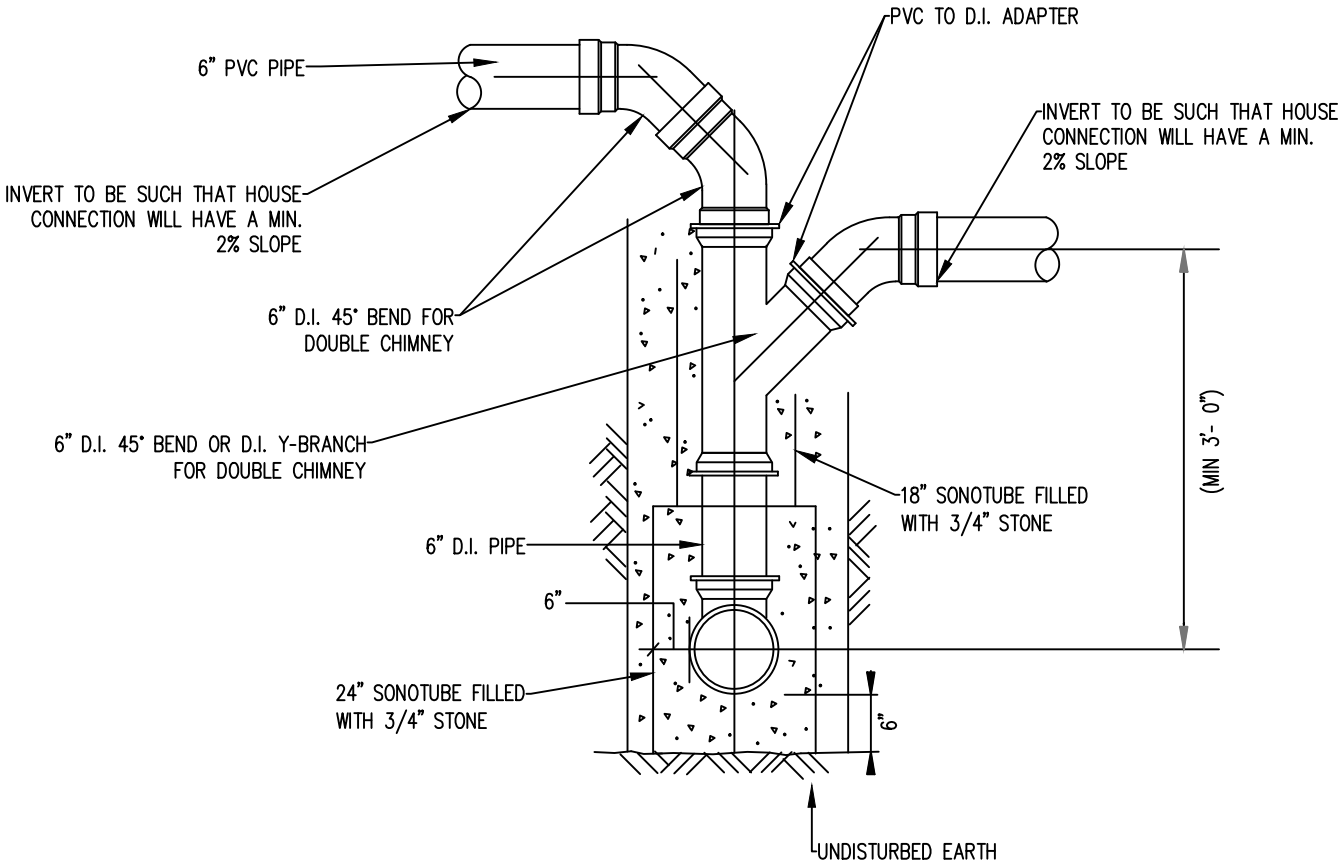
SECTION

NOTES:

1. CONTROL JOINTS AND PIPE JOINTS FOR ARCHES AND ENCASEMENT SHALL COINCIDE FOR SPACING. MAX. DISTANCE BETWEEN CONTROL JOINTS SHALL BE 24'.
2. REINFORCING STEEL TO BE USED ONLY WHEN DEPTH OF COVER TO TOP OF SURFACE OF CONCRETE IS 5'-0" OR LESS.
3. WHEN CONNECTING DI SERVICE CONNECTION TO NEW SEWER, INSTALL PVC WYE BRANCH AND 6" PVC NIPPLE PIECE (LENGTH AS REQUIRED). CONNECT 6" DI SEWER TO NIPPLE PIECE WITH COUPLING AS REQUIRED.
4. ENGINEER TO VERIFY CLASS OF PIPE. CLASS 52 IS THE MIN CLASS OF PIPE. PRICE CALCULATE TO OUNCE FOR REVIEW.



PLAN



SECTION

NOTES:
D.I. PIPE USED FOR CONSTRUCTION OF CHIMNEYS SHALL BE CLASS 52

CHIMNEY

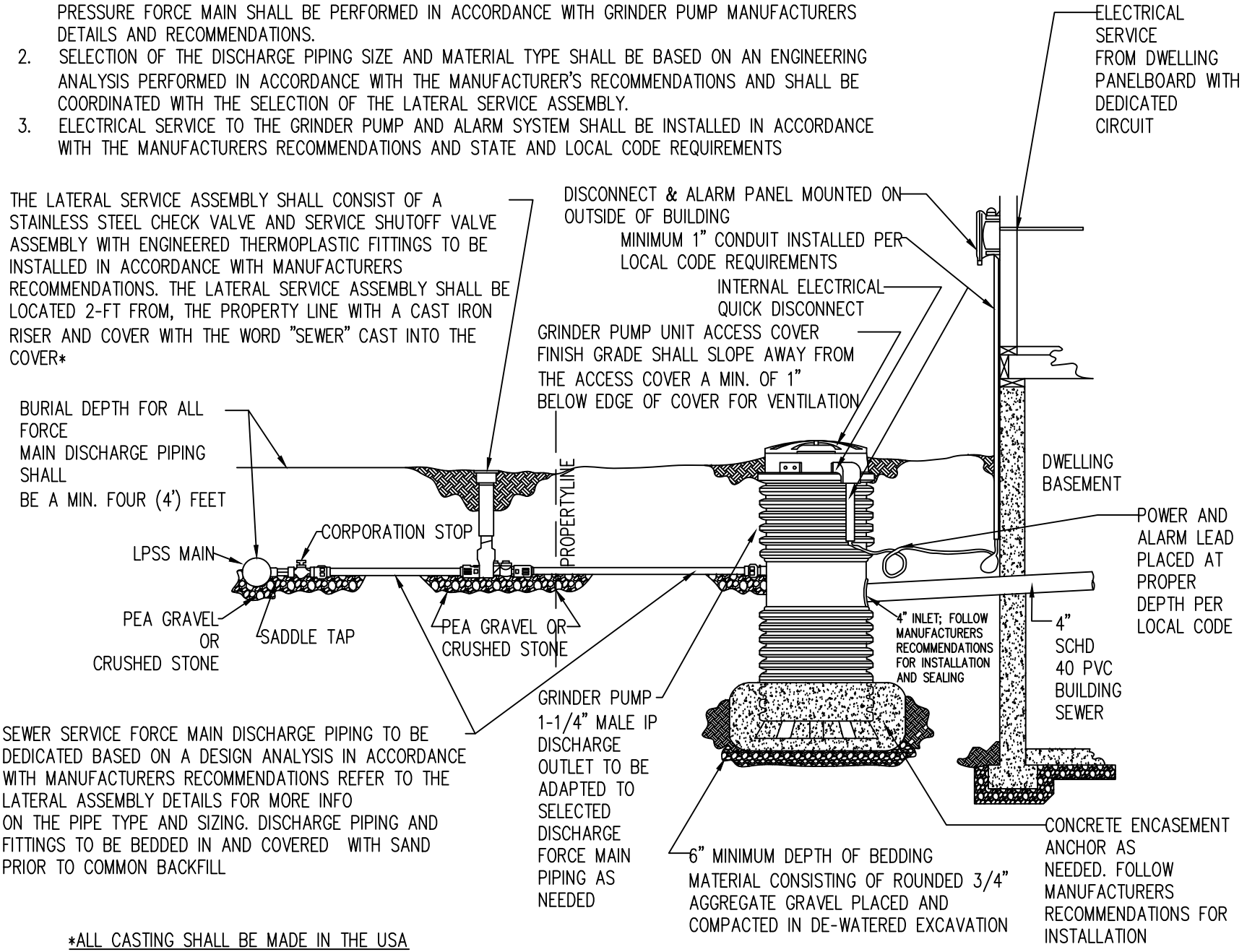
NTS

TYPICAL GRINDER PUMP AND LATERAL ASSEMBLY INSTALLATION

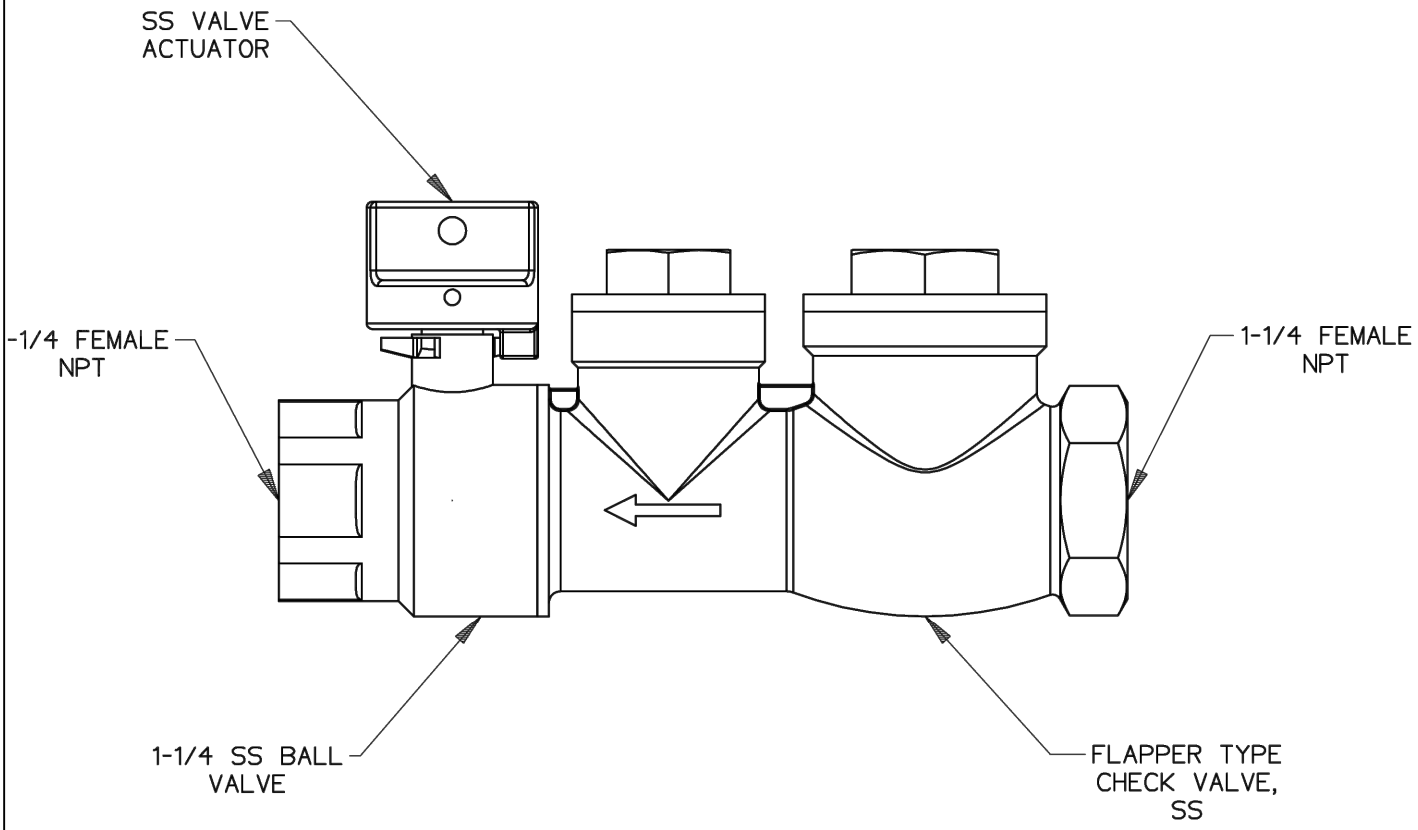
NTS

NOTES TO INSTALLER

1. ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE GRINDER PUMP ELECTRICAL SERVICE, INLET SANITARY PIPING, DISCHARGE PIPING, LATERAL SERVICE ASSEMBLY, AND CONNECTION TO THE LOW PRESSURE FORCE MAIN SHALL BE PERFORMED IN ACCORDANCE WITH GRINDER PUMP MANUFACTURERS DETAILS AND RECOMMENDATIONS.
2. SELECTION OF THE DISCHARGE PIPING SIZE AND MATERIAL TYPE SHALL BE BASED ON AN ENGINEERING ANALYSIS PERFORMED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND SHALL BE COORDINATED WITH THE SELECTION OF THE LATERAL SERVICE ASSEMBLY.
3. ELECTRICAL SERVICE TO THE GRINDER PUMP AND ALARM SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND STATE AND LOCAL CODE REQUIREMENTS



*ALL CASTING SHALL BE MADE IN THE USA



PART IS A BALL VALVE CURB STOP WITH FEMALE PIPE THREADS,
VALVE POSITION STOPS (OPEN/CLOSED), AND INTEGRAL CHECK VALVE
MATERIAL: STAINLESS STEEL

PRESSURE RATING: 235 PSI

TO ORDER SS LATERAL, NO FITTINGS
USE PART NUMBER NB0184P01

NOTES:

1. FOR SS FITTING INTO SS THREAD, USE PIPE DOPE OR TEFLON TAPE, NOT BOTH
2. FOR PLASTIC FITTINGS INTO SS THREAD, USE BOTH PIPE DOPE AND 2 LAYERS OF TEFLON TAPE

SGS	DN	09/20/11	A	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

eone
SEWER SYSTEMS

STAINLESS STEEL LATERAL ASSEMBLY
NO FITTINGS

NA0330P05

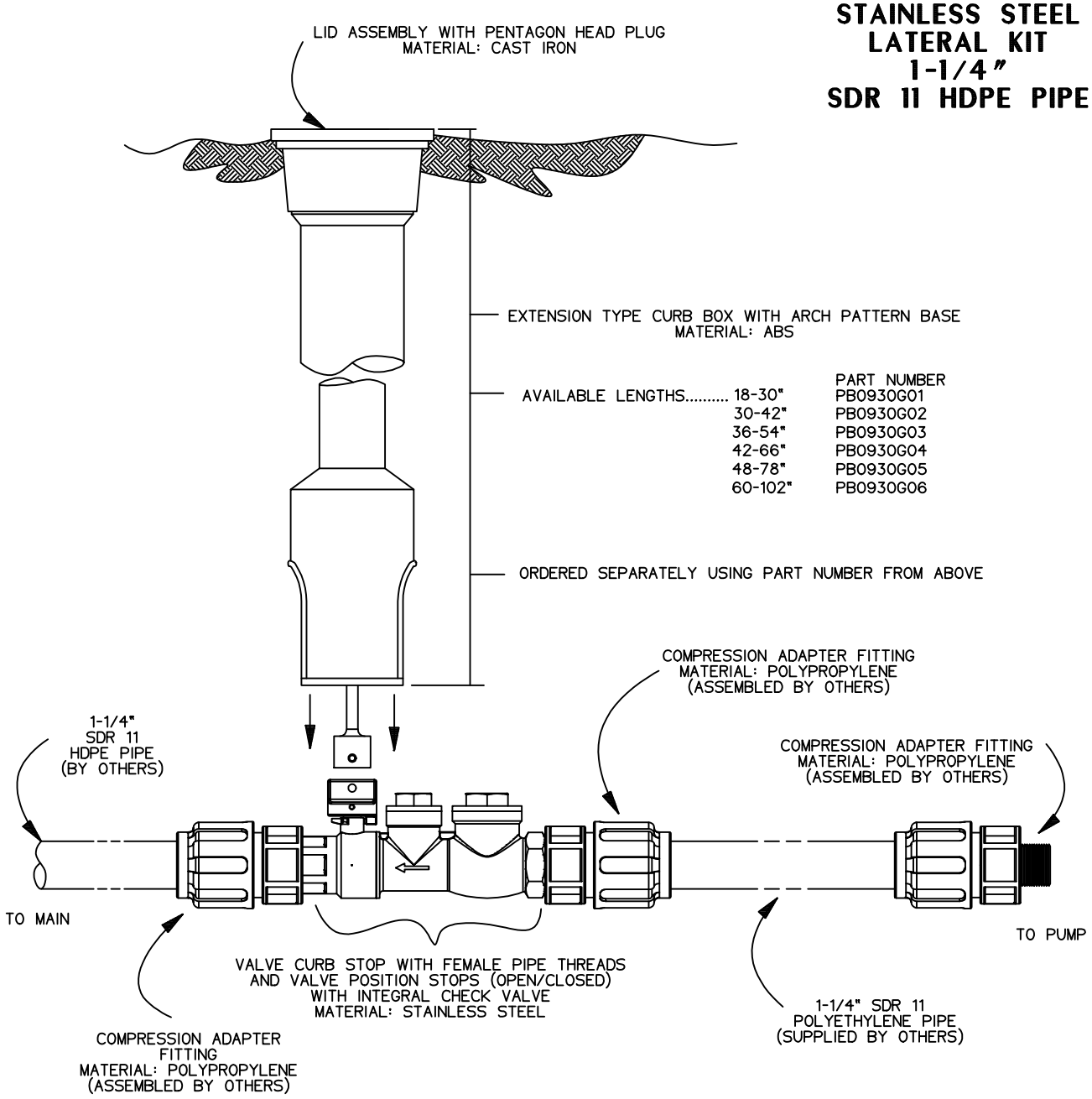
lighting the way NB new bedford

STAINLESS STEEL LATERAL ASSEMBLY

NO FITTINGS

NTS

STAINLESS STEEL LATERAL KIT 1-1/4" SDR 11 HDPE PIPE



NOTES:

1. SS CURB STOP/CHECK VALVE AND FITTINGS ARE PROVIDED SEPARATELY, TO BE ASSEMBLED BY OTHERS
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S INSTRUCTIONS
   *FOR SS FITTING INTO SS THREAD, USE PIPE DOPE OR TEFLON TAPE, NOT BOTH
3. ASSEMBLY IS TO BE PRESSURE TESTED (BY OTHERS)
4. ASSEMBLY IS TO BE USED WITH SDR11 HDPE PIPE
5. TO ORDER SS LATERAL KIT, USE PART NUMBER NC0193G01
6. CURB BOX IS TO BE ORDERED SEPARATELY, SEE ABOVE

KIT PARTS ARE NOT ASSEMBLED

SGS	DN	11/02/11	B	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

SEWER SYSTEMS

STAINLESS STEEL LATERAL KIT
1-1/4" SDR 11 HDPE PIPE

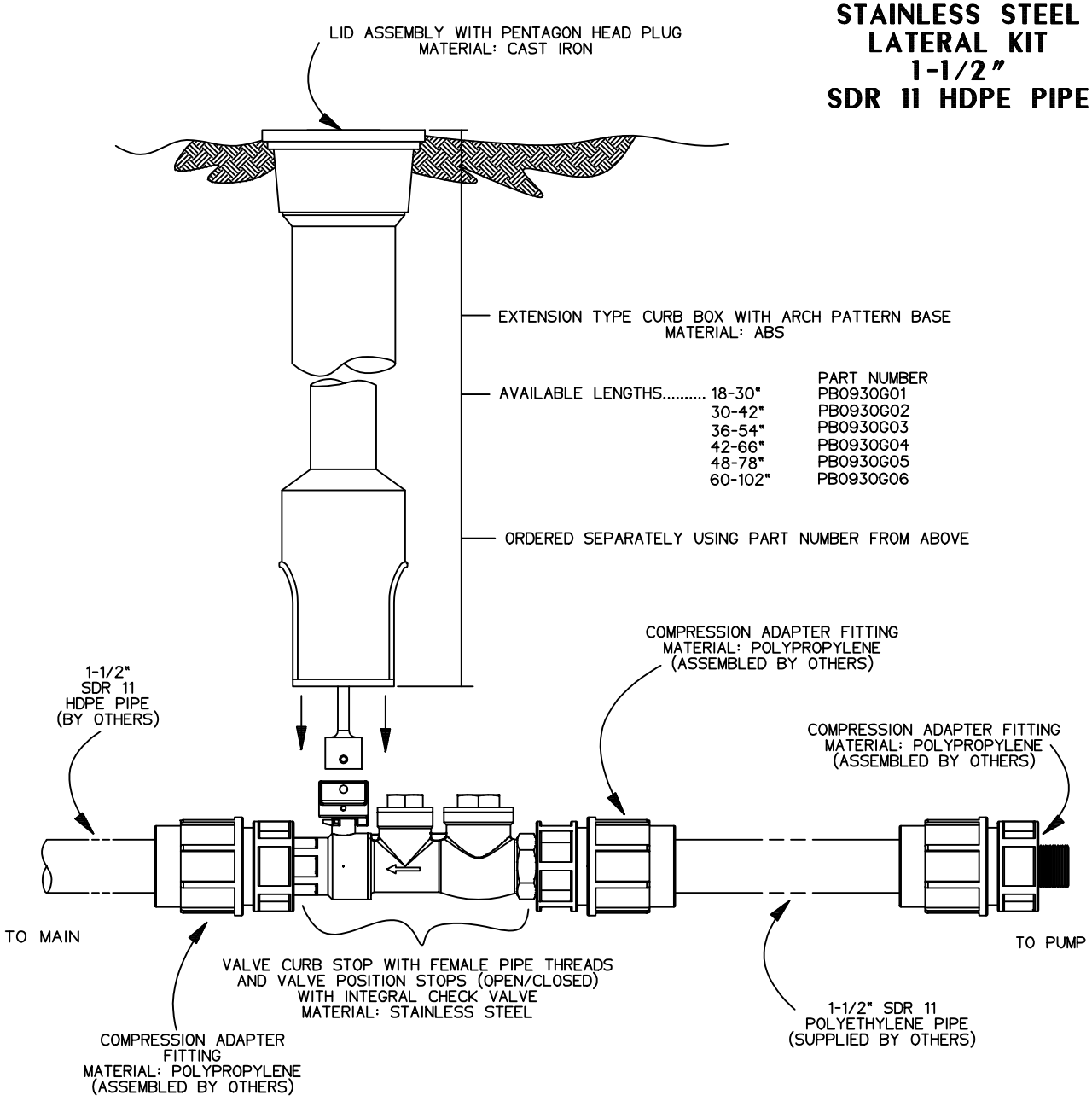
NA0330P02

STAINLESS STEEL LATERAL KIT

1-1/4"

NTS

STAINLESS STEEL LATERAL KIT 1-1/2" SDR 11 HDPE PIPE



NOTES:

1. SS CURB STOP/CHECK VALVE AND FITTINGS ARE PROVIDED SEPARATELY, TO BE ASSEMBLED BY OTHERS
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S INSTRUCTIONS
   *FOR SS FITTING INTO SS THREAD, USE EITHER PIPE DOPE OR TEFLON TAPE, NOT BOTH
3. ASSEMBLY IS TO BE PRESSURE TESTED (BY OTHERS)
4. ASSEMBLY IS TO BE USED WITH SDR11 HDPE PIPE
5. TO ORDER SS LATERAL KIT, USE PART NUMBER NC0193G02
6. CURB BOX IS TO BE ORDERED SEPARATELY, SEE ABOVE

KIT PARTS ARE NOT ASSEMBLED

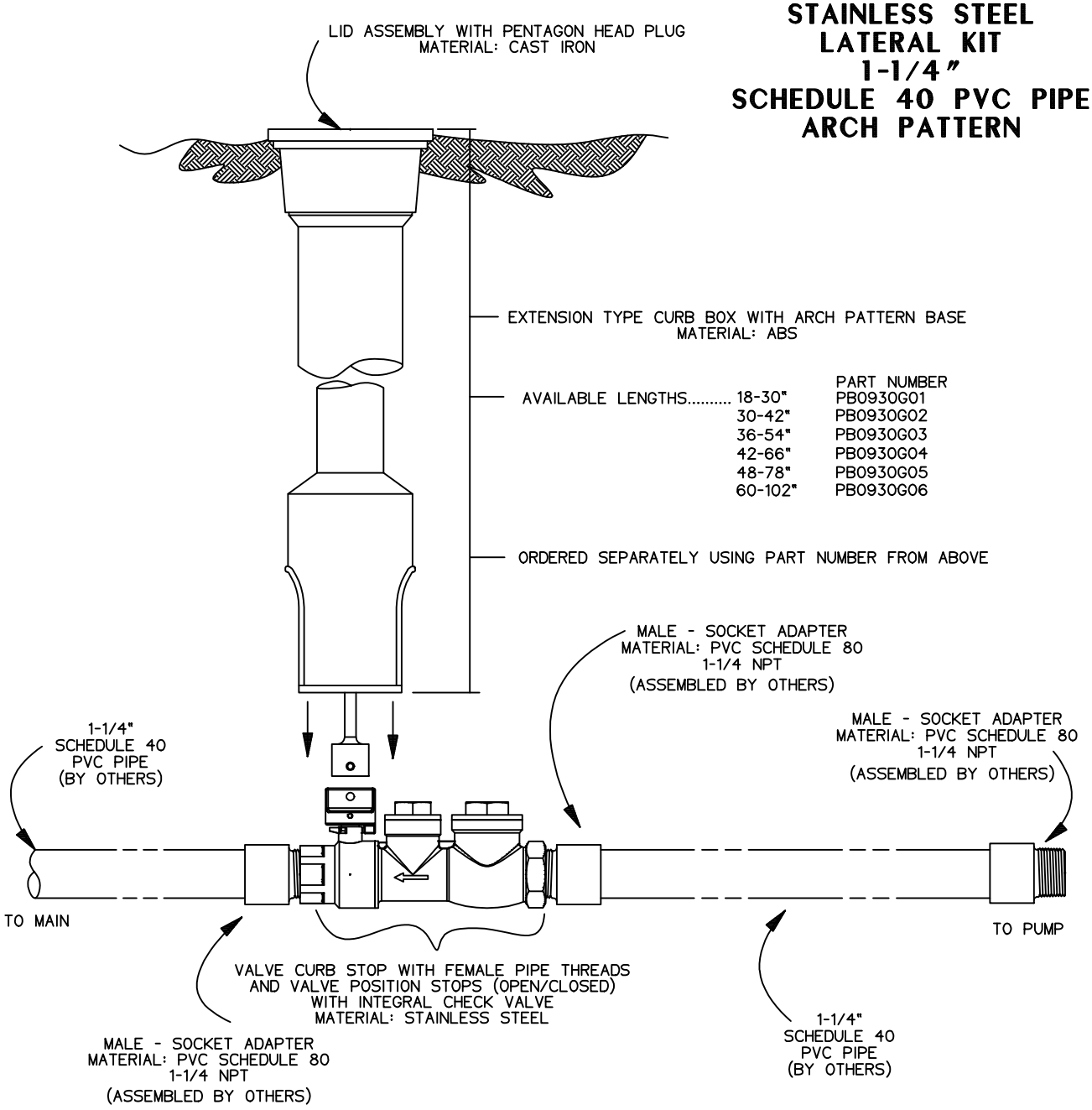
SGS	DN	11/02/11	B	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

eone SEWER SYSTEMS

STAINLESS STEEL LATERAL KIT
1-1/2" SDR 11 HDPE PIPE

NA0330P03

STAINLESS STEEL LATERAL KIT 1-1/4" SCHEDULE 40 PVC PIPE ARCH PATTERN



NOTES:

1. SS CURB STOP/CHECK VALVE AND FITTINGS ARE PROVIDED SEPARATELY, TO BE ASSEMBLED BY OTHERS
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S INSTRUCTIONS
   *FOR SS FITTING INTO SS THREAD, USE EITHER PIPE DOPE OR TEFLON TAPE, NOT BOTH
3. ASSEMBLY IS TO BE PRESSURE TESTED (BY OTHERS)
4. ASSEMBLY IS TO BE USED WITH SCHEDULE 40 PVC PIPE
5. TO ORDER SS LATERAL KIT, USE PART NUMBER NC0193G03
6. CURB BOX IS TO BE ORDERED SEPARATELY, SEE ABOVE

KIT PARTS ARE NOT ASSEMBLED

SGS	DN	11/02/11	C	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

eone SEWER SYSTEMS

STAINLESS STEEL LATERAL KIT
1-1/4" SCHEDULE 40 PIPE

NA0330P04

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STAINLESS STEEL LATERAL KIT
1-1/4" ARCH PATTERN

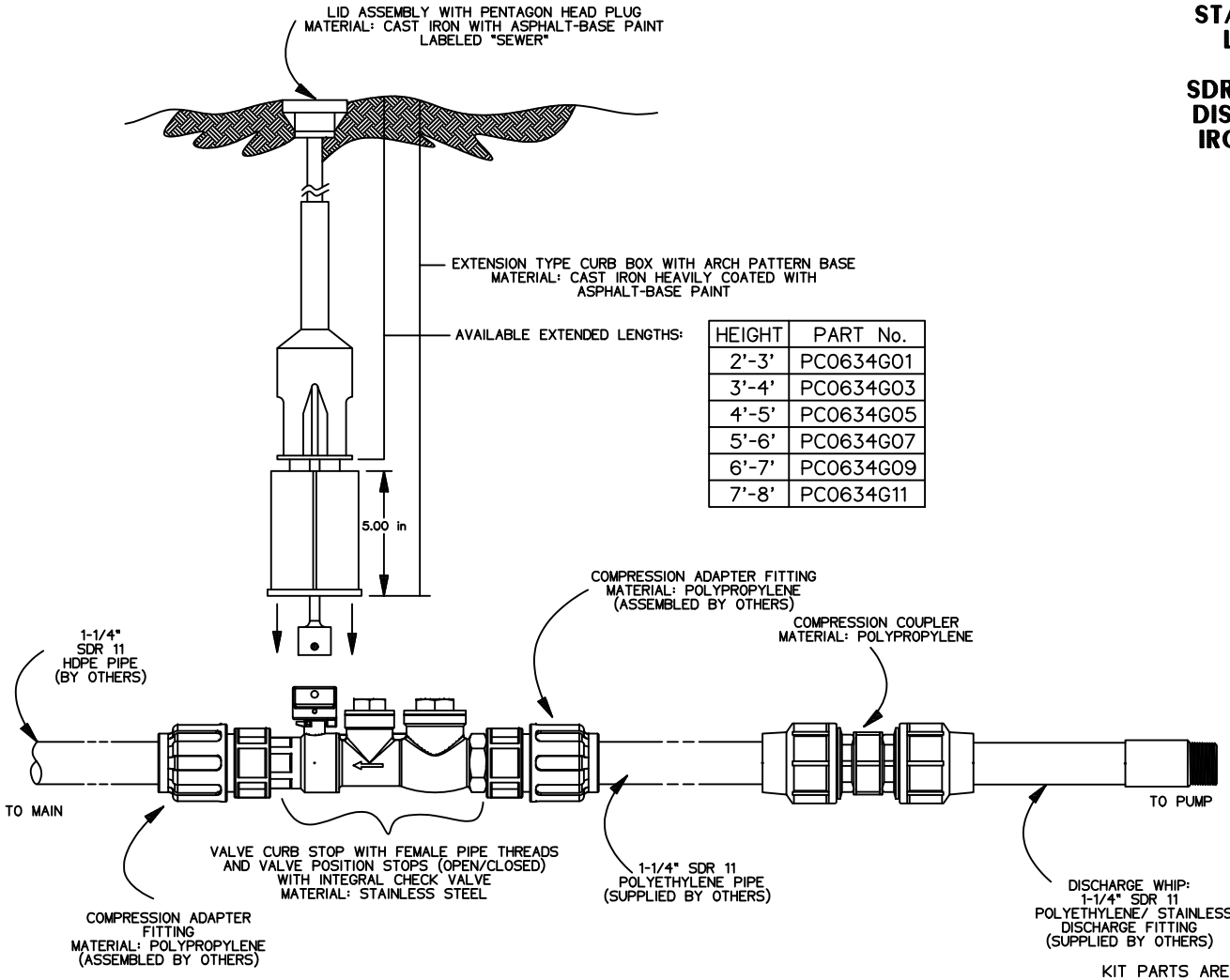
NTS

lighting the way new bedford

STAINLESS STEEL LATERAL KIT
1-1/4" SDR 11 HDPE PIPE

NTS

STAINLESS STEEL LATERAL KIT 1-1/4" SDR 11 HDPE PIPE DISCHARGE WHIP IRON CURB BOX



HEIGHT	PART No.
2'-3'	PC0634G01
3'-4'	PC0634G03
4'-5'	PC0634G05
5'-6'	PC0634G07
6'-7'	PC0634G09
7'-8'	PC0634G11

NOTES:

1. SS CURB STOP/CHECK VALVE AND FITTINGS ARE PROVIDED SEPARATELY, TO BE ASSEMBLED BY OTHERS
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S INSTRUCTIONS
3. ASSEMBLY IS TO BE PRESSURE TESTED (BY OTHERS)
4. ASSEMBLY IS TO BE USED WITH SDR11 HDPE PIPE
5. CURB BOX IS TO BE ORDERED SEPARATELY, SEE ABOVE

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	NA0184P01	VALVE ASM,LAT,SS,1-1/4 NPT
2	2	PA1365P01	ADAPTER, MALE,1-1/4"NPT X 1-1/4" SDR11
3	1	PA1836P05	DISCHARGE WHIP, 1-1/4" SS NPT X 1-1/4 PE
4	1	PA1864P02	COMPRESSION COUPLING, 1-1/4" X 1-1/4"

KIT PARTS ARE NOT ASSEMBLED

SGS	DN	02/18/14	1	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

eone SEWER SYSTEMS

STAINLESS STEEL LATERAL KIT
1-1/4", DISCH WHIP, COUPLING

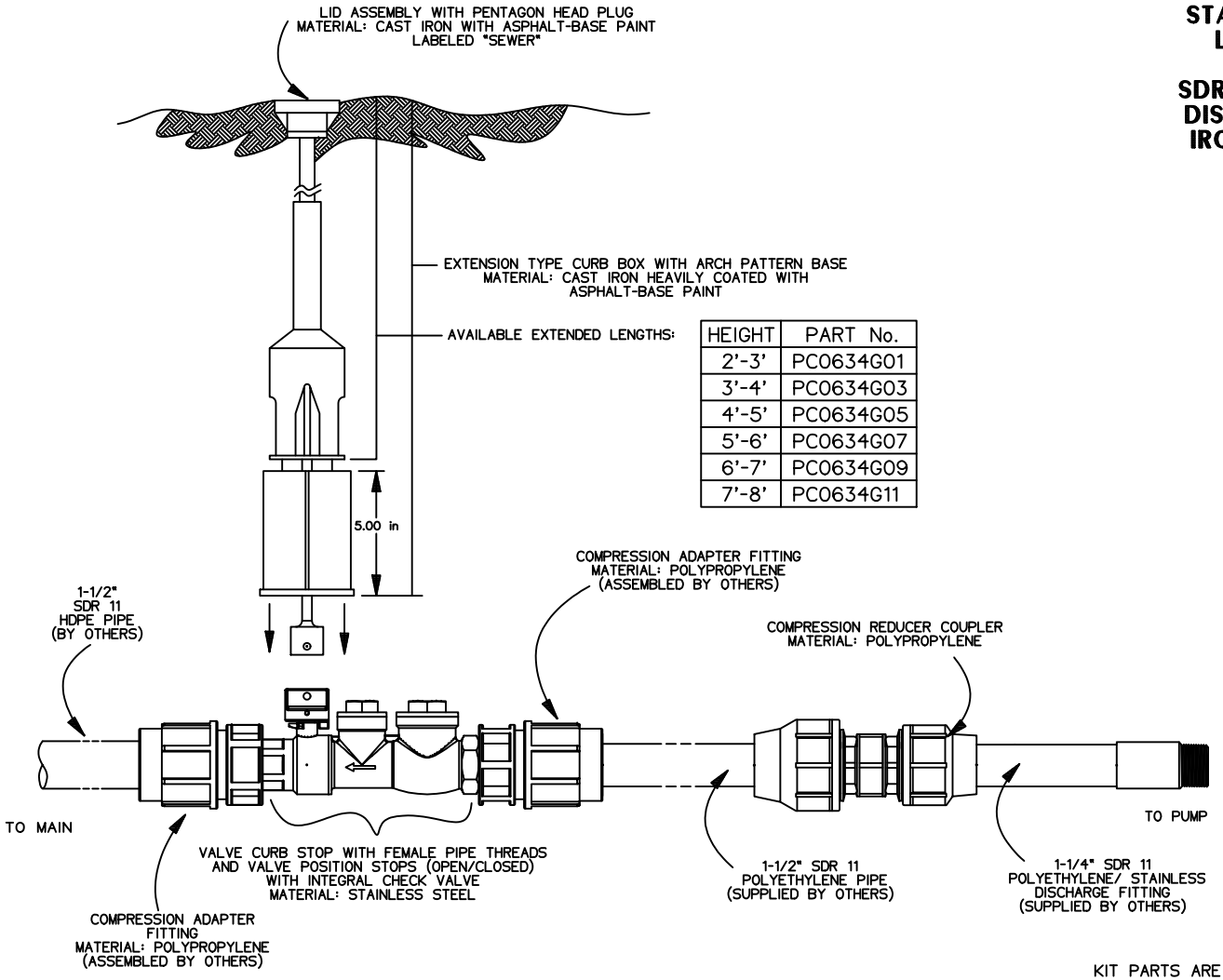
ESD 14-0020

lighting the way
new bedford

STAINLESS STEEL LATERAL KIT
1-1/2" SDR 11 HDPE PIPE
NTS

51

STAINLESS STEEL LATERAL KIT 1-1/2" SDR 11 HDPE PIPE DISCHARGE WHIP IRON CURB BOX



HEIGHT	PART No.
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3'-4'	PC0634G03
4'-5'	PC0634G05
5'-6'	PC0634G07
6'-7'	PC0634G09
7'-8'	PC0634G11

NOTES:

1. SS CURB STOP/CHECK VALVE AND FITTINGS ARE PROVIDED SEPARATELY, TO BE ASSEMBLED BY OTHERS
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S INSTRUCTIONS
3. ASSEMBLY IS TO BE PRESSURE TESTED (BY OTHERS)
4. ASSEMBLY IS TO BE USED WITH SDR11 HDPE PIPE
5. CURB BOX IS TO BE ORDERED SEPARATELY, SEE ABOVE

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	NA0184P01	VALVE ASM,LAT,SS,1-1/4 NPT
2	2	PA1365P03	ADAPTER, MALE,1-1/4"NPT X 1-1/2" SDR11
3	1	PA1836P05	DISCHARGE WHIP, 1-1/4" SS NPT X 1-1/4 PE
4	1	PA1864P01	COMPRESSION COUPLING, 1-1/2" X 1-1/4"

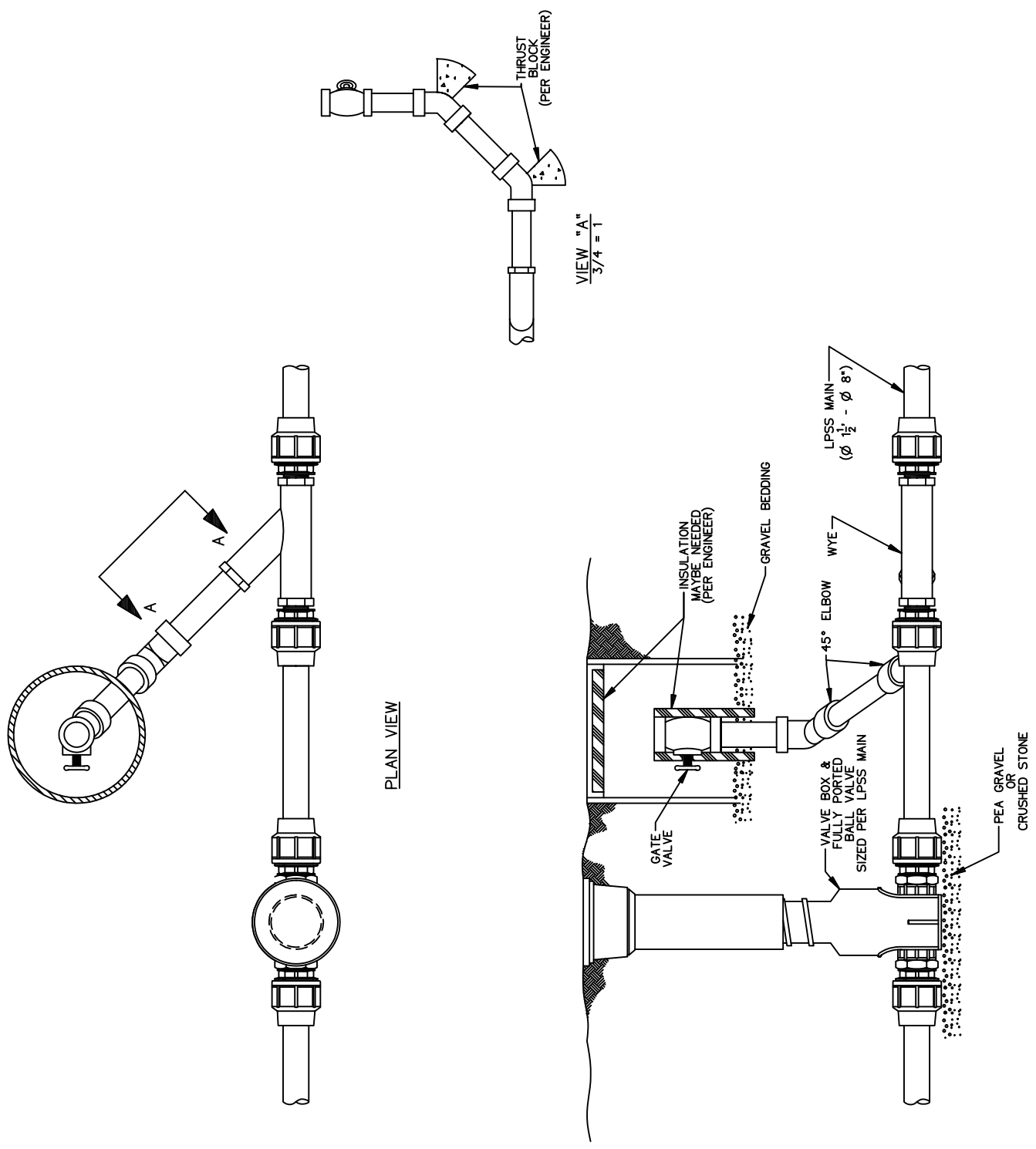
KIT PARTS ARE NOT ASSEMBLED

SGS	DN	08/19/13	1	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

e one
SEWER SYSTEMS

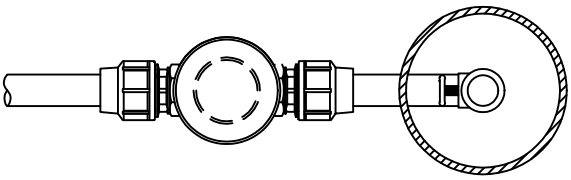
STAINLESS STEEL LATERAL KIT
1-1/2", DISCH WHIP, COUPLING

ESD 13-0091

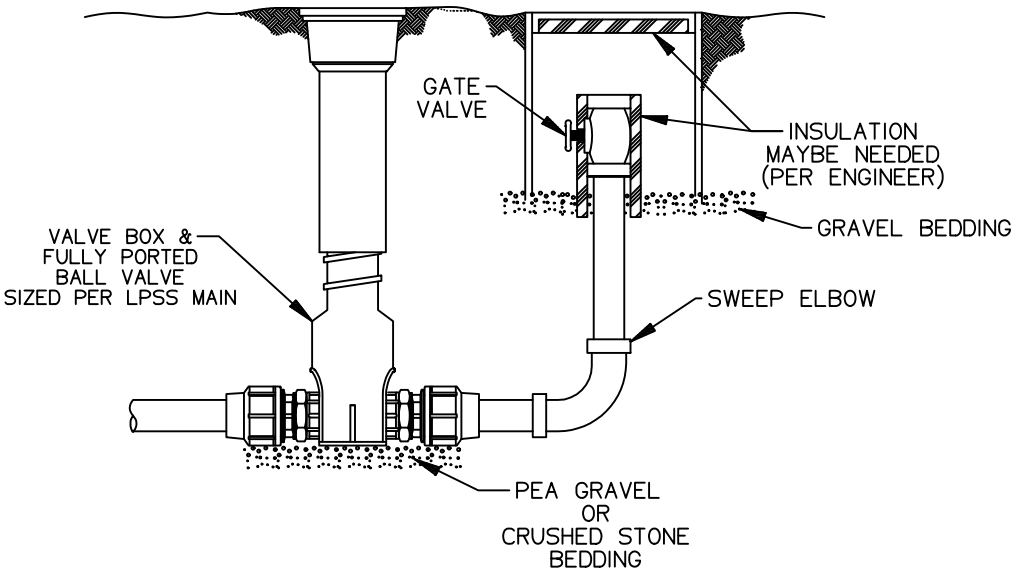


TYPICAL FLUSHING CONNECTION ON LPSS MAIN

NTS



PLAN VIEW



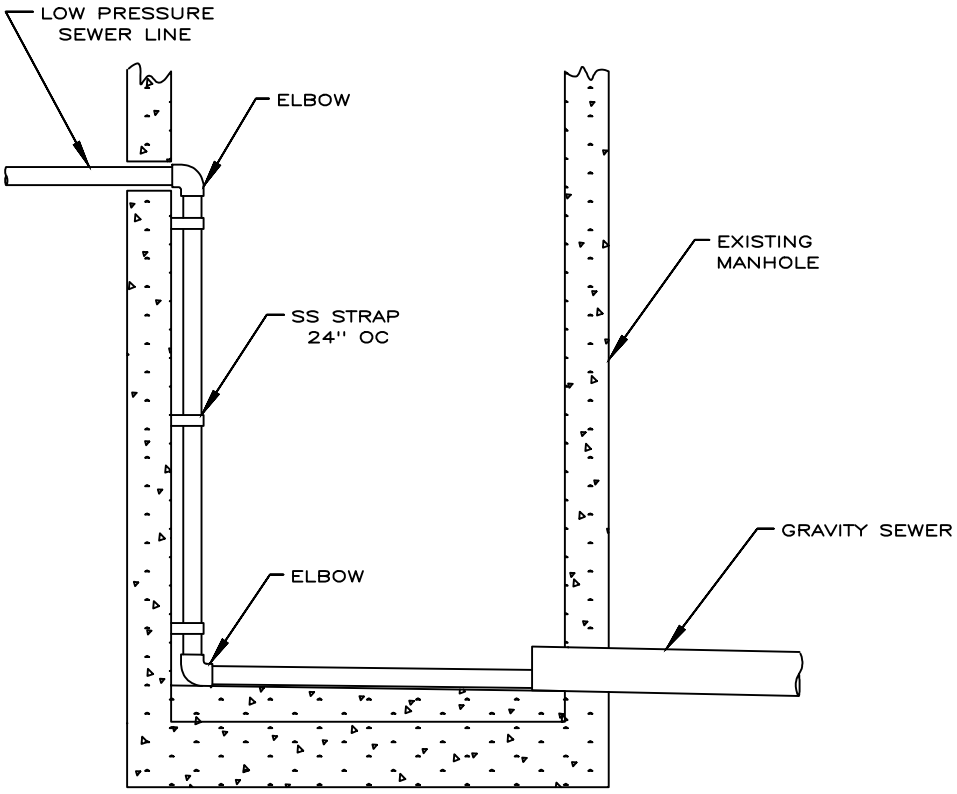
TYPICAL TERMINAL FLUSHING CONNECTION

SGS		05-13-10	1	1/32
DR BY	CHK'D	DATE	ISSUE	SCALE

eone SEWER SYSTEMS

TYPICAL TERMINAL
FLUSHING CONNECTION

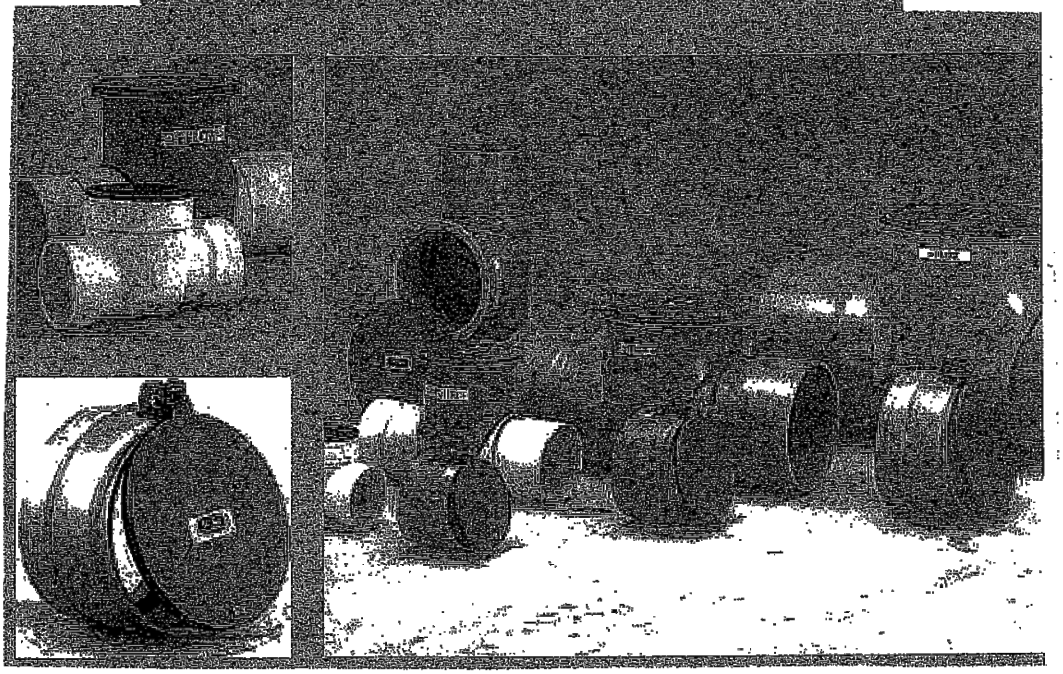
ESD 10-0094



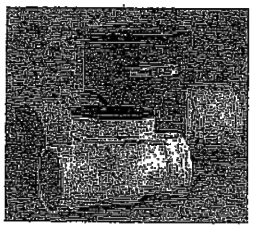
TYPICAL DROP CONNECTION
LPSS IN EXISTING MANHOLE

NTS

Backwater Valves
& Terminal Backwater Valves

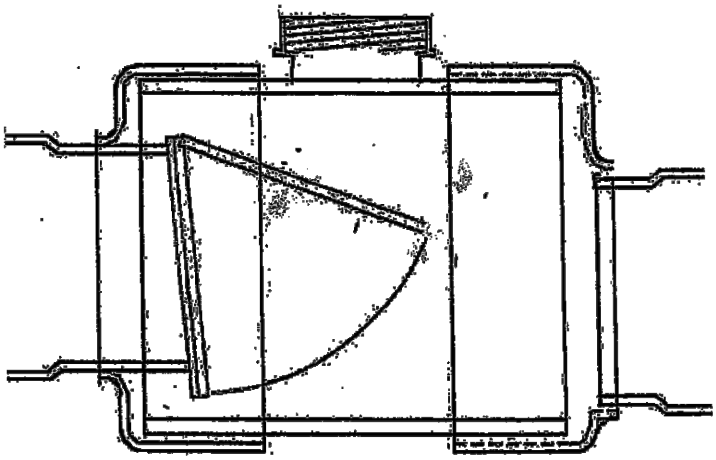


In Line Backwater Valve - *with Solvent Weld Sewer Hubs*



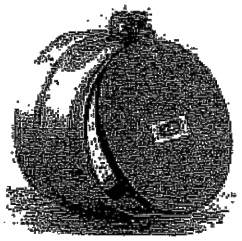
79ABWV04	79ABWV06
79ABWV08	79ABWV10
79ABWV12	79ABWV15
79ABWV18	79ABWV21
79ABWV24	79ABWV27
79ABWV30	79ABWV36

Also available in:
Sewer Gasket Bells
IPS Gasket Bells
IPS Solvent Weld Hubs
CIOD Gasket Bells



SDR35 PVC

Terminal Backwater Valve - *with Sewer Gasket Bell*



79ATBWV04G	79ATBWV06G
79ATBWV08G	79ATBWV10G
79ATBWV12G	79ATBWV15G
79ATBWV18G	79ATBWV21G
79ATBWV24G	79ATBWV27G
79ATBWV30G	79ATBWV36G

Also available in:
Sewer Gasket Bells
IPS Gasket Bells
IPS Solvent Weld Hubs
CIOD Gasket Bells

PLASTIC TRENDS .COM
ROYAL Building Products
56400 Mound Road, Shelby Township, MI 48316
Phone (586)781-2700 Fax (586)781-0888

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OR

EQUAL

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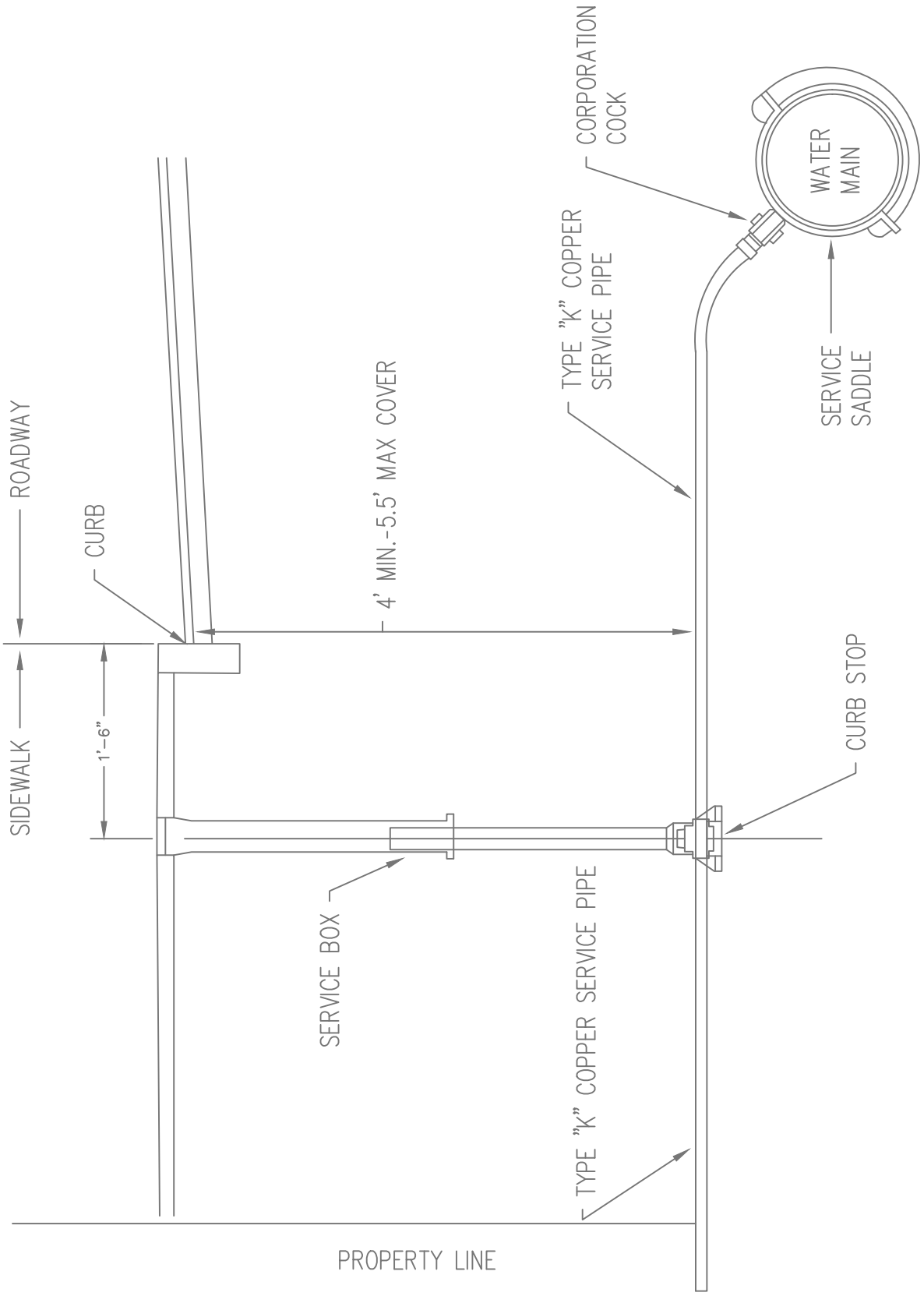
BACKWATER VALVES

NTS



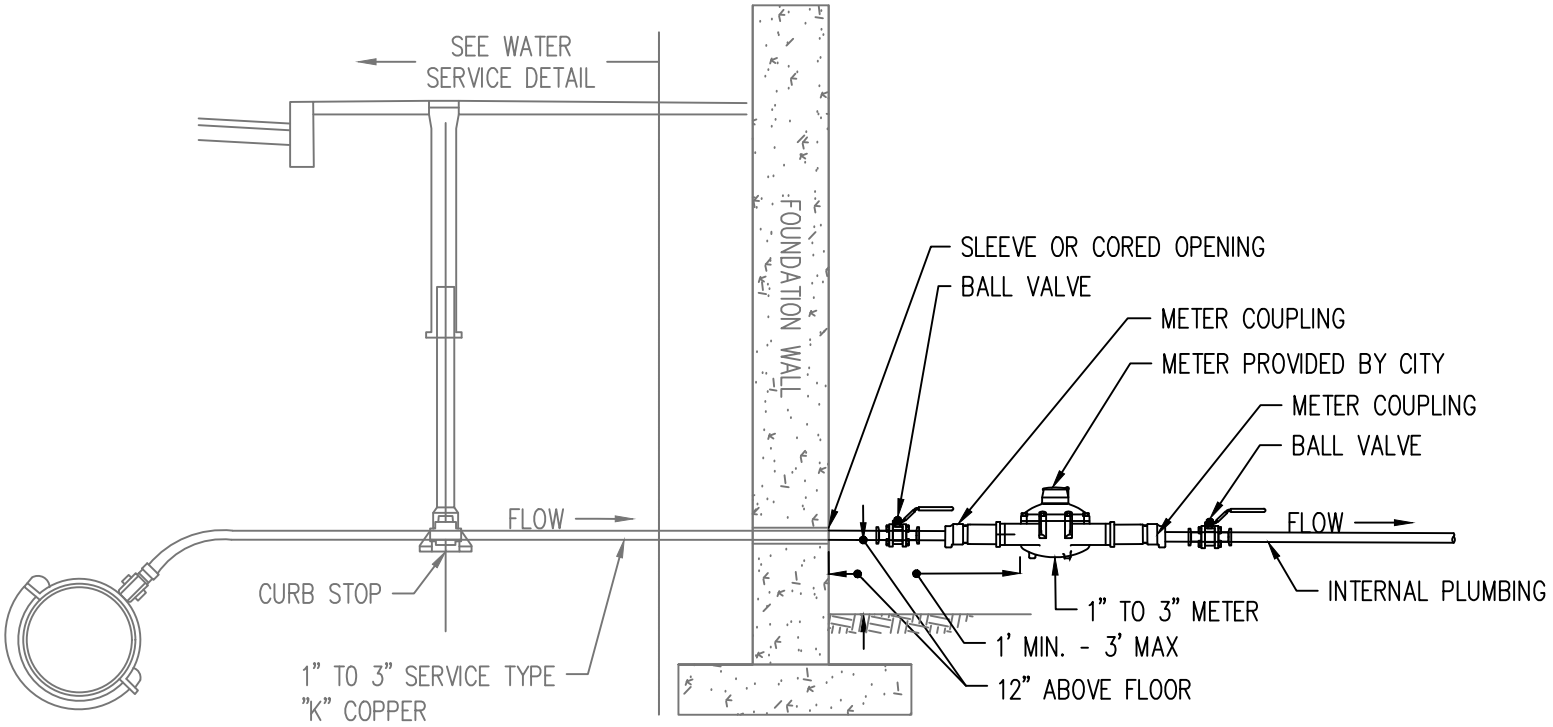
WATER SERVICE DETAIL

NTS

STANDARD WATER METER INSTALLATION

1" TO 3" SERVICE SIZE

NTS



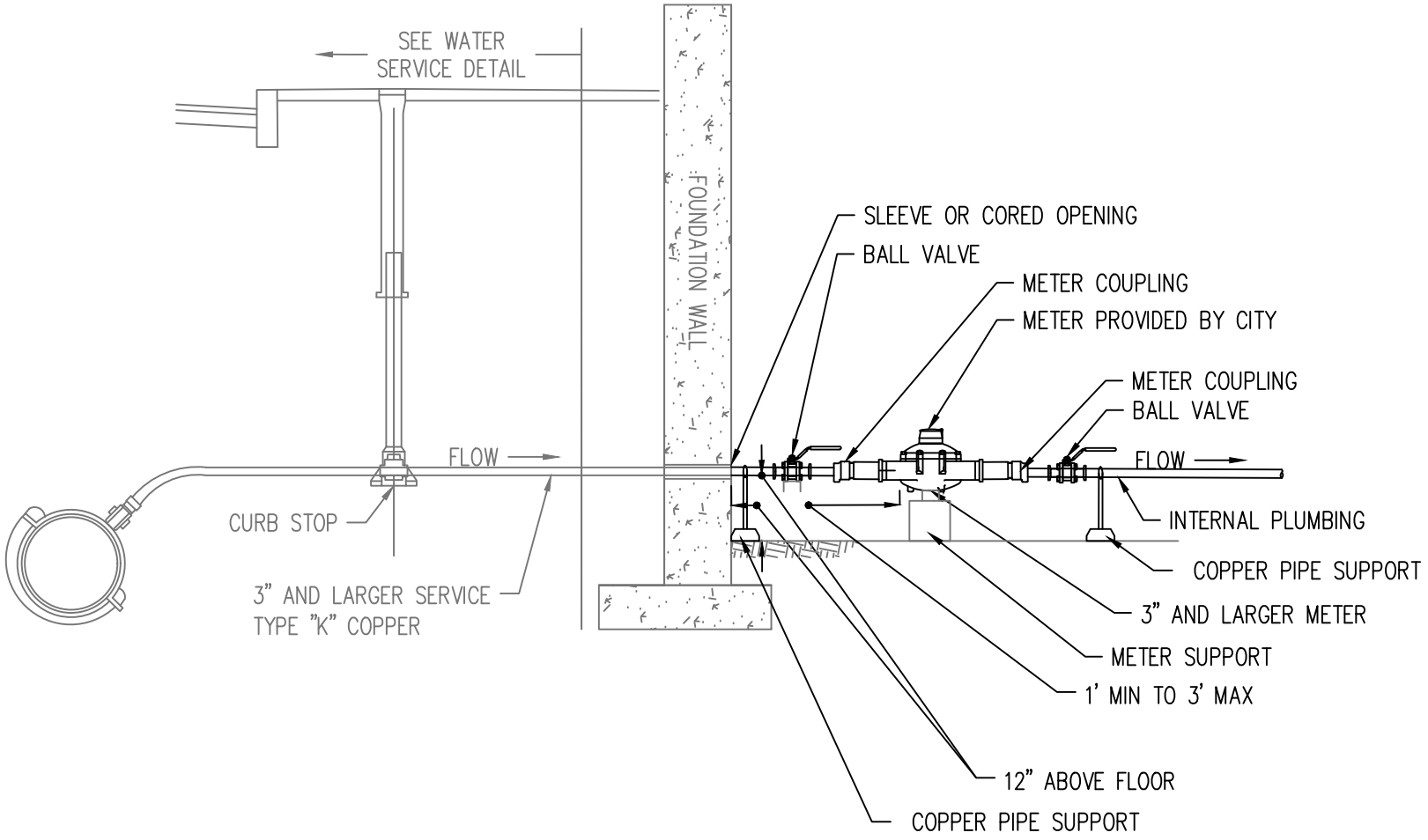
NOTES:

1. METER TO BE FURNISHED AND INSTALLED BY CITY. CITY WILL PROGRAM MIU.
2. METER SHALL BE SET IN THE HORIZONTAL POSITION.
3. DOMESTIC WATER METER SHALL BE 1", UNLESS OTHERWISE APPROVED BY THE CITY.
4. METER SHALL BE LOCATED IN ACCESSIBLE LOCATION AND AT THE POINT WHERE THE WATER SERVICE ENTERS THE STRUCTURE.
5. MANTAIN 12" FROM THE FLOOR, UNLESS OTHERWISE APPROVED BY THE OWNER.
6. CONNECTIONS PRIOR TO THE OUTLET SHUTOFF VALVE ARE PROHIBITED.
7. ALL FITTINGS AND VALVES THROUGH THE OUTLET SHUTOFF VALVE SHALL BE A BRASS OR BRONZE BODY. SOLDERING JOINTS ARE PROHIBITED. LEAD FITTINGS AND VALVES ARE PROHIBITED.
8. ELECTRICAL GROUND CLAMPS ARE NOT PERMITTED ON METER SET-UP OR PLUMBING.

STANDARD WATER METER INSTALLATION

3" AND LARGER SERVICE SIZE

NTS



NOTES:

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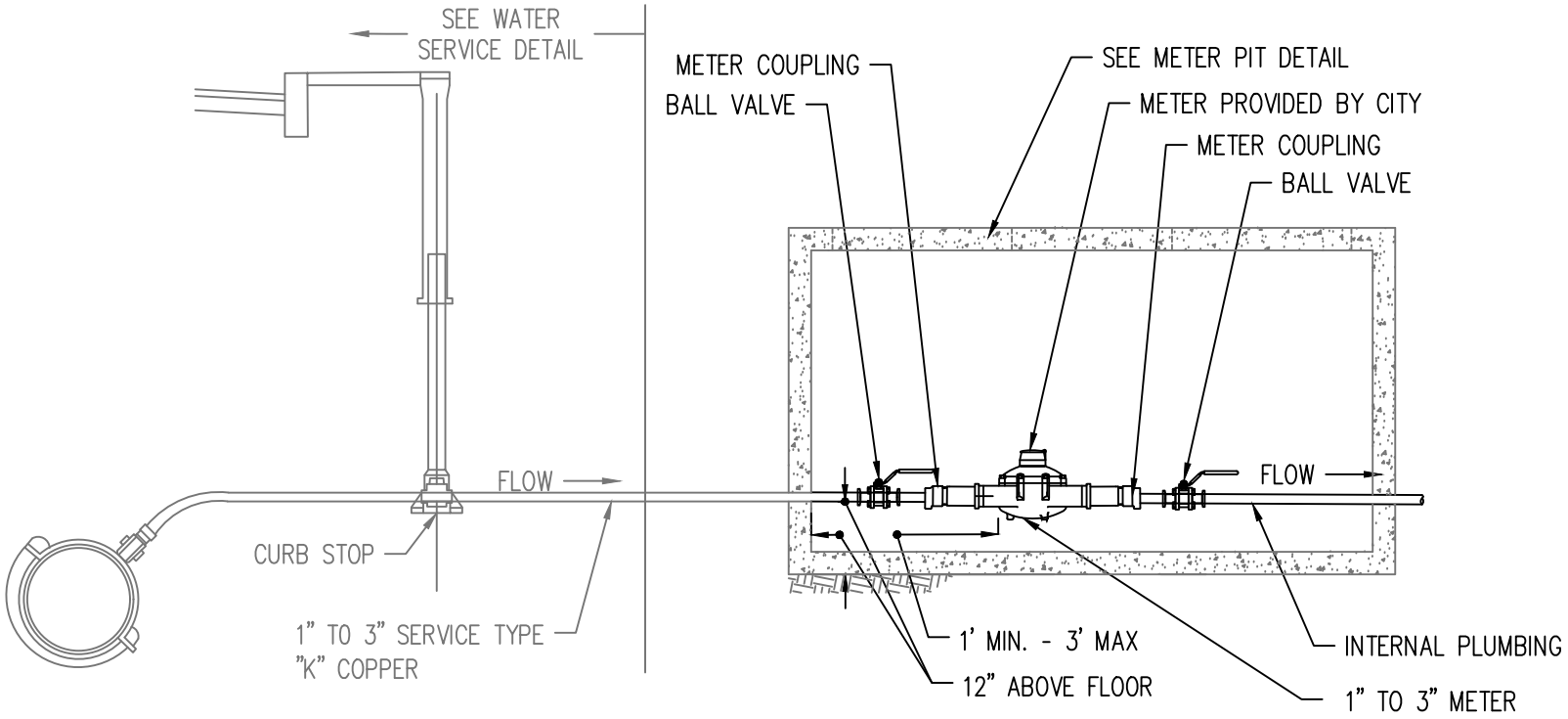
STANDARD WATER METER INSTALLATION

IN METER PIT 1" TO 3" SERVICE SIZE

NTS



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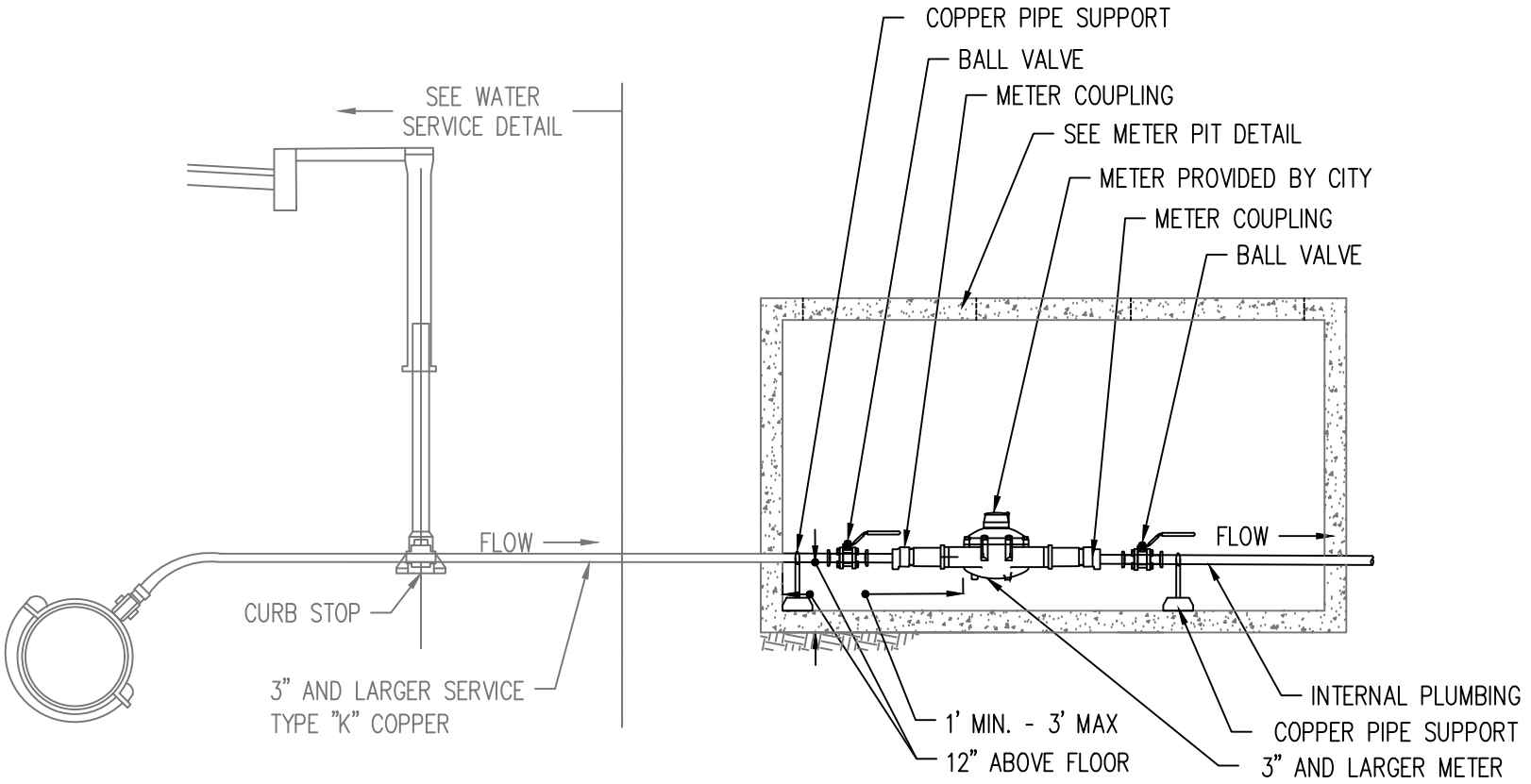
8. ELECTRICAL GROUND CLAMPS ARE NOT PERMITTED ON METER SET-UP OR PLUMBING.

STANDARD WATER METER INSTALLATION
IN METER PIT 3" AND LARGER SERVICE SIZE

NTS



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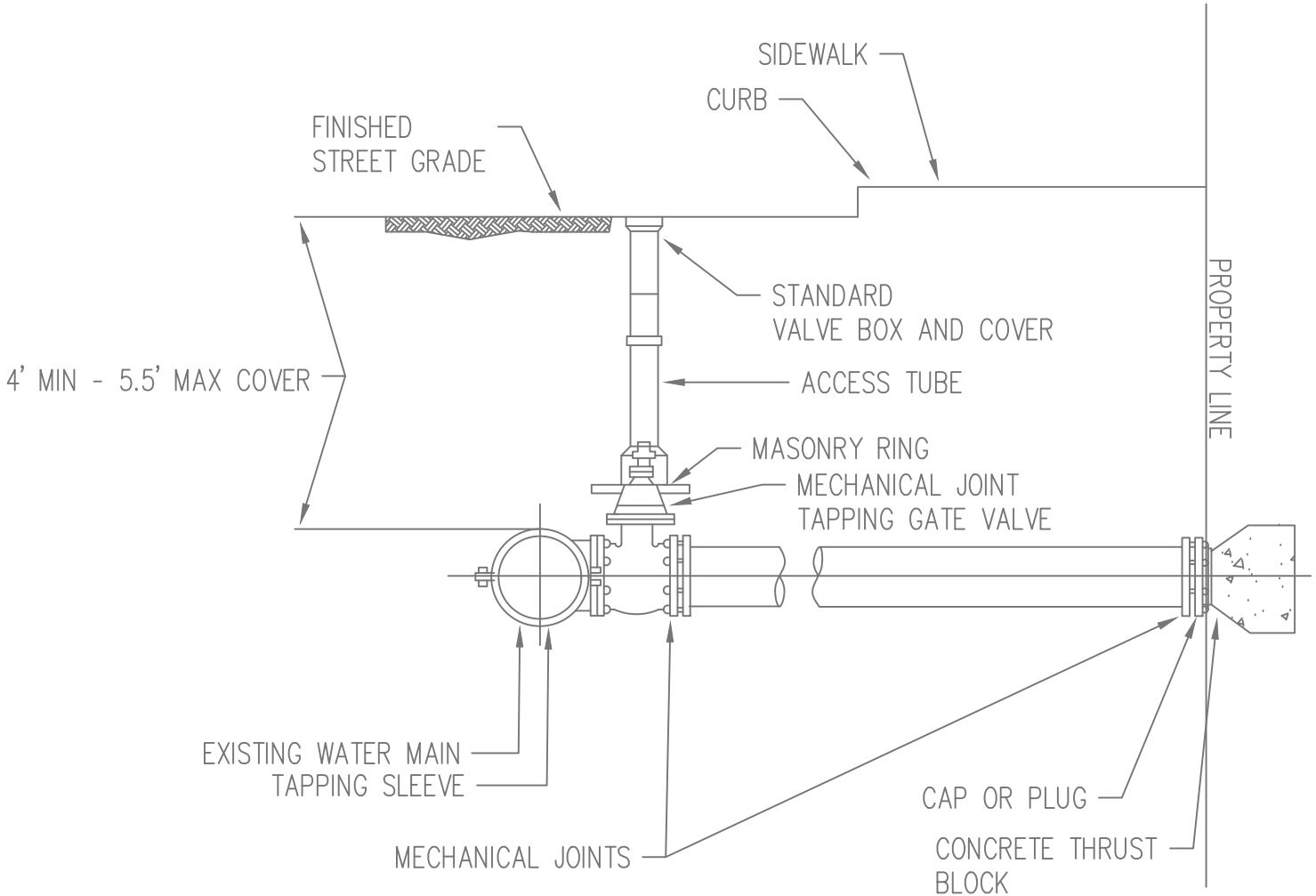
TAPPING SLEEVE AND GATE VALVE

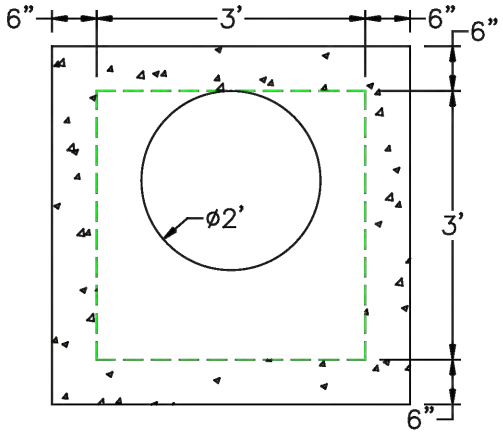
NTS

NOTES:

1. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BE ON UNDISTURBED EARTH
2. USE RE JOINT FITTINGS (MEGALUG OR APPROVED EQUAL) WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE
3. SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITION

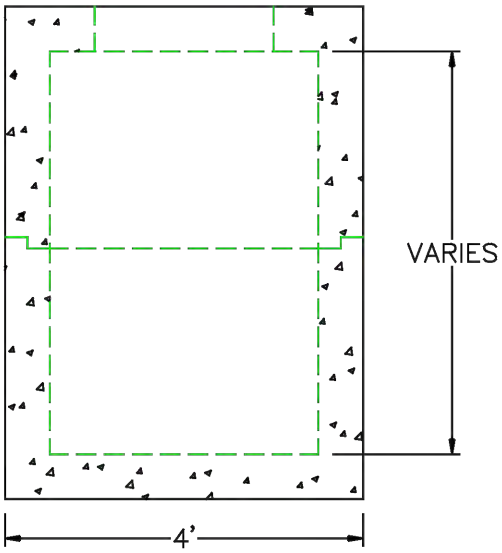


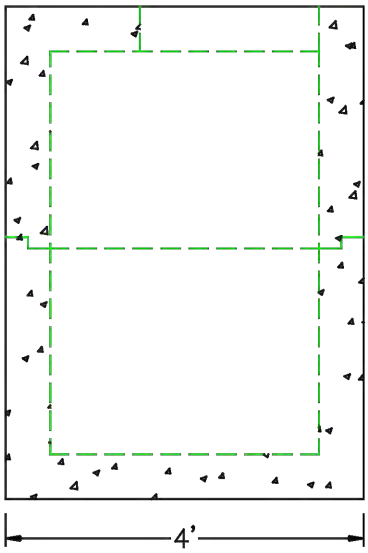
3' X 3' METER PIT



NPCA
Precast ... The Concrete Solution.

DESIGN NOTES:
1. CONCRETE 5,000 PSI @ 28 DAYS
2. REINFORCEMENT ASTM A-615 GRADE 60, 1" MIN. COVER
3. DESIGNED FOR H-20 LOADING
4. OPENINGS AS REQUIRED





SCITUATE COMPANIES

SCITUATE RAY PRECAST
120 CLAY PIT ROAD
MARSHFIELD, MA 02050
PHONE # 1-800-440-0009
FAX # 781-837-4320

CONTRACTOR:	JOB NAME:	
DATE:	DRAWING: SRP-MP33	DRAWING BY: C. J. SCOTT

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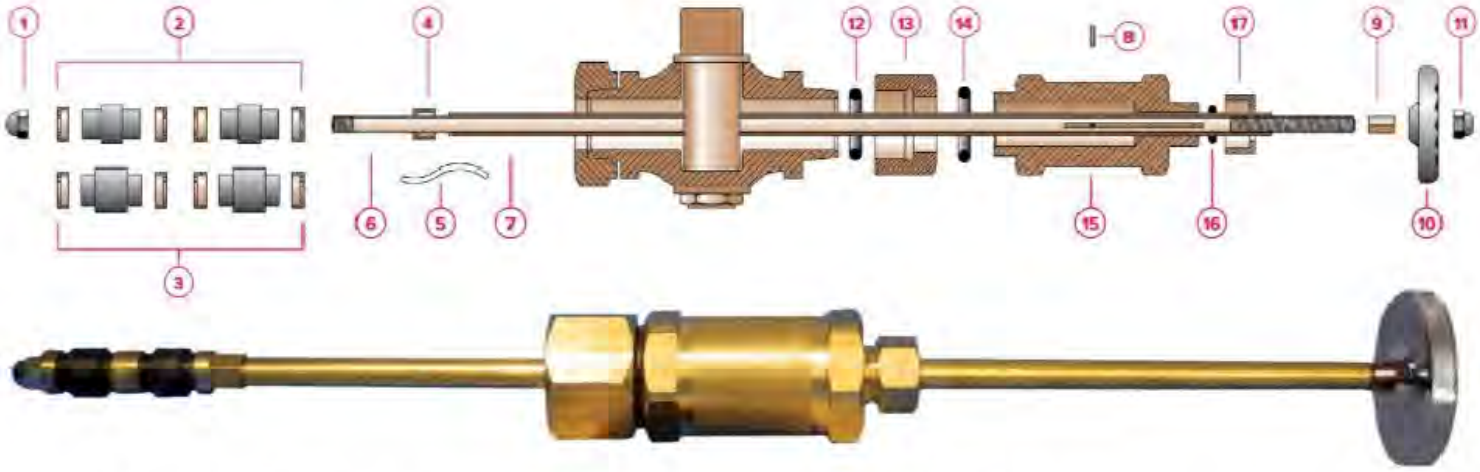
3' x 3' METER PIT

NTS

AQUA-STOP

Pollardwater



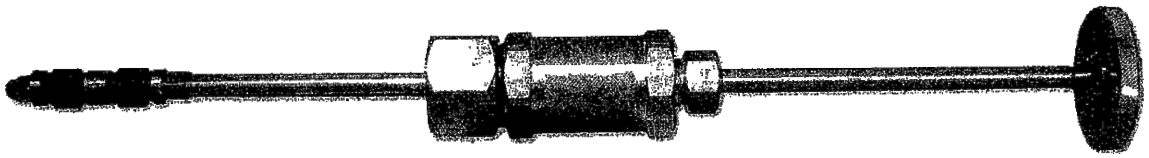
- Change round port curb stops and other valves under pressure
- Stops complete flow on service lines, allowing the swapping of valves or downstream removal of tubing
- Works on 3/4" copper, but the addition of PP64602 allows the tool to work on 1" copper
- Works on flare type and compression connections
- Easy to use; shut water off at curb or straight meter valve, remove downstream nut and connection, attach Aqua-Stop and open valve, insert operation valve and turn handwheel to compress expander nut to shut off flow of water, replace valve and reverse process to backout Aqua-Stop

SKU	Type	Price
PP645		-
Parts & Accessories		
PP64602	Adapter Kit Increasing to 1"	-
B1420ACORNPLA	#1 Expander Nut	-
PP64502	#2 Expander; 3/4"	-
PP64503	#3 Expander; 1"	-
PP64504	#4 Tube Packing Nut	-
PP64505	#5 Tube Packing	-
PP64506	#6 Operation Rod	-
PP64507	#7 Tube	-
PP64508	#8 Tube Pin	-
PP64509	#9 Operating Nut	-

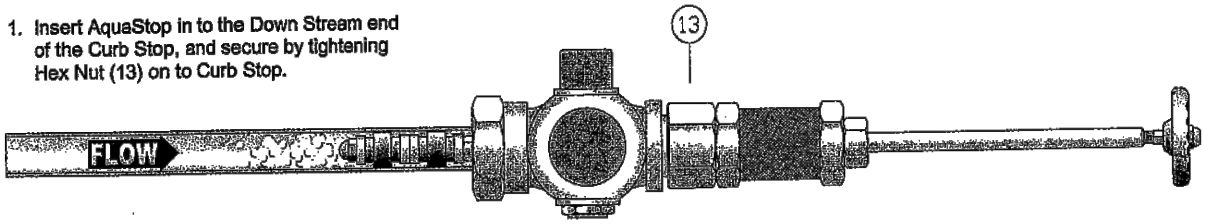
SKU	Type	Price
Parts & Accessories		
PP64510	#10 Handwheel	-
PP64511	#11 Handwheel Nut	-
PP64512	#12 Copper Adapter O-Ring; 3/4"	-
PP64513	#13 Copper Adapter; 3/4"	-
PP64514	#14 Body O-Ring	-
PP64515	#15 Body	-
PP64516	#16 Body O-Ring	-
PP64517	#17 Body O-Ring Nut	-
PP64603	#20 Copper Adapter; 1"	-
PP64604	#21 Pipe Adapter; 1"	-
PP64605	#22 Adapter O-Ring; 1"	-
M18G4F	Fiber Gasket	-

S-1001

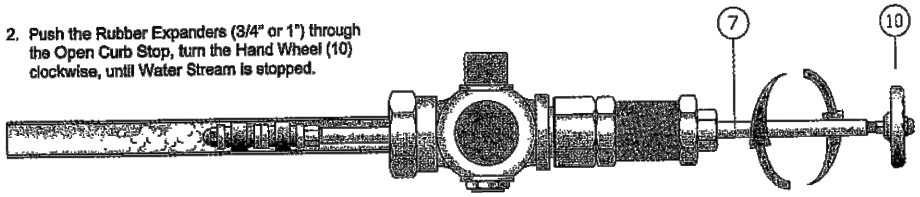
Aqua-Stop



1. Insert AquaStop in to the Down Stream end of the Curb Stop, and secure by tightening Hex Nut (13) on to Curb Stop.

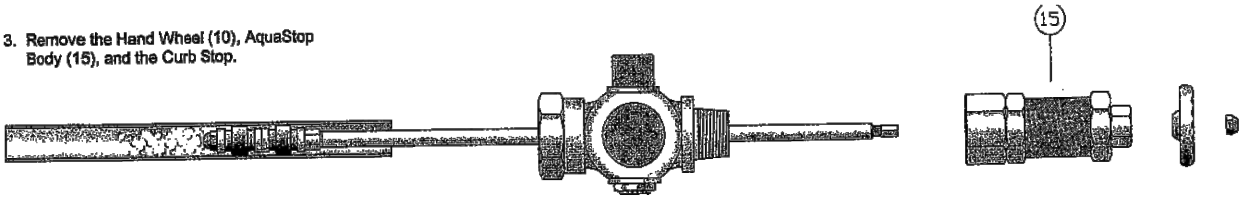


2. Push the Rubber Expanders (3/4" or 1") through the Open Curb Stop, turn the Hand Wheel (10) clockwise, until Water Stream is stopped.

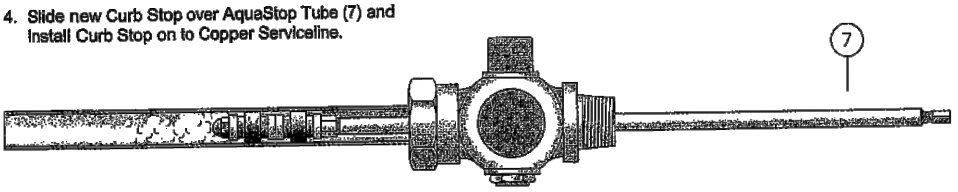


2a. While turning the Hand Wheel (10) clockwise, make certain that the AquaStop Tube (7) is secure and will not slide inside Copper Tubing.

3. Remove the Hand Wheel (10), AquaStop Body (15), and the Curb Stop.



4. Slide new Curb Stop over AquaStop Tube (7) and install Curb Stop on to Copper Serviceline.

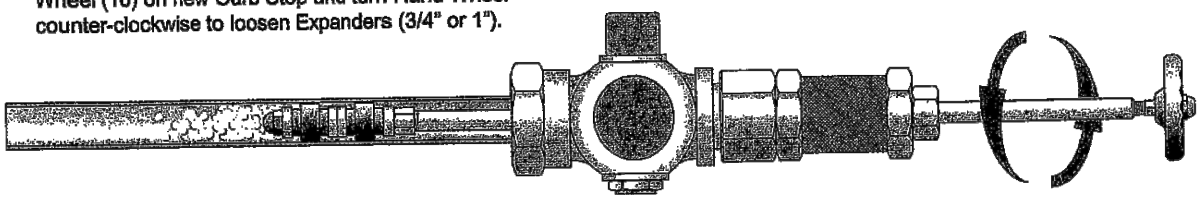


P64701 = 3/4" CTS
P64702 = 1" CTS

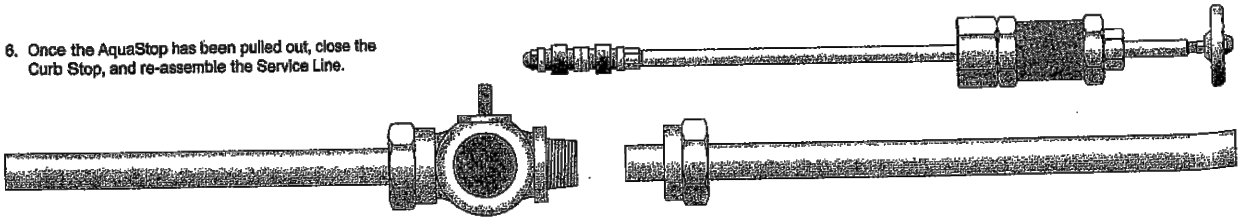
P648 Hollow Hammer

Use Pollard's Hollow Hammer and Hollow Flaring Tools for connecting Curb Stop with Flare Ends.

5. Re-assemble AquaStop Body (15) and Hand Wheel (10) on new Curb Stop and turn Hand Wheel counter-clockwise to loosen Expanders (3/4" or 1").



6. Once the AquaStop has been pulled out, close the Curb Stop, and re-assemble the Service Line.

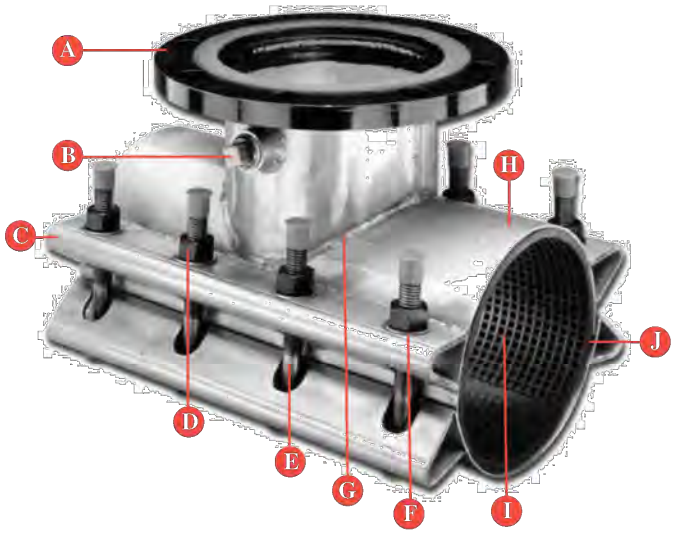


AQUA STOP OPERATION

NTS

MUELLER® Stainless Steel Tapping Sleeve 4"-24"

Corrosion resistance / High pressure sealing



A. 304 Stainless Steel, Carbon Steel or Ductile Iron Flanges
ANSI B16.1, Class 125 drilling with a machined centering recess for tapping valves in accordance with MSS-SP 60. Fully machined flange face for precise alignment of gate valve and drilling machine. Carbon steel and ductile iron flanges are factory-coated with a water base enamel for corrosion protection.

B. Test Plug
3/4" NPT brass plug for pressure testing is standard. Optional stainless steel plug available. Plug has a square head for easy removal and installation.

C. Side Bars
Heavy gauge 304L stainless steel construction for maximum bending resistance. All side bars are drop-in bolt design for ease of installation.

D. Nuts
Heavy hex 304 stainless steel.

E. Bolts
Bolts are 304 stainless steel, coated with an anti-galling compound. Rolled threads facilitate spin assembly of nuts.

F. Washers
304 stainless steel washers prevent galling and facilitate tightening.

G. Welding
Welds are continuous bead (MIG), utilizing state-of-the-art robotic welding equipment. Robotic welding provides a consistently superior weld versus the manual method.

H. Shell
The shell is plasma cut to exacting tolerances. 304L stainless steel is low carbon to minimize carbide precipitation corrosion. The entire sleeve is fully passivated (not just the weld sections) to maintain optimum corrosion resistance.

I. Gasket
Provides full 360° seal. Made of virgin NBR (R78) material, the "waffle" design provides an optimal watertight seal. An integral sealing ring with two concentric raised surfaces surrounds the outlet (at the base of the pipe), which enhances high pressure sealing capability.

J. Integral Gap Bridging
Unique design eliminates the need for separate gap bridges and makes installation easier. This design reduces deformation of the bridge at high torques and aids in the assembly of the sleeve.

High Pressure Sealing
250 psig 4"-12"
200 psig 14"-24"

NSF 61 Certified

New MJ Outlet Option

- Connects directly to standard MJ valve end.
- Uses standard MJ gasket provided with valve.
- Saves time, material and reduces inventory.

The following are standard sleeve ranges. Other ranges are available by contacting Mueller Customer Service at 800-423-1323.

Sleeve O.D. Range

Nominal Pipe Size	Outlet Flange	Sleeve O.D. Range (inches)
4"	4"	4.50-4.90
6"	4",6"	6.59-6.99
		6.89-7.30
		7.10-7.50
		7.40-7.80
8"	4",6"	7.90-8.30
	4",6",8"	8.62-9.06
		9.04-9.45
		9.20-9.60
		9.60-10.00
10"	4",6",8"	9.90-10.30
	4",6",8",10"	10.73-11.13
		11.05-11.45
		11.70-12.10
		12.00-12.40
12"	4",6",8",10",12"	12.50-12.90
		13.16-13.56
		13.60-14.09
		14.10-14.58
14"	4",6",8",10",12"	15.25-15.65
		15.60-16.00
		16.38-16.73
		16.48-16.88
16"	4",6",8",10",12"	17.40-17.80
		17.54-17.94
		17.85-18.25
		18.15-18.55
		18.60-19.00
18"	4",6",8",10",12"	19.30-19.70
		19.70-20.10
20"	4",6",8",10",12"	21.40-21.80
		21.90-22.30
		22.30-22.70
24"	4",6",8",10",12"	23.30-23.70
		23.80-24.10
		25.60-26.00

Dimensions

Size Main	Size Outlet	Outlet Flange Dimensions (inches)† A	B	Sleeve Dimensions (inches) C	D	E	Bolts Per Side F
4"	4"	5.0315	.25	7.00	15	4.50	4
6"	4"	5.0315	.25	7.50	15	4.50	4
6"	6"	7.0315	.31	8.00	15	6.50	4
8"	4"	5.0315	.25	8.50	15	4.50	4
8"	6"	7.0315	.31	9.00	15	6.50	4
8"	8"	9.0315	.31	9.50	18	8.50	6
10"	4"	5.0315	.25	10.00	15	4.50	4
10"	6"	7.0315	.31	10.50	15	6.50	4
10"	8"	9.0315	.31	11.00	18	8.50	6
10"	10"	11.0315	.31	11.50	24	10.50	8
12"	4"	5.0315	.25	12.00	15	4.50	4
12"	6"	7.0315	.31	12.00	15	6.50	4
12"	8"	9.0315	.31	12.00	18	8.50	6
12"	10"	11.0315	.31	12.00	24	10.50	8
12"	12"	13.0315	.31	12.00	30	12.50	8
14"	4"	5.0315	.25	13.63	15	4.50	4
14"	6"	7.0315	.31	13.63	15	6.50	4
14"	8"	9.0315	.31	13.63	18	8.50	6
14"	10"	11.0315	.31	13.63	24	10.50	8
14"	12"	13.0315	.31	13.63	30	12.50	8
16"	4"	5.0315	.25	14.59	15	4.50	4
16"	6"	7.0315	.31	14.59	15	6.50	4
16"	8"	9.0315	.31	14.59	18	8.50	6
16"	10"	11.0315	.31	14.59	24	10.50	8
16"	12"	13.0315	.31	14.59	30	12.50	8
18"	4"	5.0315	.25	16.00	15	4.50	4
18"	6"	7.0315	.31	16.00	15	6.50	4
18"	8"	9.0315	.31	16.00	18	8.50	6
18"	10"	11.0315	.31	16.00	24	10.50	8
18"	12"	13.0315	.31	16.00	30	12.50	8
20"	4"	5.0315	.25	16.88	15	4.50	4
20"	6"	7.0315	.31	16.88	15	6.50	4
20"	8"	9.0315	.31	16.88	18	8.50	6
20"	10"	11.0315	.31	16.88	24	10.50	8
20"	12"	13.0315	.31	16.88	30	12.50	8
24"	4"	5.0315	.25	19.00	24	4.50	8
24"	6"	7.0315	.31	19.00	24	6.50	8
24"	8"	9.0315	.31	19.00	24	8.50	8
24"	10"	11.0315	.31	19.00	24	10.50	8
24"	12"	13.0315	.31	19.00	30	12.50	10

†With MJ option, this flange is replaced by an integral SS outlet pipe extension and MJ gland welded permanently in place allowing the sleeve to bolt directly to the outlet of any standard MJ valve. Dimensions for MJ option are compatible with standard MJ connections, and A and B dimensions in chart do not apply.

How to determine a Mueller® Tapping Sleeve Part Number

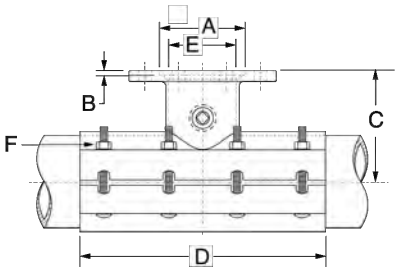
Select the appropriate numbers from the chart.
Example:

Pipe Size	Outlet Size	Model No.	Flange Material	Maximum O.D. Range
06	06	H304*	SS**	0750

Resulting Part No. 0606H304SS0750

*Model H304 is constant for all Mueller® Stainless Steel Tapping Sleeves listed here.

**SS=stainless steel flange, CS=carbon steel flange, DI=ductile iron flange
MJ=stainless steel MJ gland and pipe extension welded in place



Mueller Co.

Main Office — Decatur, IL
Water Division: 800-423-1323
www.muellercompany.com
Canada — Mueller Canada Inc., Barrie, Ontario 705-719-9965

All products must be installed and maintained in accordance with applicable instructions and/or standards.

Form 11963-Rev. 5/07-2.5M-2
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STAINLESS TAPPING SLEEVE 4"-24"

NTS

SST III STAINLESS STEEL TAPPING SLEEVE

ROMAC INDUSTRIES, INC.

MATERIAL SPECIFICATIONS

SHELL & LUGS: Stainless steel per ASTM A240, type 304 and type 304L.

TEST PLUG: 3/4" NPT type 304 Stainless Steel. Plug threads coated to prevent galling.

BOLTS: 5/8" UNC rolled thread, stainless steel per ASTM A193, type 304.

NUTS: Heavy hex, stainless steel per ASTM A194, type 304,coated to prevent galling

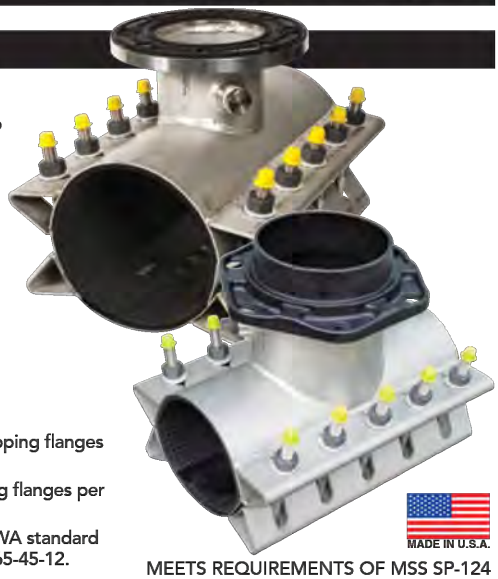
WASHERS: Stainless steel, type 304 and plastic lubricating washer.

GASKETS: SBR per ASTM D2000 MAA 610, compounded for water and sewer service. Other compounds available on request.

MJ BOLTS & NUTS: 3/4" UNC T-Bolts, heavy hex nuts, high strength low alloy steel per AWWA C111.

OUTLET OPTIONS

1. **DUCTILE IRON FLANGE** per ASTM A536, Grade 65-45-12. Will accommodate tapping flanges per MSS SP-60.
2. **STAINLESS STEEL FLANGE** per ASTM A240, type 304. Will accommodate tapping flanges per MSS SP-60.
3. **DUCTILE IRON MECHANICAL JOINT OUTLET** MJ style in accordance with AWWA standard C111. Cast from ductile (nodular) iron, meeting or exceeding ASTM A536, Grade 65-45-12.
4. **STAINLESS STEEL MECHANICAL JOINT OUTLET** MJ style in accordance with AWWA standard C111. Stainless steel per ASTM A351 CF3 (Type 304L).



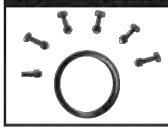
MADE IN U.S.A.

MEETS REQUIREMENTS OF MSS SP-124

NOTE: SSTIII is designed for rigid pipe. It is not recommended for thin or brittle pipe such as high DR C900, IPS PVC, PIP, SDR35. For these applications see SST or FTS419 product pages.

NSF61 certified upon request.

SST III SLEEVES WITH MJ OUTLETS



MJ Gasket and HSLA T-bolts & Nuts are included with SST-MJ and SST-SS-MJ

NOM. PIPE SIZE	SLEEVE O.D. RANGE (inches)	SLEEVE #	BY	BRANCH SIZE	D.I. FLANGE	304 S.S. FLANGE	D.I. MJ OUTLET	304 S.S. MJ OUTLET	APPROX. WEIGHT (lbs.)
4"	4.40 - 4.60 4.50 - 4.80 4.70 - 5.00 5.00 - 5.30 5.30 - 5.60 5.60 - 5.90	SSTIII- 4.60 SSTIII- 4.80 SSTIII- 5.00 SSTIII- 5.30 SSTIII- 5.60 SSTIII- 5.90	×	3" 4" [1]	NA 1,679.00	$2,088.71 2,088.71	NA 1,751.70	$2,383.30 2,394.60	37# 42#
6"	5.90 - 6.25 [2] 6.25 - 6.60 [2] 6.60 - 7.00 6.82 - 7.12 6.90 - 7.30 7.10 - 7.50 7.50 - 7.90	SSTIII- 6.25 SSTIII- 6.60 SSTIII- 7.00 SSTIII- 7.12 SSTIII- 7.30 SSTIII- 7.50 SSTIII- 7.90	×	3" 4" 6"	NA 1,768.93 1,804.99	2,123.22 2,123.22 2,153.28	NA 1,841.62 1,887.43	2,383.30 2,394.60 2,585.51	50# 54# 59#
8"	7.90 - 8.30 [3] 8.30 - 8.63 8.62 - 9.06 8.97 - 9.37 9.04 - 9.45 9.20 - 9.60 9.55 - 9.95 9.90 - 10.30	SSTIII- 8.30 SSTIII- 8.63 SSTIII- 9.06 SSTIII- 9.37 SSTIII- 9.45 SSTIII- 9.60 SSTIII- 9.95 SSTIII-10.30	×	3" 4" 6" 8"	NA 1,838.14 2,000.30 2,585.23	2,141.01 2,141.01 2,316.35 2,833.15	NA 1,910.87 2,082.70 2,700.60	2,435.63 2,446.93 2,748.53 3,315.45	56# 60# 63# 83#
10"	10.33 - 10.73 [4] 10.73 - 11.13 11.02 - 11.42 11.06 - 11.45 11.45 - 11.85 11.79 - 12.19 12.10 - 12.50	SSTIII- 10.73 SSTIII- 11.13 SSTIII- 11.42 SSTIII- 11.45 SSTIII- 11.85 SSTIII- 12.19 SSTIII- 12.50	×	3" 4" 6" 8" 10"	NA 2,055.94 2,106.89 2,597.85 3,662.22	2,467.05 2,467.05 2,488.61 3,263.78 4,777.27	NA 2,128.65 2,189.29 2,713.23 3,807.32	2,761.65 2,772.96 2,920.83 3,746.10 5,411.62	60# 64# 68# 88# 121#

[1] For 4" flanged outlets, the recommended cutter size is 3 1/2"
[2] Not Available with 6" branch.
[3] Not Available with 8" branch.
[4] Not Available with 10" branch.

TO ORDER: Specify Sleeve Number x Branch Size x Outlet Type. **EXAMPLE: SSTIII - 9.45 x 6" D.I. FLG** Other sizes are available on request - P.O.A

Manufactured with Domestic and Import material. For Domestic requirements please contact our Quotations Department.
JANUARY 10, 2022

ROMAC INDUSTRIES, INC.

SST III STAINLESS STEEL TAPPING SLEEVE

NOM. PIPE SIZE	SLEEVE O.D. RANGE (inches)	CATALOG NUMBER SLEEVE #	BY	BRANCH SIZE	LIST PRICE EACH D.I. FLANGE	304 S.S. FLANGE	D.I. MJ OUTLET	304 S.S. MJ OUTLET	APPROX. WEIGHT (lbs.)
12"	12.35 - 12.75 [5,6] 12.45 - 12.85 [5,6] 12.70 - 12.90 [5,6] 12.75 - 13.20 [5,6] 12.90 - 13.30 13.12 - 13.52 13.16 - 13.56 13.40 - 13.80 13.70 - 14.10 13.98 - 14.38 14.38 - 14.80	SSTIII - 12.75 SSTIII - 12.85 SSTIII - 12.90 SSTIII - 13.20 SSTIII - 13.30 SSTIII - 13.52 SSTIII - 13.56 SSTIII - 13.80 SSTIII - 14.10 SSTIII - 14.38 SSTIII - 14.80	×	3" 4" 6" 8" 10" 12"	NA 2,368.81 2,423.81 3,128.45 4,057.97 4,800.53	$2,762.38 2,762.38 3,057.67 3,728.42 4,881.86 5,407.82	NA 2,441.51 2,506.24 3,243.85 4,203.09 5,012.53	$3,056.97 3,068.28 3,489.86 4,210.75 5,516.23 6,109.08	65# 68# 72# 93# 123# 159#
14"	14.80 - 15.20 15.20 - 15.60 15.60 - 16.00 15.80 - 16.20 16.00 - 16.40 16.38 - 16.78	SSTIII - 15.20 SSTIII - 15.60 SSTIII - 16.00 SSTIII - 16.20 SSTIII - 16.40 SSTIII - 16.78	×	3" 4" 6" 8" 10" 12"	NA 2,910.12 2,996.08 3,315.46 4,225.24 5,310.67	3,005.74 3,005.74 3,556.02 4,451.16 5,497.08 6,023.05	NA 2,982.80 3,167.58 3,430.83 4,370.41 5,409.98	3,118.46 3,129.77 3,988.24 4,933.46 5,642.25 5,642.25	70# 75# 80# 103# 134# 174#
16"	16.78 - 17.20 17.15 - 17.55 17.40 - 17.80 17.55 - 17.95 17.85 - 18.25 18.20 - 18.60 18.58 - 18.98 18.90 - 19.30	SSTIII - 17.20 SSTIII - 17.55 SSTIII - 17.80 SSTIII - 17.95 SSTIII - 18.25 SSTIII - 18.60 SSTIII - 18.98 SSTIII - 19.30	×	3" 4" 6" 8" 10" 12"	NA 2,913.77 3,290.22 3,708.80 4,596.62 6,040.75	3,903.61 3,903.61 4,426.57 4,811.12 5,703.19 6,595.23	NA 3,362.95 3,372.66 3,824.19 4,741.69 6,252.79	4,229.83 4,241.14 4,858.80 5,293.43 6,337.51 7,296.53	92# 96# 102# 110# 140# 205#
18"	19.30 - 19.70 19.70 - 20.10 19.80 - 20.20 20.20 - 20.60 20.60 - 21.00 21.00 - 21.40	SSTIII - 19.70 SSTIII - 20.10 SSTIII - 20.20 SSTIII - 20.60 SSTIII - 21.00 SSTIII - 21.40	×	3" 4" 6" 8" 10" 12"	NA 3,096.00 3,348.53 3,665.76 4,312.65 6,458.47	3,965.16 3,965.16 4,734.18 5,118.71 6,010.80 7,210.50	NA 3,168.66 3,430.95 3,858.74 4,795.10 6,670.51	4,259.74 4,271.04 5,166.38 5,678.60 6,982.49 7,911.76	97# 102# 107# 115# 152# 230#
20"	21.40 - 21.80 21.70 - 22.10 21.90 - 22.30 22.30 - 22.70 22.70 - 23.10 23.00 - 23.40	SSTIII - 21.80 SSTIII - 22.10 SSTIII - 22.30 SSTIII - 22.70 SSTIII - 23.10 SSTIII - 23.40	×	3" 4" 6" 8" 10" 12"	NA 3,208.17 3,460.60 3,777.93 4,703.39 6,531.80	4,122.04 4,122.04 4,888.01 5,189.47 6,318.41 7,825.73	NA 3,280.85 3,543.04 3,893.29 4,848.48 6,670.51	4,416.61 4,427.92 5,320.22 5,671.76 7,159.18 8,453.67	104# 109# 114# 120# 155# 232#
24"	23.30 - 23.70 23.60 - 24.00 23.80 - 24.20 24.20 - 24.60 24.60 - 25.00 24.90 - 25.30 25.30 - 25.70 25.60 - 26.00 25.90 - 26.30 26.10 - 26.50	SSTIII - 23.70 SSTIII - 24.00 SSTIII - 24.20 SSTIII - 24.60 SSTIII - 25.00 SSTIII - 25.30 SSTIII - 25.70 SSTIII - 26.00 SSTIII - 26.30 SSTIII - 26.50	×	3" 4" 6" 8" 10" 12"	NA 3,302.88 3,316.78 3,596.00 4,451.23 7,224.22	4,340.46 4,340.46 5,041.80 5,663.18 6,626.02 8,440.95	NA 3,375.60 3,956.97 4,400.98 5,164.86 7,436.26	4,635.08 4,646.38 5,474.00 6,145.48 7,426.87 9,142.23	107# 112# 117# 124# 158# 236#
28"	27.20 - 27.80 [6] 27.80 - 28.40 [6] 28.40 - 29.00 [6] 29.00 - 29.60 [6]	SSTIII - 27.80 SSTIII - 28.40 SSTIII - 29.00 SSTIII - 29.60	×	3" 4" 6" 8" 10" 12"	NA 4,734.44 4,979.67 5,464.31 6,636.57 9,006.57	5,771.99 5,771.99 6,704.66 7,530.98 8,811.38 11,224.86	NA 4,807.12 5,062.07 5,579.68 6,781.68 9,218.59	6,066.58 6,077.88 7,136.86 8,013.28 9,445.73 11,926.15	185# 190# 195# 202# 236# 314#
30"	29.60 - 30.20 [6] 30.20 - 30.80 [6] 30.80 - 31.40 [6] 31.40 - 32.00 [6]	SSTIII - 30.20 SSTIII - 30.80 SSTIII - 31.40 SSTIII - 32.00	×	3" 4" 6" 8" 10" 12"	NA 5,202.43 5,523.25 6,074.44 7,351.01 9,916.67	6,239.95 6,239.95 7,248.24 8,141.57 9,525.80 12,134.99	NA 5,275.12 5,605.67 6,189.77 7,496.08 10,128.69	6,534.54 6,545.85 7,136.86 8,623.83 10,160.11 12,836.27	232# 237# 242# 249# 283# 361#

[5] For 12" flanged outlets, the recommended cutter size is 11 1/2". [6] Not available with 12" MJ Outlet. [6] Three piece sleeve.

TO ORDER: Specify Sleeve Number x Branch Size x Outlet Type.

EXAMPLE: **SSTIII - 9.45 x 6" D.I. FLG** Other sizes are available on request - P.O.A

JCM INDUSTRIES
P. O. Box 1220, Nash, TX 75569-1220
Phone 800-527-8482 or 903-832-2581
Fax 800-874-9524 or 903-838-6260
www.jcmindustries.com

Typical Specification

JCM 452 All Stainless Steel Tapping Sleeve with Stainless Steel Flange

Tapping Sleeve shall be of the high strength type with a body made of corrosion resistant, 304 stainless steel, which conforms to and reinforces the pipe. The sleeve shall have a wide gasket of Nitrile Butadiene Rubber (NBR, Buna-N) per ASTM D2000 with hydromechancial activated lip, captured in a groove around the outlet; 18-8 Type 304 stainless steel hardware and nuts. Stainless steel tapping sleeve shall be furnished with a 304 stainless steel test plug in the test outlet. Sleeve shall be fully passivated to return the stainless steel to its highest corrosion resistance.

Flanged outlets shall be 304 stainless steel and shall be recessed per MSS-SP60 to accept tapping valve and have the equivalent O.D. and drilling as Class 125 Cast-Iron Flanges (ANSI/ASME B16.1) and Class 150 Steel-Ring Flanges (ANSI/ASME B16.5).

For outlet sizes 14" and larger, the gasket groove must be consistently positioned about throat of tapping waterway. The inside diameter of the gasket groove must be set back a minimum of 1" from the waterway to allow dispersal of forces generated by gasket compression. Gasket grooves machined in a circle and formed to an elliptical shape will not be an accepted equal.

Tapping Sleeves shall be JCM 452 or approved equal.

*Higher test and working pressure ratings available upon request, contact JCM Industries.
JCM 400 Series Tapping Sleeves are ANSI/NSF Standard 61, Annex G & ANSI/NSF 372 Certified.
JCM 400 Series Tapping Sleeves meet MSS-SP124 and ANSI/AWWA Standard C223 Fabricated Steel and Stainless Steel Tapping Sleeves, ANSI/AWWA Standard C228 Stainless Steel Pipe Flanges for Water Service as applicable.

JCM 452 Tapping Sleeve
Image reflects 6” x 4”

This typical specification, provided by JCM Industries, is a proposed guideline for use by specifying agencies to ensure significant design and material features of this product are included within the agencies’ individual specifications.

Effective 09.03.19

JCM INDUSTRIES
P. O. Box 1220, Nash, TX 75569-1220
Phone 800-527-8482 or 903-832-2581
Fax 800-874-9524 or 903-838-6260
www.jcmindustries.com

Material Specification

JCM 452 All Stainless Steel Tapping Sleeve with Stainless Steel Flange

Body: Stainless Steel 18-8 Type 304.

Bolts: Stainless Steel 18-8 Type 304.
Sleeve sizes 14.20 and smaller = 5/8", sizes 14.75 and larger = 3/4"

Flange: 304 Stainless Steel or equivalent, per ANSI/AWWA C228 Class SD. Flange outlets shall be indexed per MSS-SP60 to accept tapping valve and have the equivalent O.D. and drilling as Class 125 Cast-Iron Flanges (ANSI/ASME B16.1) and Class 150 Steel-Ring Flanges (ANSI/ASME B16.5). Other flanges available upon request.

Branch Outlet: Schedule 10 Stainless Steel Pipe Type 304

Gasket: Nitrile Butadiene Rubber (NBR, Buna-N) per ASTM D2000. Molded virgin rubber with a pressure activated hydro mechanical design. Gasket is bonded into a cavity for internal and external retention. Gasket temperature range -40ºF to 212ºF (-40ºC - 100ºC) Gasket suitable for water, salt solutions, mild acids, bases, and sewage.

Service Rating: 2" - 12" Outlets: 175 PSI, per ANSI/AWWA C228.
For higher service ratings, contact JCM Technical Services.

JCM 400 Series Tapping Sleeves are ANSI/NSF Standard 61, Annex G & ANSI/NSF Standard 372 Certified.

JCM 400 Series Tapping Sleeves meet MSS-SP124 and ANSI/AWWA Standard C223 Fabricated Steel and Stainless Steel Tapping Sleeves, ANSI/AWWA Standard C228 Stainless Steel Pipe Flanges for Water Service as applicable.

NSF Certified to NSF/ANSI 61-G & 372

Effective 09.03.19

JCM INDUSTRIES
P. O. Box 1220, Nash, TX 75569-1220
Phone 800-527-8482 or 903-832-2581
Fax 800-874-9524 or 903-838-6260
www.jcmindustries.com

JCM 452 All Stainless Steel Tapping Sleeve with Stainless Steel Flange Dimensions

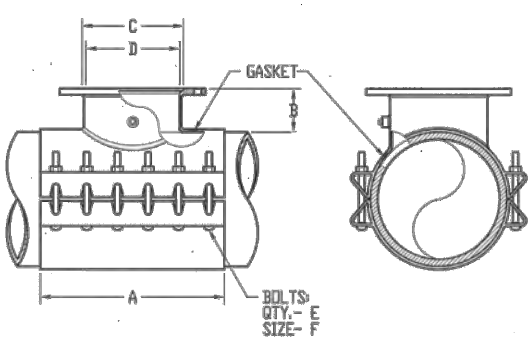
Nominal Pipe Sizes 4" - 12"*
Outlet Sizes 2" - 12"*

Outlet	A	B	C	D	E	F
2	9	4	3-1/32	2-1/16	6	5/8
3	9	5	4-1/32	3-1/4	6	5/8
4	12	5	5-1/32	4-1/4	8	5/8
6	12	5	7-1/32	6-5/16	8	5/8
8	15	5-1/8	9-1/32	8-5/16	10	5/8
10	21	5-1/2	11-1/16	10-3/8	14	5/8
12	24	5-3/4	13-1/16	12-3/8	16	5/8

Dimensions represented in inches
3 x 3 Size on Size fittings available upon request.

Nominal Pipe Sizes 14" - 30"
Outlet Sizes 2" - 12"

Outlet	A	B	C	D	E	F
2	12	4	3-1/32	2-1/16	6	3/4
3	12	5	4-1/32	3-1/4	6	3/4
4	12	5	5-1/32	4-1/4	6	3/4
6	12	5	7-1/32	6-5/16	6	3/4
8	16	5-1/8	9-1/32	8-5/16	8	3/4
10	20	5-1/2	11-1/16	10-3/8	10	3/4
12	24	5-3/4	13-1/16	12-3/8	12	3/4



Dimensions represented in inches

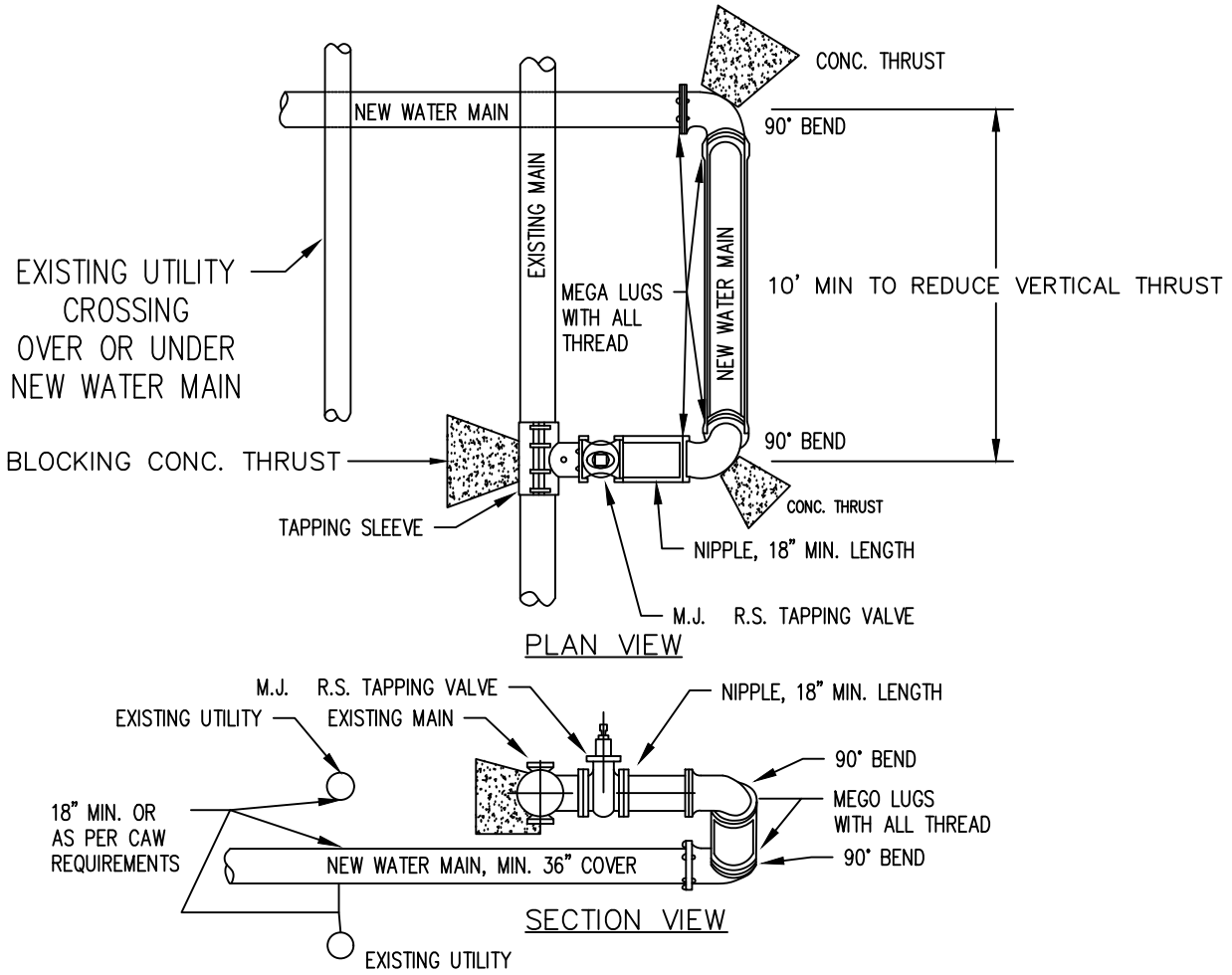
Effective 09.03.19

SST III STAINLESS TAPPING SLEEVE

NTS

BACKSIDE TAP SWING CONNECTION

NTS



NOTES:

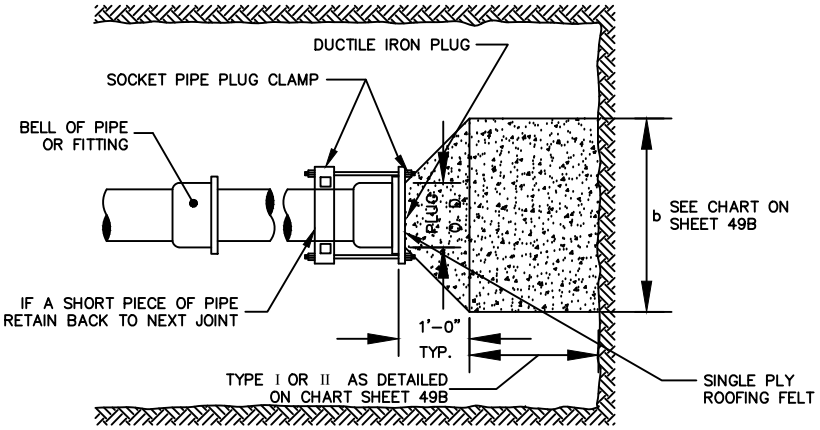
1. CONTRACTOR SHALL LOCATE EXISTING MAIN IN ADVANCE OF LAYING NEW LINE IN ORDER TO ASSURE ADEQUATE LENGTH TO ADJUST DEPTH OF NEW MAIN.
2. DIMENSIONS SHOWN ARE RECOMMENDED MINIMUMS TO PROVIDE ADEQUATE ROOM FOR TIGHTENING BOLTS ON JOINTS (OTHER DIMENSIONS MAY BE USED)
3. USE TIE RODS IF ADEQUATE THRUST BLOCKING AGAINST UNDISTURBED SOIL IS NOT POSSIBLE
4. ALL TIE RODS AND NUTS FOR PERMANENT PLACEMENT SHALL BE STAINLESS STEEL. USE $\frac{3}{4}$" RODS FOR 6" THRU 24". USE 1" RODS FOR 30" THRU 36". USE 1 $\frac{1}{4}$" RODS FOR 42" THRU 48".
5. RODS SHALL BE FIELD CUT TO FIT & SHALL BE PROTECTED WITH POLYWRAP.
6. ROTATE TEE UP & ELBOW DOWN AS REQUIRED TO MATCH

225 PSI STAINLESS STEEL

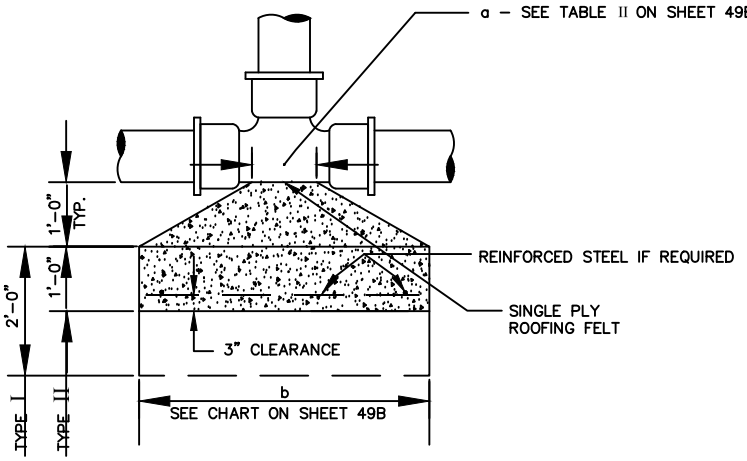
PIPE SIZE	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"
RODS/NIPPLE	2	2	4	4	8	12	16	14	18	16	20

THRUST BLOCK LAYOUTS

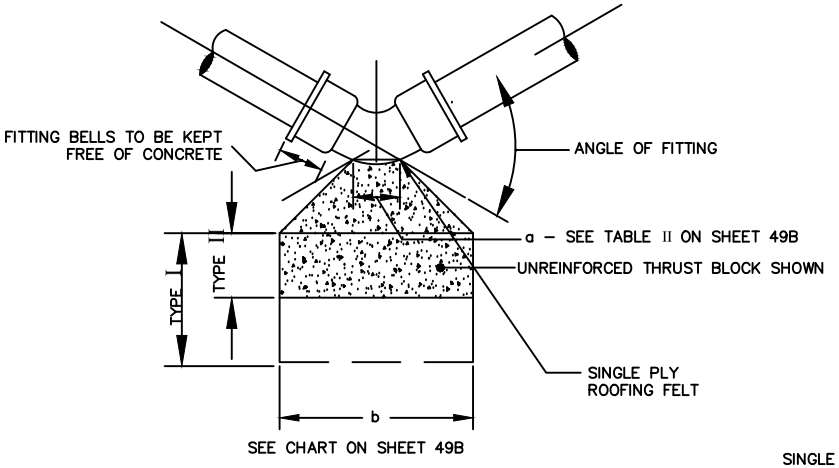
NTS



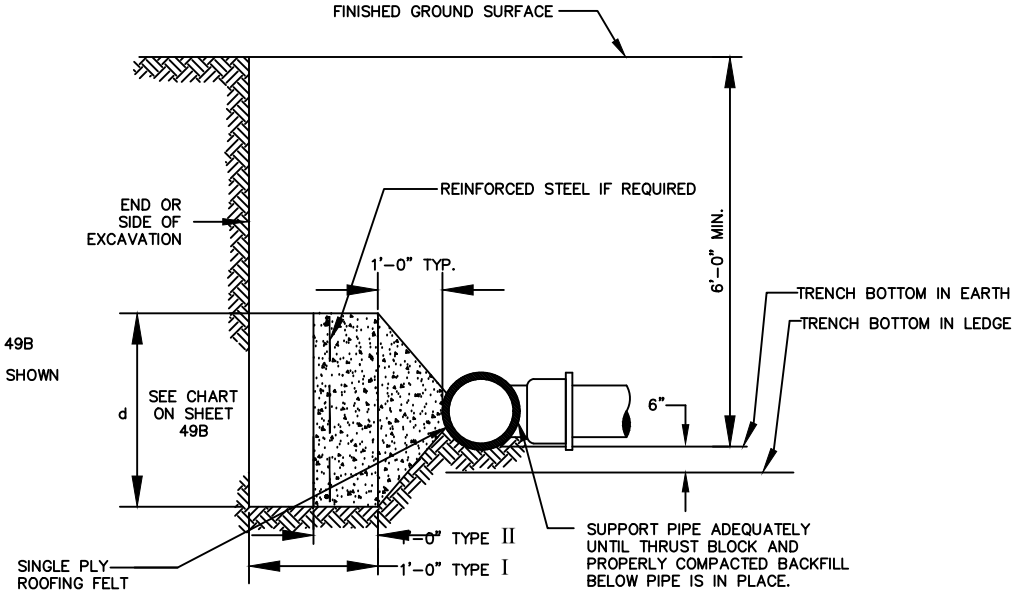
PLAN – DEAD END



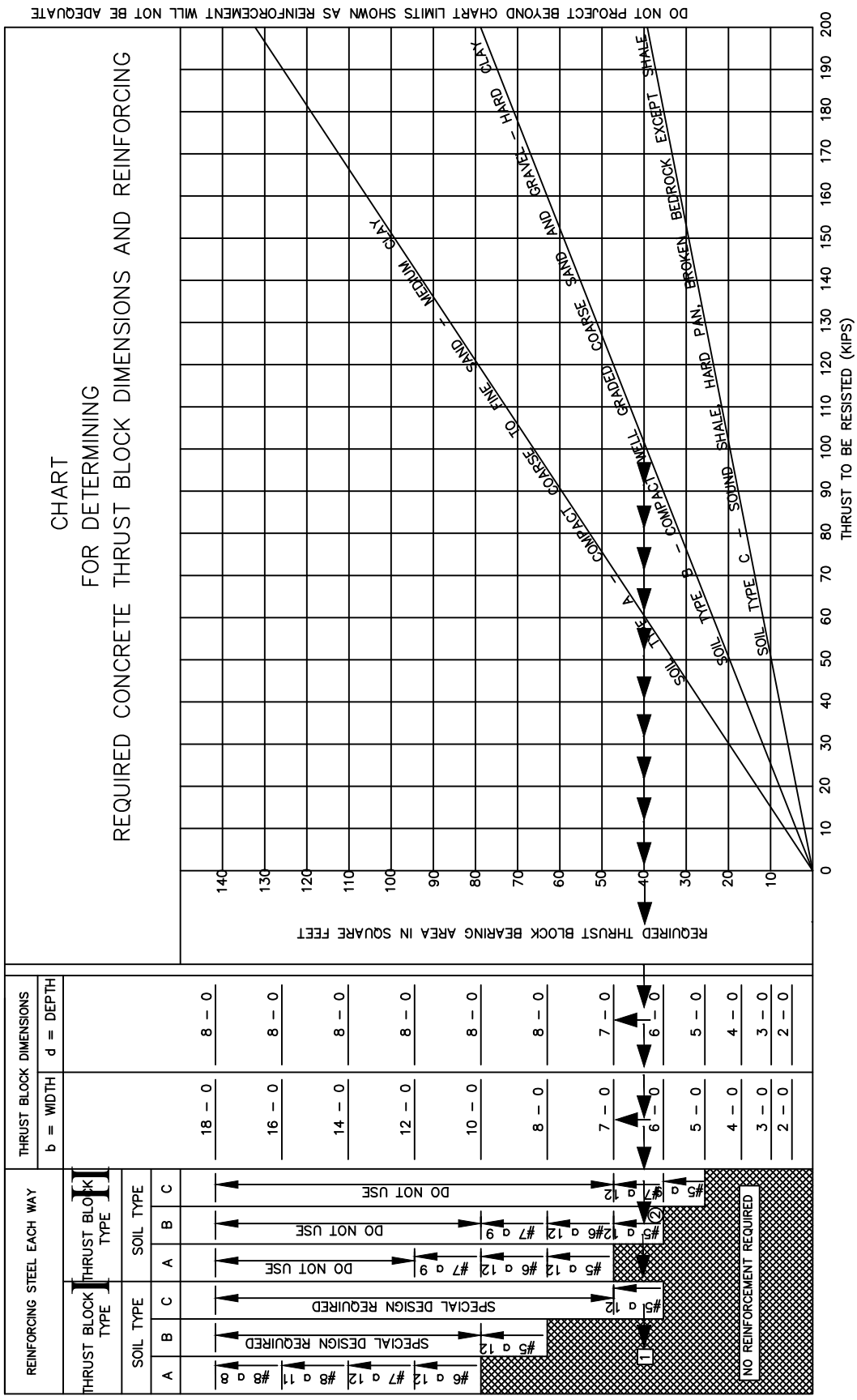
PLAN – TEE



PLAN – BEND



TYPICAL SECTION
(FOR TEES, BENDS & DEAD ENDS)



THRUST BLOCK SIZING CHART

NTS

THRUST BLOCK GUIDE

NTS

ILLUSTRATIVE PROBLEM

DESIGN A THRUST BLOCK FOR A 67–1/2° BEND,
A 24–INCH DIAMETER WATER MAIN,
CARRYING A MAXIMUM PRESSURE OF 200 P.S.I.
SOIL CLASSIFIED AS A WELL GRADED COMPACT COARSE SAND AND GRAVEL.

SOLUTION

1. ENTER TABLE I AT 24–INCH PIPE DIAMETER – GO VERTICALLY DOWN COLUMN
   UNTIL OPPOSITE 67–1/2° ANGLE FITTING. READ THRUST = 100.2 KIPS.
2. SEE CHART IMMEDIATELY BELOW TABLE I – SELECT SOIL TYPE CURVE
   REFLECTING ACTUAL SOIL CLASSIFICATION. TYPE B FOR THIS PROBLEM.
3. ENTER CHART AT THRUST TO BE RESISTED AND GO VERTICALLY TO SOIL TYPE
   CURVE SELECTED IN 2 ABOVE – SEE CHART AND FOLLOW ILLUSTRATIVE
   PROBLEM ARROW LINE FROM 100.2 KIP THRUST TO SOIL TYPE B CURVE.
4. FROM THIS INTERSECTION GO HORIZONTALLY FOLLOWING ARROW LINE TO
   INTERSECTION WITH REQUIRED THRUST BLOCK BEARING AREA IN SQUARE
   FEET – 40 SQUARE FEET MINIMUM IS REQUIRED TO RESIST THRUST.
5. CONTINUE HORIZONTALLY TO "THRUST BLOCK DIMENSIONS" COLUMN AND
   SELECT DIMENSIONS "b" AND "d" IMMEDIATELY ABOVE HORIZONTAL
   ARROW LINE PROJECTION.
   7' – 0" SQUARE THRUST BLOCK REQUIRED FOR THIS PROBLEM.
6. CONTINUE HORIZONTALLY TO "REINFORCING STEEL – EACH WAY" COLUMN,
   NOTING COLUMNS FURTHER CLASSIFICATION BY SOIL TYPE AND FOOTING TYPE.
   (SEE "THRUST BLOCK DETAIL", FOR TYPE I AND TYPE II REQUIREMENTS.)
   TWO SOLUTIONS TO ILLUSTRATIVE PROBLEM ARE ACCEPTABLE:
   SOLUTION 1 – TYPE I THRUST BLOCK AND SOIL TYPE B INDICATE
   NO REINFORCEMENT REQUIRED.
   SOLUTION 2 – TYPE II THRUST BLOCK AND SOIL TYPE B INDICATES
   #5 @ 12 EACH WAY REQUIRED.

NOTES :

ALL FITTINGS SHALL BE ANCHORED BY MECHANICAL MEANS OR BY CONCRETE THRUST BLOCKS, OR BOTH,
IF REQUIRED BY THE BOSTON WATER AND SEWER COMMISSION OR AS NOTED ON THE CONTRACT PLANS.
ALL EXPOSED METAL SHALL BE PAINTED OR COATED. CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRESS OF 3,000 P.S.I. AT 28 DAYS. REINFORCING STEEL SHALL BE A.S.T.M. A615 GRADE 40.
WATER PRESSURE IN TABLE 1 INCLUDES WATER HAMMER ALLOWANCE.

THE ACTUAL METHOD OF RESTRAINT MUST BE DETERMINED BY ACTUAL FIELD CONDITIONS.
THESE ARE TYPICAL INSTALLATIONS TO BE USED AS A GUIDE TO THE DESIGNER.
FINAL DESIGNS ARE SUBJECT TO REVIEW BY BOSTON WATER AND SEWER COMMISSION.

SCHEDULE OF TIE RODS

PIPE SIZE	NUMBER OF RODS PER FITTING	DIAMETER OF RODS
4" – 12"	2	3/4"
16"	4	3/4"
20" – 24"	4	1 1/2"
36"	6	1 1/2"

TABLE II – "a" DIMENSION – FEET

PIPE DIAMETER – INCHES	90° FITTING	OTHERS
6, 8, 10 & 12	1 – 6	1 – 0
16 & 20	2 – 0	1 – 6
24" – 30"	3 – 0	2 – 0

TABLE I – THRUST – KIPS (WATER PRESSURE = 200 P.S.I.)

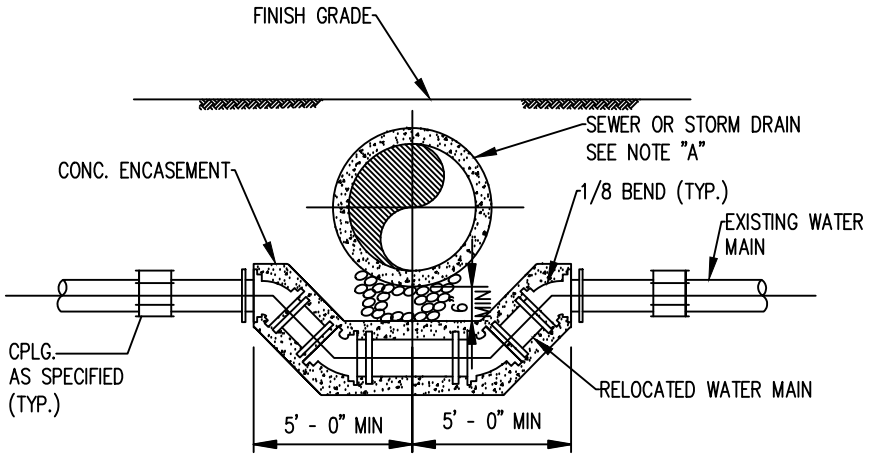
PIPE DIAMETER INCHES		6	8	10	12	16	20	24	30	36	42
DEAD ENDS AND TEES		5.6	10	15.8	22.6	40.2	62.8	90.4	141.0	203.6	277.0
ANGLE FITTINGS	90°	7.9	14.2	22.4	32.0	56.8	88.8	127.7	199.0	288.0	392.0
	67 1/2°	–	11.1	17.6	25.1	44.7	70.0	100.2	157.0	226.0	308.0
	56 1/4°	–	–	14.9	21.2	37.9	59.2	85.1	133.0	192.0	261.0
	45°	–	–	–	17.3	30.8	48.1	69.0	108.0	156.0	212.0
	33 3/4°	–	–	–	13.1	23.3	36.5	52.5	82.0	118.0	161.0
	22 1/2°	–	–	–	8.8	15.7	24.5	35.2	55.0	79.5	108.0

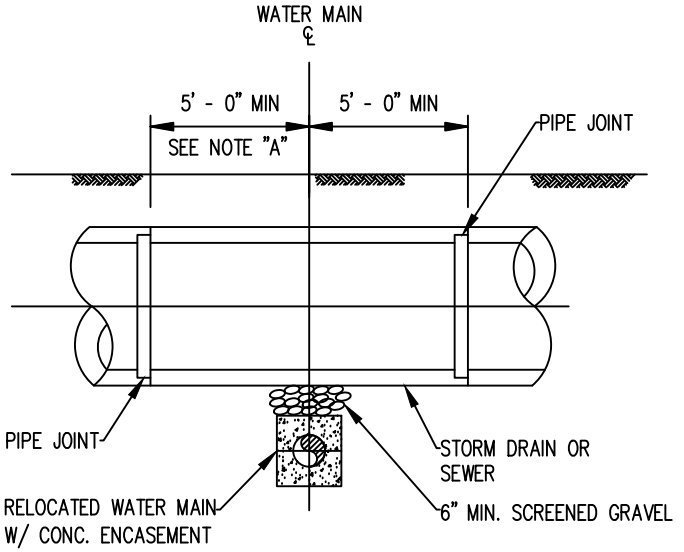
DESIGN THRUST BLOCKS OR OTHER SUITABLE ANCHORAGE TO SUIT ACTUAL CONDITIONS

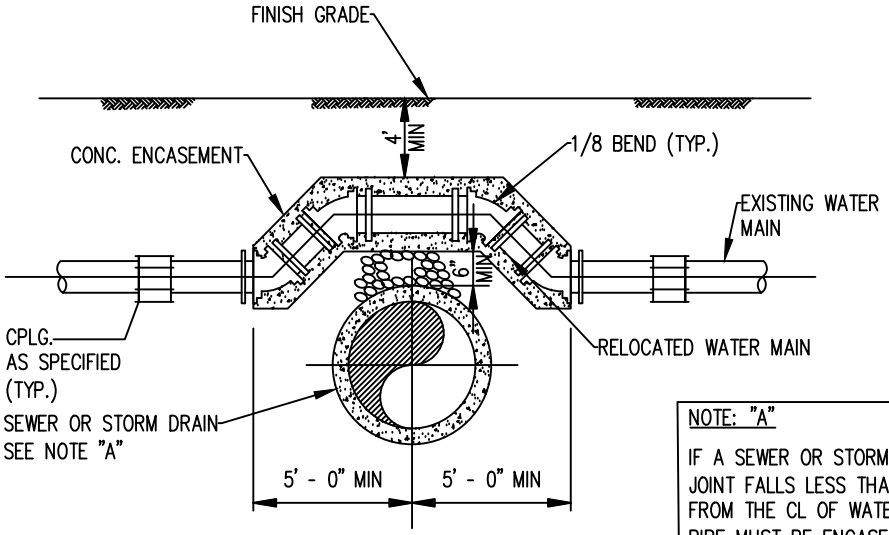
CONCRETE THRUST BLOCK REQUIREMENTS	
FITTING	MINIMUM BEARING SURFACE AREA
30" $\frac{1}{8}$ BENDS	30 SQ. FT.
12" $\frac{1}{8}$ BENDS	9 SQ. FT.
16" $\frac{1}{16}$ BENDS	8 SQ. FT.
10" $\frac{1}{8}$ BENDS	8 SQ. FT.
8" $\frac{1}{16}$ BENDS	4 SQ. FT
8" $\frac{1}{8}$ BENDS	6 SQ. FT
8" $\frac{1}{4}$ BENDS	10 SQ. FT
6" $\frac{1}{8}$ BENDS	4 SQ. FT
30" X 12" TEE	16 SQ. FT
30" X 10" TEE	12 SQ. FT
30" X 8" TEE	10 SQ. FT
16" X 8" TEE	10 SQ. FT
12" X 8" TEE	10 SQ. FT
12" X 6" TEE	6 SQ. FT
8" X 8" TEE	10 SQ. FT
8" X 6" TEE	6 SQ. FT.
8" X 4" TEE	4 SQ. FT.

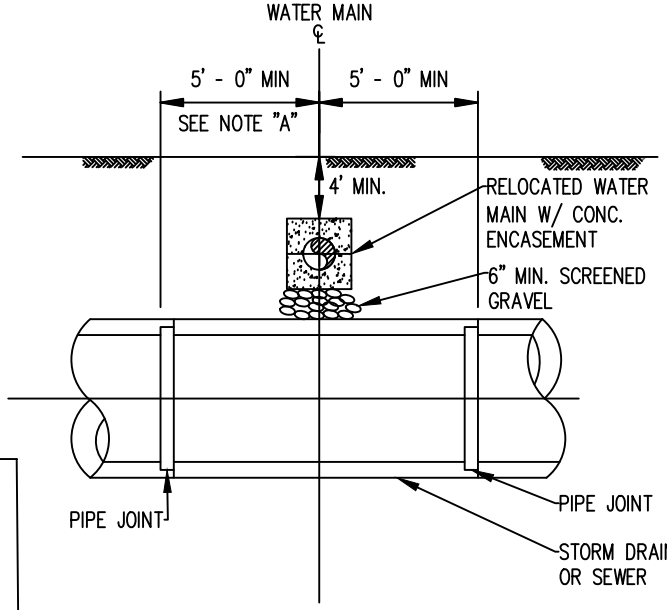
WATER MAIN RELOCATION

NTS





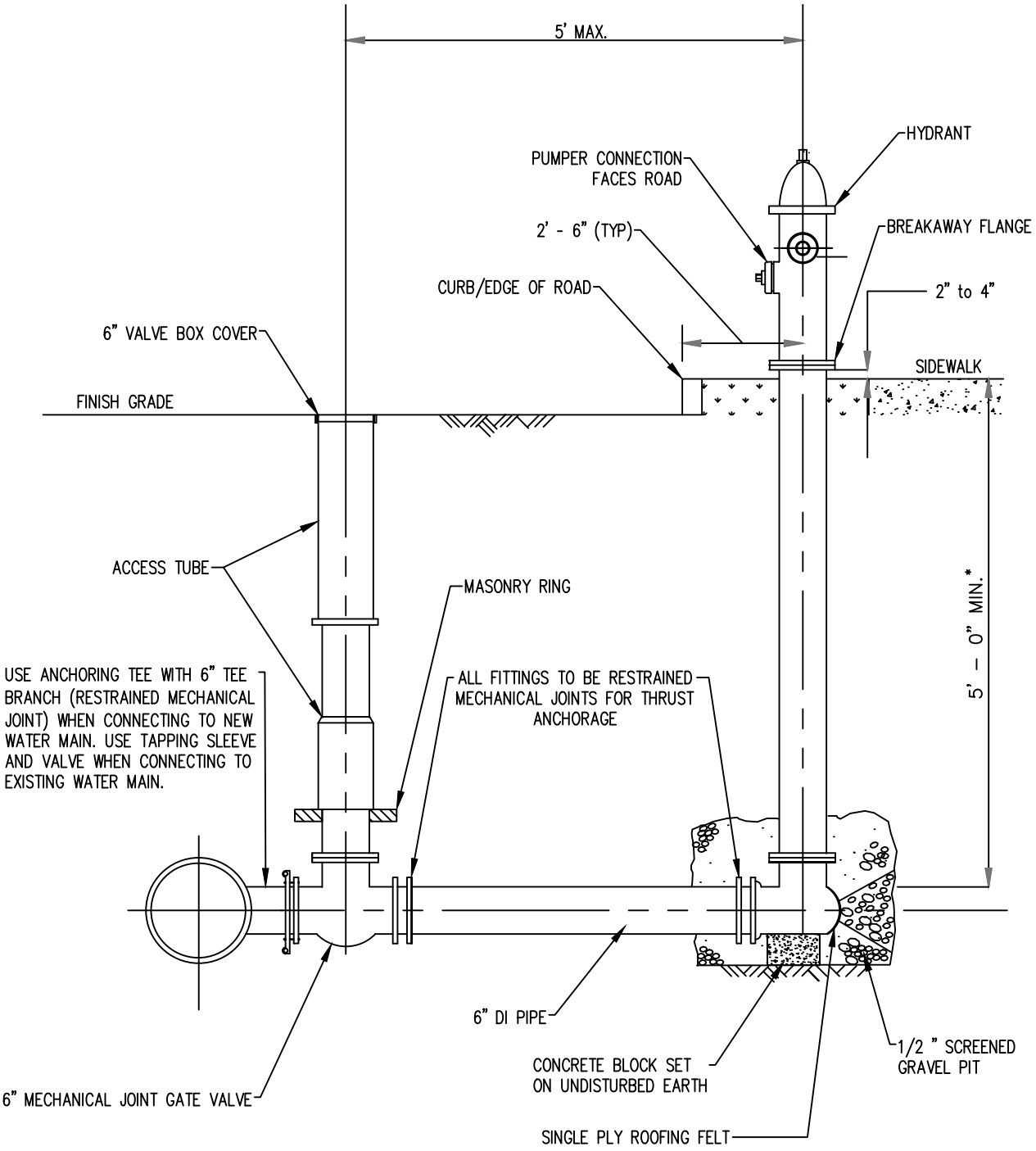




NOTE: "A"

IF A SEWER OR STORM WATER PIPE JOINT FALLS LESS THAN 5' - 0" FROM THE CL OF WATER MAIN, THE PIPE MUST BE ENCASED IN 6" OF CONCRETE 5' - 0" EACH SIDE OF THE WATER MAIN.

NOTES:
ALL JOINTS SHALL BE RESTRAINED



NOTE:

* VERIFY DEPTH OF WATER MAIN PRIOR TO ORDERING HYDRANT.

HYDRANT

NTS

Eclipse #9700

Portable Automatic Flushing Device

For non-freezing temps only!

- Attached to any 2.5" NST Nozzle
- Maintains Consistently Safe Residuals
- Remove stagnant water before DBPs Form
- Flush at night when demand is low
- Adjustable flow rates up to 200GPM
- Valve rated up to 220 PSI
- Powder-coated aluminum enclosure
- Swivel collar lock
- EPA approved for water conservation
- Approved for GPR funding
- Available in red or yellow

Sizes Available

2" Valve: flows of approximately 200 GPM

1" Valve: flows of approximately 60 GPM

Controllers Options

- Handheld Digital Controller

- Bluetooth Controller

Ask about our 30-Day Pilot Program

Patented
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6,048,512

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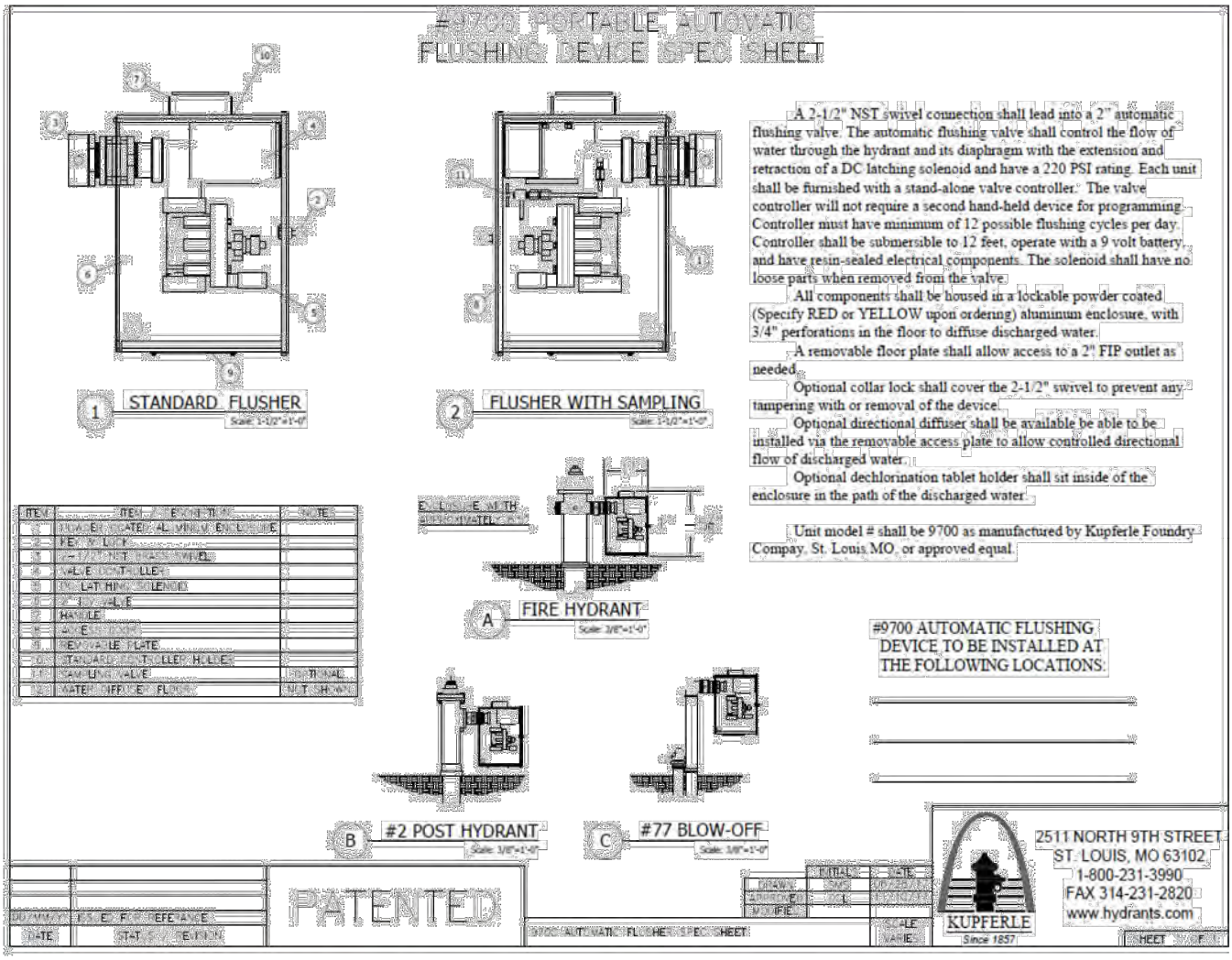
lighting the way NB new bedford

HYDRANT WITH AUTO FLUSHER

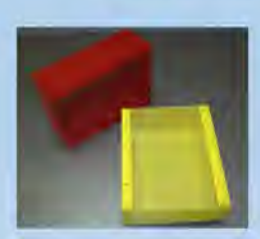
NTS

Eclipse #9700



Optional Accessories:

Sampling Point Bibb



Dechlorination Basket

Directional Diverter

Meter Stand

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HYDRANT WITH AUTO FLUSHER

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Quality Aluminum Castings Since 1948

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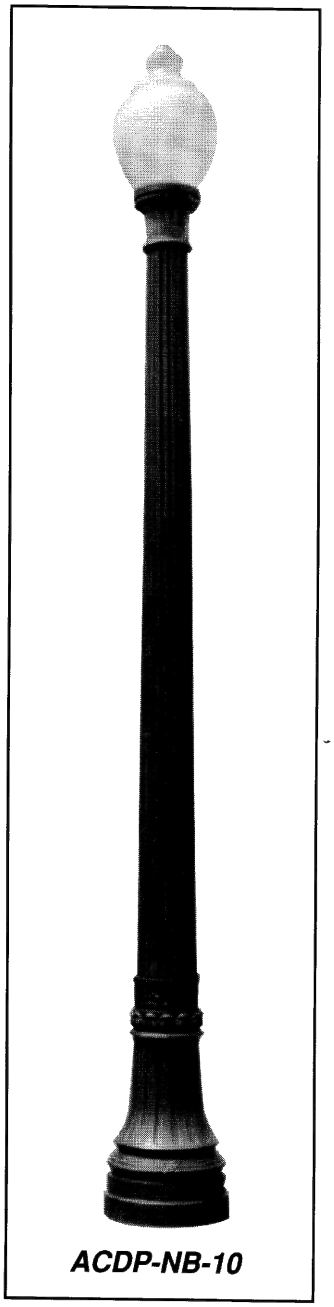
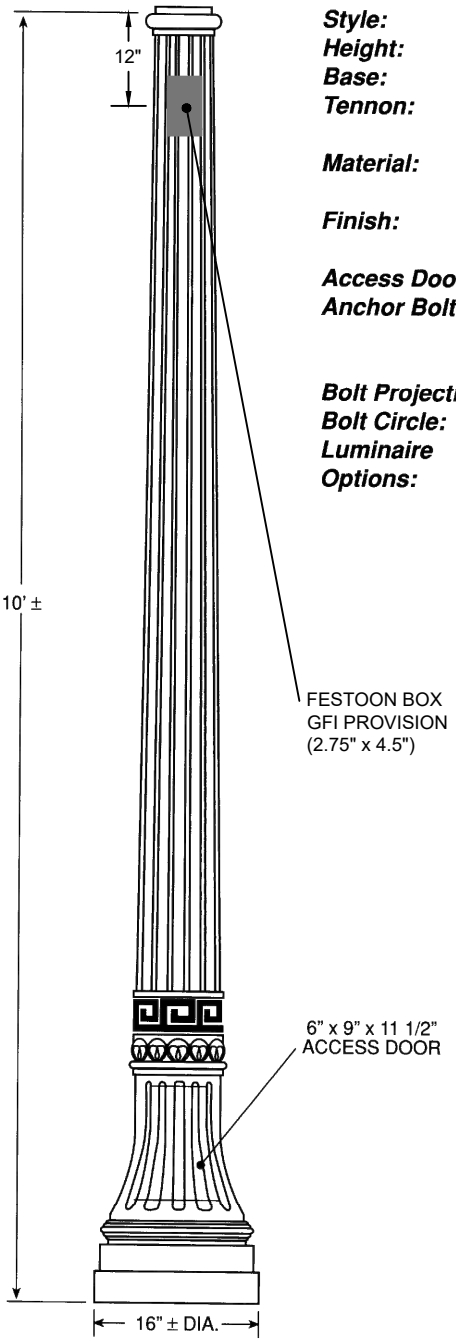
New Bedford Style Decorative Pole

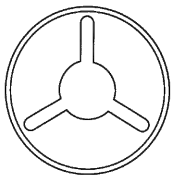


ACDP-NB-10



Style:	New Bedford
Height:	10' ±
Base:	16" ± diameter, round
Tennon:	3" x 2-7/8" diameter. Optional tenon heights and diameters available.
Material:	Heavy Wall Cast Aluminum 356 Allov.
Finish:	Black - Thermostat Powder Coating
Access Door:	6"x9"x11 1/2", located in base.
Anchor Bolts:	(3) 3/4" x 24" plus 3" hook including 1 lock washer, 2 flat washers and 2 nuts. Fully galvanized.
Bolt Projection:	3" above foundation.
Bolt Circle:	9" to 11" ± Diameter.
Luminaire Options:	Refer to detail "Quick Disconnect Light Fixture and Bulb"

ANCHOR BOLT DETAIL



(3) 3/4" ANCHOR BOLTS
ON 9 to 11"± BOLT CIRCLE

***POLE MODEL TO BE SPECIFIED BY THE DPI**

NEW BEDFORD DECORATIVE POLE

NTS

From: ALLOY CASTINGS CO., INC.
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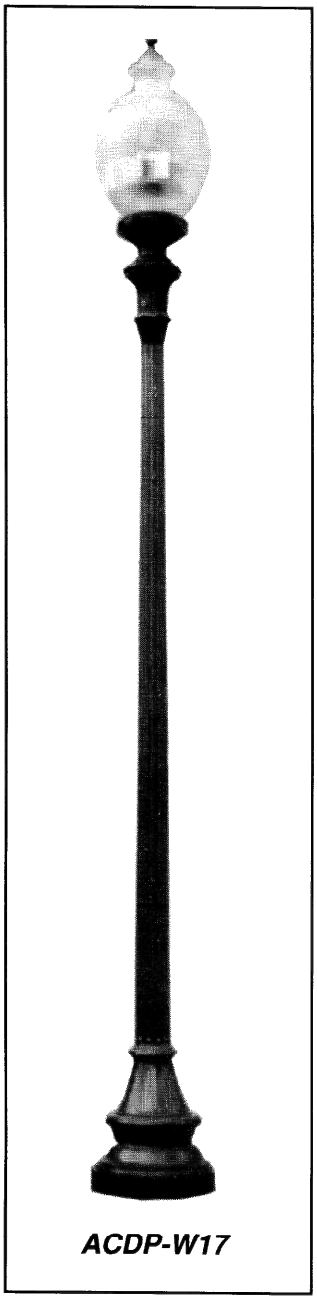
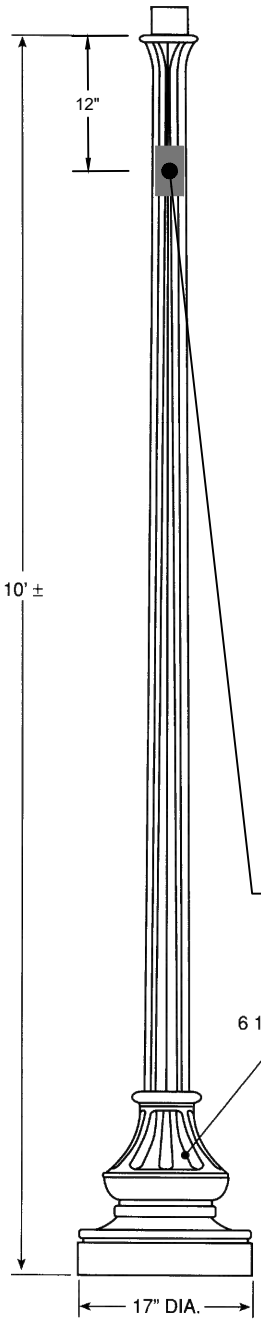
Washington 17 Style Decorative Pole



ACDP-W17

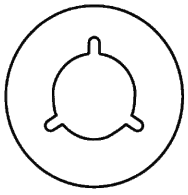


Style:	Washington 17
Height:	10' ±
Base:	17" ± diameter, round
Tennon:	3" x 2-7/8" diameter. Optional tenon heights and diameters available.
Material:	Heavy Wall Cast Aluminum 356 Alloy.
Finish:	Black - Thermostat Powder Coating
Access Door:	6 1/4" x 4", located in base.
Anchor Bolts:	(3) 3/4" x 24" plus 3" hook including 1 lock washer, 2 flat washers and 2 nuts. Fully galvanized. Template included with each order.
Bolt Projection:	3" above foundation.
Bolt Circle:	12 1/4" ± Diameter.
Features:	A variety of heights are available in straight shafts and extruded shafts. A variety of bolt circles are also available.
Luminaire Options:	Refer to detail "Quick Disconnect Light Fixture and Bulb"
Accessory Options:	Ladder rest and decorative brackets are available.

FESTOON BOX
GFI PROVISION
(2.75"x4.5")

6 1/4" X 4" ACCESS DOOR

ANCHOR BOLT DETAIL



(3) 3/4" ANCHOR BOLTS
ON 12 1/4"± BOLT CIRCLE

***POLE MODEL TO BE SPECIFIED BY THE DPI**

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10-FT WASHINGTON STYLE LIGHT POLE

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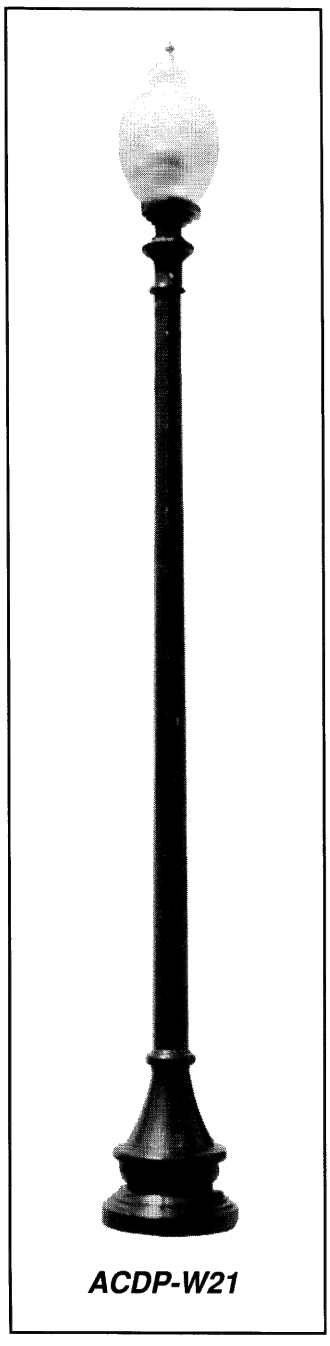
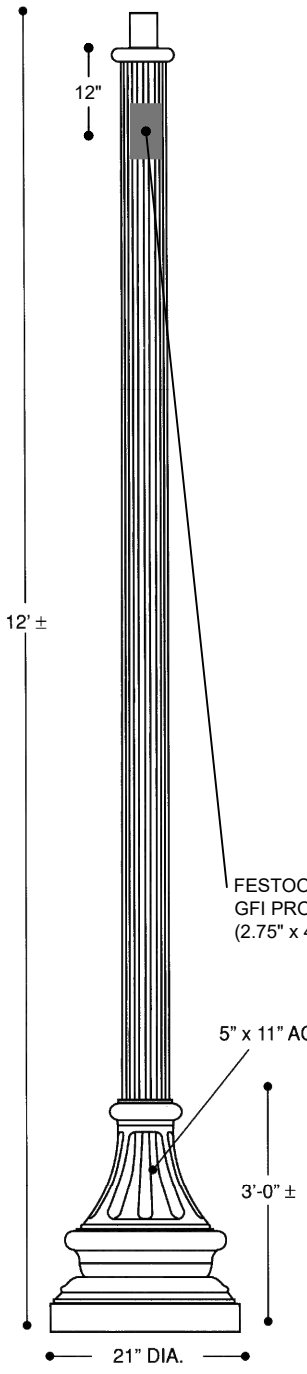
Washington 21 Style Decorative Pole

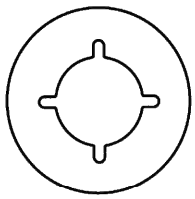


ACDP-W21



Style:	Washington 21
Height:	12' ±
Base:	21" ± diameter, round
Tennon:	3" x 2-7/8" diameter. Optional tenon heights and diameters available.
Material:	Heavy Wall Cast Aluminum 356 Alloy.
Finish:	Black - Thermostat Powder Coating
Access Door:	5" x 11", located in base.
Anchor Bolts:	(4) 3/4" x 24" plus 3" hook including 1 lock washer, 2 flat washers and 2 nuts. Fully galvanized. Template included with each order.
Bolt Projection:	3" above foundation.
Bolt Circle:	12" ± Diameter.
Features:	A variety of heights are available using extruded shafts or straight aluminum shafts.
Luminaire Options:	Refer to detail "Quick Disconnect Light Fixture and Bulb"
Accessory Options:	Ladder rest and decorative brackets are available.

ANCHOR BOLT DETAIL



(4) 3/4" ANCHOR BOLTS
ON 12"± BOLT CIRCLE

***POLE MODEL TO BE SPECIFIED BY THE DPI**

12-FT WASHINGTON STYLE LIGHT POLE

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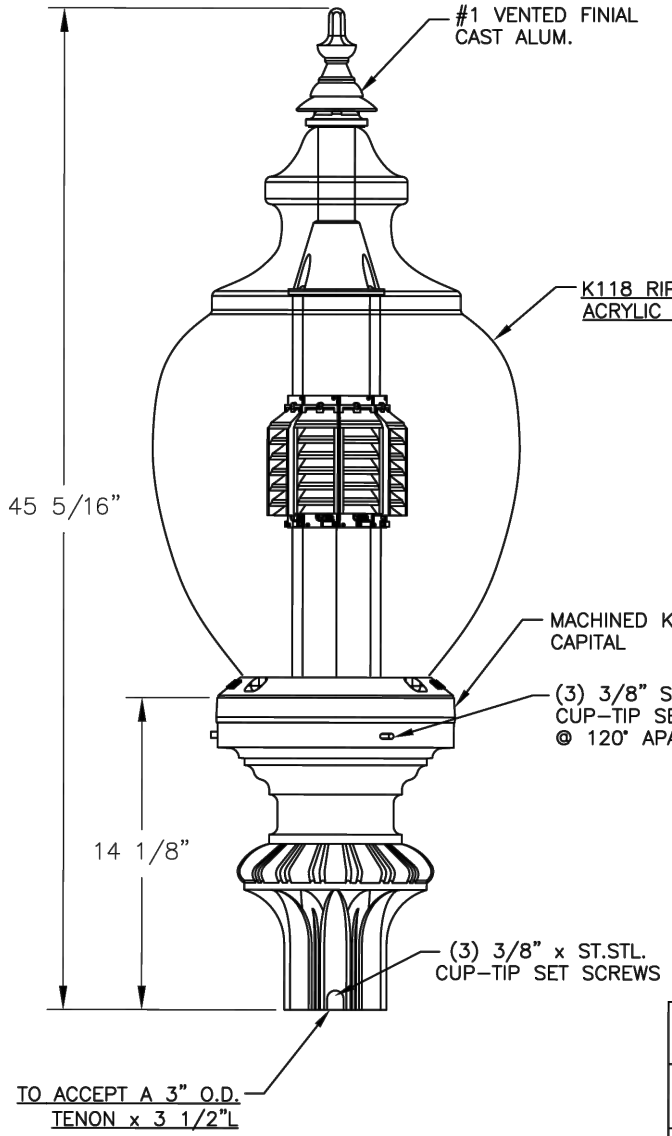
QUICK DISCONNECT LIGHT FIXTURE AND BULB

NTS



NOTES:

1. 100W MEANWELL DRIVER DIALED DOWN TO 40W.
2. FOR USE ON NEW BEDFORD STYLE AND WASHINGTON STYLE LIGHT POLES

REV.	ALTERATION	DATE	BY
A	WATTAGE SELECTOR ADDED	02/01/21	V.V.

LUMINAIRE SPECIFICATIONS

CATALOGUE NO.:	K118R-B2AR-III-100(SSL)-1063 -120:277-K16/K4-4K-WS
QUANTITY:	
OPTICAL SYSTEM:	BAFFLED ARRAY ACRYLIC RIPPLED
IES CLASS.:	TYPE III
WATTAGE:	100W (1063 SERIES) SOLID STATE LIGHTING
LINE VOLTAGE:	120:277V
CCT:	4000K
POLE ADAPTOR:	K16/K4 (MACHINED)
PAINT:	TEXTURED BLACK
OPTIONS:	#1 VENTED FINIAL *** HEAVY DUTY GLOBE *** WATTAGE SELECTOR

OPTIONS

QUICK DISCONNECT ☒

WATTAGE SELECTOR STICKER

	WS OPTION	WATTAGE
☐	0	100W
☐	1	90W
☐	2	80W
☐	3	70W
☐	4	60W
☐	5	50W
☐	6	40W

CUSTOMER APPROVAL & DATE: _____

CUSTOMER ORDER No:	
STRESSCRETE ORDER No:	
KMFG. ORDER No:	
KING U.S. ORDER No:	

KING

King Luminaire • StressCrete • Est. 1953

STRESSCRETE GROUP

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Northport, Alabama 1-800-435-6563

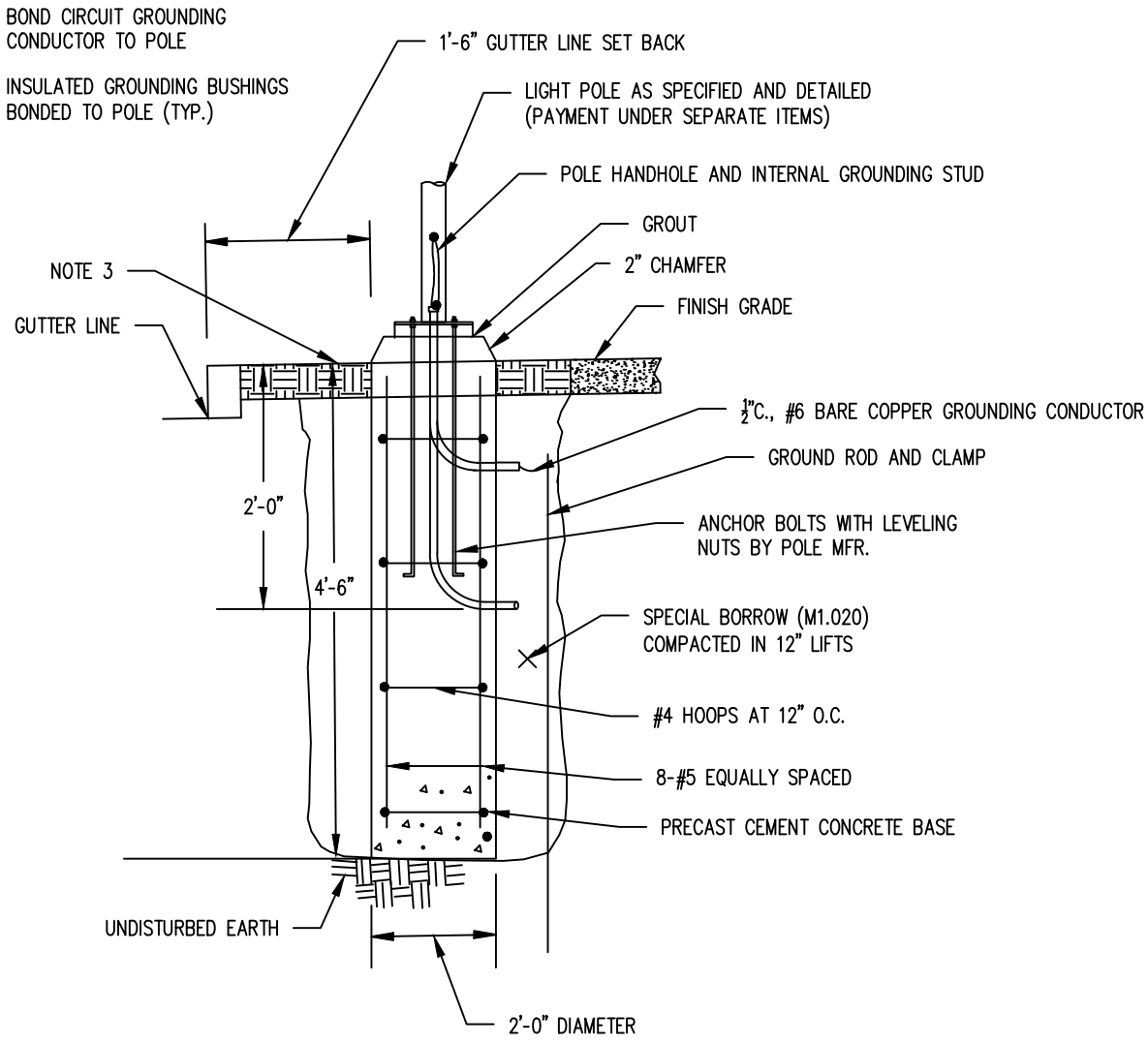
Atchison, Kansas 1-800-837-1024

Jefferson, Ohio 1-800-268-7809

PROJECT/CUSTOMER: CITY OF NEW BEDFORD

DRAWN BY:	AT:	CHECKED BY:	DATE:	REVISION:
V.V.	SC1		01/26/21	A

DRAWING TYPE:	DRAWING NUMBER:
APPROVAL/MFG. DWG.	NEW-BEDFORD-LED-5



NOTES:

1. COORDINATE LIGHT POLE BASE AND BOLT LOCATION WITH LIGHT POLE STYLE.
2. TO BE USED FOR WASHINGTON STYLE OR NEW BEDFORD STYLE.
3. NO CHAMFER EDGE FOR LIGHT POLES TO BE SET WITHIN BRICK RIBBON. TO BE FLUSH WITH FINISH GRADE.

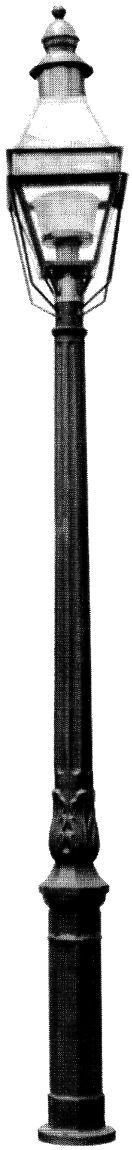
STANDARD LIGHT BASE

NTS

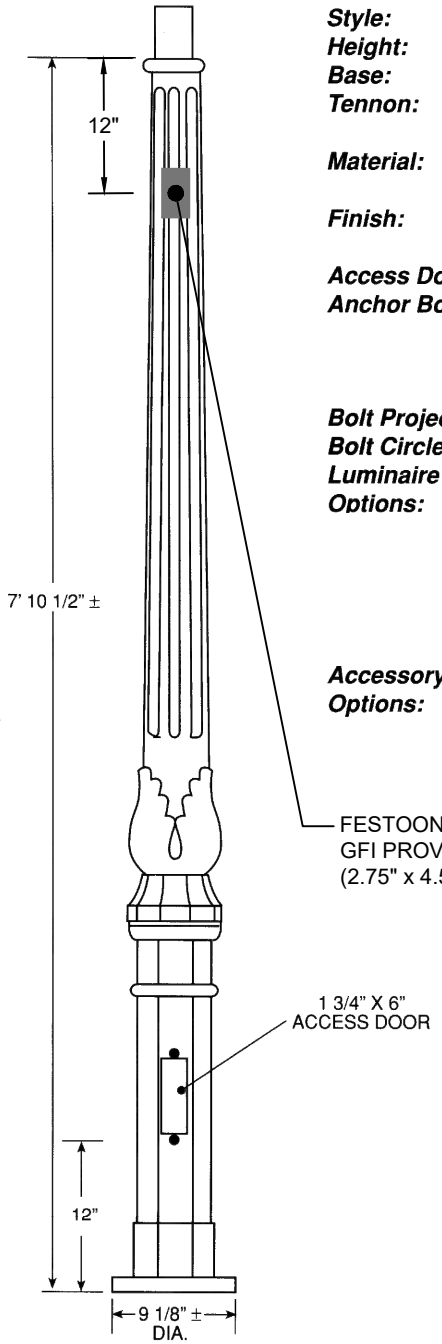
From: ALLOY CASTINGS CO., INC.
Quality Aluminum Castings Since 1948

151 West Union Street • East Bridgewater, MA 02333
Telephone: (508) 378-2541 • FAX: (508) 378-1240
www.alloycastings.com

Dartmouth Style Decorative Pole

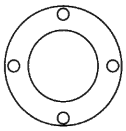


ACDP-P-7'-10"



Style:	Dartmouth
Height:	7' 10 1/2" ±
Base:	9 1/2" ± diameter, round
Tennon:	4 3/4" x 2-7/8" diameter. Optional tenon heights and diameters available.
Material:	Heavy Wall Cast Aluminum 356 Alloy.
Finish:	Black - Thermostat Powder Coating
Access Door:	1 3/4" x 6", located in base.
Anchor Bolts:	(4) 3/4" x 24" plus 3" hook including 1 lock washer, 2 flat washers and 2 nuts. Fully galvanized. Template included with each order.
Bolt Projection:	3" above foundation.
Bolt Circle:	7 3/4" ± Diameter.
Luminaire Options:	Refer to detail "Copper Head Luminaire"
Accessory Options:	Ladder rest and decorative brackets are available.

ANCHOR BOLT DETAIL

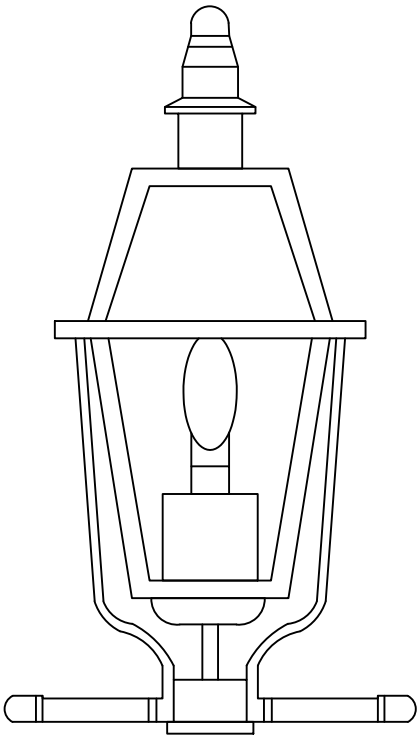


(4) 3/4" ANCHOR BOLTS
ON 7 3/4"± BOLT CIRCLE

***POLE MODEL TO BE SPECIFIED BY THE DPI**

DARTMOUTH STYLE LIGHT POLE

NTS

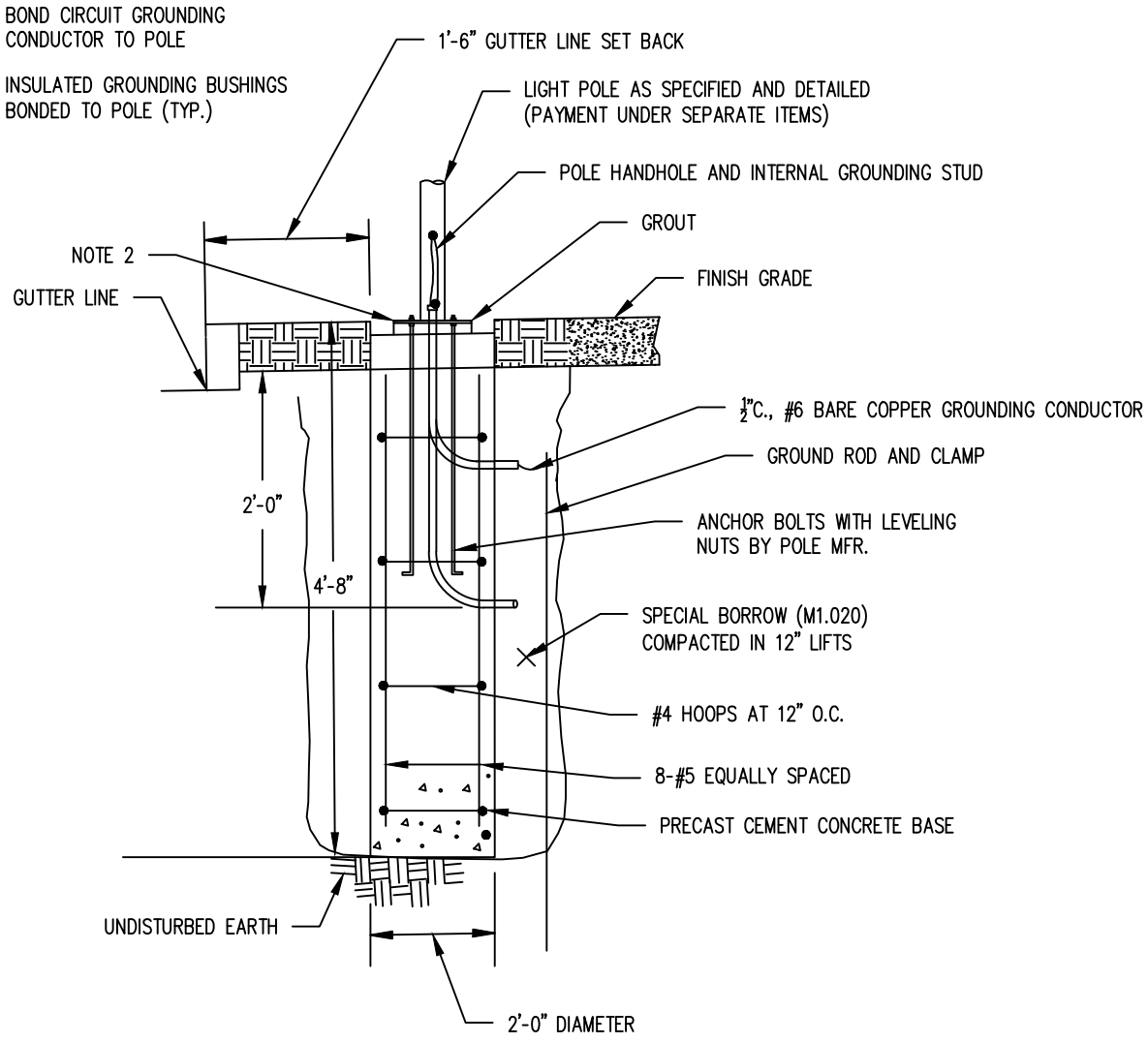


SPECIFICATIONS

STYLE:	"COPPERHEAD" HISTORIC SQUARE LANTERN
LAMP SPEC:	23 W CFL
VOLTAGE:	120 VAC
COLOR TEMP:	3000K (WARM WHITE)
LUMEN OUTPUT:	1650 LUMENS
BASE MATERIAL:	COPPER WITH ROUND STEEL CRADLE
LENS SPEC:	DOUBLE WIDTH THICK CLEAR GLASS
ACCESSORIES:	10" HIGH FROSTED HURRICANE CHIMNEY

COPPER HEAD LUMINAIRE

NTS



NOTES:
1. TO BE USED FOR DARTMOUTH STYLE
2. NO CHAMFER EDGE FOR LIGHT POLES TO BE SET WITHIN BRICK RIBBON. TO BE FLUSH WITH FINISH GRADE.

HISTORIC DISTRICT LIGHT BASE

NTS

PELCO PRODUCTS, INC.
PH: 405-340-3434
FAX: 405-340-3435
Edmond, OK 73013
www.pelcoinc.com

This drawing is the property of Pelco and is not to be used in whole or in part without Pelco's written permission.

ASSEMBLY CUT SHEET

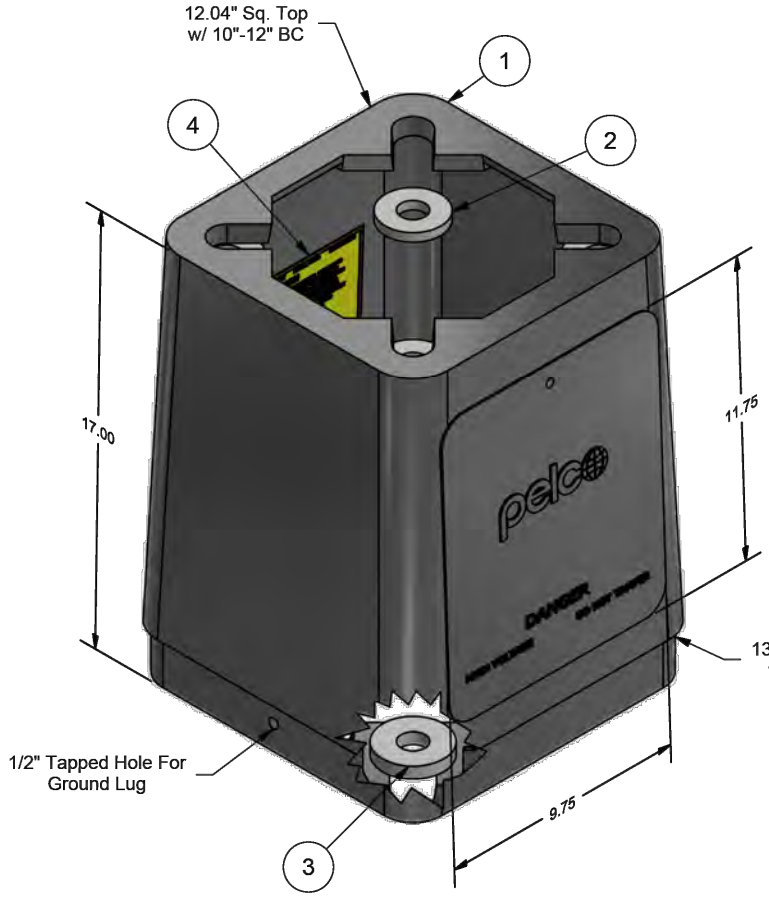
REF:

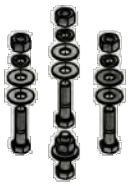
TITLE: Transformer Base Assy w/ Pelco Door & Washers, TB 2-17, Alum

PART NO.: PB-5514

Example Part No.
PB-5514-PXX
PB-5514-HK-PXX

w/ Hardware Kit
Process No Color=PNC
Paint=PXX





PB-5437-GLV
Hardware Kit Option

Options
HK = w/ Hardware Kit
Paint BLACK

ITEM	PART NUMBER	DESCRIPTION	QTY
1	PB-5514	Transformer Base w/ Pelco Door, TB 2-17, Alum. "CAUTION" Label Shipped Loose	1
2	PB-5439-GLV	Hardware Kit, T-Base Washers,1-1/6" ID x 2-1/2" OD x 3/8" Thk, Set of 4, Steel, Galv	1
3	PB-5440-GLV	Hardware Kit, T-Base Washers,1-1/6" ID x 2-3/4" OD x 1/2" Thk, Set of 4, Steel, Galv	1
4	O-3236	Label, Akron Foundry, TB2-17 Base (supplied w/ base)	1

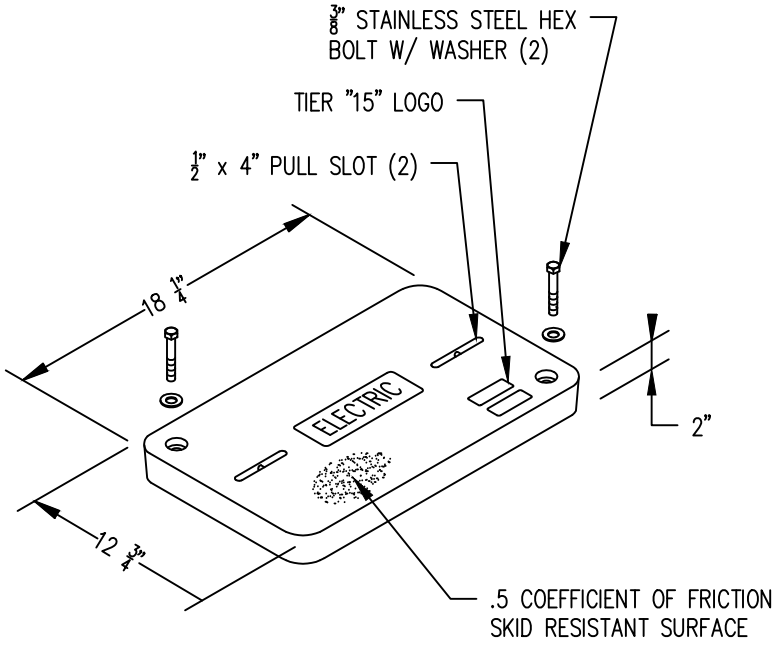
DRAWN:	DATE:	CHECKED:	DATE:	MFG ENG:	DATE:	QA:	DATE:	REV:	DATE:	REV CHK'D:	DATE:	SHEET 1 OF 1
Chris.Opie	7/14/2011	KAK	7/14/2011	JLH	5/8/2014	ZSM	5/8/2014	F	5/31/19 TRL	BPM	6/3/2019	

Pelco Assy.idw 8/20/18

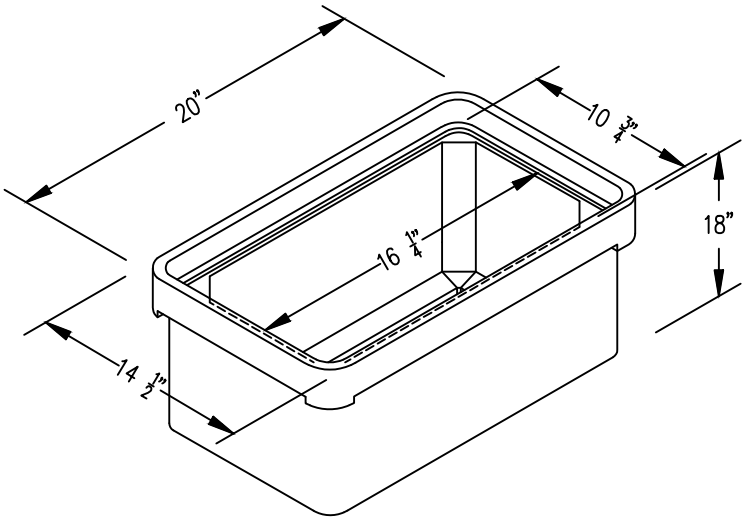
lighting the way NB new bedford

COBRA HEAD LIGHT BASE

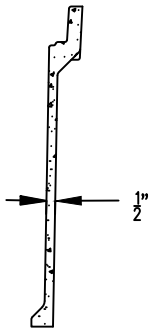
NTS



COVER



BOX



WALL

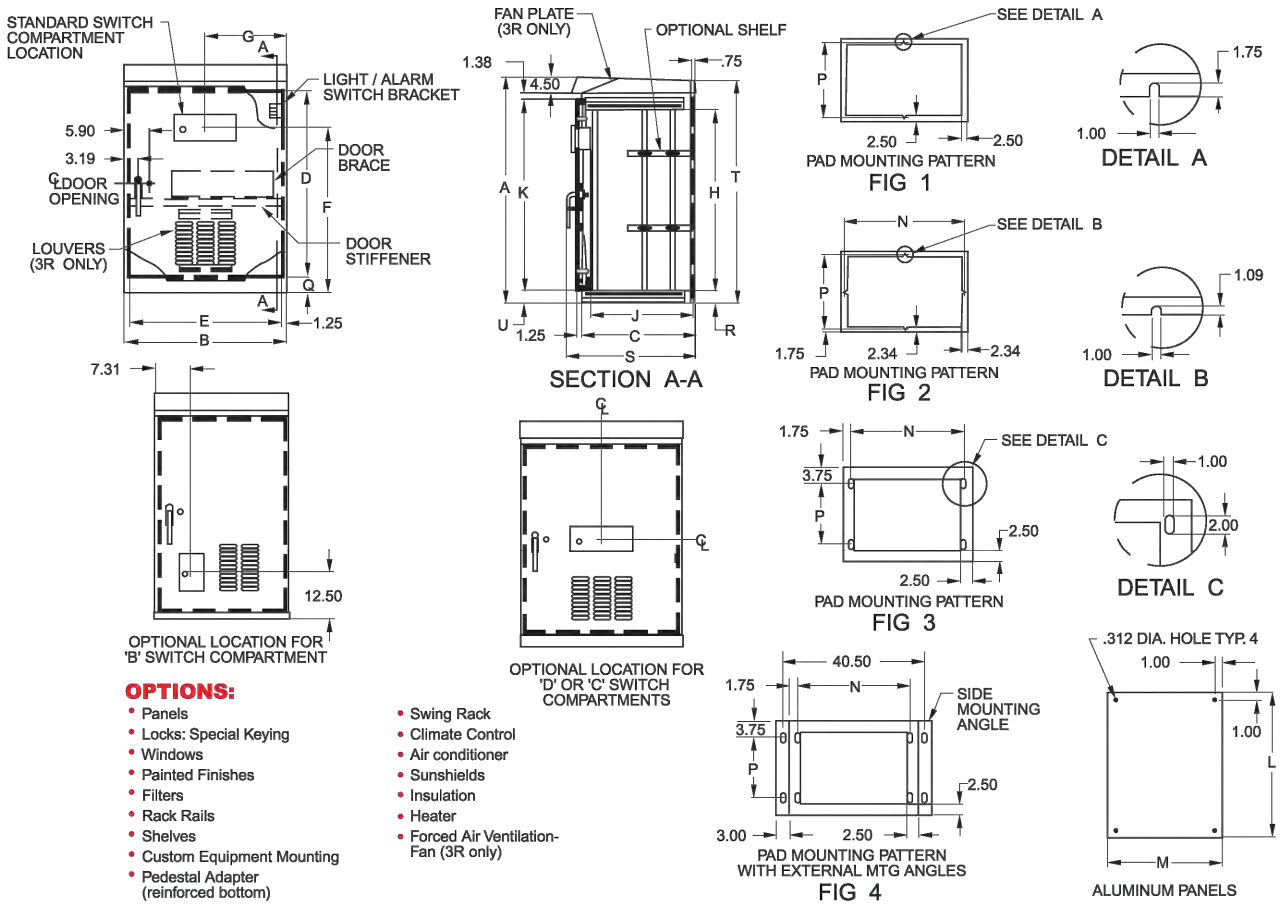
NOTES:
ELECTRIC BOX SHALL BE MADE IN THE USA.

STANDARD ELECTRIC BOX

NTS

Large Single Door

APX Enclosures, Inc.



OPTIONS:

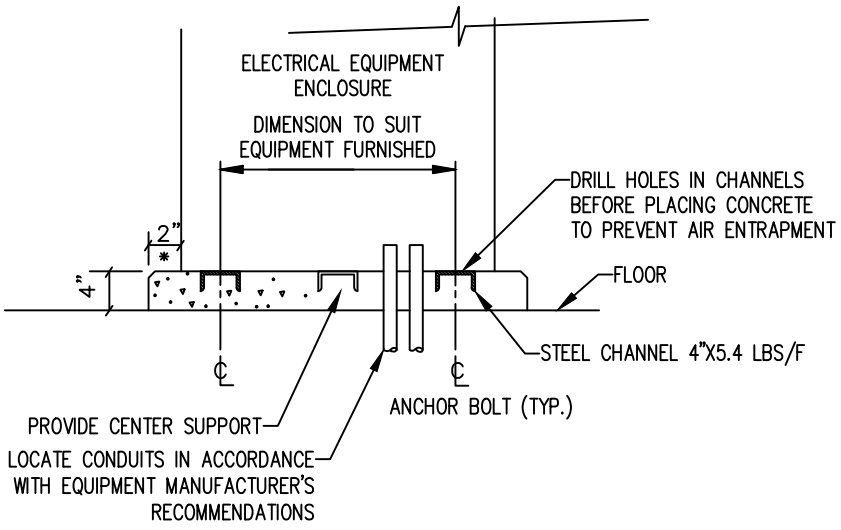
- Panels
- Locks: Special Keying
- Windows
- Painted Finishes
- Filters
- Rack Rails
- Shelves
- Custom Equipment Mounting
- Pedestal Adapter (reinforced bottom)
- Swing Rack
- Climate Control
- Air conditioner
- Sunshields
- Insulation
- Heater
- Forced Air Ventilation-Fan (3R only)

MODEL TC503617 OR APPROVED EQUAL WITH THE FOLLOWING FEATURES:

OVERALL DIMENSIONS OF
50" HEIGHT (A) X 36" WIDTH (B) X 17" DEPTH (C)

UL LISTED ENCLOSURE
NEMA 3R
BLACK POWDER COAT FINISH

3 PT. MAIN DOOR LATCH, CORBIN # LOCK, TWO KEYS, STAINLESS STEEL PAD LOCKABLE HANDLE, ADJUSTABLE EQUIPMENT CHANNELS ON SIDE AND REAR WALLS, FAN/LIGHT MOUNTING PLATE, CONTINUOUS STYLE HINGE, SLOPED LID, PLYWOOD BACK PANEL KIT, DOOR GASKETS, DOOR SWITCH BRACKET, LOUVERED DOOR, DISPOSABLE AIR FILTER, EXHAUST VENTS IN OVERHANG, PROVISIONS FOR PAD MOUNTING. (WITH OPEN BOTTOM FOR CONDUIT ENTRY)

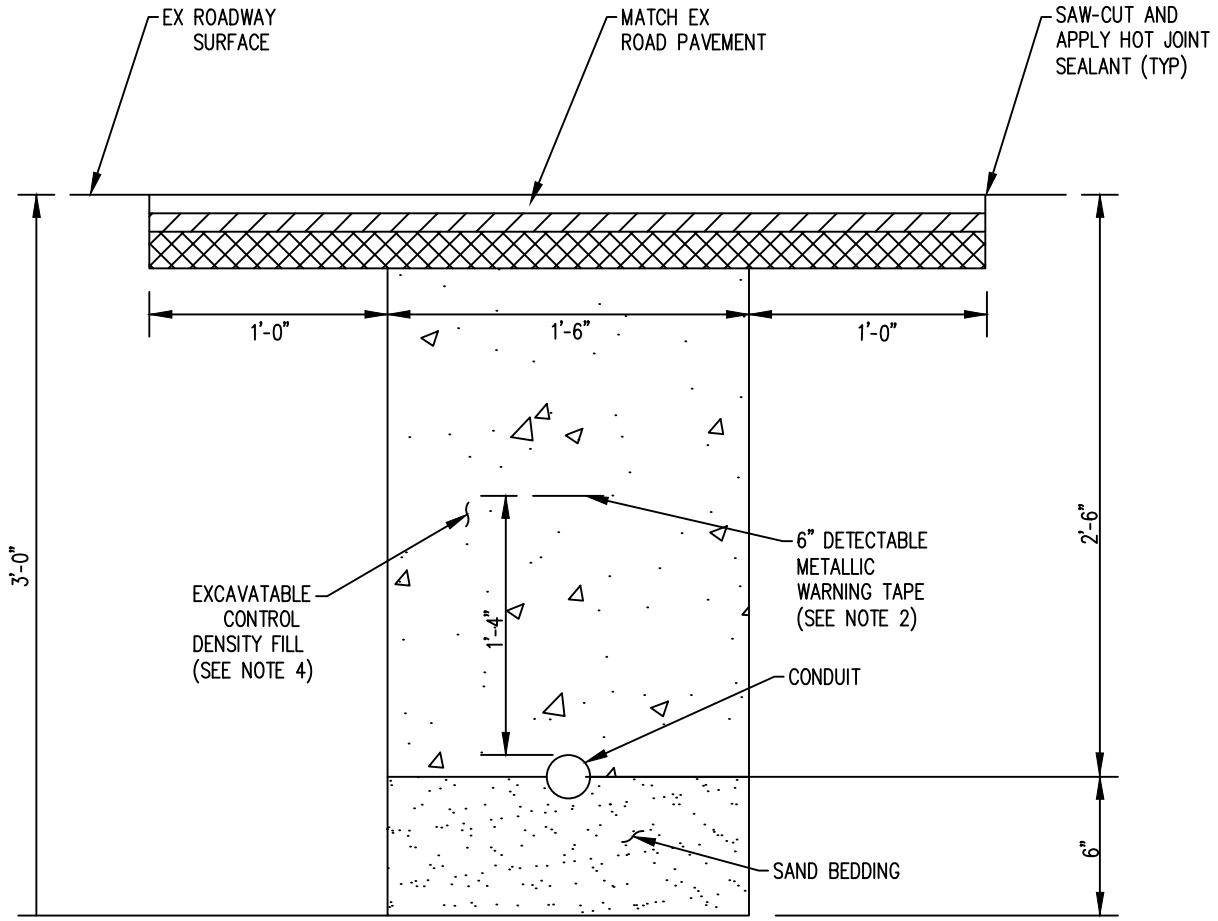


ELECTRICAL EQUIPMENT PAD

lighting the way NB new bedford

STANDARD ELECTRIC CABINET

NTS

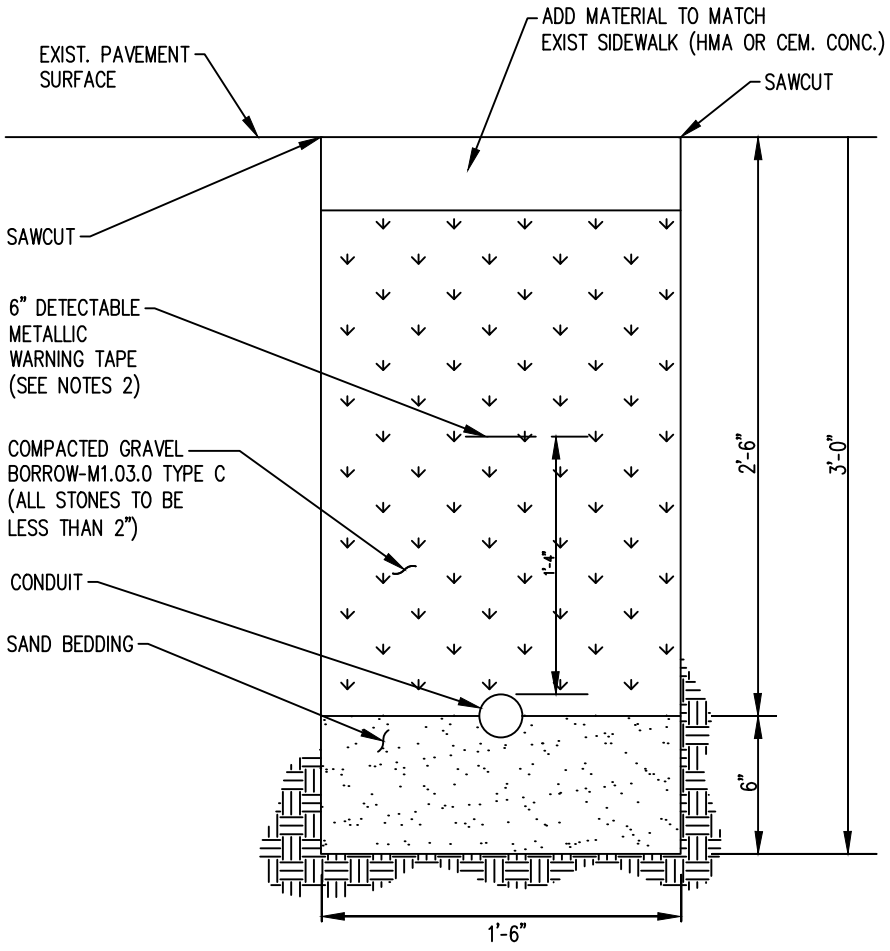


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY CITY OF NEW BEDFORD DPI.
2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.
3. FOR DOUBLE CONDUIT INSTALLATIONS, SEPARATE CONDUIT BY 3". IN THE EVENT THAT A POWER CONDUIT IS ADJACENT TO A NON-POWER CONDUIT, SEPARATE BY 12".
4. CONTROL DENSITY FILL SHALL MEET THE REQUIREMENTS OF SUBSECTION MA.08.0. OF THE MASSDOT STANDARDS.

CONDUIT CROSSING UNDER PAVEMENT

NTS

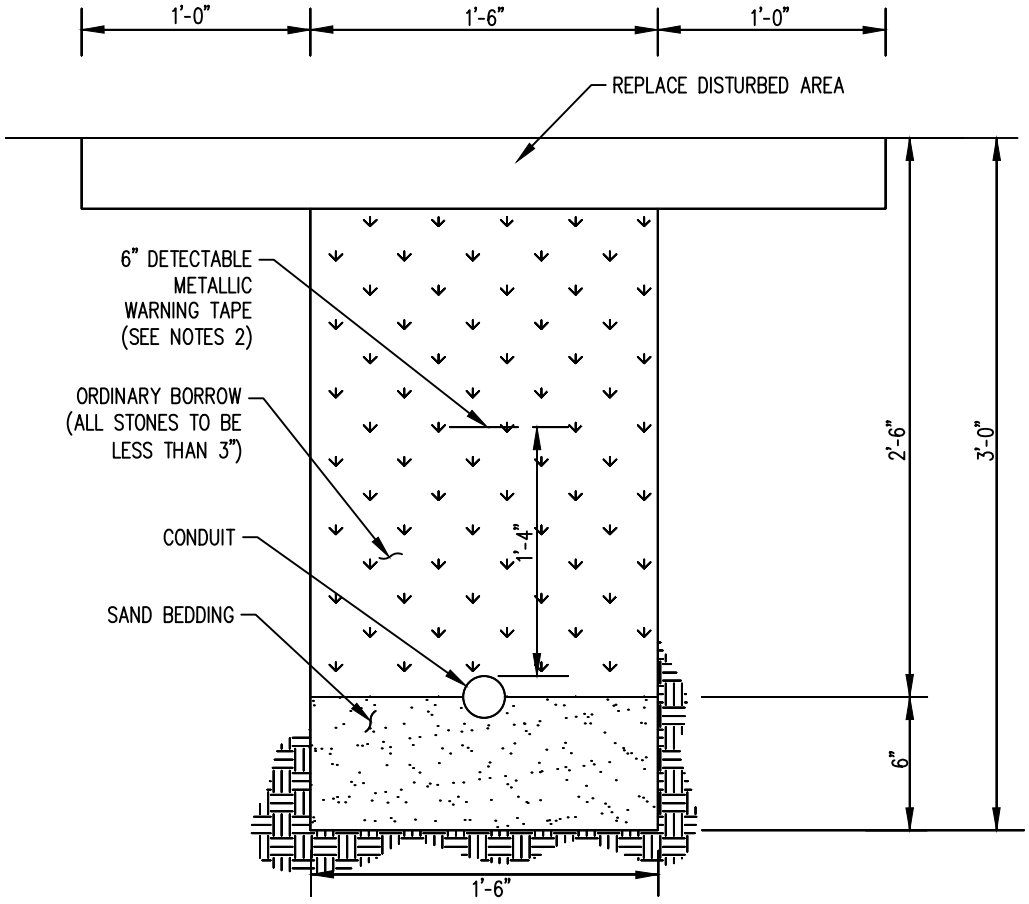


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.
2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.
3. FOR DOUBLE CONDUIT INSTALLATIONS, SEPARATE CONDUIT BY 3". IN THE EVENT THAT A POWER CONDUIT IS ADJACENT TO A NON-POWER CONDUIT, SEPARATE BY 12".

CONDUIT CROSSING UNDER SIDEWALK

NTS

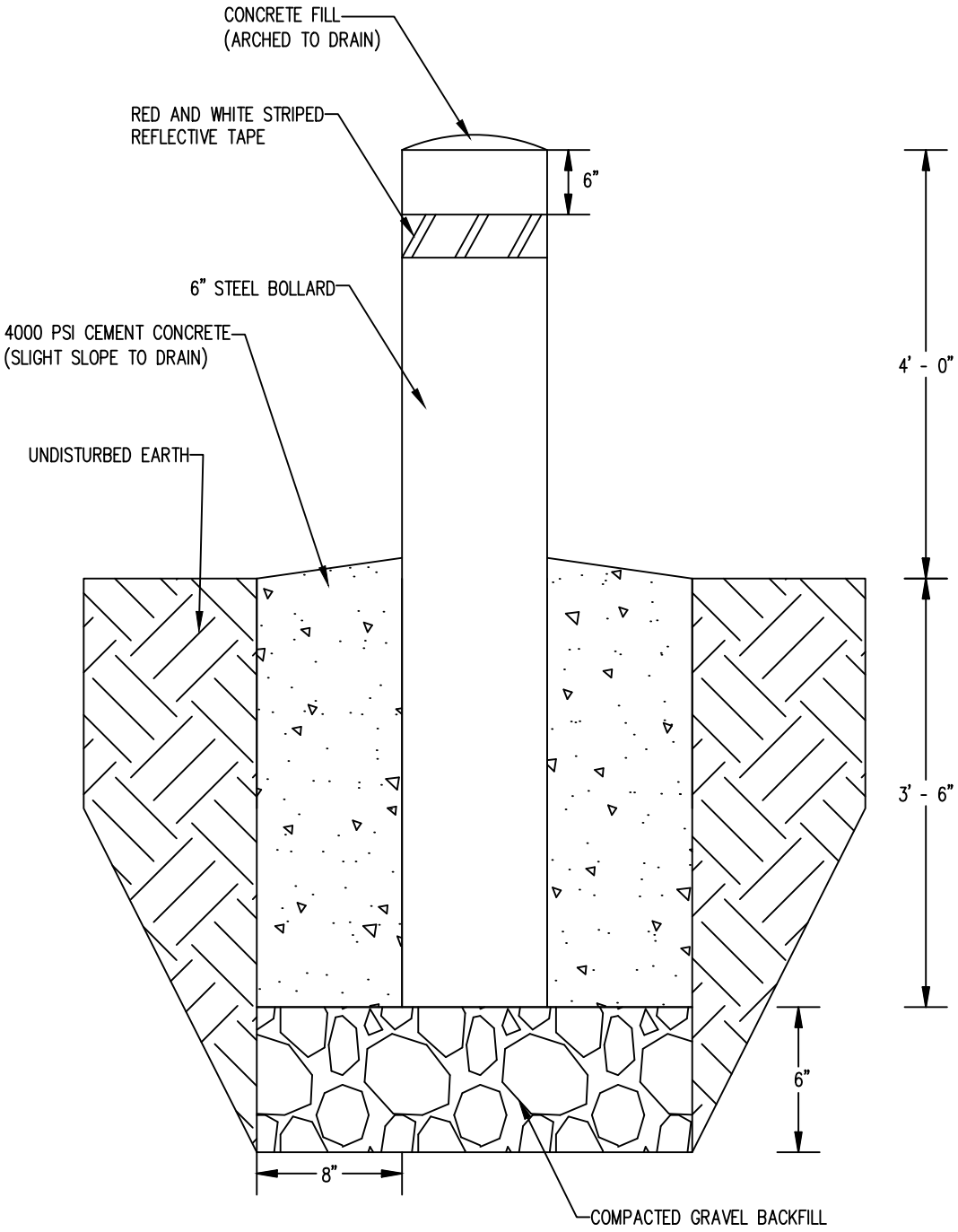


NOTES:

1. SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.
2. WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.
3. FOR DOUBLE CONDUIT INSTALLATIONS, SEPARATE CONDUIT BY 3". IN THE EVENT THAT A POWER CONDUIT IS ADJACENT TO A NON-POWER CONDUIT, SEPARATE BY 12".

CONDUIT CROSSING IN GRASS AREAS

NTS



NOTES:

1. BOLLARDS SHALL BE POWDER COATED BLACK (WITH REFLECTIVE TAPE AT THE TOP, IF SPECIFIED BY DPI).
2. FINISH DETAILS SHALL BE SPECIFIED BY DPI.

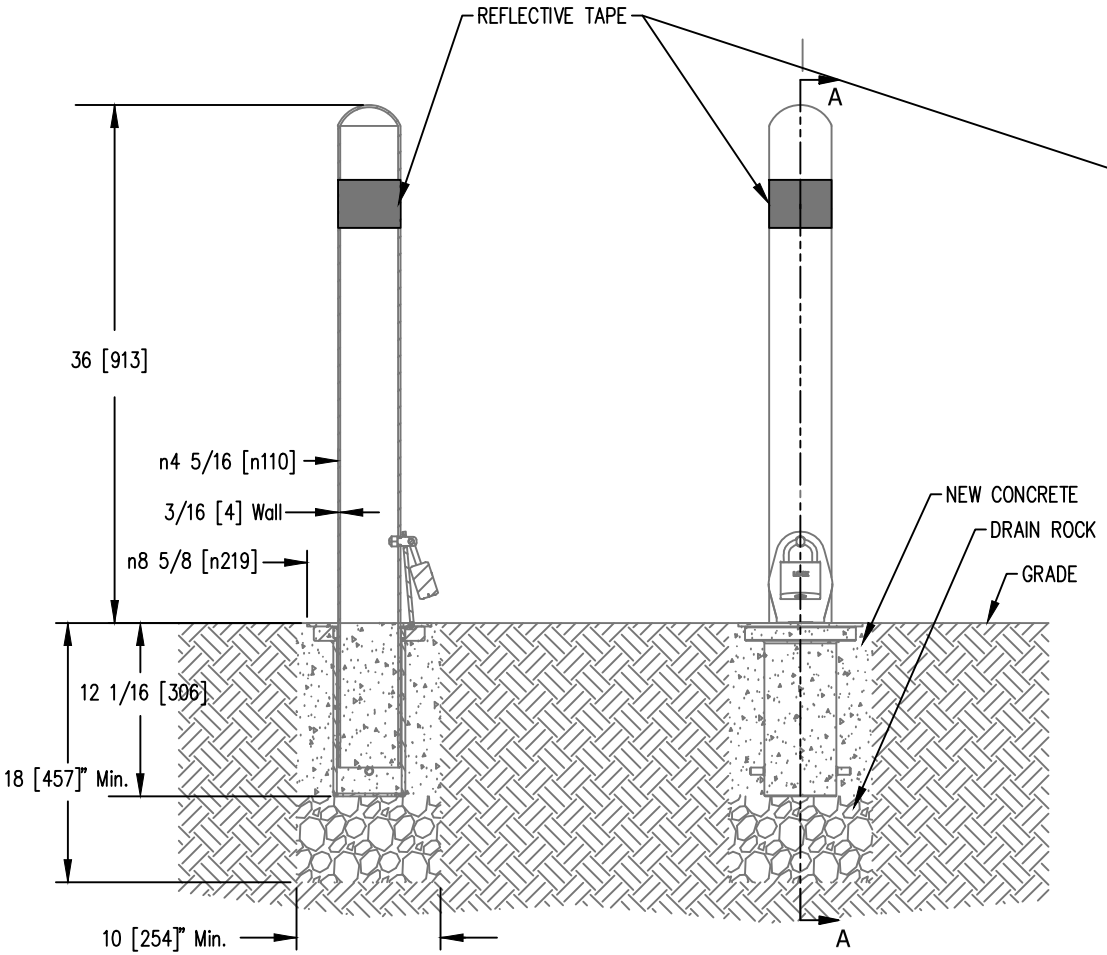
STEEL BOLLARD

NTS

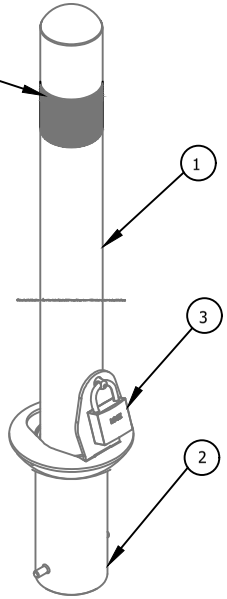
lighting the way new bedford

REMOVABLE BOLLARD WITH LID AND RECEIVER

NTS



SECTION A-A



SPECIFICATIONS:

HEIGHT ABOVE GRADE: 36" [914]

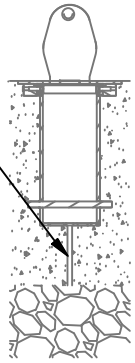
DIAMETER: 4 5/16" [110]

Weight: 31 lbs [14Kg]
(BOLLARD POST FULL LENGTH)

MATERIAL: STEEL (ASTM A36)

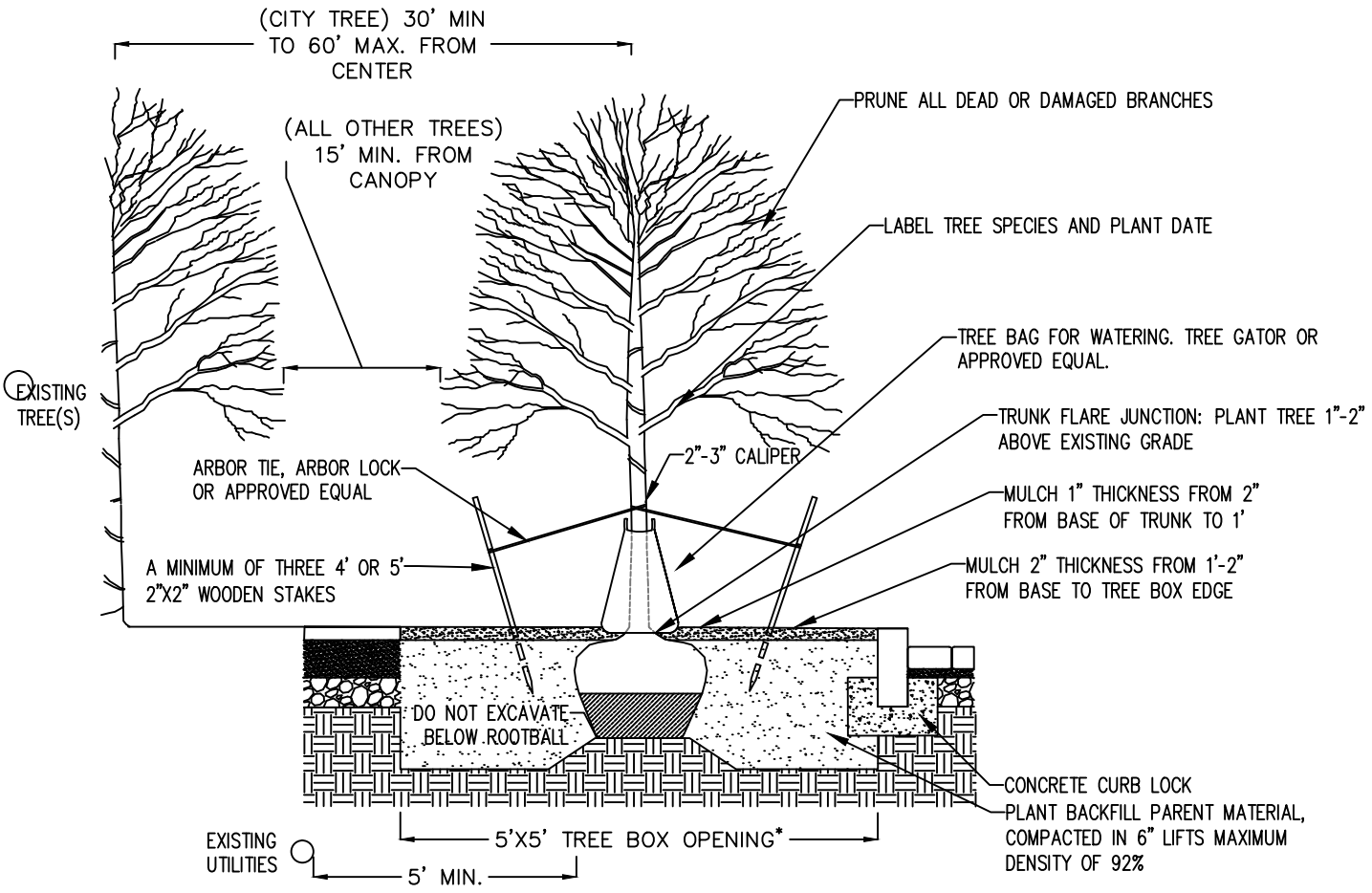
FINISH OPTIONS:
POLYSTER
POWDERCOATED_BLACK

* IF LOCAL FROST LINE EXEEDS 12" DEEP, PROVIDE ADEQUATE DRAINAGE BY PIPING THROUGH CONCRETE, CONNECT TO DRAIN ROCK LAYER UNDERNEATH.



NOTES:

1. EMBEDMENT DETAILS ARE FOR REFERENCE ILLUSTRATION ONLY. MINIMUM FOUNDATION SIZES DEPEND ON LOCAL SOIL CONDITIONS, WEATHER CONDITIONS, AND ENGINEERING REQUIREMENTS.
2. INCORPORATE REFLECTIVE TAPE ON ALL BOLLARDS TO IMPROVE VISIBILITY IN LOW-LIGHT CONDITIONS.



OVERHEAD WIRE TREE SPECIES

- Ostrya Virginiana-Hop Horn
- Cercis Candensis-Eastern Red Bud
- Prunus-Cherry
- Cretagus-Hawthorn
- Prunus Cerasifera-Purple Leaf Plum
- Parrotia persica-Persian Ironwood

OPEN SPACE TREE SPECIES

- Platanus Acerfolia-London Plane
- Ulmus Americana-Elm
- Quercus Palustrus-Pin Oak
- Quercus Palustrus-Green Pillars
- Gleditsia Triacanthos-Locust
- Liquidambar Styraciflua-Sweet Gum
- Umlmus Parvifolio-Chinese Elm
- Tilia-Linden
- Ostrya Virginiana-Hop Horn
- Cercis Candensis-Eastern Red Bud
- Prunus-Cherry
- Cretagus-Hawthorn
- Prunus Cerasifera-Purple Leaf Plum
- Parrotia persica-Persian Ironwood

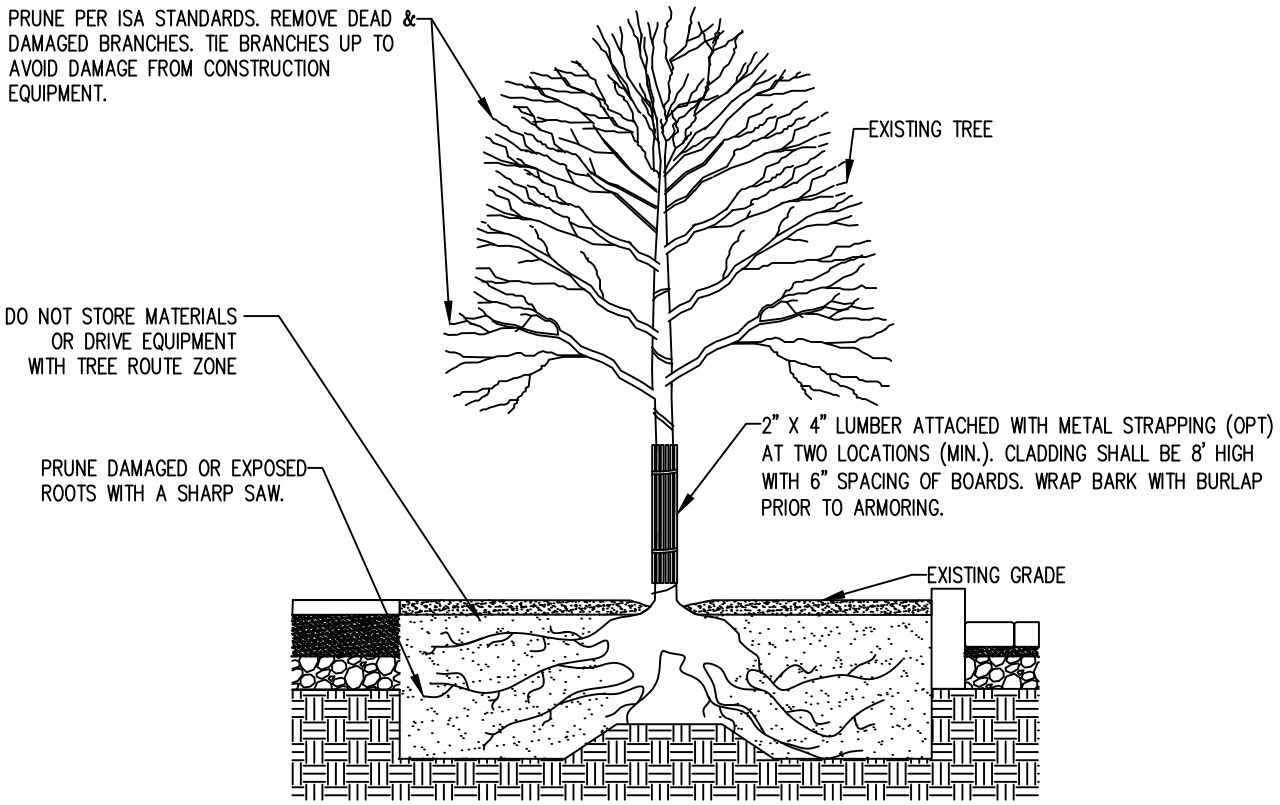
NOTES:

CONTACT THE CITY ARBORIST FOR ALLOWABLE PLANTING DATES.

*UNLESS NOTED ON PLANS TO MAINTAIN ADA COMPLIANCE OF ABUTTING SIDEWALK/PATH OF TRAVEL.

PLANTING PIT

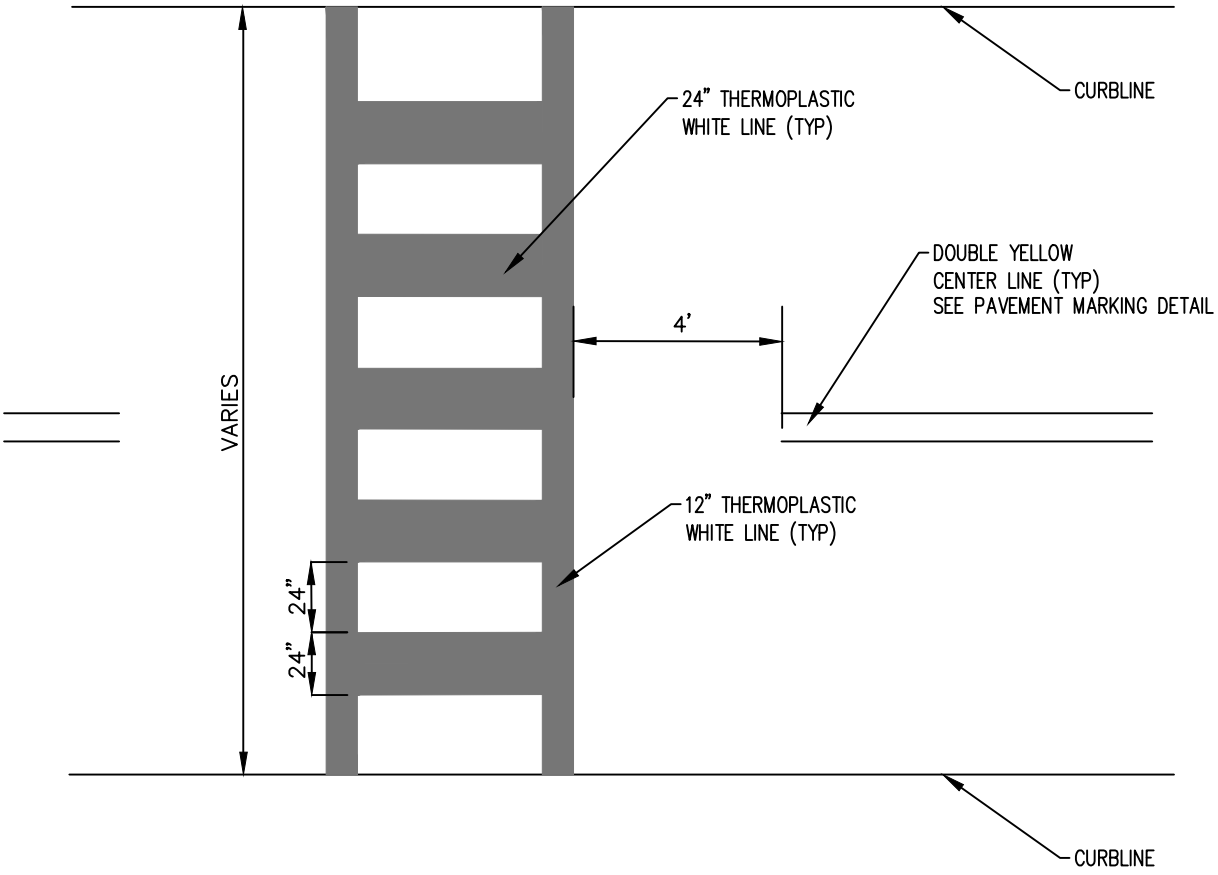
NTS



NOTES:
NO STORAGE OF EQUIPMENT OR STOCKPILING OF MATERIALS WITHIN DRIPLINE.

TREE PROTECTION

NTS

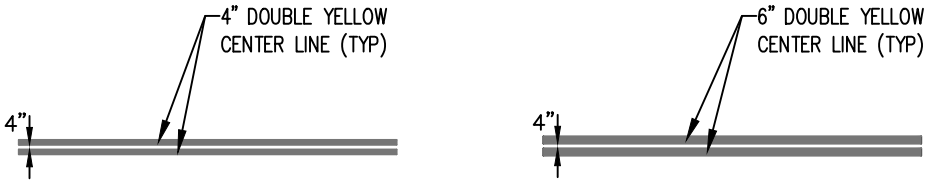


NOTES:

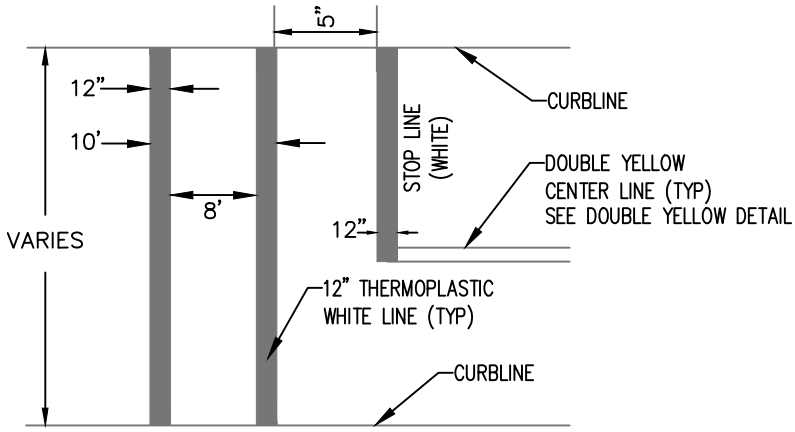
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
2. LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.

HIGH VISIBILITY MIDBLOCK CROSSWALK PAVEMENT MARKING

NTS



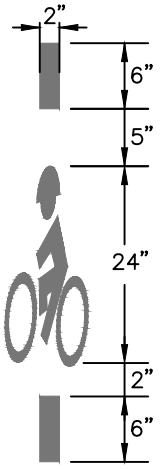
DOUBLE YELLOW CENTERLINE



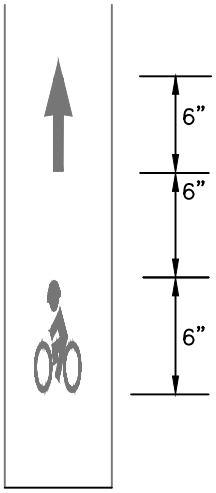
STANDARD CROSSWALK

NOTES:

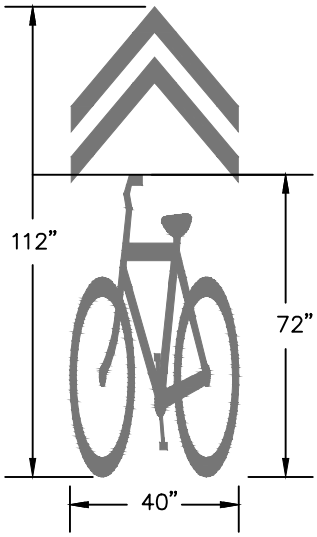
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
2. LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.



BICYCLE DETECTOR MARKINGS



BIKE LANE MARKINGS



SHARROW SYMBOL

NOTES:

1. ALL 12” LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6” LINES) WILL BE ACCEPTED.
2. LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.

BIKE PAVEMENT MARKINGS-SYMBOLS

NTS

APPENDIX B

SAMPLE FORMS

CITY OF NEW BEDFORD
Jonathan F. Mitchell, Mayor

Department of Public Infrastructure

Jamie Ponte
Commissioner

Water
Wastewater
Highways
Engineering
Cemeteries
Park Maintenance
Forestry

DEMOLITION FORM FOR FUTURE USE

I, _____, am the owner of the property located at _____ and understand that a deposit is required to be left with the Department of Public Infrastructure in order to have the services temporarily cut and capped at the property line. If the water and sewer services are not reconnected within twelve (12) months after being cut and capped, I will forfeit my deposit in order to have said services killed at the mains.

_____ _____
Property Owner Print Property Owner Signature

_____
Date

CITY OF NEW BEDFORD
Jonathan F. Mitchell, Mayor

Department of Public Infrastructure

Jamie Ponte
Commissioner

Water
Wastewater
Highways
Engineering
Cemeteries
Park Maintenance
Forestry

PERMISSION SLIP

I hereby authorize _____ of
(Applicant Name)

_____ at the address of
(Company Name & Telephone Number)

_____ to act on my behalf including affixing
(Company Address)

my signature in securing permits for Plot _____, Lot _____

_____
(Address for permit location)

_____Sewer Service Permits
_____Stormwater Permits
_____Water Service Permits
_____Driveway Installation Permits
_____Sidewalk Installation Permits

I further agree to conform to, and abide by, all City rules and regulations applicable to the permit(s) being applied for.

Property Owner Information:

_____
Printed Name Signature

_____
Address City State Zip Code

_____
Today's Date Telephone Number

1105 Shawmut Avenue, New Bedford, MA 02746 Telephone 508-979-1550 Fax 1-508-961-3054

CITY OF NEW BEDFORD
Jonathan F. Mitchell, Mayor

Department of Public Infrastructure

Jamie Ponte
Commissioner

Water
Wastewater
Highways
Engineering
Cemeteries
Park Maintenance
Forestry

Release of Liability for Sump Pump Discharge and Ground Infiltration

I _____ of _____
Owner Name — Business Name (If Applicable) and Address

hereby release the City of New Bedford of liability for the discharge of the sump pump installed at _____.
Release of Liability for Property Address and Parcel ID (Plot/Lot)

I have taken precautions to protect the sump pump pit from possible spill contamination by including the installation of a 6-inch lip around the sump pit. If it is identified by government agencies that pollutants are intentionally being dumped and/or have been discharged into the sump pump pit therefore causing ground contamination, the property owner is deemed the responsible party for any and all cleanup.

In signing below, I, being the current owner of the property aforementioned, accept and agree to the terms of this affidavit. Additionally, I agree to disclose this Release of Liability document in future ownership transfer of the parcel to the new property owner.

_____ _____
Owner Name (Printed/Signed) Date

_____ _____
Witness Name (Printed/Signed) Date

_____
Witness Title and Department Name

APPENDIX C

PLAN SUBMITTAL REQUIREMENTS

How to use the DPI Site Plan Requirements Checklist

This checklist should be used in the development of site plans that are to be reviewed by the City of New Bedford (City) Department of Public Infrastructure (DPI). Use this checklist as a guide when finalizing a site plan that is to be submitted with an application for a building permit for new construction, redevelopment, additions/alterations, garages/carports, stormwater management permits, and other projects/permit types requiring DPI review.

Read through this guide in its entirety and use the checklist provided to ensure your plan meets the minimum requirements for a DPI approval. Upon receiving an application and a site plan that achieves the required standard, the DPI Engineering Division will review the project, provide feedback accordingly, and update the status of your permit application.

Please Note:

I. The number of sheet(s) in a site plan will vary depending upon the scope of the project being proposed. As an example, smaller scale projects may only require one sheet with existing conditions, proposed site layout, demolition and erosion control, grading and drainage, utility and detail plans condensed to a couple of viewports on one sheet. All pertinent elements outlined below must be included in submitted site plans regardless of the number of sheets utilized.

II. The following site plan elements are minimum requirements for the DPI to accept and review a site plan. Other City entities may require different components on site plan(s) for respective review and approval(s).

III. Additional supporting information/documents may be required for stormwater management permit applications and is outlined separately below.

IV. The following is intended only as a guide and is subject to change.

DPI Site Plan Checklist

I. General Plan Elements

All plans shall have:

- ☐ A Locus Map at a scale of 1"= 1000'
- ☐ A Plan Sheet Index (If Applicable)
- ☐ Parcel identification, legal reference, name, and address of property owner
- ☐ Name and address of developer

All sheets shall have:

- ☐ Title block: project title, plan issue date, revision block, parcel identification, site address (if it is a former address, then it needs to be noted as "f/k/a")
- ☐ Sheet title and number
- ☐ North arrow
- ☐ Written and graphical scale
- ☐ Appropriate legend, notes, labels, line weights, and distinct symbology
- ☐ Show appropriate elements from existing conditions plan
- ☐ Plan sheets shall be prepared and stamped by a Commonwealth of Massachusetts Registered Professional Engineer
- ☐ Plans shall be drawn at a scale between 1"=10', 1"=20', or 1"= 40'

A. Existing Conditions Information

(shall be in a grayscale and called out/labeled accordingly)

- ☐ Property lines with bearings and distances
- ☐ Parcel identification, name of owner and address number of subject parcel and abutting properties

☐ Easements and/or deed restrictions

☐ Benchmarks (based on USGS NGVD-shown year)

☐ Total site area in square feet

☐ Buildings and other structures (dimensioned) and their property line setbacks with callout "to remain" or "to be razed"

☐ Parking/Paved areas

☐ Pavement markings

☐ Site utilities, municipal utilities and stormwater features above and below ground (include pipe material, sizes, lengths, slopes, rim and invert elevations, access vaults, handholes, hydrants, gates, shutoffs, tees, transformer locations, etc.)

☐ Adequate utility information outside the site to verify proposed connections

☐ Trees and vegetation (types and sizes)

☐ Features: walls, curbing, curb cuts, walkways, fences, lighting, poles, guys, signs, fire hydrants, fire alarm boxes, waste receptacles, known buried slab, etc.

☐ Site grading (topo at 2-ft intervals)

☐ Test Pit/Soil Boring locations and cross reference to log

☐ Street names (notated public or private)

☐ Wetlands, flood zones, containment zones, if applicable

B. Proposed Site Layout Information

(shall be in bold and called out/labeled accordingly)

☐ Property lines with bearings and distances

☐ Easements and/or deed restrictions with bearings and distances

☐ Benchmarks (based on USGS NGVD-shown year)

☐ Buildings and other structures (area, number of stories, and dimensions) and setbacks from property lines

☐ Parking/Paved areas (include pavement types and critical dimensions such as aisle width/parking space dimensions)

☐ Site utilities, municipal utilities and stormwater features above and below ground (include pipe types, sizes, lengths, slopes, rim and invert elevations, access vaults, handholes, hydrants, gates, shutoffs, tees, transformer locations)

☐ Indicate all items to be demolished, removed, relocated, transplanted, or protected

☐ Landscaped areas

☐ Waste receptacle storage areas

☐ Features: walls, curbing, curb cuts, walkways, fences, lighting, poles, guys, signs, fire hydrants, fire alarm boxes, waste receptacles, known buried slab, etc.

☐ Site grading (topo at 2-ft intervals)

☐ Spot grades for driveways and driveway aprons

☐ General circulation plan for vehicles and pedestrians (include pavement markings and directional signage)

☐ Provide construction details for proposed elements*:

1. Proprietary designs elements

2. Stormwater BMPs
3. Sediment and erosion controls

**All other project features that fall under the jurisdiction of the DPI shall conform to the specifications and details in the most recent revision of the City Construction Standards and Specifications Manual (Construction Manual). Since work under the DPI's jurisdiction must be conducted by a City of New Bedford Bonded Contractor those details already provided in the Construction Manual are not required to be included on the site plan.*

☐ Include the following standard notes on the proposed site layout plan:

1. Any modification(s) made to the plan approved by the DPI as the "final site plan(s)" shall be submitted to the DPI as a plan revision for review and approval prior to the work being performed.
2. Any work and material in public right of way and/or for water, sewer or stormwater shall conform to the most recent revision of the City of New Bedford Department of Public Infrastructure Construction Standards and Specifications and be completed by a contractor on the City of New Bedford Bonded Contractor List.
3. The contractor shall obtain a street disturbance and obstruction permit prior to any construction within the public right-of-way.
4. The contractor shall obtain a trench permit for any excavation three feet or deeper within a private way/property prior to any excavation.
5. All sediment and erosion control measures shall be in place prior to construction and conform to:
   i. US EPA, NPDES, MA DEP, Massachusetts Erosion and Sedimentation Control Guidelines for Urban and Suburban areas, and the City of New Bedford Stormwater Rules and Regulations.
   ii. Conditions of the approved stormwater management permit.
   iii. The City of New Bedford Conservation Commission requirements as stated in the Order of Conditions date "XX-XX-XXXX"
6. Commercial driveway permits are subject to Traffic Commission Approval.
7. Permits for sidewalks, driveways, water, fire supplies, sewer, and stormwater must be obtained from the DPI on the OpenGov permitting platform.
8. All driveway/sidewalk, water, fire supply, sewer, and stormwater construction shall be inspected by the City of New Bedford DPI before being back filled in conformance with the City of New Bedford Construction Standards and Specifications. Photographs will NOT be accepted in lieu of the DPI inspecting the work performed. The DPI shall be notified at least one full business day prior to required inspections.

II. Stormwater Management Permit Supporting Document Checklist

☐ Include stormwater management site plan key elements:

1. Stormwater Management BMP(s) layout
2. All Connection Points into and out of the Stormwater Management BMP(s)
3. Overflows and clean outs for the system
4. Pipe Sizes and Materials
5. Sediment and erosion control plan to include materials stockpile location on site, construction entrances, perimeter controls, and site security plan
6. Test pit/soil boring locations identified on the site plan

☐ Test pit/soil boring results

☐ Stormwater calculations in accordance with the Stormwater Rules and Regulations

☐ Operations and maintenance plan for both the construction phase and the post construction phase of the project

☐ Planting plan (if applicable)

☐ If it is anticipated a sump pump will be required as permenant feature on the property, additional information is required including:

1. Point of discharge for the sump pump must be clearly identified.
2. If it is intended that the sump pump be connected into a stormwater BMP proposed on the site layout, then supporting calculations to support the additional inflow must be submitted with the site plan and stormwater permit application accompanied by a letter from the Registered Professional Engineer certifying that the system will not be overtaxed by the added inflow.
3. The following additional notes are required on the site plan if the applicant intends to utilize a sump pump on site:
    i. A sealed 6-inch vertical lip must be constructed around the sump pump pit. The lip must be inspected by the DPI prior to the issuance of a certificate of occupancy.
    ii. A sump pump discharge release of liability waiver must be signed by the property owner prior to the issuance of the final certificate of occupancy.

How to use the UTILITY AS-BUILT Plan Checklist

This checklist should be used in the development of UTILITY AS-BUILT plans that are to be reviewed by the City of New Bedford (City) Department of Public Infrastructure (DPI). Use this checklist as a guide for submitting an UTILITY AS-BUILT plan to the DPI.

Read through this guide in its entirety and use the checklist provided to ensure your plan meets the minimum requirements for a DPI acceptance. Projects that have an UTILITY AS-BUILT requirement stipulated in the site plan review process or permit review process will only receive approval of a certificate of occupancy from the DPI after an UTILITY AS-BUILT is received and accepted.

Please Note:

I. The following UTILITY AS-BUILT plan elements are minimum requirements for the DPI to accept an UTILITY AS-BUILT plan. Other City entities may require different components on as-built plan(s) for respective review and approval(s). The DPI may require additional information/details if deemed necessary by the City Engineer.

II. Utilities depicted in an UTILITY AS-BUILT plan must be shown as installed (as-built). As-builts will be field verified and compared to inspection reports for accuracy.

III. The following is intended only as a guide and is subject to change.

IV. The UTILITY AS-BUILT plan shall not include disclaimers and/or notes that dis-credit the plan being a true as-built.

DPI Site Plan Checklist

General Plan Elements

Plans shall have:

- ☐ A Locus Map at a scale of 1"= 1000'
- ☐ Parcel identification, legal reference, name, and address of property owner
- ☐ Name and address of developer

Sheet(s) shall have:

- ☐ Title block: project title, plan issue date, revision block, parcel identification, site address (assigned by the DPI Engineering Division)
- ☐ Sheet title "UTILITY AS-BUILT"
- ☐ North arrow
- ☐ Written and graphical scale
- ☐ Appropriate legend, notes, labels, line weights, and distinct symbology
- ☐ Plan sheets shall be prepared and stamped by a Commonwealth of Massachusetts Registered Professional Engineer
- ☐ Plans shall be drawn at a scale of 1"=10', 1"=20', or 1"= 40'

UTILITY AS-BUILT Information

(shall be in a line type and called out/labeled accordingly such that the reviewer can distinguish as-built information from existing condition information)

- ☐ Property lines with bearings and distances
- ☐ Parcel identification, name of owner and address number of subject parcel and abutting properties
- ☐ Easements and/or deed restrictions (new utility easements also require record of easement recording)

- ☐ Benchmarks (based on USGS NGVD-shown year)
- ☐ Total site area in square feet
- ☐ Buildings and other structures (dimensioned) and their property line setbacks with callout "to remain" or "to be razed"
- ☐ Parking/Paved areas
- ☐ Pavement markings
- ☐ Existing and as-built site utilities including: municipal utilities, private utilities and stormwater features above and below ground (include pipe material, sizes, lengths, slopes, rim and invert elevations, access vaults, handholes, hydrants, gates, shutoffs, tees, transformer locations, etc.)
- ☐ Call-out connections of the utilities including roof drain connection points, inspection ports, clean outs, valves, meter location, etc.
- ☐ Identify pervious areas that were installed as a condition of the stormwater management permit
- ☐ Trees and vegetation (types and sizes)
- ☐ Test pit location(s) and data
- ☐ Features: walls, curbing, curb cuts, walkways, fences, lighting, poles, guys, signs, fire hydrants, fire alarm boxes, waste receptacles, known buried slab, etc.
- ☐ Street names (notated public or private)
- ☐ Wetlands, resource areas, flood zones, containment zones, if applicable

SEWER/SURFACE DRAIN RECORD PLANS

AN INTEGRAL PART OF ANY SEWER/SURFACE DRAIN INSTALLATION IS AN AS-BUILT RECORD DRAWING SHOWING THE FACILITY IN BOTH PLAN AND PROFILE VIEWS, TOGETHER WITH ITS CONNECTION(S) TO EXISTING LINES.

SUCH DRAWINGS MUST BE PREPARED IN ACCORDANCE WITH DPI ENGINEERING STANDARDS AS OUTLINED BELOW.

FAILURE TO MEET THESE REQUIREMENTS IN ANY WAY SHALL RESULT IN A REJECTED AND RETURNED DRAWING TO THE APPLICANT OR PERSON(S) SUBMITTING RECORDS.

1. SIZE
   DRAWING SHALL BE 24" x 36" OVERALL, INCLUDING A ¾" MARGIN
2. MEDIUM
   DRAWING SHALL BE ON MYLAR DRAFTING FILM, DOUBLE MATTE FINISH, 3-MILS MINIMUM THICK RESULTING IN A PLAN WITH LONG-TERM DURABILITY.
3. FORMAT
   DRAWING SHALL HAVE A TITLE BLOCK ARRANGED AS FOLLOWS:

(STREET NAME) AS-BUILT SEWER (& SURFACE DRAIN)
PLAN FROM (POINT OF ORIGIN) TO (POINT OF TERMINATION)

-SCALES-

HORIZONTAL: 1" = 40'	VERTICAL: 1" = 4'
CONDUCTED BY:	(NAME OF DEVELOPER)
CONSTRUCTION COMPLETED:	(DATE)

_____
DPI COMMISSIONER

SCALES SHALL BE 1"=40' HORIZONTAL AND 1"=4' VERTICAL. STREET NAME SHALL BE IN LETTERS 3/8" TO 1/2" HIGH, AND TITLE BLOCK SHALL BE IN THE CENTER OF SHEET, BETWEEN PLAN VIEW AND PROFILE. OTHER INFORMATION, i.e. BENCHMARK NOTATION, APPURTENANCE DESCRIPTION, LOCUS MAP, STATE COORDINATE SYSTEM, GRAPHIC SCALE, REFERENCE POINTS, etc. MAY BE ARRANGED AS SPACE PERMITS.

4. CONTENT
   DRAWING MUST BEAR THE NOTATION "AS-BUILT" OR "RECORD PLAN" AND MUST CONTAIN THE STAMP AND SIGNATURE OF THE PROFESSIONAL ENGINEER OR PROFESSIONAL SURVEYOR GUARANTEEING THE ACCURACY AND CORRECTNESS OF THE DRAWING. THE DRAWING MUST CONTAIN THE FOLLOWING INFORMATION, IN EITHER BLACK OR COLORED INK AS INDICATED BELOW:

   ON PLAN VIEW: (PLAN VIEW SHALL SHOW ALL PIPE SIZES, IN APPROPRIATE COLOR)
   - A. STREET LINE(S) AND NAME(S) INVOLVED, ASSESSOR'S PLOT NUMBER, LOT NUMBERS, SIDE LINES, AND FRONTAGE DISTANCE OF ABUTTING LOTS, NORTH ARROW - BLACK COLOR.
   - B. EXISTING SEWER AND STORM DRAIN MAINS, WITH EXISTING MANHOLES AND CATCH BASINS (IDENTIFIED AS "EXISTING"). SHOW AS DASHED LINES - GRAY COLOR.
   - C. NEW SEWER AND/OR STORM DRAIN MAINS, WITH MANHOLES AND CATCH BASINS (IDENTIFIED AS "NEW"). SHOW AS SOLID LINES - BLACK COLOR.

   ON PROFILE VIEW: (PROFILE SHALL SHOW PIPE SIZES, SLOPES, MATERIAL TYPE, MANHOLE INVERTS IN PROPER COLOR)
   - D. DATUM LINE, ROAD/GROUND SURFACE AT LOCATION OF NEW PIPE, LOCATION OF INTERSECTING STREETS, ELEVATION OF DATUM LINE AND MANHOLE STATIONS - BLACK COLOR.
   - E. EXISTING SEWER AND STORM DRAIN MAINS, WITH EXISTING MANHOLES TO WHICH THE NEW PIPING CONNECTS (IDENTIFIED AS "EXISTING"). SHOW AS DASHED LINES - GRAY COLOR.
   - F. NEW SEWER/STORM DRAIN MAINS WITH MANHOLES AND CATCH BASINS (IDENTIFIED AS "NEW"). SHOW AS SOLID LINES - BLACK COLOR.

5. SCOPE
   AS-BUILT DRAWINGS ARE INTENDED TO SHOW A COMPLETE SYSTEM OF MAINS, AND INDIVIDUAL LOT SERVICES, DRAINAGE AREAS AND EASEMENTS. THE LOCATION OF THE WYES ON THE MAIN, TOGETHER WITH THE POINT AT WHICH THE SERVICES CROSS THE STREET SIDELINES. THE SERVICE LINES AT STREET LINES SHALL BE ACCURATELY TABULATED BY STATIONS AND OFFSETS ON THE SHEET IN A CONVENIENT LOCATION. ZERO STATION CAN BE THE POINT OF CONNECTION OF THE NEW PIPE(S) WITH THE EXISTING LINES, OR THE STATIONING AS LAID OUT ON THE SUBDIVISION PROFILES.
6. SUBMIT THE MYLAR ORIGINAL ALONG WITH A CAD.DWG FILE.

WATER RECORD PLANS

AN INTEGRAL PART OF ANY WATER INSTALLATION IS AN AS-BUILT RECORD DRAWING, SHOWING THE FACILITY IN PLAN VIEW, TOGETHER WITH ITS CONNECTION(S) TO EXISTING LINES.

SUCH DRAWINGS MUST BE PREPARED IN ACCORDANCE WITH DPI ENGINEERING STANDARDS AS OUTLINED BELOW.

FAILURE TO MEET THESE REQUIREMENTS IN ANY WAY SHALL RESULT IN A REJECTED AND RETURNED DRAWING TO THE APPLICANT OR PERSON(S) SUBMITTING RECORDS.

1. SIZE
   DRAWING SHALL BE 24" x 36" OVERALL, INCLUDING A ¾" MARGIN
2. MEDIUM
   DRAWING SHALL BE ON MYLAR DRAFTING FILM, DOUBLE MATTE FINISH, 3-MILS MINIMUM THICK RESULTING IN A PLAN WITH LONG-TERM DURABILITY.
3. FORMAT
   DRAWING SHALL HAVE A TITLE BLOCK ARRANGED AS FOLLOWS:

AS-BUILT WATER PLAN OF
(STREET NAME)
PLAN FROM (POINT OF ORIGIN) TO (POINT OF TERMINATION)

-SCALE-
HORIZONTAL: 1" = 60'
CONDUCTED BY: (NAME OF DEVELOPER)
CONSTRUCTION COMPLETED: (DATE)

_____
DPI COMMISSIONER

SCALES SHALL BE 1"=60' HORIZONTAL. STREET NAME SHALL BE IN LETTERS 1/4" TO 1/2" HIGH, AND TITLE BLOCK SHALL BE IN THE CENTER OF SHEET, BETWEEN PLAN VIEW AND PROFILE. OTHER INFORMATION, i.e. BENCHMARK NOTATION, APPURTENANCE DESCRIPTION, LOCUS MAP, STATE COORDINATE SYSTEM, GRAPHIC SCALE, REFERENCE POINTS, etc. MAY BE ARRANGED AS SPACE PERMITS.

4. CONTENT
   DRAWING MUST BEAR THE NOTATION "AS-BUILT" OR "RECORD PLAN" AND MUST CONTAIN THE STAMP AND SIGNATURE OF THE PROFESSIONAL ENGINEER GUARANTEEING THE ACCURACY AND CORRECTNESS OF THE DRAWING. STREET ACCEPTANCE INFORMATION (i.e., STREET DIMENSIONS, CURVE DATA, AREAS, ABUTTERS' NAMES, SURFACE PROFILE ELEVATIONS, etc., ARE NOT PART OF A WATER RECORD DRAWING AND SHALL NOT BE SHOWN THEREON) THE DRAWING MUST CONTAIN THE FOLLOWING INFORMATION, IN EITHER BLACK OR COLORED INK AS INDICATED BELOW:

   ON PLAN VIEW: (PLAN VIEW SHALL SHOW ALL PIPE SIZES, IN APPROPRIATE COLOR)
   - A. STREET LINE(S) AND NAME(S) INVOLVED, ASSESSOR'S PLOT NUMBER, LOT NUMBERS, SIDE LINES, AND FRONTAGE DISTANCE OF ABUTTING LOTS, NORTH ARROW - BLACK COLOR.
   - B. EXISTING SEWER AND STORM DRAIN MAINS, WITH EXISTING MANHOLES AND CATCH BASINS (IDENTIFIED AS "EXISTING"). SHOW AS DASHED LINES - GRAY COLOR.
   - C. NEW SEWER AND/OR STORM DRAIN MAINS, WITH MANHOLES AND CATCH BASINS (IDENTIFIED AS "NEW"). SHOW AS SOLID LINES - BLACK COLOR.

5. SUBMIT THE MYLAR ORIGINAL ALONG WITH A CAD.DWG FILE.