CITY OF NEW BEDFORD

DEPARTMENT OF PUBLIC INFRASTRUCTURE

CONSTRUCTION STANDARDS and SPECIFICATIONS

Revised March 2018

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City of New Bedford

CONSTRUCTION SPECIFICATIONS

SECTION I – DEFINITIONS

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

"**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.

"**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.

"**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.

"**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.

"**Shall**" and "**Will**" are mandatory. "**May**" and "**Should**" are permissive.

"**MHD Standards**" means the "Commonwealth of Massachusetts Standard Specifications for Highways and Bridges," 1988 edition and including MHD revisions and supplemental changes and/or information.

"**DPI**"-shall mean The Department of Public Infrastructure.

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

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

"**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.

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

SECTION II – GENERAL PROVISIONS

INTENT OF THE SPECIFICATIONS

The intent of these standard specifications is to clarify and advise the Contractor of his 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 himself with and abide by any applicable local, state and federal laws governing his intended activities.

CERTIFICATES OF COMPLIANCE

Prior to the use of any material covered by these specifications, the Contractor shall furnish the Commissioner Shop Drawings, Catalog Cuts, and a statement in triplicate, certifying that all materials to be used in the work comply with the requirements of the specifications. 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 for 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 Officials (AASHO), The American Society of Testing and Materials (ASTM), The American Standards Association (ASA), the Massachusetts (Mass. DOT), or any other agency are called for, the latest edition of these specifications 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 Commissioner. 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 take measures 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.

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 "Bonded Contractors" approved by the City of New Bedford are allowed to do work on public right of ways.

The following permits are required:

1. Street Obstruction: Required when working within the right of way.
2. Trench Safety/Street Disturbance: Required when excavating within the right of way.
3. Trench Safety: Required when excavating on private property.
4. Sidewalk/Driveway Permits: Required when installing sidewalks and driveways.
5. Sewer/Drain Permit: Required when installing storm drains and sewers.
6. Water: Required when installing a new water mains or service connections.

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

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

Under the new regulation, a **trench** is defined as a subsurface excavation greater than 3' 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.**

To ensure that all excavators are aware of and follow these new public safety regulations, a permit will be required prior to excavation of all regulated trenches.

All excavators must obtain a **trench permit** for each trench site. The new **trench permit** will require information such as the name of the excavator, the location of the trench, a certificate of insurance, and the Dig Safe number.

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

The Department of Public Infrastructure will have the authority to take action, 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.

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 at open excavations.

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

The Contractor shall take all necessary precautions to protect his work from damage by vandalism, storms, ground water infiltration, etc. In case of damage, the Contractor shall make such repairs or 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 and specifications.

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 Road Construction:

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

2. For Drainage, Water and Sewer Construction:

    a. While laying pipe, 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).
    c. All water mains must be chlorinated and tested prior to acceptance.

Contractors will be charged a three-hour minimum for failure to notify DPI of a cancellation..

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 representative. All test results shall be reported to the Commissioner in duplicate.

MATERIALS AND WORKMANSHIP

All contractors shall be responsible for all 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. The City of New Bedford does not allow excavating on streets resurfaced within five years unless approved by the DPI Commissioner.

DIG SAFE REQUIREMENTS

All dig safes within the downtown area will require a written letter to the DPI Commissioner stating the reason for the dig-up and work to be completed.

SECTION III – ROAD CONSTRUCTION

CLEARING AND GRUBBING

The work shall conform to the relevant provisions of Section 101 of the MHD 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 MHD 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 is commenced, 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. When rock excavation requires blasting, the 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.

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 its maximum practical density.

After each layer has been placed and evenly spread, it shall be thoroughly compacted to its maximum practical density. 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. During summer months, proper dust control measures shall be taken by the Contractor to abate dust nuisance to abutting properties. Calcium chloride shall be furnished and applied by the Contractor unless this requirement is waived, in writing, by the Engineer. 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.

SUBGRADE PREPARATION

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

The sub grade 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% of maximum density as defined and measured in AASHO test T-180 Method A.

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 a six (6) 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 fifty (50) feet on center so that string lines may be stretched between the stakes.

Material. Gravel base course materials shall be hard, durable particles from sources approved by the Engineer, free from organic matter and clay, and conforming to the following gradation requirements:

Sieve Size	Per Cent by Weight Passing
3 inch	100
½ inch	50-85
# 4	40-75
# 50	8-28
# 200	0-10

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 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% of modify proctor density for roadways and sidewalks, as defined and measured in AASHO test T-180 Method A.

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 six (6) 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 MHD Standards, supplemented by the following:

Bituminous Concrete. The surface shall consist of two (2), courses, 2 ½" bituminous concrete base and 1 ½" bituminous concrete top totaling 4", of bituminous concrete layers; the first a binder course, and the second a top course. All materials and workmanship shall conform to Section 460 of the MHD Standards.

Any reference, in that book to State officials or departments shall apply to the corresponding officials or departments of the City of New Bedford, Massachusetts or approved substitute.

PATCHING TRENCHES

All material for backfilling the trench shall be suitable and free from organic substances, large stones, and frost. Twelve inches of gravel shall be compacted to a minimum of 95% of modify proctor density for roadway and sidewalk trenches, before permanent patch is applied. The permanent patch shall consist of four (4) inches of bituminous concrete. **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 also 2 feet beyond the width of the trench on both sides.** This bituminous concrete on all roadway cuts shall be Class 1, Bituminous Concrete Pavement, Type I, installed in 2 ½" bituminous concrete base and 1 ½" bituminous concrete top totaling 4" of bituminous concrete layers. Tack coat shall be applied prior to the placement of Hot Mix Asphalt. Seams shall be sealed after the patch is placed.

The three (3) inch concrete overlay will be at the discretion of the Engineer based on the existing condition of the road.

No permanent patching will be allowed during the winter months (December 15 – March 31).

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 in roadways or driveways only. Concrete slab elevation to be set by the Department of Public Infrastructure in order to allow for the proper replacement of sand and stone.
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 paver detail page 4B.

SECTION III – A

SPECIFICATIONS FOR CONSTRUCTION OF 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 Commonwealth of Massachusetts Department of Public Works Standard Specification for Highways, Bridges, and Waterways (1988) (hereinafter referred to as "State D.P.W. Specifications). In case of conflict between the "State D.P.W. Specifications, 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" Section

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 Massachusetts Highway Department Standards and ADA Standards. The precise location and dimensions of individual wheel chair 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 unless approved in writing by the Commissioner of Public Infrastructure. If approved then the Contractor must comply with Section 901.72 "Concrete Construction during cold weather of the State D.P.W. Specifications."

Contractor must notify the DPI for pre-inspection of the site 24 hours before placing the cement concrete.

MATERIALS

Materials shall meet the requirements specified in the following subsections of Division III. Materials of the "state D.P.W. Specifications".

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

Cement Concrete (air-entrained 4,000 psi. ¾".610) M4.02.00 with a 4 ½" maximum slump.

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

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 – After the sub grade has been prepared, a foundation of gravel shall be placed upon it. After being wetted and thoroughly rolled and tamped, the foundation shall be at least six (6) inches in thickness and four (4) inches below and parallel to the proposed surface of the walk, except that driveways, and wheelchair ramps shall be six (6) inches below and parallel to the proposed surface of the walk, and with a minimum 6" thick gravel foundation.

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

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 of an inch 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 attached "Typical Drive Detail". Driveway brows exceeding these limits shall be replaced at the Contractor's expense.

The Contractor must notify the DPI twenty-four (24) hours in advance for a pre-inspection before placement of concrete. Failure of notification for pre-inspection may result in Non-Acceptance of said work.

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.

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.

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 and broom perpendicular to the street.

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 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.

STONE BOUND, MANHOLES, SHUT-OFFS, WATERGATES, STOPS, GAS SHUT-OFFS, MANHOLES AND CATCH BASIN FRAMES AND COVERS shall be carefully set to the proposed finished grade, with 3" of document concrete to underside of flange where applicable.

Utility shut-offs 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.

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 DPI 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 or the "State D.P.W. Specifications".

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.

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.

Contractor must notify the DPI twenty-four (24) hours before he starts a project.

Contractor must obtain street obstruction and disturbance permits before work commences. These permits will be issued once the property owners have obtained their permit(s).

SECTION III – B

SPECIFICATIONS FOR CONSTRUCTION OF BITUMINOUS CONCRETE SIDEWALKS, AND DRIVEWAYS

SCOPE OF WORK:

Bituminous Concrete sidewalks, and driveways shall be constructed in two courses on a prepared foundation of gravel in accordance with Section 701 of the Commonwealth of Massachusetts Department of Public Works Standard Specifications for Highways, Bridges and Waterways (1988) (hereinafter referred to as "State D.P.W. Specifications"). In case of conflict between the "State D.P.W. Specifications", and the following specifications, the following specifications shall govern. All bituminous concrete 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 bituminous concrete driveways installed without curb must be perpendicular to the road's edge of pavement. Driveways are not to contain any radius curvature at entrance corners.

GENERAL:

The Contractor shall be responsible for notification to "Dig Safe" at locations where excavation is scheduled.

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 Massachusetts Highway Department Standards and American Disability Act (ADA) Standards. The precise location and dimensions of individual wheel chair 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 15 to April 1 unless approved in writing by the Commissioner of Public Infrastructure.

Contractor must notify DPI, for pre-inspection of the site 24 hours before placing the bituminous concrete.

MATERIALS

Materials shall meet the requirements specified in the following subsections of Division III. Materials of the "State D.P.W. Specifications".

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

Class I Bituminous Concrete Pavement, Top Course Conforming to Section M3.11.00 for the "State D.P.W. Specifications".

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.

Bituminous Concrete Sidewalks –

A.) 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.

B.) Placing Bituminous Concrete – The bituminous concrete walk surface shall be laid in 2 courses to a depth after rolling of 3 inches. The bottom course shall be 1 1/2 inches in thickness, and its surface after rolling shall be 1 1/2 inches below and parallel to the proposed grade of the finished surfaces. The top course shall be 1½ inches in thickness after rolling.

The surface shall have a pitch 3/16 of an inch per foot of width to provide for proper drainage.

The courses shall be constructed in accordance with the applicable requirements of Section 460 of the "State D.P.W. Specifications" 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 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 50 pounds and having a tamping face not exceeding 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.

Bituminous Concrete 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 for bituminous concrete sidewalks (section 701.62B-1).

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.

STONE BOUND, MANHOLES, SHUT-OFF, WATER GATES, STOPS, GAS SHUT-OFFS, MANHOLES AND CATCH BASIN FRAMES 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

Contractor 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.

Contractor must notify the DPI twenty-four (24) hours before he starts the project.

Contractor must obtain street obstruction and disturbance permits before work commences. These permits will be issued once the property owners have obtained their permit(s).

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 1988 Edition of the Standard Specifications for Highway and Bridges:

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. 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, flatside 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.

BELGIAN PAVERS PAVEMENT

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 1988 Edition of the Standard Specification for Highway and Bridges:

3,000 psi, 1 ½" 470 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.

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 done as required in Section 901. 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.

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 in order 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.

SECTION III – C
Miscellaneous
STREET DISTURBANCE DRIVEWAY PERMITS

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 $30 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 yard at 1105 Shawmut Ave. or the DPI Stock Yard on Liberty St. between the hours of 7:30 – 8:00 am and 3:30 – 4:00 pm. Curbing must be in full pieces. Deliveries outside of these hours, contractors will be responsible for unloading the curb. If curbing is returned within the 30 days, the Contractor will be given back the deposit check, and if not, the Contractor will forfeit the deposit.

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 homeowner has been given two copies of the Engineering Driveway Permit. One copy is for the homeowner and the other is for the contractor. Any driveway brow larger than mentioned on the permit or the mark out lines will result in the Contractor being suspended from the Bonded Contractor's List until further notice.

CONCRETE CONSTRUCTION DURING COLD WEATHER:

Section 901.72 "Concrete Construction During Cold Weather" of the Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highway and Bridges" 1988 shall apply to cement concrete sidewalk and driveway construction.

Any concrete placed during cold 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.

SECTION 111 – D
MISCELLANEOUS
FLOWABLE FILL REQUIREMENTS

The City of New Bedford, Department of Public Infrastructure requires the "Controlled Density Fill" (flowable fill) shall be the standard backfill material whenever the City (DPI) issues disturbance permits.

It is mandatory to use C.D. F. (Flowable fill) for backfill in all trench cuts within the paved surface.

All work shall conform to the relevant provision of Mass. Highway Standard Specifications for Highways and Bridges dated 1988, and Supplemental Specifications dated December 11, 2002.

Control Density Material (flowable fill) shall meet the requirements of Subsection M4.08.0 Controlled Density Fill, hereby attached.

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

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

SECTION IV – DRAINAGE 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 new 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 the Department of Public Infrastructure. (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.

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 ASA A21-8.
2. Ductile iron pipe, not less than Class 50.
3. Polyvinyl chloride pipe conforming to ASTM Standard D 1784 and D 3034-SDR 35.

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 specs for manhole 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. Any required rock blasting shall be done by licensed persons only and shall be carried out in strict accordance with the existing governmental ordinances and regulations. A

blasting permit must be obtained from the local Fire Chief having jurisdiction over the area. 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 six 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 six inches when the pipe is laid in the trench with a normal alignment.

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 inspector, 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.

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.

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 per cent, 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 stamped by an engineer is required to be submitted to DPI for review and approval.

SECTION V – SANITARY SEWER 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 work in accordance with the plans and specifications, approved by the Commissioner.

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.

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.

Frames and covers shall have machined seats and be true to pattern in form and dimensions, free from faults and other defects affecting their strength. Covers shall have the marking "SEWER". Frames and covers shall conform to City specifications.

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).

Rock Excavation. Any required rock blasting shall be done by licensed persons only and shall be carried out in strict accordance with the existing governmental ordinances and regulations. A blasting permit must be obtained from the local Fire Chief having jurisdiction over the area. 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 six (6) 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 six (6) inches when the pipe is laid in the trench with a normal alignment.

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 2.5 feet per second, and the minimum grades in Table 1 shall apply.

TABLE 1 SEWER DESIGN FOR SELF-CLEANSING VELOCITIES

Sewer Size	Minimum Slope
8" (terminal sewers only)*	.008
8"	.006
10"	.0025
12"	.002
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 12" below the water main. Where this is not possible, review is required by the Engineering Department prior to installation.

Changes in direction of less than five degrees (5°) shall be made with suitable curved pipe sections or "sweeps". So-called "cocked" angle joints shall not be acceptable. Changes in direction of five degrees (5°) or more 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 in Fig. I. Initial cover and backfill shall also be as shown in Fig. I.

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.

Selected Material. Selected material shall be screened gravel, crushed gravel, or crushed stone, consisting of hard, durable particles and shall meet the following graduation requirements:

Sieve (square openings)	Per Cent Passing (by weight)
1-1½ inch	100
1 inch	35-70
½ inch	0-15
No. 4	0-5

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. (See Item "C" below).

TESTINGS. 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.

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.

Sewer Main Extension Permits.

Any sewer main extension less than 1,000 feet requires Form #BRP WP 72-Compliance Certification for Sewer Extensions to be filed with Mass DEP within sixty (60) days.

SECTION VI

SEWER & DRAIN SERVICE CONNECTION REQUIREMENTS

1. 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.

2. Pipe shall be of a type and material approved by the Commissioner of Public Infrastructure. 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 Commissioner.

3. A clean-out must be installed with a cast iron "Clean-out" cover with the word "Sewer" at grade, one (1) foot from the property line. See proposed Sewer Stub Diagram in the Detail Section, on page 22A.

4. 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 wherever possible, and with not less than one-eighth (1/8) inch per foot as absolute minimum. A minimum cover of at least four (4) feet is required over all sanitary sewer pipes in City streets and ways.

5. 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. 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 two (2) feet, a drop-type connection shall be constructed in order to bring the service into the manhole at the proper elevation (see Detail Sketch 11A). Any connection to a manhole in which the flow from the service pipe exceeds two (2) feet in a freefall drop to the bottom of the manhole shall not be acceptable.

6. 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, as shown in Fig. I. Initial cover and backfill shall also be as shown in Fig. I.

7. 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.

8. 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.

9. Pavement repairs shall be made by the contractor in accordance with Fig. I. All pavement cuts shall have a temporary patch as follows:

    a. The patch shall be installed within five (5) days of backfilling of the trench.
    b. 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.
    c. In warm weather, the temporary patch shall be regular bituminous concrete base coat (preferred), or so-called "Cold Mix". In cold weather, the temporary patch shall be regular cement concrete, with a minimum thickness of six (6) inches, poured flush with the wearing surface of the adjacent paving.
    d. In either case, the temporary patch shall be replaced with a permanent bituminous concrete repair, not less than thirty (30) nor more that sixty (60) days following the original backfilling or the opening of the blacktop plant, whichever occurs first.
    e. It is the responsibility of the contractor to maintain the patch.
    f. All patches shall be of a rectangular shape and not diagonal nor jogged in anyway.

10. When applying 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 paving. The patch paving shall be a minimum thickness of four (4) inches. It shall be placed in two layers of equal thickness, compacting thoroughly between layers. Emphasis is placed also on the requirement calling for crushed stone or compacted gravel as shown in Fig. I.

    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.

11. 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 in Section (8) above.

12. Beginning December 15 and lasting until April 1, street pavement cuts will be restricted to situations of an emergency nature only. Routine installation of new sewer, storm drain, water, gas, electrical, telephone, etc. services will no longer be permitted during the winter months without written permission from the Commissioner of DPI.

13. 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.

14. Chapter 22, Article II, Section 22-39 (copy attached) of the New Bedford City Code requires that all applications for permits to disturb City street surfaces for any reason, including the installation or repair of sewer, water and drainage services, must be accompanied by a certified check in an amount to be determined by the Commissioner of Public Infrastructure.

    This check is to be held by the City of New Bedford as surety that the disturbed street surface will be in three years properly and permanently repaired by the applicant, and will be refunded to the applicant upon certification by a City Inspector that the repair is satisfactory. Any minor expense incurred by the City arising from the pavement disturbance will be deducted from this surety check before refunding. Major expenses will be referred to the applicant's bonding company.

    Any complaints requiring deductions from the surety deposit will be noted in the applicant's performance record and can be considered cause for refusal of future permits.

    The same Ordinance amendment also makes positive the three (3) -year period following the completion of a street pavement repair during which the applicant is held responsible for the condition of the repair.

15. In all cases where sanitary sewer pipes cross potable water pipes, the sanitary sewer pipe is to be located a minimum of 12" below the potable water pipe. Should this impact the design slope of the sanitary sewer system, review and approval will be required by the Engineering Department prior to installation.

SECTION VII
GRINDER PUMP LOW PRESSURE SYSTEMS

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 a 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. For ease of serviceability, all pump systems shall be of like type and horsepower as manufactured by Environment One Corporation or equal.

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	PUMP UNITS	STORAGE-GALLONS
Single Family	0-500 gpd	1	60
Duplex	500-1200 gpd	1	120
Multi-Family (3 – 6 units)	1200-1500 gpd	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.

SECTION VIII
LOW PRESSURE SEWER PIPE, VALVES AND APPURTENANT ACCESSORIES

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.

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

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

1. 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.
2.
    a. 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.

    b. 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.

    c. 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.

    d. 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 OF FORCE MAIN SEWERS

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 pipe 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.

SEWER 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.

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.

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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.

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 inspectors 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.

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.

(All services North of Tarkiln Hill Road must be one (1) inch copper.) All new water services will be kept closed until all testing requirements, are completed. Contractor will test water mains at 150 pounds P.S.I. for 1 (one) 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. (Appendix pg 57-58). Contractors responsible for curb stop cost if service is already copper.

WATER MAIN CONSTRUCTION

Materials

Main Pipe:

Pipe to be 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 150psi 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.

Materials continued:

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 to 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.

Materials continued:
Gate valves & Gate Boxes Continued

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 150 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.

Materials continued:

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 insure 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.

Materials continued:
Hydrants continued

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.

Materials continued:
Hydrants continued

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.

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 94lb 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 ¾ in. and shall be soft, annealed seamless copper tubing conforming to ASTM B88, Type K. 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 Hed 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. Extension services boxes of the required length and having slide-type adjustment shall be installed at all service box locations The boxes shall have housings of sufficient size to completely cover the service curb stop and shall be complete with identifying covers.

Curb stop box shall be a 2½ inch Caldwell Shaft Service Box, complete-No.1 or equal. Top Section to be 26 inches, Bottom Section to be 42 inches or 45 inches, stop box to fit over curb stop in sizes ¾ inches to 2 inches an having inside leg measurements of 4-7/8 inches. Top Section of this No.1 service box must be recessed to receive 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

Trench excavation shall include material of every description and of whatever substance encountered, except rock and boulders. Pavement shall be cut with a saw, wheel or pneumatic chisel along straight lines before excavating. Contractor is responsible for removing existing reinforced sub-base if encountered.

Strip and stockpile topsoil from grassed areas crossed by trenches. At the contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.

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.

Installation continued:
Trench Excavation continued

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.

Disposal of Materials

Excavated materials shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

It is expressly understood that no excavated material shall be removed from the site of the work or disposed of, except as directed by the Engineer. When the engineer has approved removal of surplus materials, dispose of such surplus in approved designated areas.

Installation continued:
Disposal of Materials continued:

Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided. When required, it shall be re-hauled and used in backfilling the trench.

Sheeting and Bracing

Contractor shall furnish, put in place and maintain sheeting and bracing required by Federal, State or local safety requirements to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work or endanger adjacent structures. If the Engineer/Contractor is of the opinion that at any point sufficient or proper supports have not been provided, he/she may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the contractor from his or her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed they shall be immediately filled and rammed.

When movable trench bracing such as boxes, movable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill.

When installing flexible pipe (PCV, DI, etc.) trench boxes, movable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, movable sheeting, shoring or plates are moved, screen gravel shall be placed to fill any voids created and the screened gravel and backfill shall be recompacted to provide uniform side support for the pipe. Sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least 1ft above the top of the pipe.

All sheeting and bracing shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, or property, whether public or private. All voids left after withdrawal of the sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as directed.

Test Pits

Excavation of test pits may be required for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.

Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

Installation continued:

Excavation Below Grade and Backfill

Whenever the nature of unstable material encountered or the groundwater conditions 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. Goetextile 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 then 3 inches in diameter shall not be closer then 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.

Installation continued:
Backfilling continued

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 6inches 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.

Where the pipes are laid in street, the remainder of the trench up to a depth of 1 foot below the bottom of the specified permanent paving shall be backfilled with common fill material in layers not to exceed 1foot and thoroughly compacted. The sub-base layer for paving shall be bank- run gravel thoroughly compacted in 6 inch layers.

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.

WATER MAIN CONSTRUCTION

Installation

Pipe installation & Appurtenants:

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.

Pipe installation & Appurtenants continued:
Installing Cast and Ductile Iron pipe and fittings continued:

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 confirm 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 (3.0 m), 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 (46 cm) 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 (46 cm) 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 (3.0 m) 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 150m psi to ensure that they are watertight.

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.

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 manually operated before installation. Buried valves and valve shall be set with the stem vertically (plumb), aligned in the center of the valve box. 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.

Hydrant

Fire hydrants shall be set at the location as shown on the Plans and 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 inches diameter cast iron or ductile pipe shall be used for hydrant laterals. Each hydrant must a 6-inch gate valve, box and cover on the lateral.

A drainage pit as detailed on plans, or it shall beat 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" 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 150 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 break shall be maintained at all times between the distribution system and the Contractor's equipment to prevent cross-connection.

Pipe installation & Appurtenants continued:
Water Main Filling and Testing continued.

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 150psig 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 150p.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.

Pipe installation & Appurtenants continued:
Testing Continued:

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.

Pipe installation & Appurtenants continued:
Water Main Disinfection continued:

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 drain 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 Services

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

Saddle shall be made from iron, bronze or 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. New services North of Tarkiln Hill Road shall be copper 1-inch or greater in size, shall be Smith-Blair #313, 317, 323, 331 or equal.

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 Stops

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.

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.

Curb Stops

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 Boxes

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.

Pipe installation & Appurtenants continued:
Domestic Services Continued:

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.

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:

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

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

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

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

Department of Public Infrastructure

Jamie Ponte
Commissioner

Water
Wastewater
Highways
Engineering
Cemetery

CITY OF NEW BEDFORD
Jonathan F. Mitchell, Mayor

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). 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. 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 liable 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**
Water Consumption Charge	**$5.86 per CCF**

Signature of Renter/Agent

Date

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.

3. 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.

4. 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 6 months to 1 year.

   A letter written by the owner to the Commissioner to request the reuse of the service is required along with $1000 surety deposit.

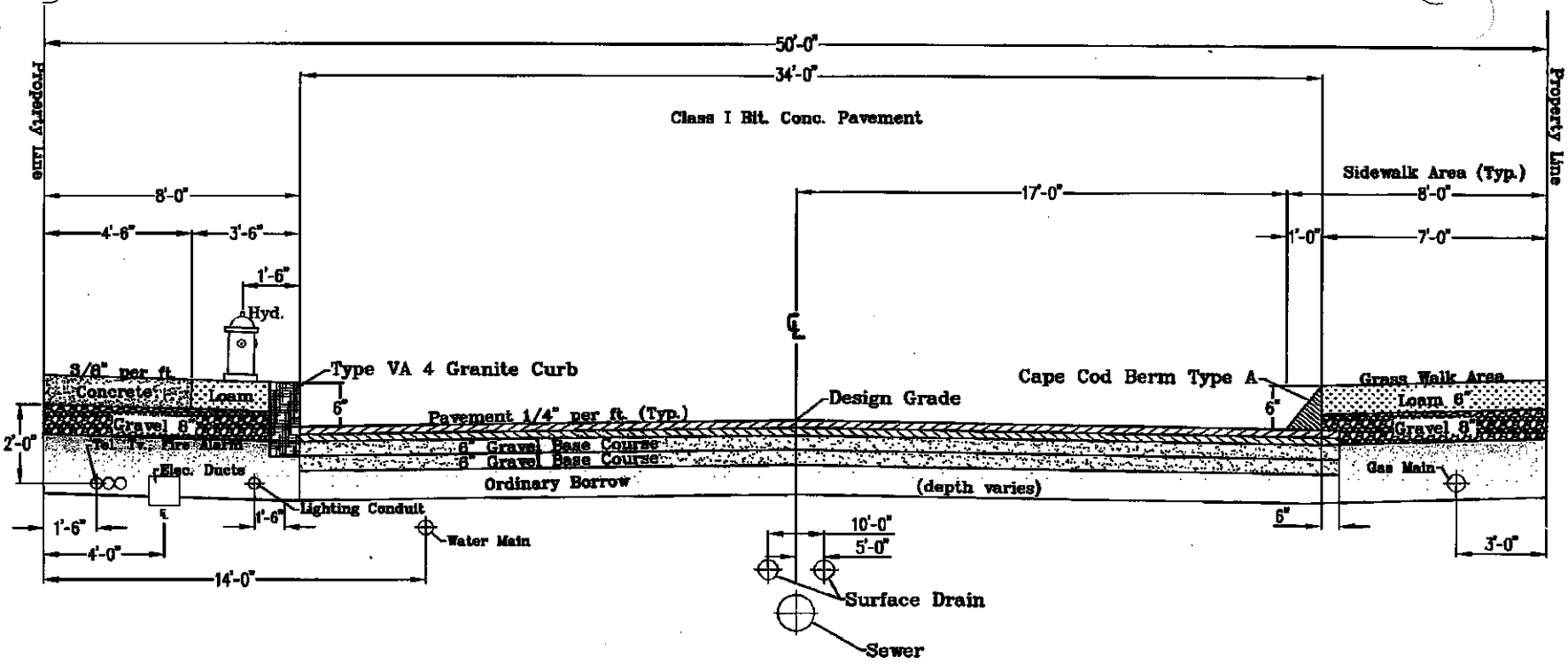
   If the service is not reused within 1 year of the request, the water service is to be removed at the corp. tap by the owners' Bonded Contractor. After the water service is removed then the surety deposit will be returned.

CITY OF NEW BEDFORD MASSACHUSETTS DEPARTMENT OF PUBLIC INFRASTRUCTURE

TYPICAL SECTION REQUIRED FOR STREET ACCEPTANCE CITY OF NEW BEDFORD, MA.

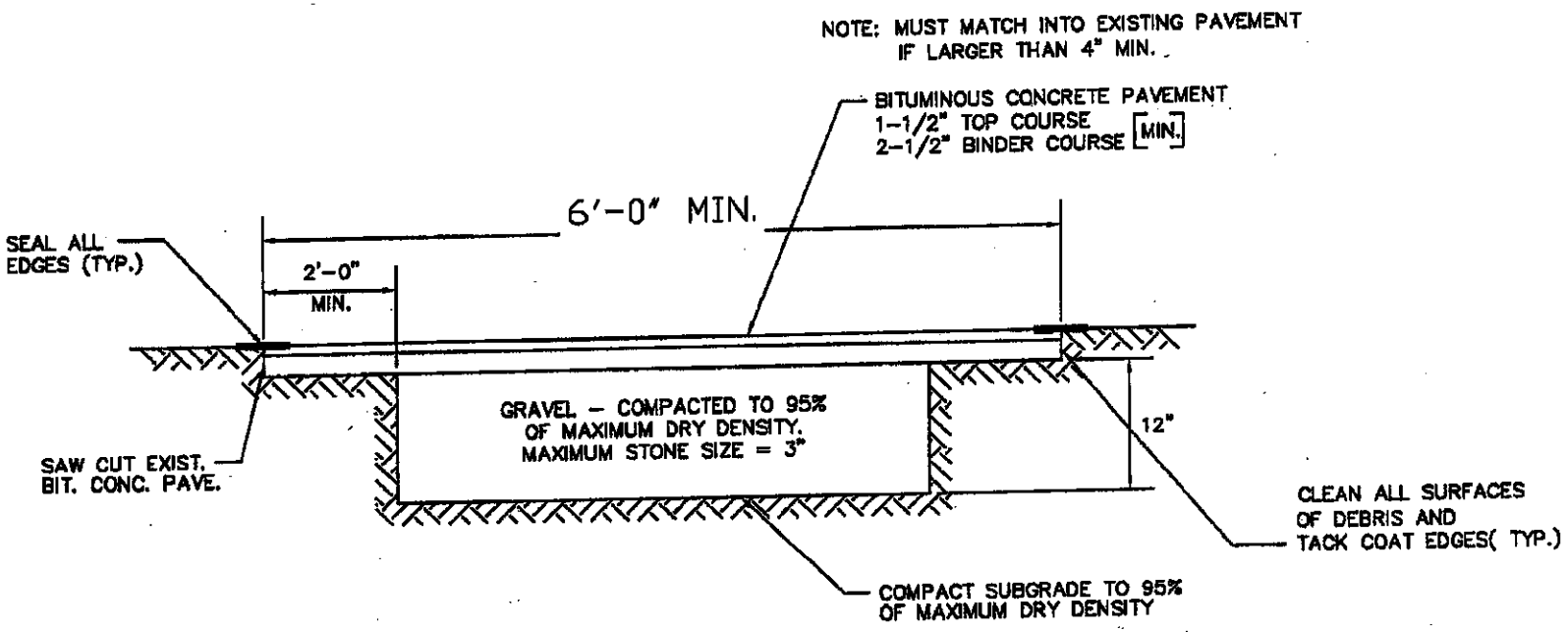
(N.T.S.)

1



a. Water Mains 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 1½' from south or west property lines with 2'min cover.
e. Electric Lines to be 4' from south or west property lines with 2½' 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 to be Class I Bituminous Concrete, Type I–1 laid in two courses (1½" Top Course, 2½" 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 paving, curbing, trees, etc. are available from the D.P.I. Engineering Division



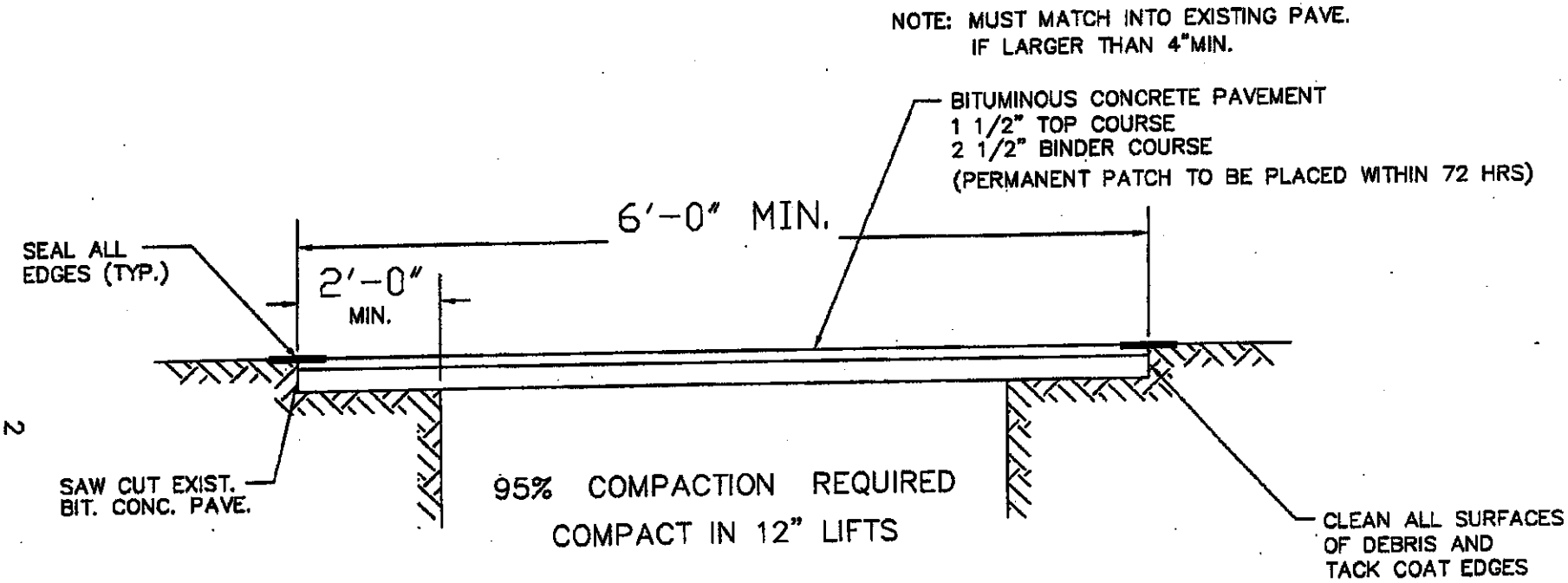
TYPICAL BITUMINOUS CONCRETE PAVEMENT RESTORATION DETAIL

NOT TO SCALE

1A

MB_PAVEREST.DWG

NOTE . ...WALK REPAIR TO BE DONE WITHIN 72 ... AND THE "CONCRETE CONSTRUCTION DURING COLD WEATHER" SPECIFICATIONS MUST BE FOLLOWED.

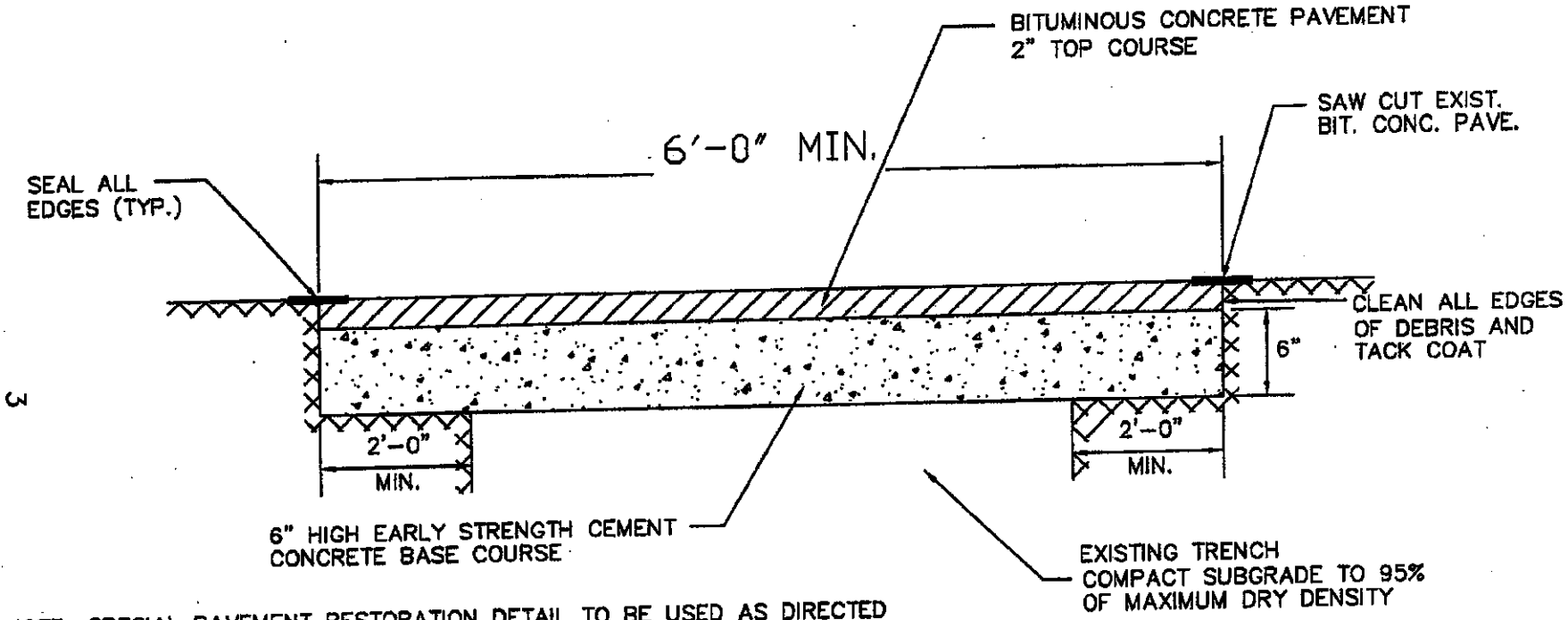


NSTAR GAS
WINTER SEASON
TYPICAL BITUMINOUS CONCRETE PAVEMENT RESTORATION DETAIL

NOT TO SCALE

NB_PAVREST1C.DWG

2

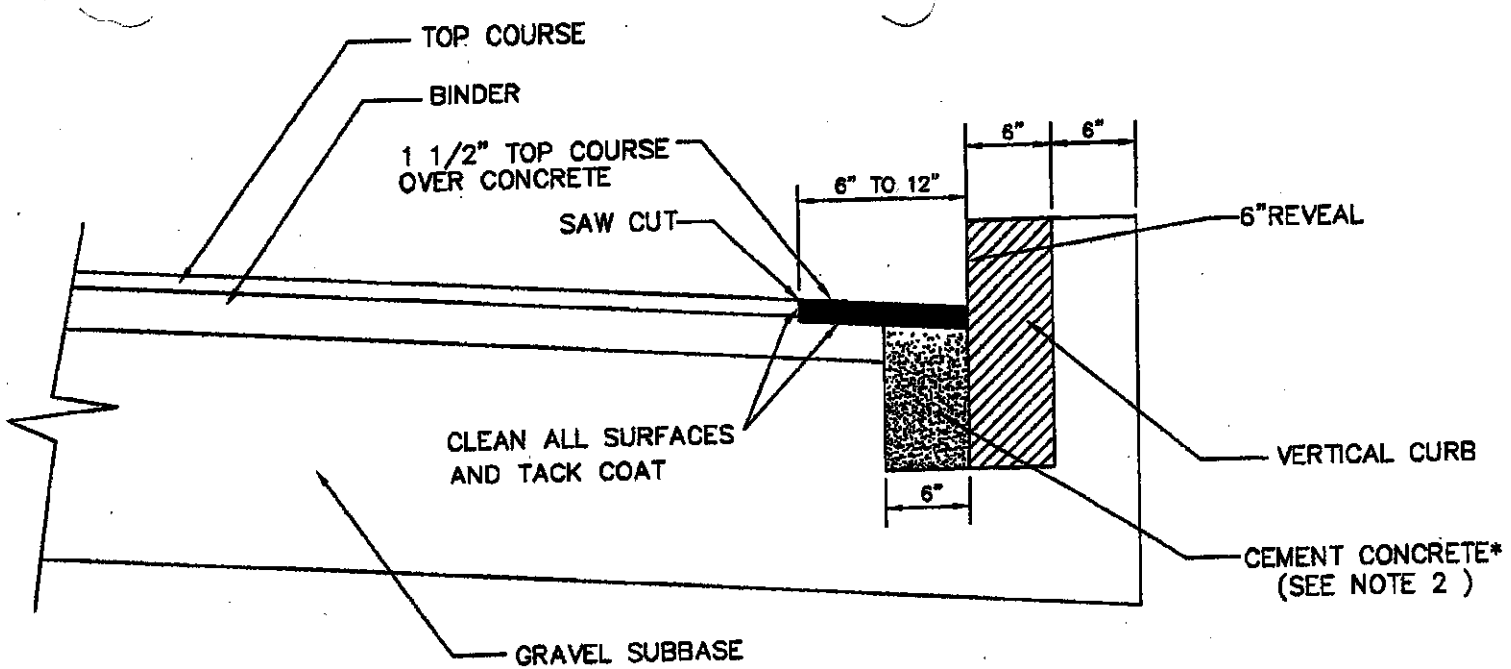


NOTE: SPECIAL PAVEMENT RESTORATION DETAIL TO BE USED AS DIRECTED BY THE DPI COMMISSIONER IN AREAS THAT FLOWABLE FILL CAN NOT BE USED

SPECIAL BITUMINOUS CONCRETE PAVEMENT RESTORATION DETAIL

NOT TO SCALE

NB_SPECPAVER.DWG



* PROCEDURE DESCRIBED HEREIN IS APPLICABLE ONLY IF CURB IS TO BE SET AFTER BASE AND/OR BINDERCOURSES ARE IN PLACE OTHERWISE CEMENT CONCRETE WILL BE ELIMINATED AND GRAVEL BROUGHT TO BOTTOM OF BASE COURSE.

NOTES :

1.SAW CUT NEATLINE 6" TO 12" FROM CURB LINE AND REMOVE BINDER,BASE COURSE AND GRAVEL,REPLACE WITH CEMENT CONCRETE.

2.ANY CLASS CEMENT CONCRETE THAT IS ACCEPTABLE TO THE DEPT. UNDER SECTION M4 OF THE 1996 STNDARD SPECIFICATIONS,ALL TEST REQUIREMENTS ARE WAIVED.BITUMINOUS CONCRETE IS NOT TO BE USED AS A SUBSTITUTE.

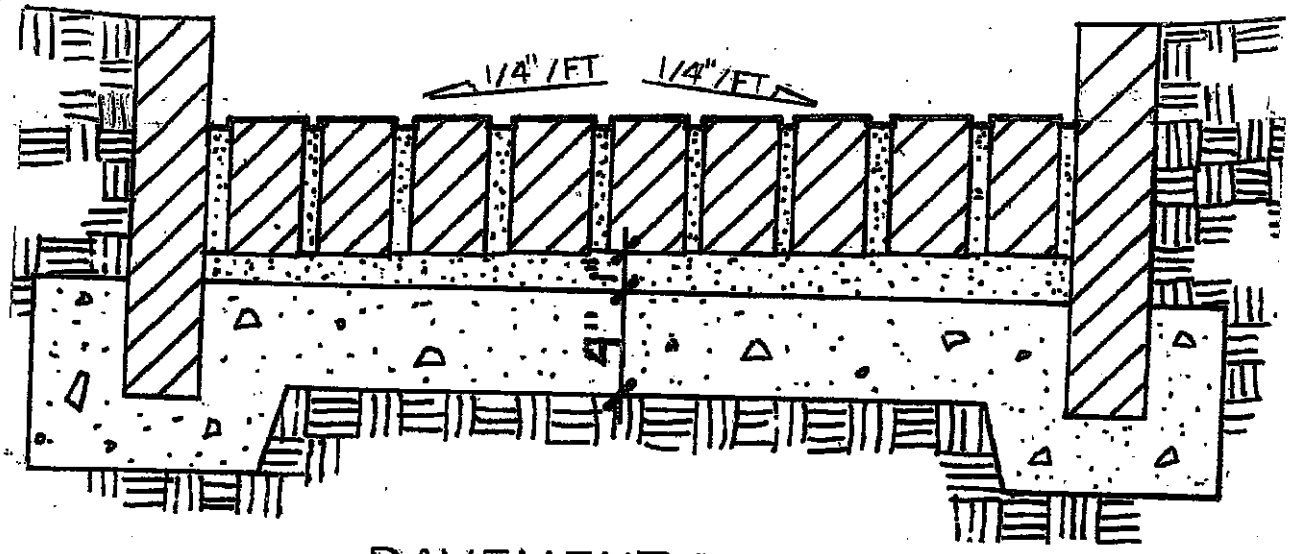
3.PAYMENT FOR CEMENT CONCRETE WILL BE INCLUDED IN THE PRICE PER LINEAL FOOT OF CURBING.

METHOD OF SETTING VERTICAL CURB

NOT TO SCALE

CURBSET.DWG

BELGIAN PAVERS



PAVEMENT DETAIL

NTS

SUBGRADE: CLEAN GRAVEL GRADED AND COMPACTED

BASE: 4"–3000 PSI CEMENT CONCRETE

BEDDING: 1 TO 3" COARSE SAND LAYER

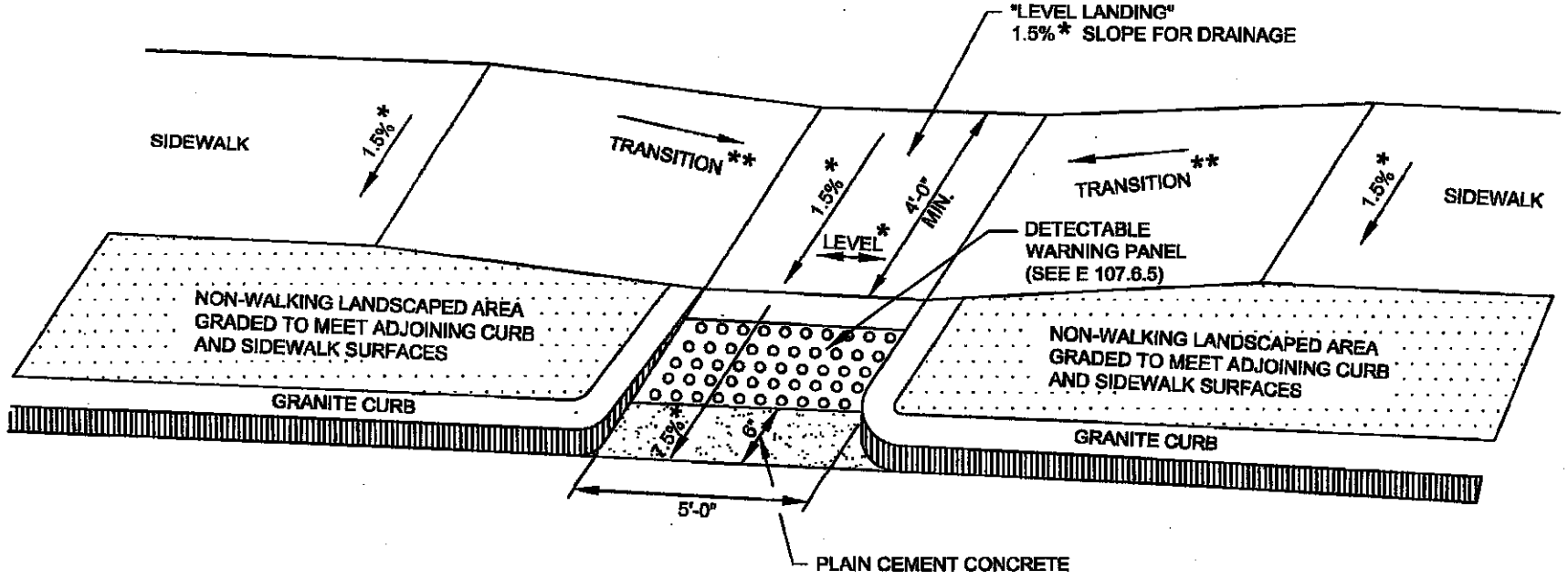
CURBING: 6" CURB REVEAL

GROUT: RESERVE 1/2" TO 1" SPACING FOR FULL DEPTH MORTAR TO 1/4" BELOW FINISH

CONSTRUCTION STANDARDS

massDOT Massachusetts Department of Transportation Highway Division

WHEELCHAIR RAMP WITH LANDSCAPING STRIP



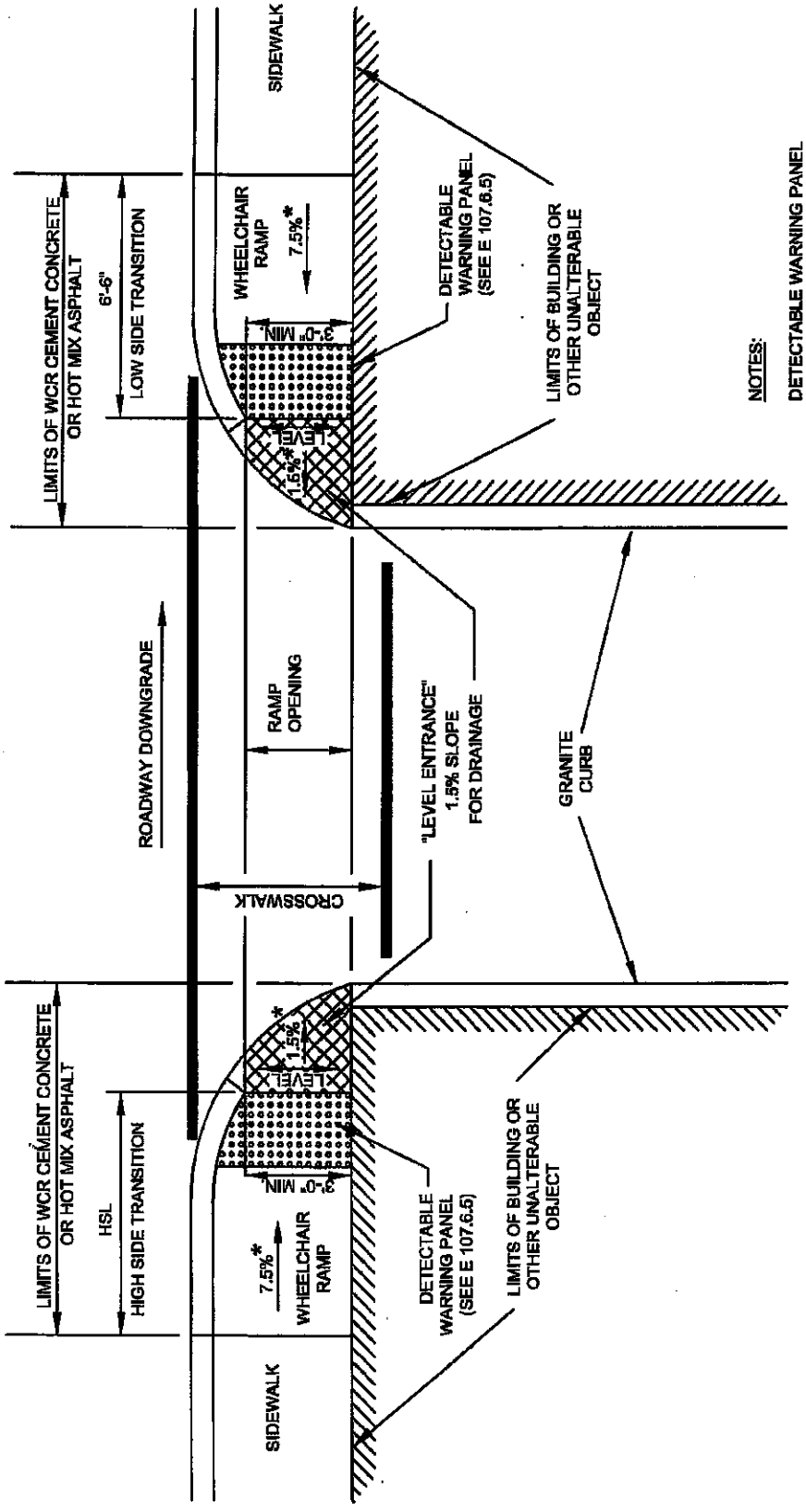
LEGEND

* = TOLERANCE FOR CONSTRUCTION ±0.5%

** = SEE E 107.9.0 FOR TRANSITION LENGTH

DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.6.9



NOTES:

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.

FOR DETAILS OF TRUNCATED DOMES SEE DRAWING E 107.6.5.

ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.

LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)

* = TOLERANCE FOR CONSTRUCTION ±0.5%

massDOT Highway Division

CONSTRUCTION STANDARDS

WHEELCHAIR RAMP FOR ONE CONTINUOUS DIRECTION OF PEDESTRIAN TRAVEL

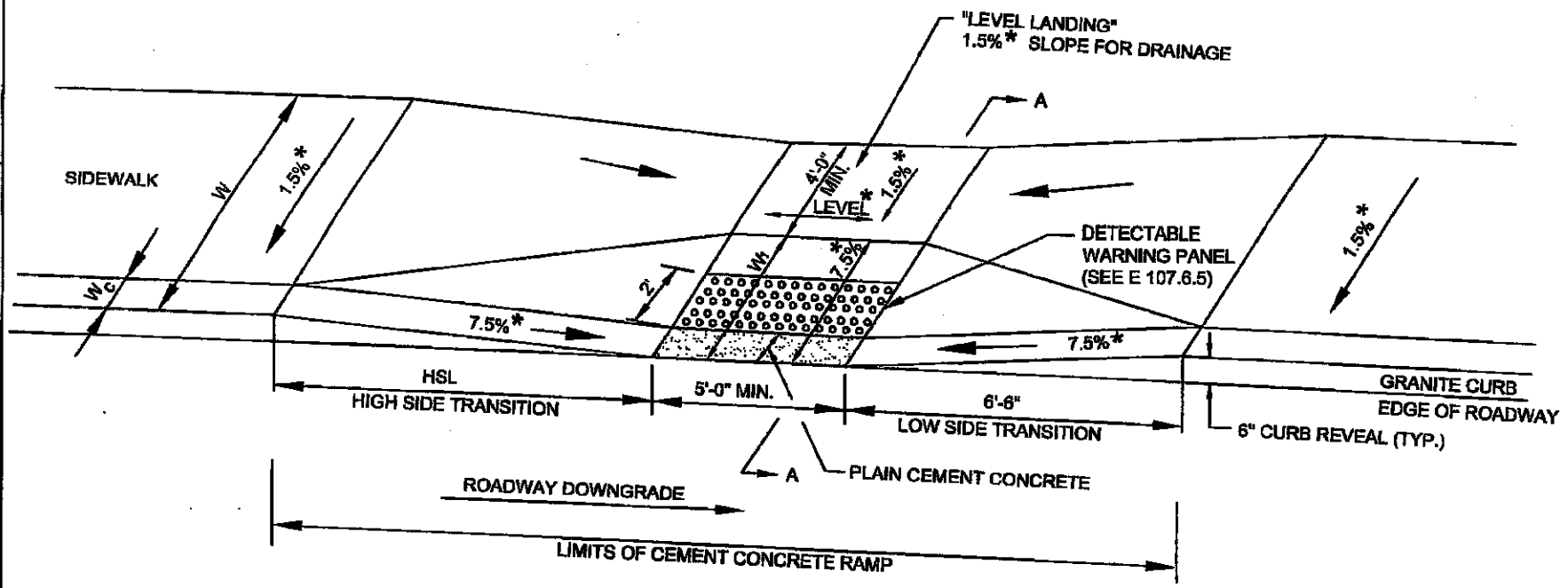
DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.6.0

CONSTRUCTION STANDARDS

massDOT Highway Division

WHEELCHAIR RAMPS
LESS THAN 12'-4" SIDEWALK



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)

W = SIDEWALK WIDTH

W_c = CURB WIDTH

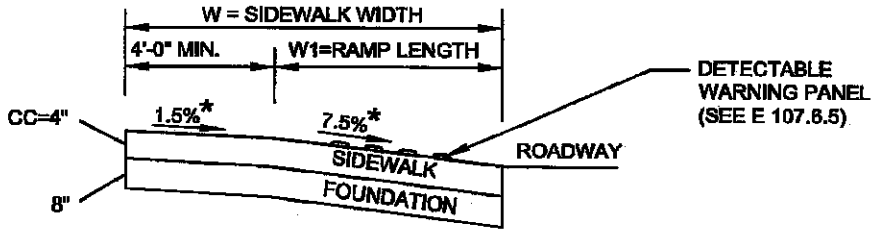
W_1 = PERPENDICULAR RAMP LENGTH

CC = CEMENT CONCRETE

* = TOLERANCE FOR CONSTRUCTION ±0.5%

USABLE SIDEWALK WIDTH PER AAB = W-Wc

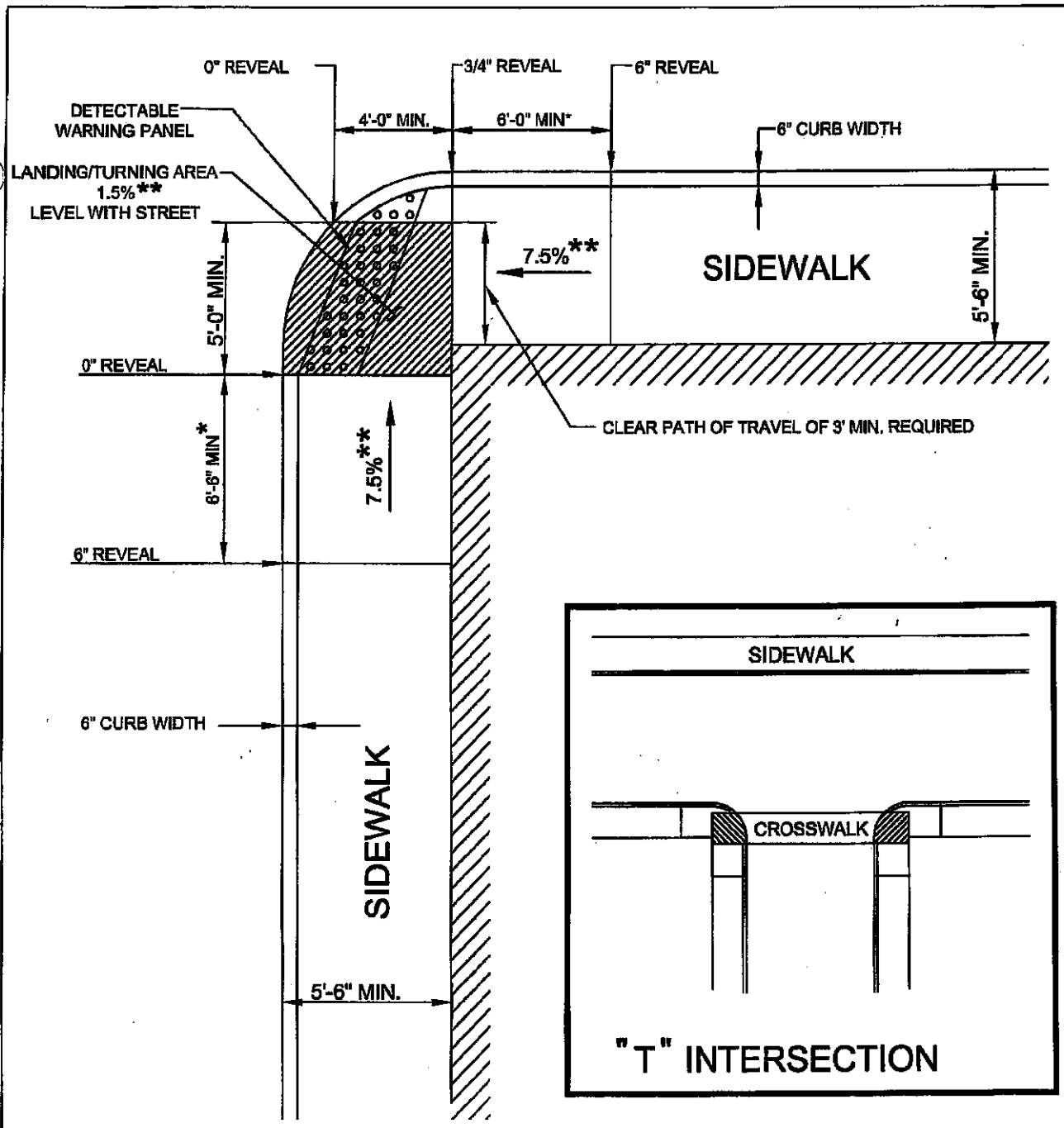
RAMP LENGTH, W1 = W-4'-0" Min



SECTION A-A

DATE OF ISSUE
OCTOBER 2017

DRAWING NUMBER
E 107.2.0



LEGEND

BUILDING OR OTHER UNALTERABLE CONDITION

* TRANSITION LENGTH SHOWN IS MINIMUM. (SEE E 107.9.0)

** TOLERANCE FOR CONSTRUCTION ±0.5%

NOTE:

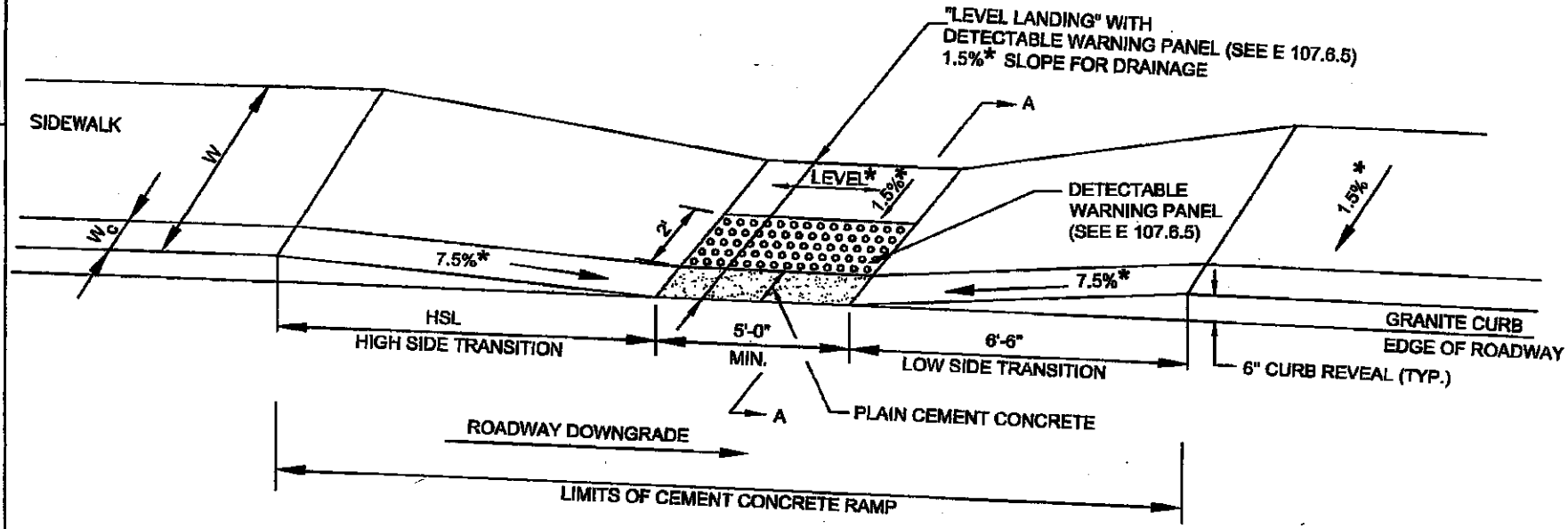
ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS

massDOT Highway Division CONSTRUCTION STANDARDS	**"T" INTERSECTION WHEELCHAIR RAMP**	DATE OF ISSUE OCTOBER 2017 DRAWING NUMBER **E 107.6.4**

CONSTRUCTION STANDARDS

massDOT Highway Division

WHEELCHAIR RAMP ON NARROW SIDEWALK WITH DETECTABLE WARNING PANEL



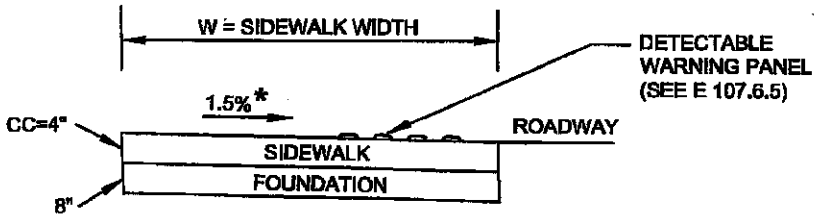
LEGEND

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

USABLE SIDEWALK WIDTH PER AAB = W-Wc
USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'0"
SEE E 107.6.5 FOR DETAILS OF DETECTABLE WARNING PANEL

NOTE:

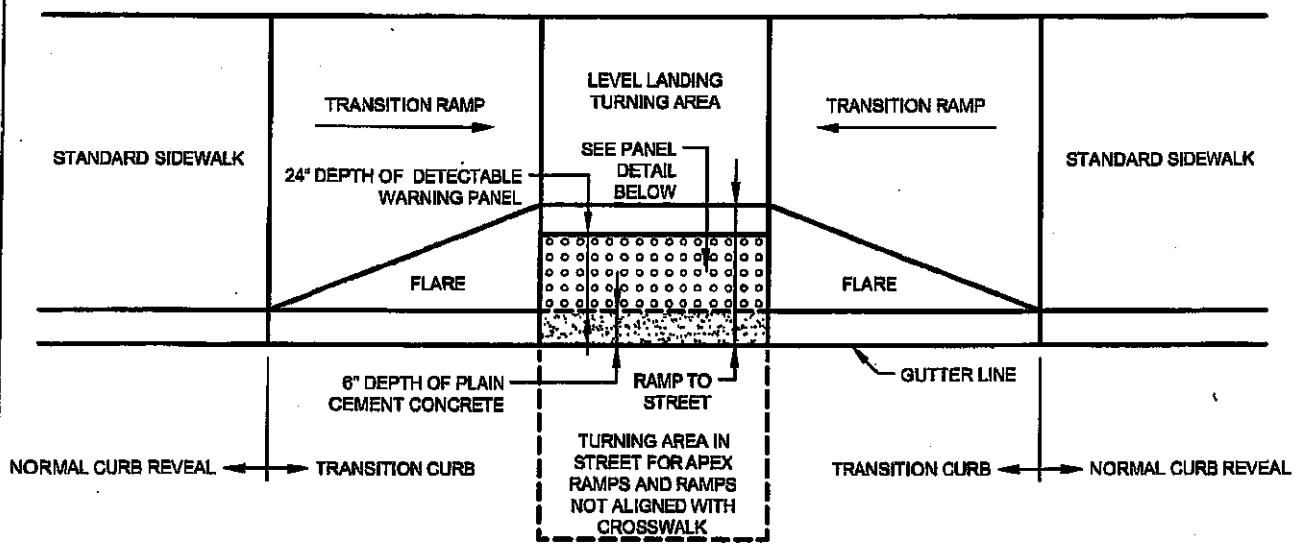
ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS



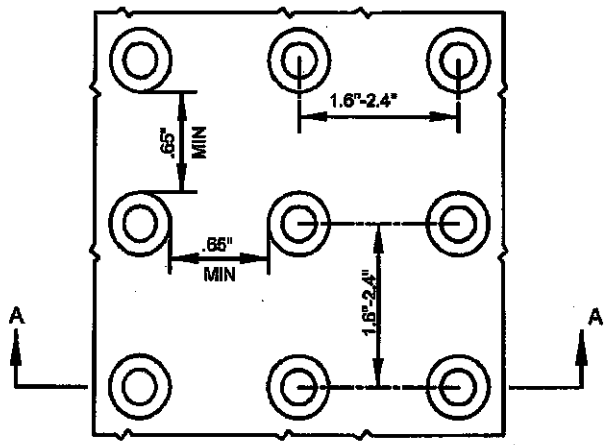
SECTION A-A

DATE OF ISSUE
OCTOBER 2017

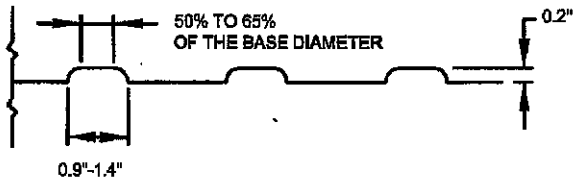
DRAWING NUMBER
E 107.2.1



TYPICAL INSTALLATION



DETAIL OF DETECTABLE WARNING PANEL



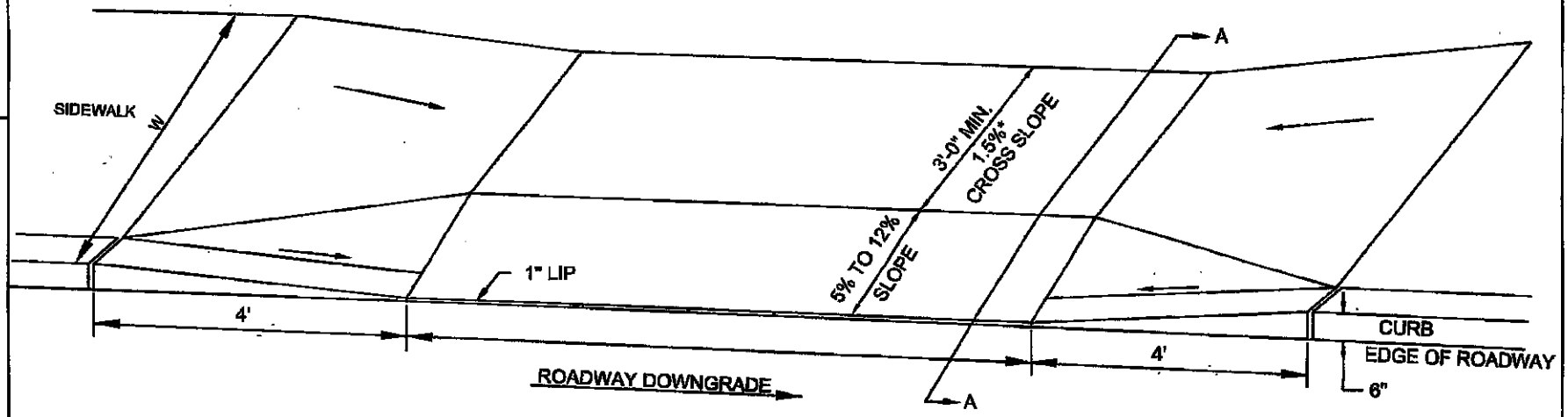
SECTION A-A

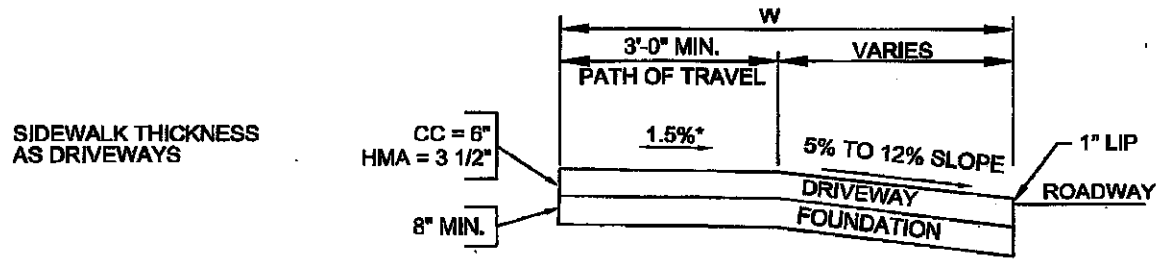
NOTE:

PANELS MAY BE CONCRETE PRECAST OR CAST IN PLACE OR OTHER SUITABLE MATERIAL PERMANENTLY APPLIED TO THE RAMP. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT.

massDOT Massachusetts Department of Transportation Highway Division CONSTRUCTION STANDARDS	**DETECTABLE WARNING PANEL FOR WHEELCHAIR RAMPS AND STANDARD RAMP TERMINOLOGY**	DATE OF ISSUE OCTOBER 2017 DRAWING NUMBER **E 107.6.5**

SIDEWALK THROUGH DRIVEWAYS WITHOUT CURB RETURNS



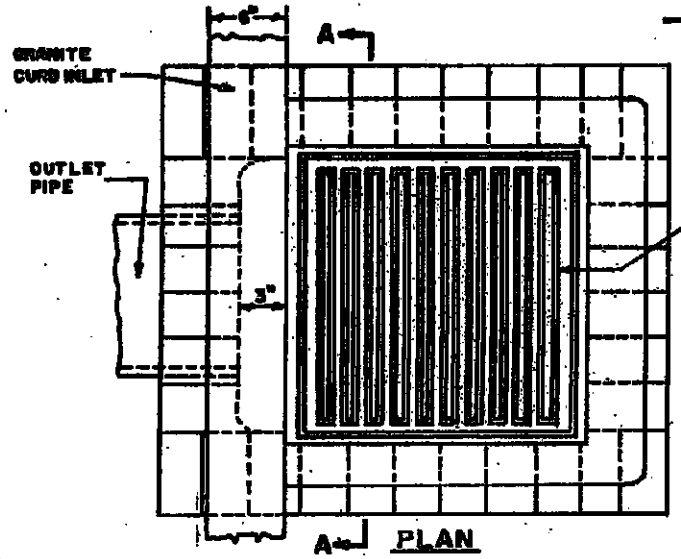


SECTION A-A

LEGEND

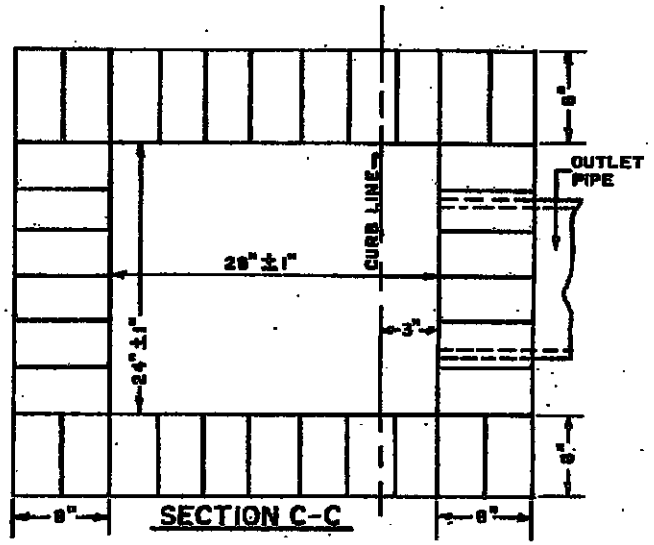
W = SIDEWALK WIDTH
* = TOLERANCE FOR CONSTRUCTION ±0.5%
CC = CEMENT CONCRETE
HMA = HOT MIX ASPHALT

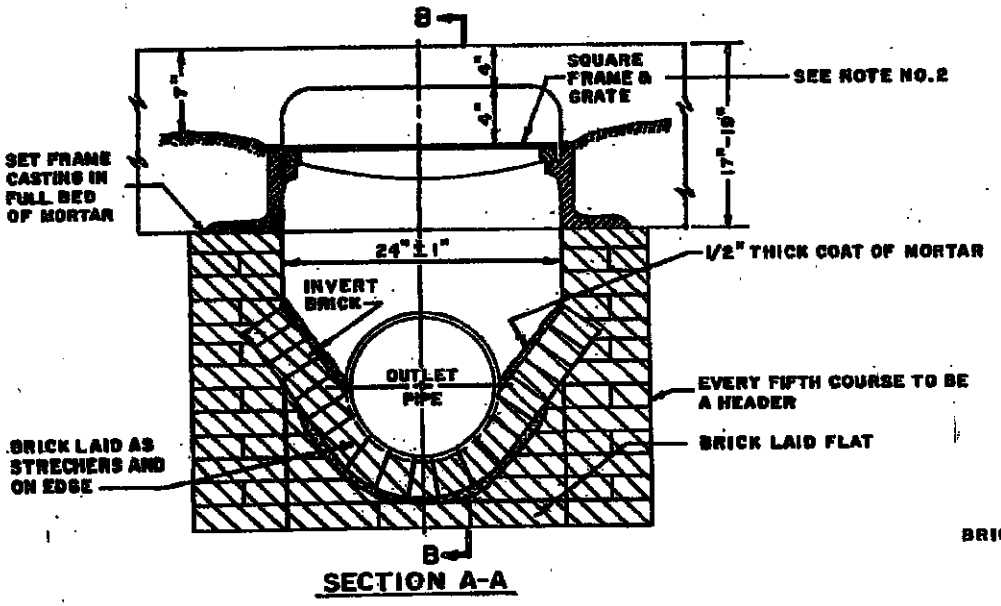
BRICK GUTTER INLET

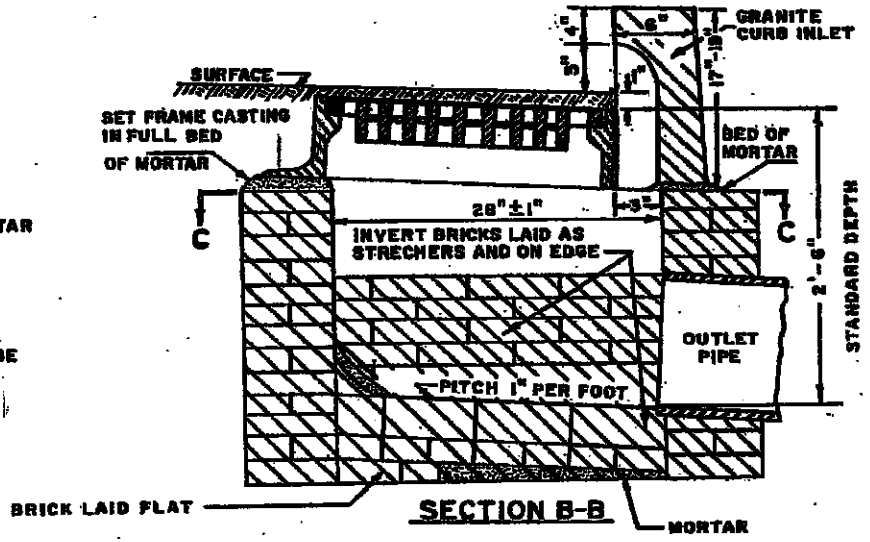


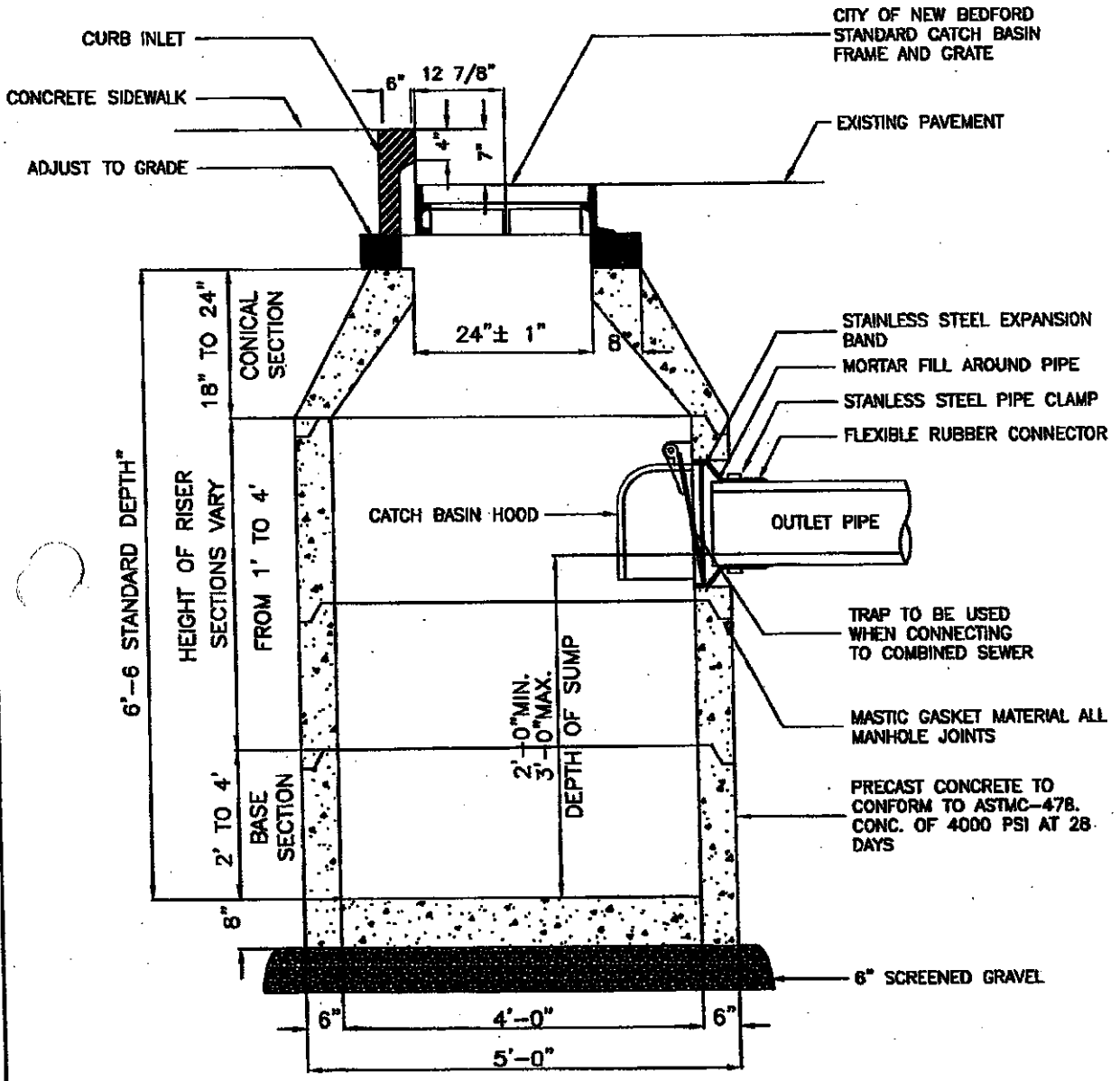
NOTES:

1. WHEN THE CURB INLET IS NOT USED THE INSIDE HORIZONTAL DIMENSION OF GUTTER INLET TO BE 24"±1"×24"±1" IN WHICH CASE AND UNLESS OTHERWISE DIRECTED, A STANDARD 4-FLANGE FRAME IS TO BE USED.
2. A CASCADE GRATE IS TO BE USED WHERE BICYCLE TRAFFIC IS ALLOWED SEE 201.7.0 THROUGH 201.9.0
3. FOR DESCRIPTION, MATERIAL AND CONSTRUCTION METHODS SEE LATEST SPECIFICATIONS





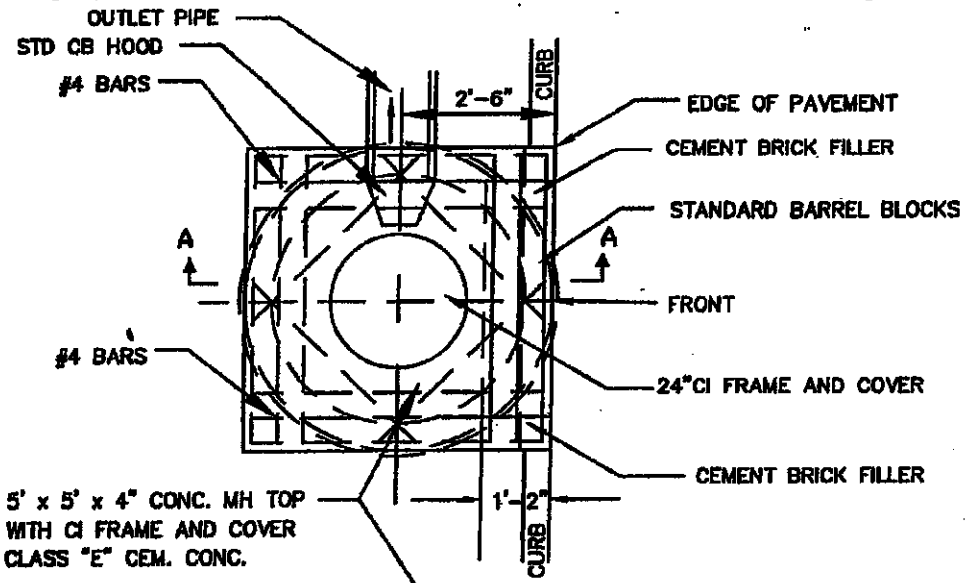




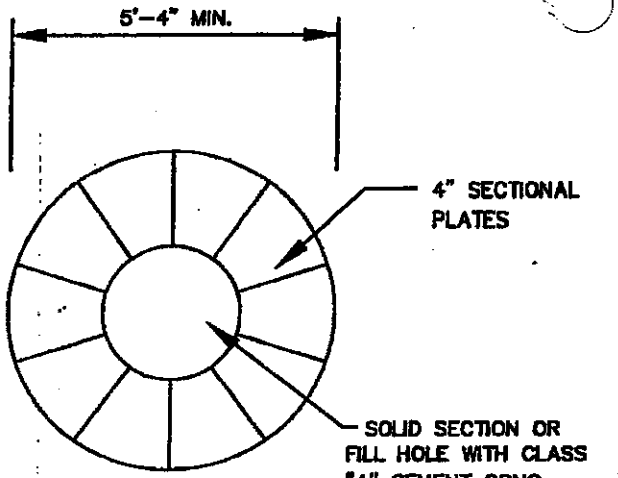
PRECAST CONCRETE CATCH BASIN

NOT TO SCALE

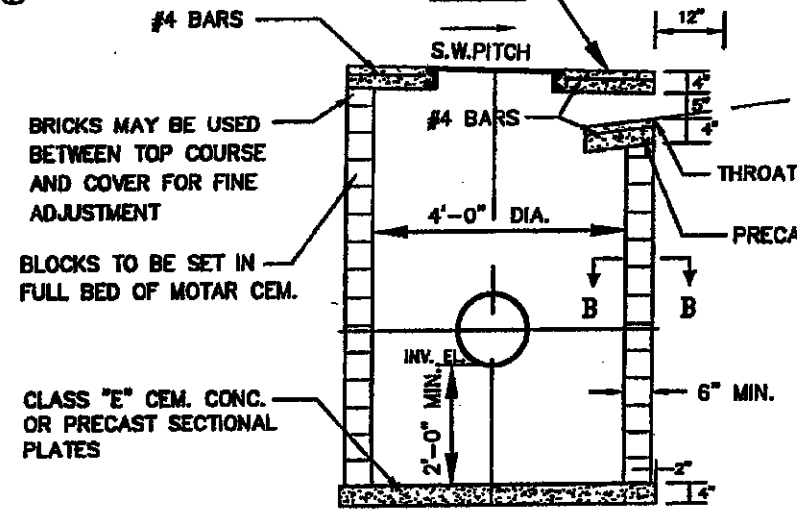
NBCATCHBASIN1.DWG



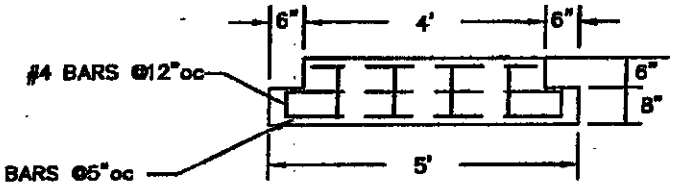
PLAN



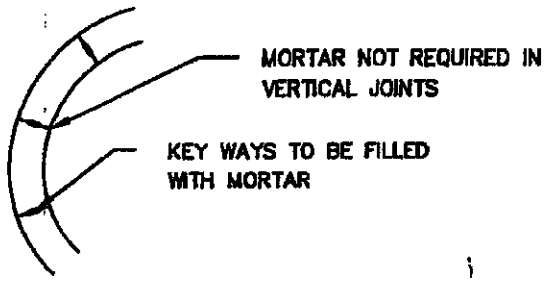
PLAN OF BASE



SECTION "A"-"A"



PLAN OF WASH STONE

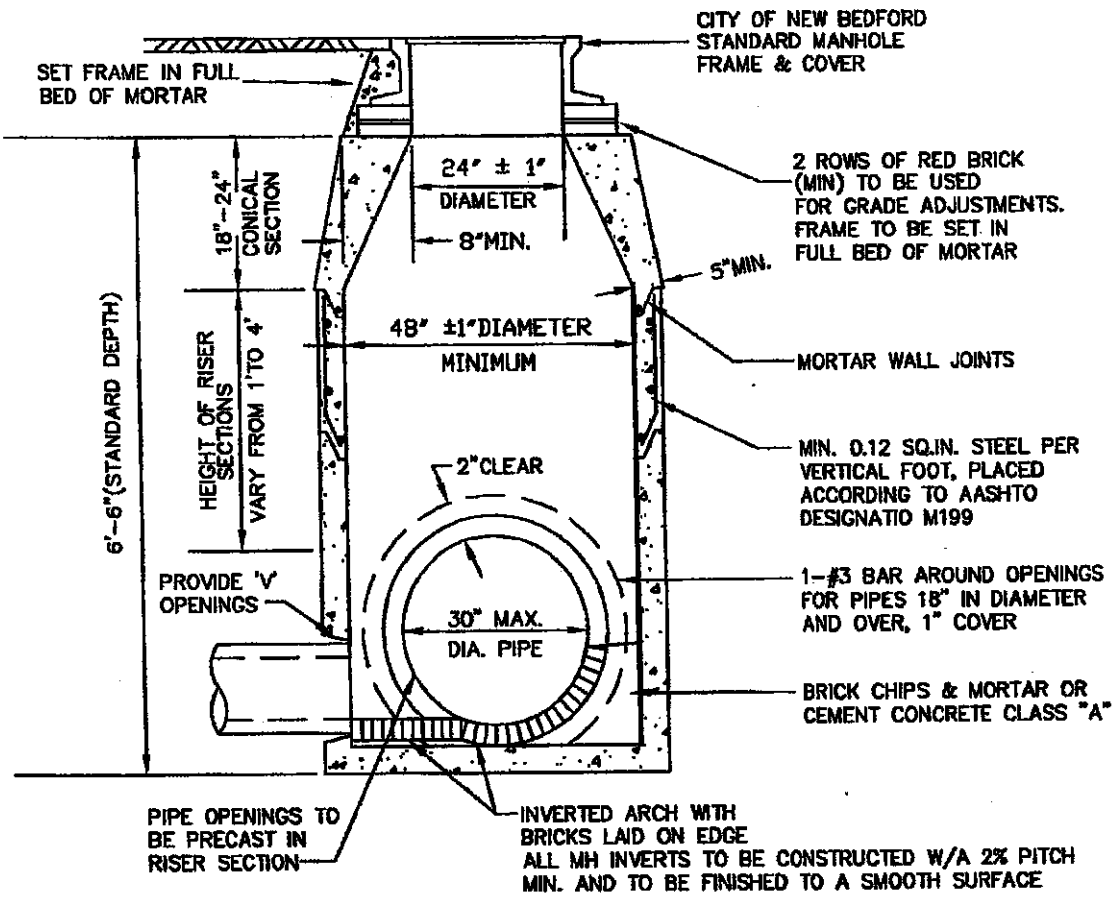


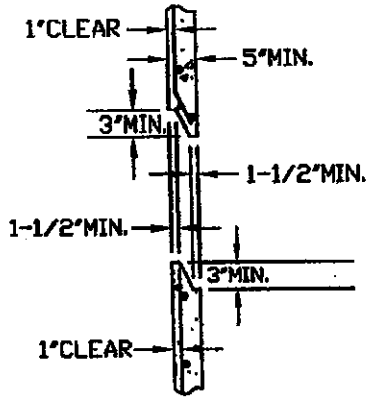
SECTION "B"-"B"

CATCH BASIN (MUNICIPAL STANDARD)

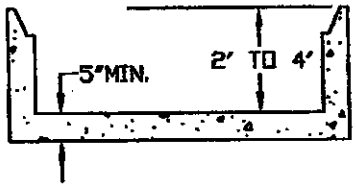
NOT TO SCALE

NBCBMS.DWG

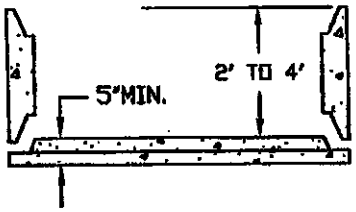




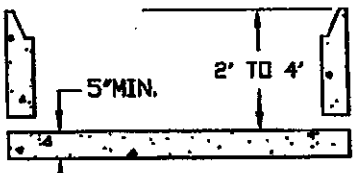
JOINT DETAILS



PRECAST UNIT



PRECAST BASE

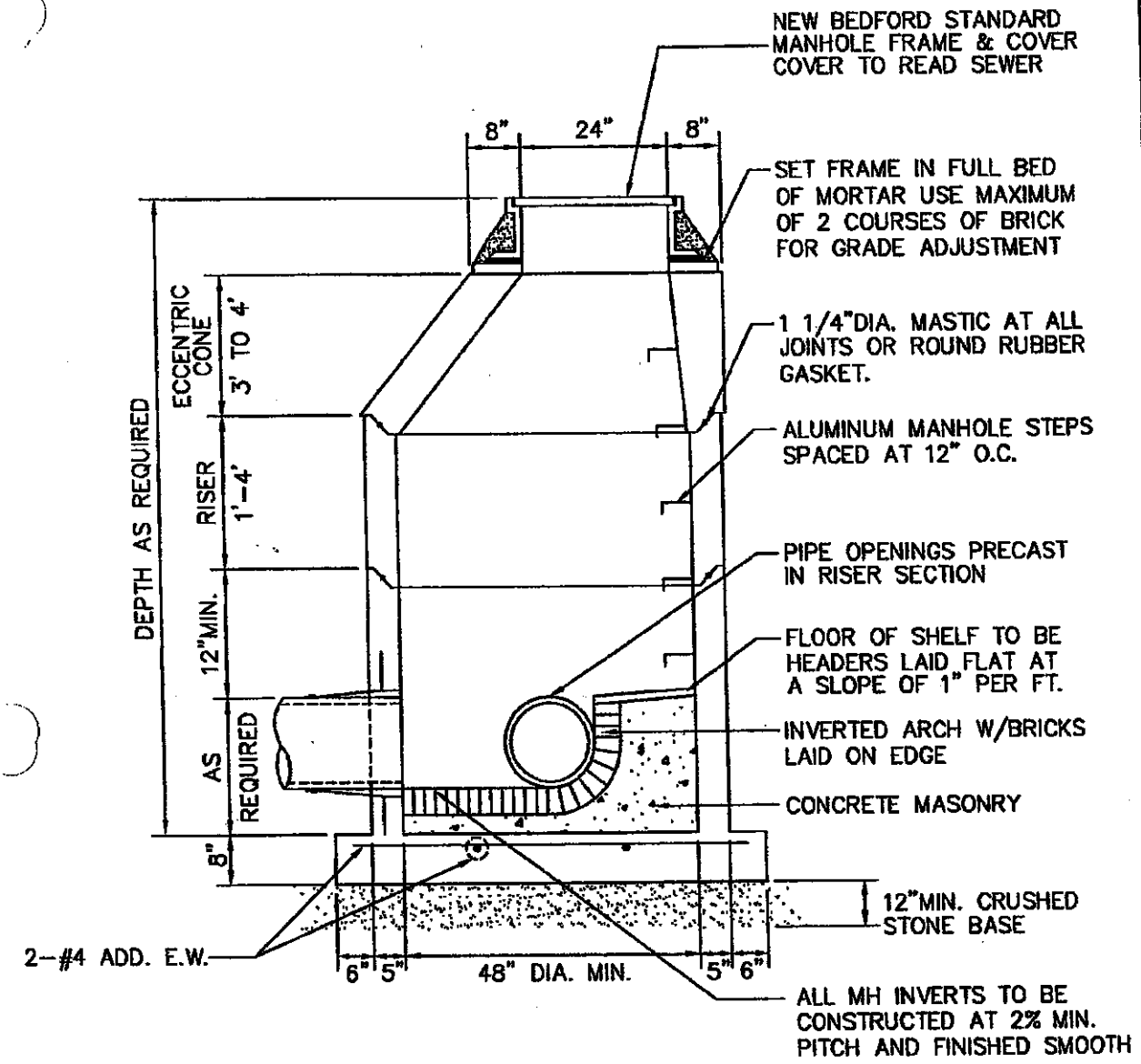


CAST IN PLACE
BASE

PRECAST CONCRETE MANHOLE

NOT TO SCALE

NBCONCMH



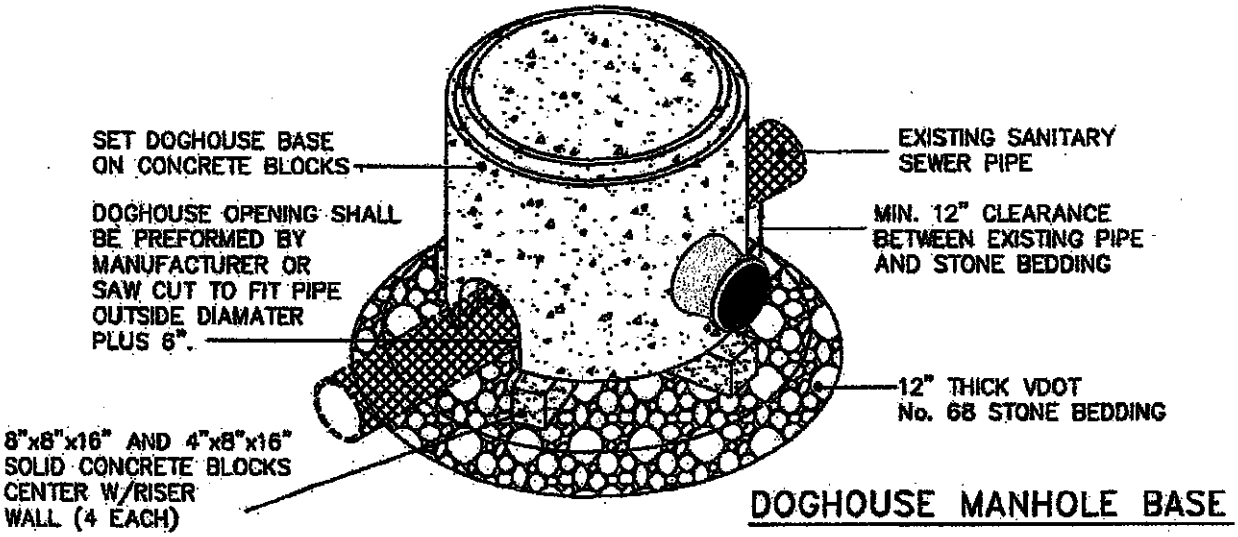
TYPICAL PRECAST SEWER MANHOLE

NOT TO SCALE

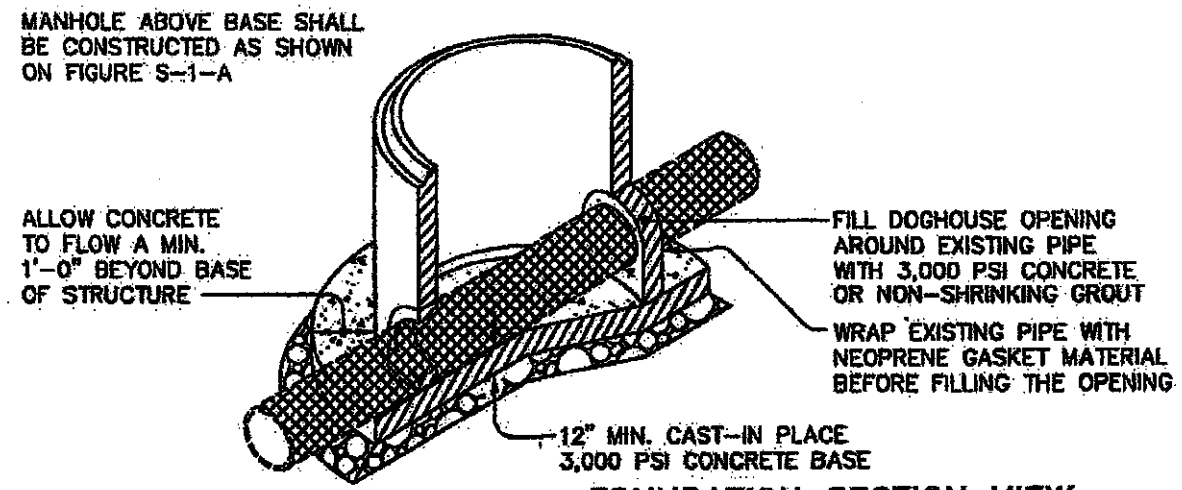
NOTES:

1. MANHOLE DESIGN TO CONFORM TO PRECAST CONCRETE MANHOLE SECTIONS – ASTM C478 LATEST REVISION.
2. FILL OUTSIDE FACE OF ALL MANHOLE JOINTS W/NON SHRINK MORTAR.
3. USE FLAT TOP SLAB WHEN HEIGHT OF CONE SECTION IS LESS THAN
4. PROVIDE PIPE JOINTS NO MORE THAN 3'-0" FROM OUTSIDE FACE
5. PLUG LIFT HOLES SOLID W/MASTIC.
6. PROVIDE FLEXIBLE SLEEVE AND STAINLESS STEEL STRAP AT ALL PIPE TO MANHOLE JOINTS.

NBSewmh.dwg



DOGHOUSE MANHOLE BASE

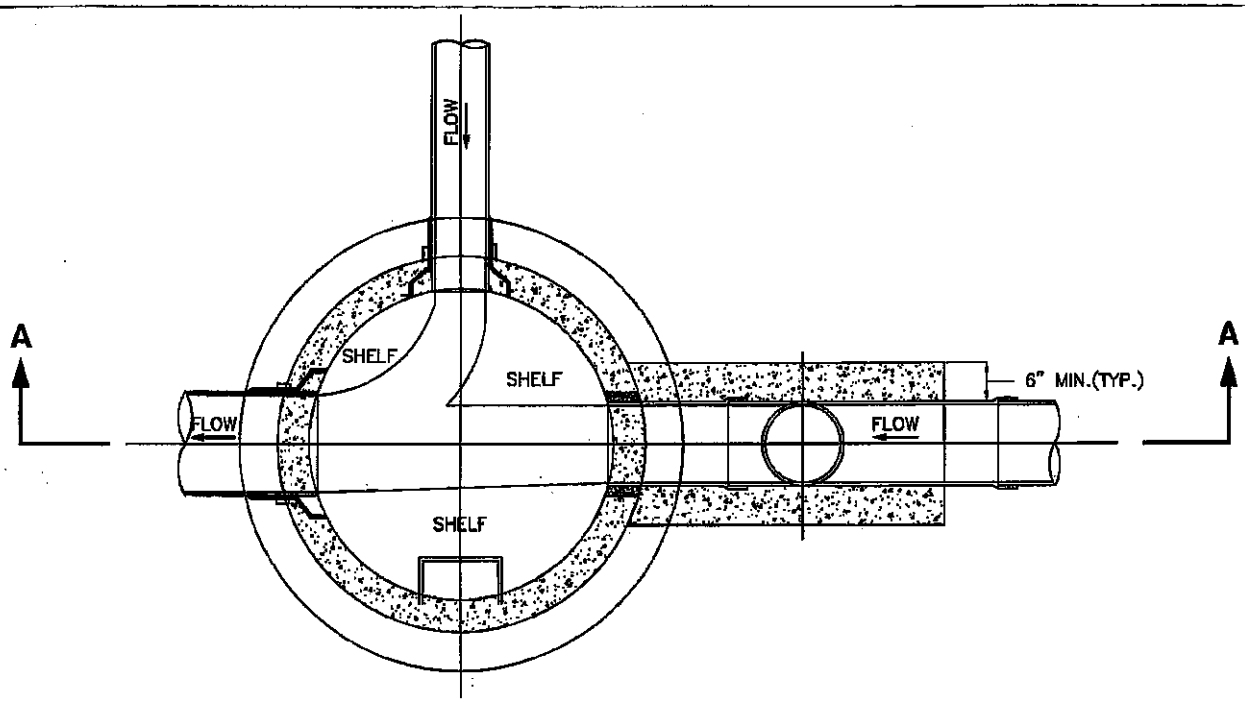


FOUNDATION SECTION VIEW

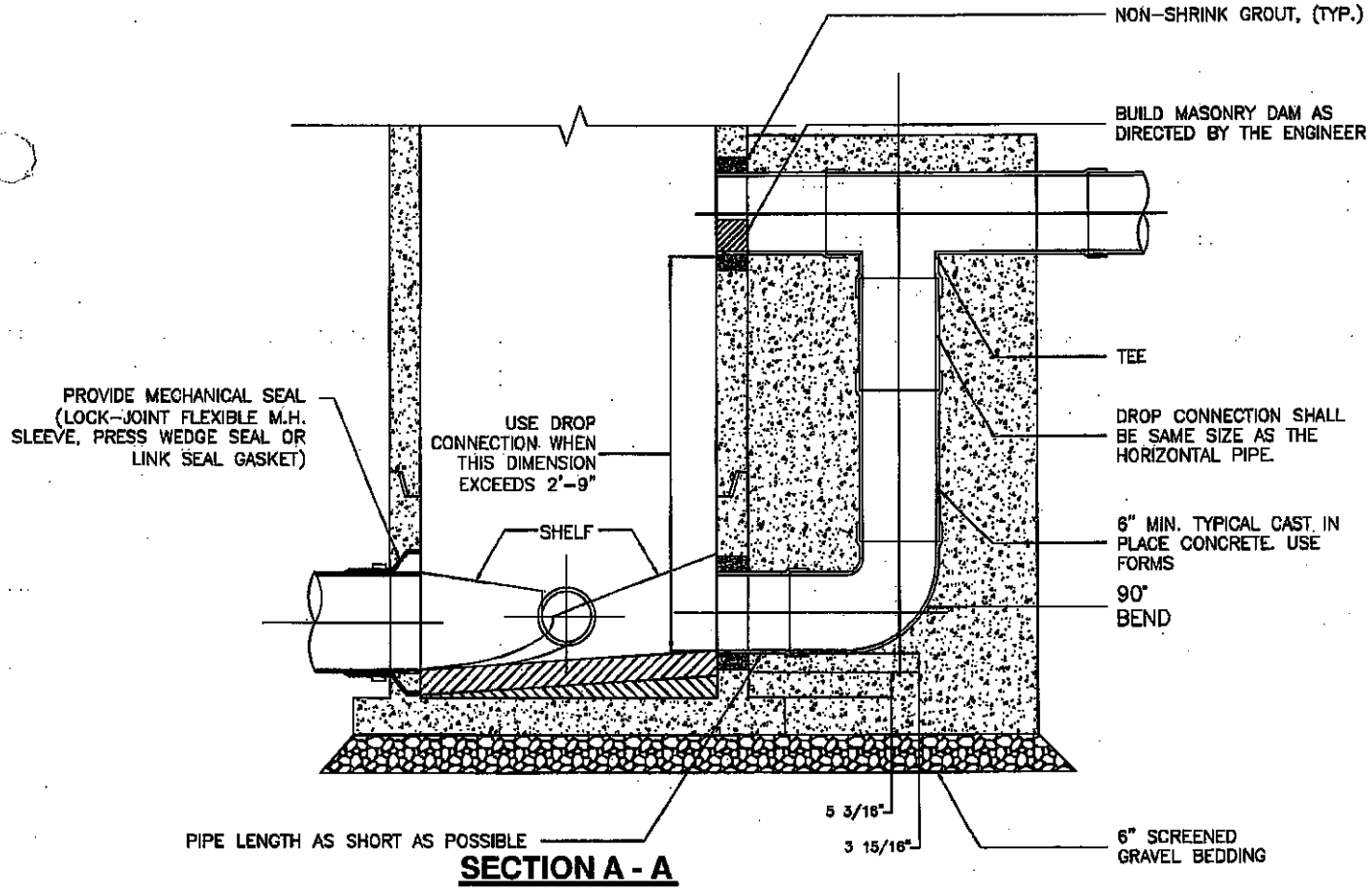
NOTES:

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.

TYPICAL MANHOLE BASE SHOWING "DOGHOUSE" INSTALLATION



PLAN

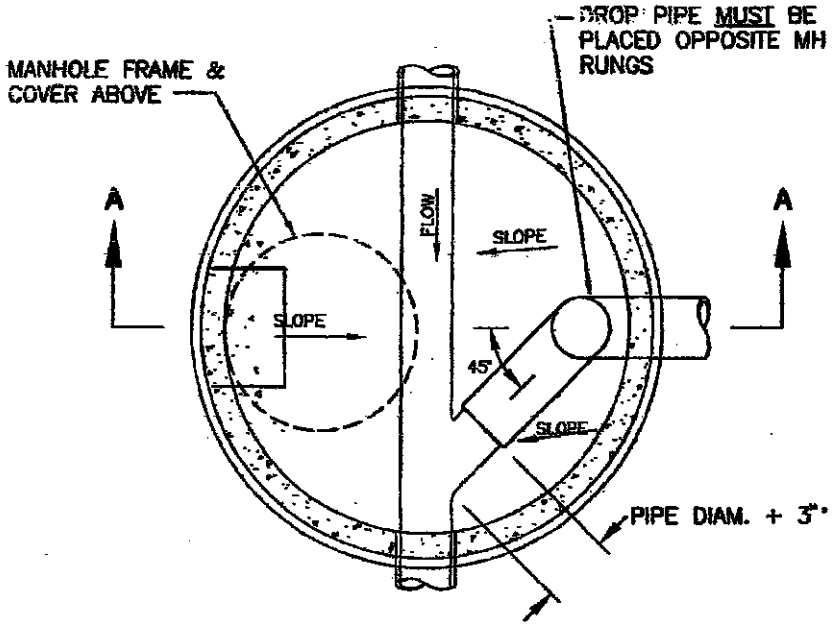


SECTION A - A

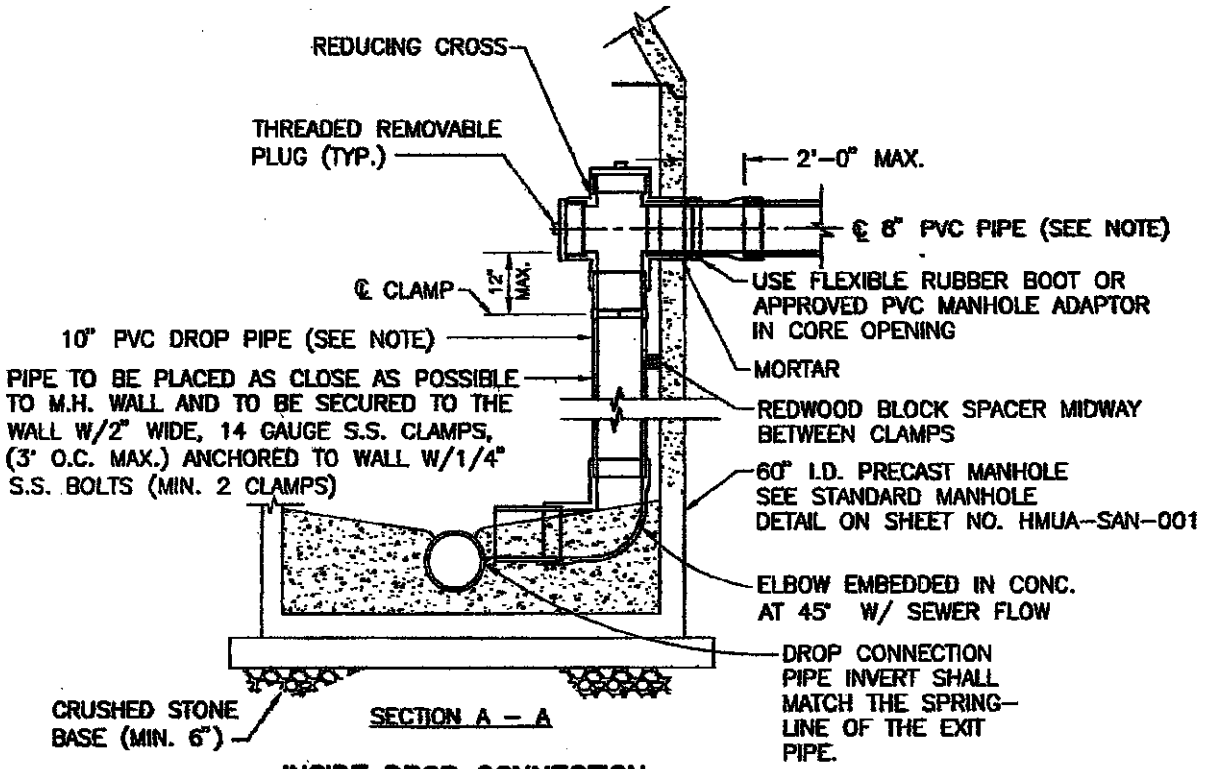
OUTSIDE DROP MANHOLE DETAIL

NOT TO SCALE

Z_CIVIL PROJECTS DPI GENERIC DETAILS



INSIDE DROP – PLAN

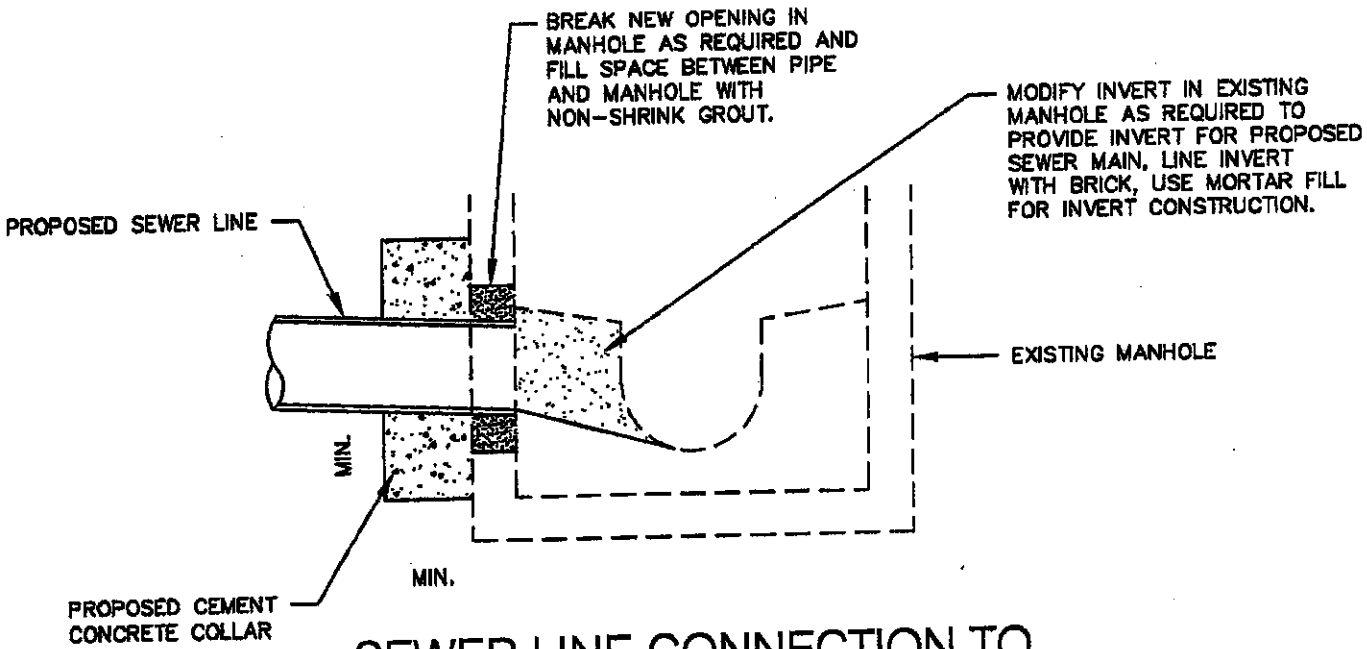


INSIDE DROP CONNECTION

(NOT TO SCALE)

NOTE:
FOR 8" PVC PIPE PROVIDE
10" PVC INTERNAL DROP PIPING
FOR 10" PVC PIPE PROVIDE
12" PVC INTERNAL DROP PIPING

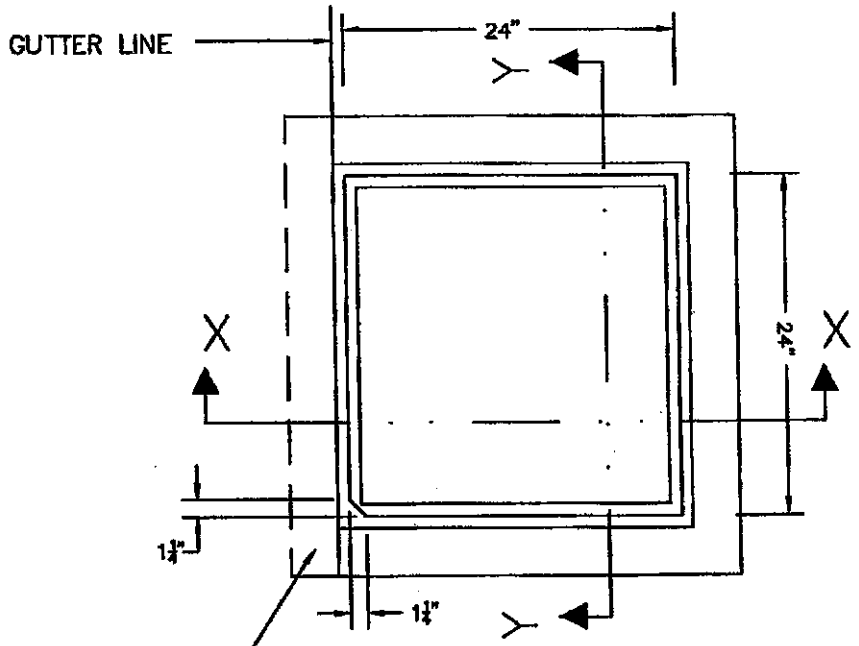
		STANDARD DETAIL INSIDE DROP CONNECTION
Date	Revision	



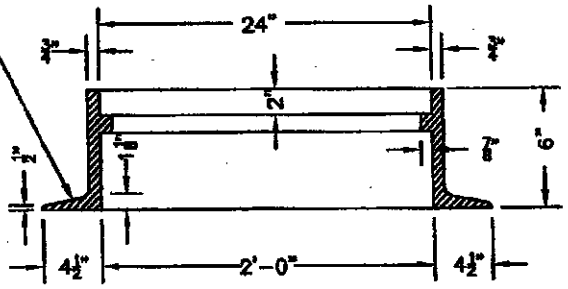
SEWER LINE CONNECTION TO EXISTING MANHOLE DETAIL

NOT TO SCALE

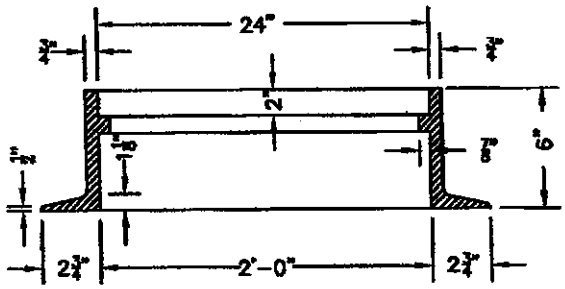
NBSewerconn.dwg



FOURTH FLANGE
WHEN REQUIRED



SECTION X–X



SECTION Y–Y

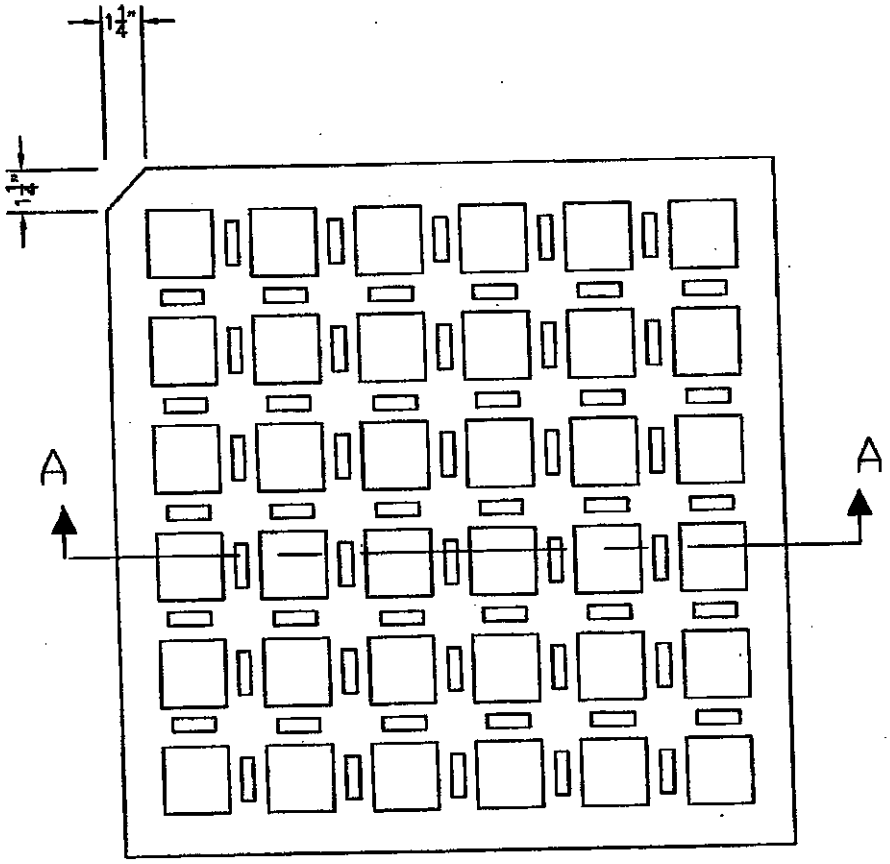
NOTES :

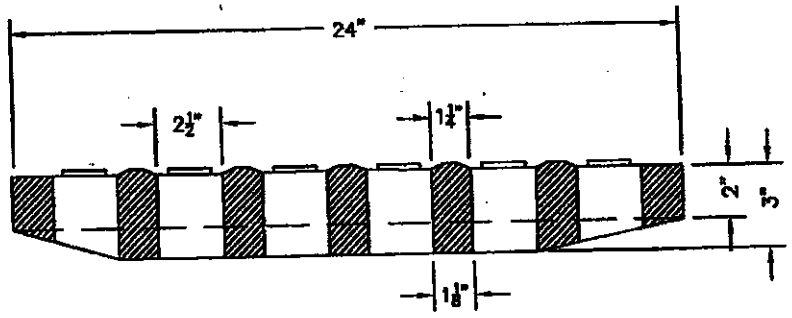
1. FRAME & COVER WEIGHT : 400 LBS +/–
2. MATERAL – CAST IRON
3. TO BE USED WITH SQUARE OPENING
   TYPE GRATE Le BARON MOD# LF–246
   OR APPROVED EQUAL

CATCH BASIN FRAME

NOT TO SCALE

NBCBF.DWG





NOTES :

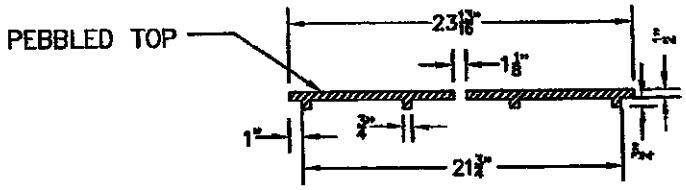
1. MININUM GRATE WEIGHT – 220± lbs
2. MATERAL – CAST IRON
3. TO BE USED WITH STANDARD CATCH BASIN FRAME. LeBARON MOD# LF–246 OR CITY APPROVED EQUAL

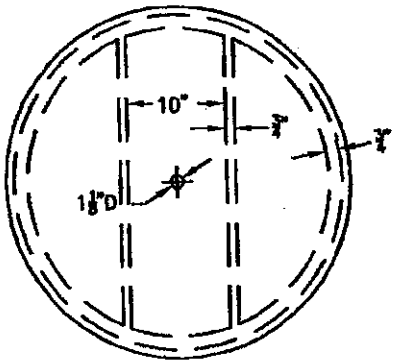
" SQUARE OPENING TYPE "
CATCH BASIN GRATE

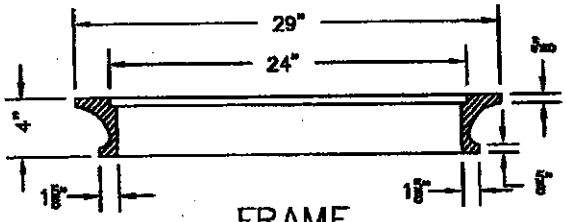
NOT TO SCALE

NBSQCBG.DWG

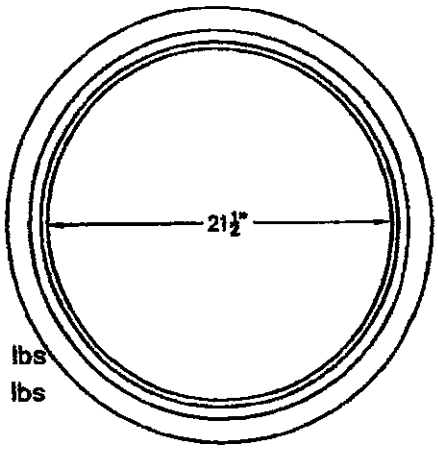
COVER







FRAME



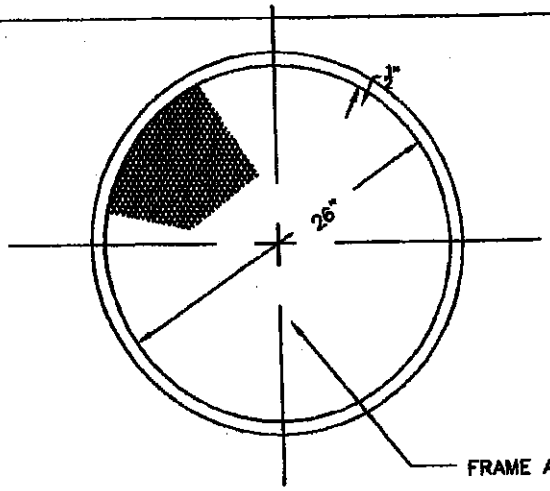
NOTES :

1. MININUM COVER WEIGHT – 73 lbs
2. MININUM FRAME WEIGHT – 113 lbs
3. MATERAL – CAST IRON
4. SIDEWALK AREA USE ONLY

DETAIL OF CAST IRON FRAME & COVER FOR CATCH BASINS (MUNICIPAL STANDARD) ALSO KNOWN AS A BRADLEY HEAD BASIN

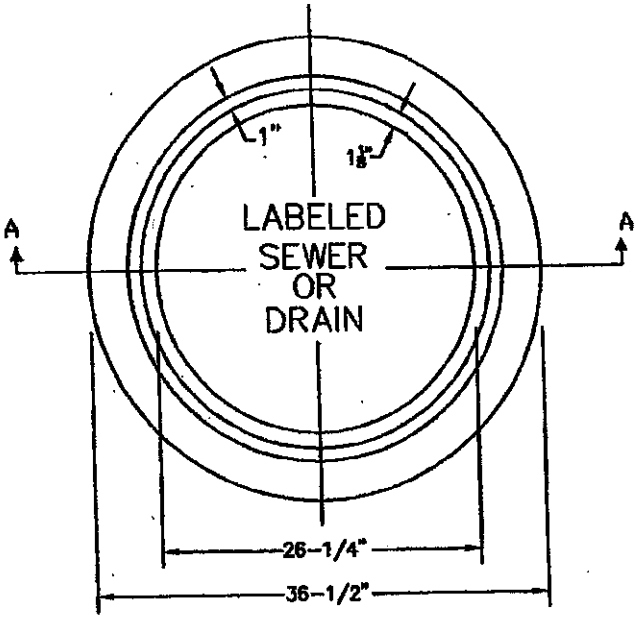
NOT TO SCALE

NBF&CMS.DWG



FRAME AND COVER AS MFD BY LE BARON
CAT. No. LK110A OR APPROVED EQUAL
BY CITY ENGINEER

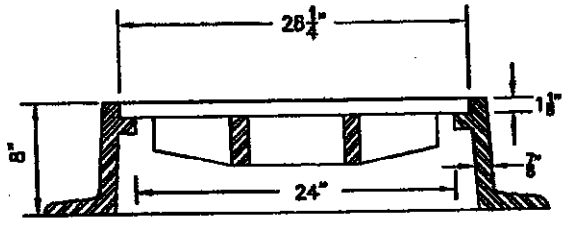
STANDARD COVER



FRAME TOP VIEW

NOTES :

1. FRAME & COVER WEIGHT – 475 LBS
2. MATERAL – CAST IRON
3. LeBARON LK 110A OR APPROVED EQUAL BY CITY ENGINEER



X– SECTION "A"–"A"

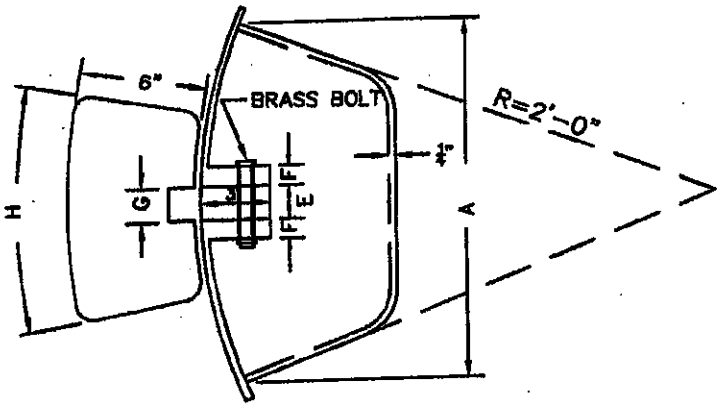
TYPE – A FRAME & COVER

MANHOLE FRAME AND COVER

NOT TO SCALE

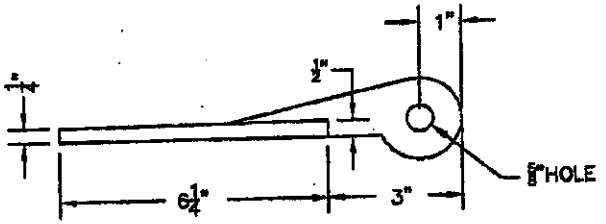
NBMHF&C.DWG

CATCH BASIN HOOD

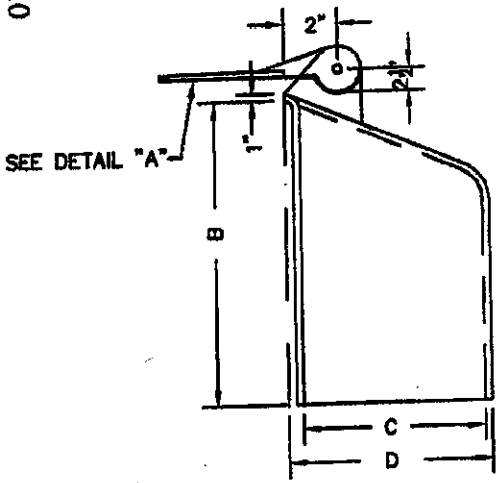


TOP

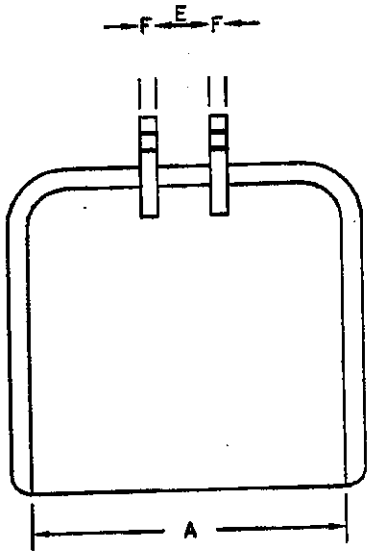
DIMENSIONS	A	B	C	D	E	F	G	H
8"AND 10" PIPE	15"	15"	8"	9"	2"	$\frac{7}{8}$"	$1\frac{7}{8}$"	14"
12"AND 15" PIPE	18"	18"	$11\frac{1}{4}$"	18"	2"	1"	$1\frac{7}{8}$"	14"



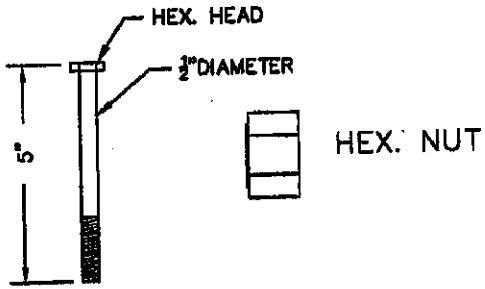
DETAIL "A" HINDGE



SIDE



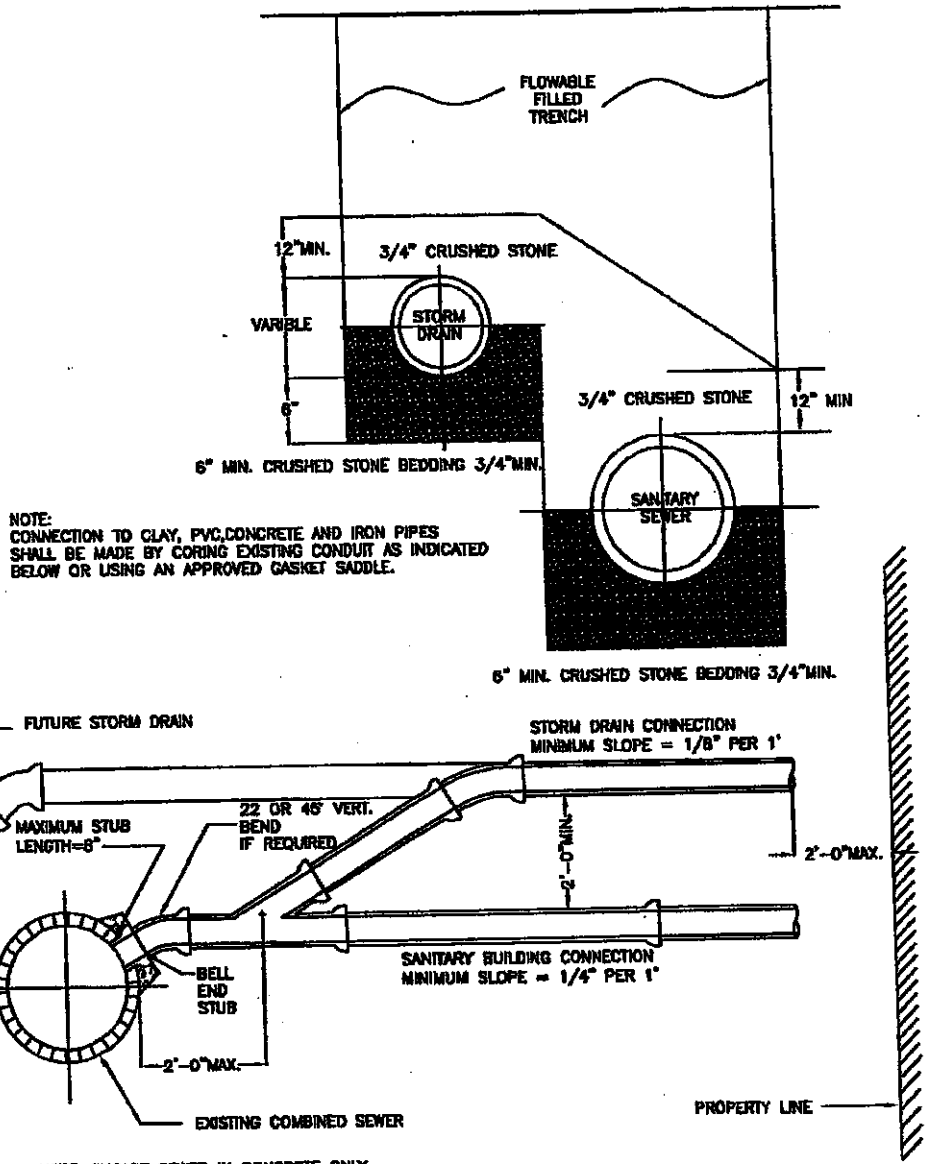
BACK



BRASS BOLT & NUT

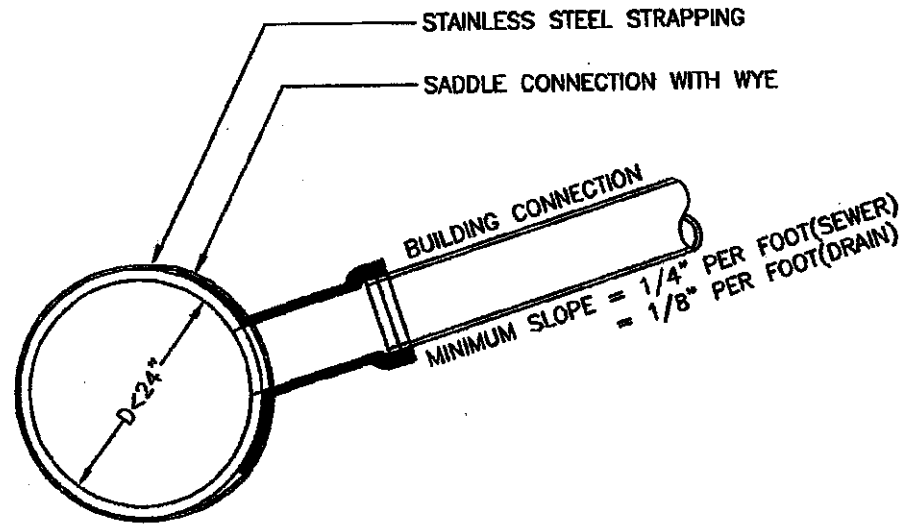
HOODS TO BE GRAY CAST IRON AASHTO CLASS # 30

NBHOOD.DWG



SEWER CONNECTION DETAIL

NBSEWCOND.DWG



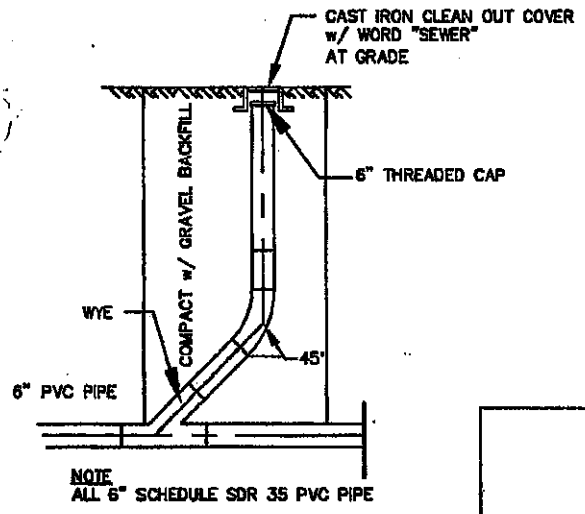
EXISTING SEWER OR DRAIN PIPE

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 CUT 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 DIRECTED BY THE INSPECTING ENGINEER.

SEWER CONNECTION DETAIL

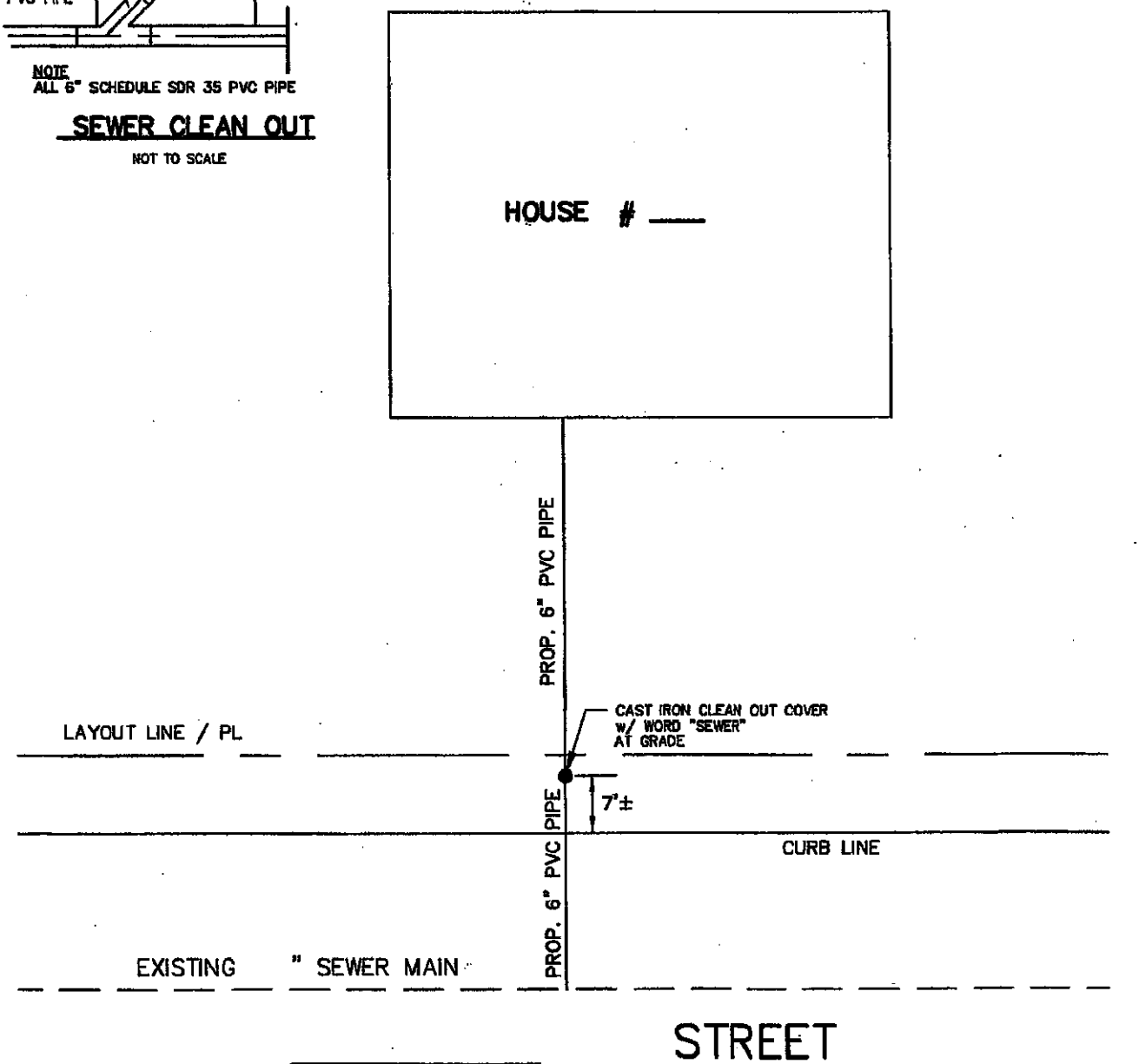
NBSEWCOND.DWG



NOTE
ALL 6" SCHEDULE SDR 35 PVC PIPE

SEWER CLEAN OUT

NOT TO SCALE



PROPOSED SEWER STUB DIAGRAM

NOT TO SCALE

SEWERDIAGRAM.DWG

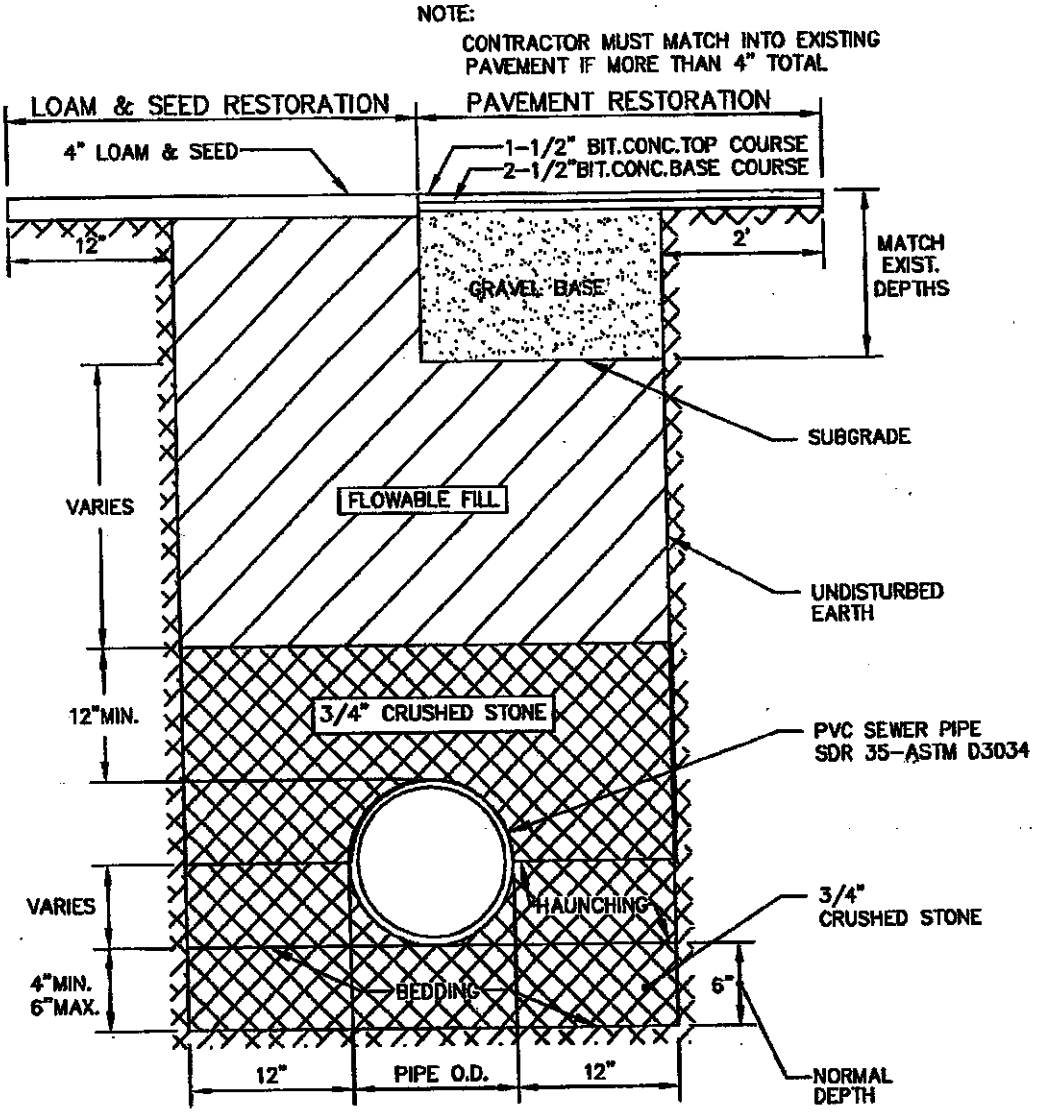
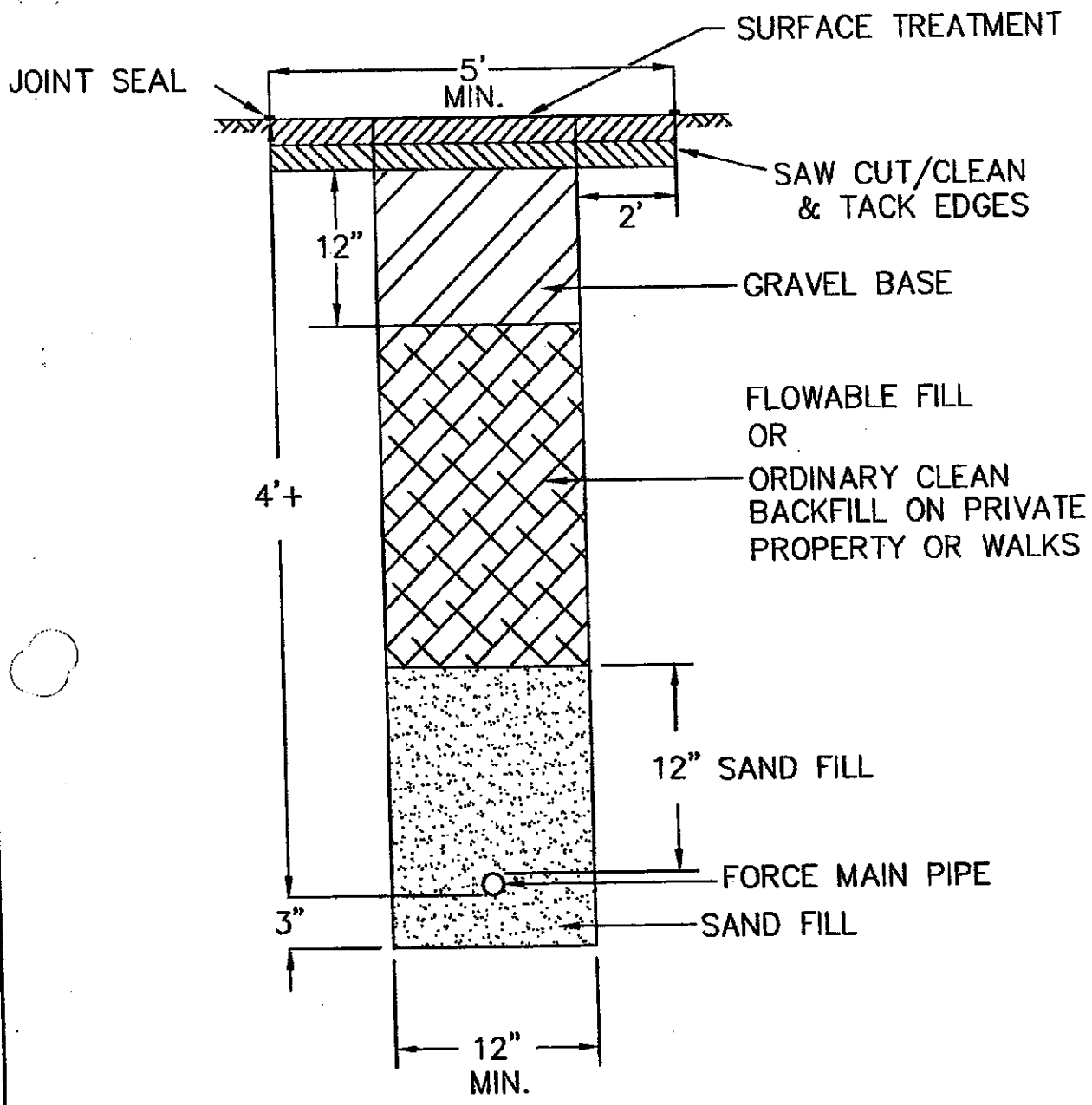


FIGURE 1
TYPICAL TRENCH DETAIL
(ALL PIPES LESS THAN 20"DIA.)

NOT TO SCALE

NBTRENX.DWG

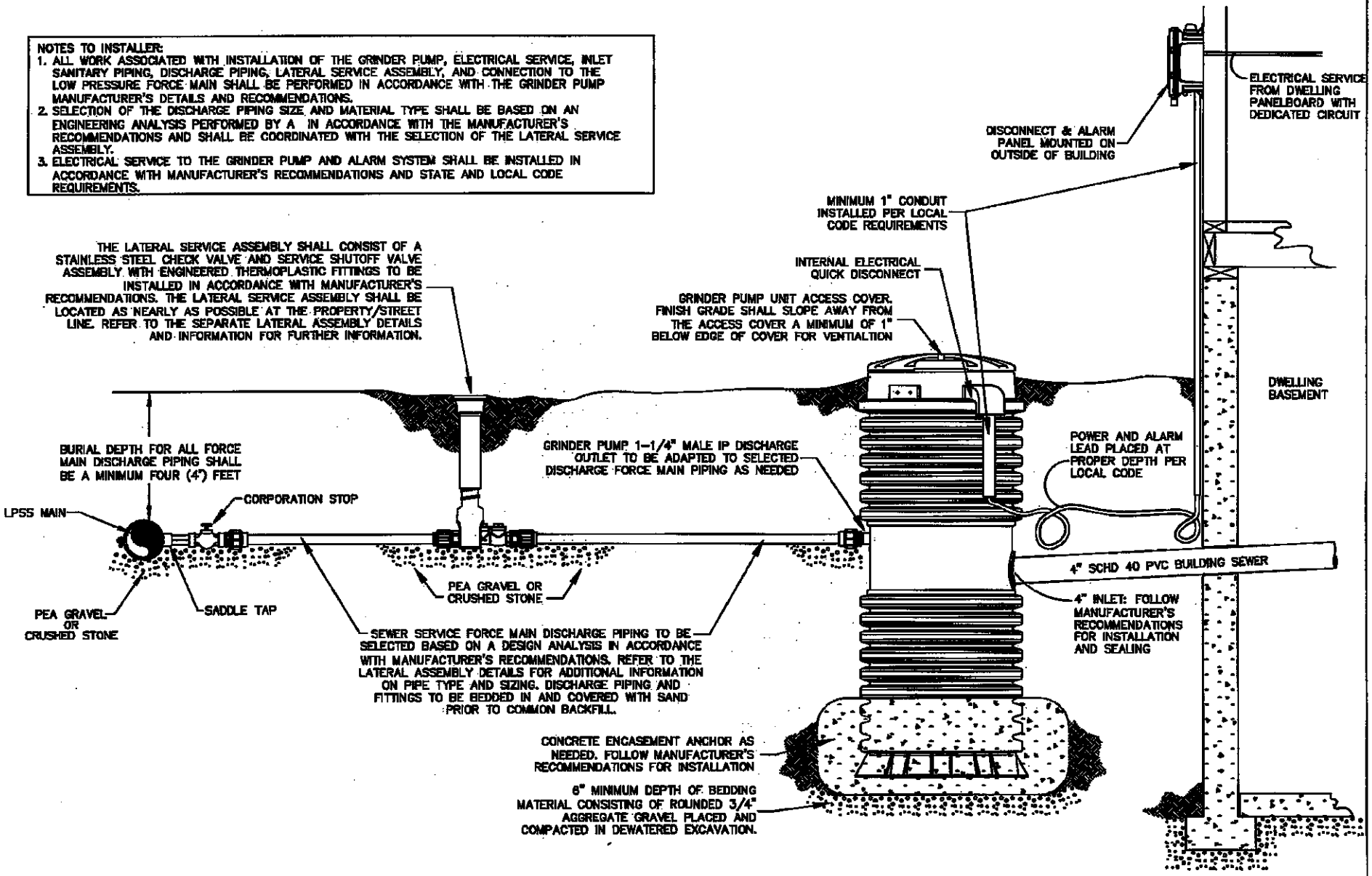


FORCE MAIN TRENCH

NOT TO SCALE

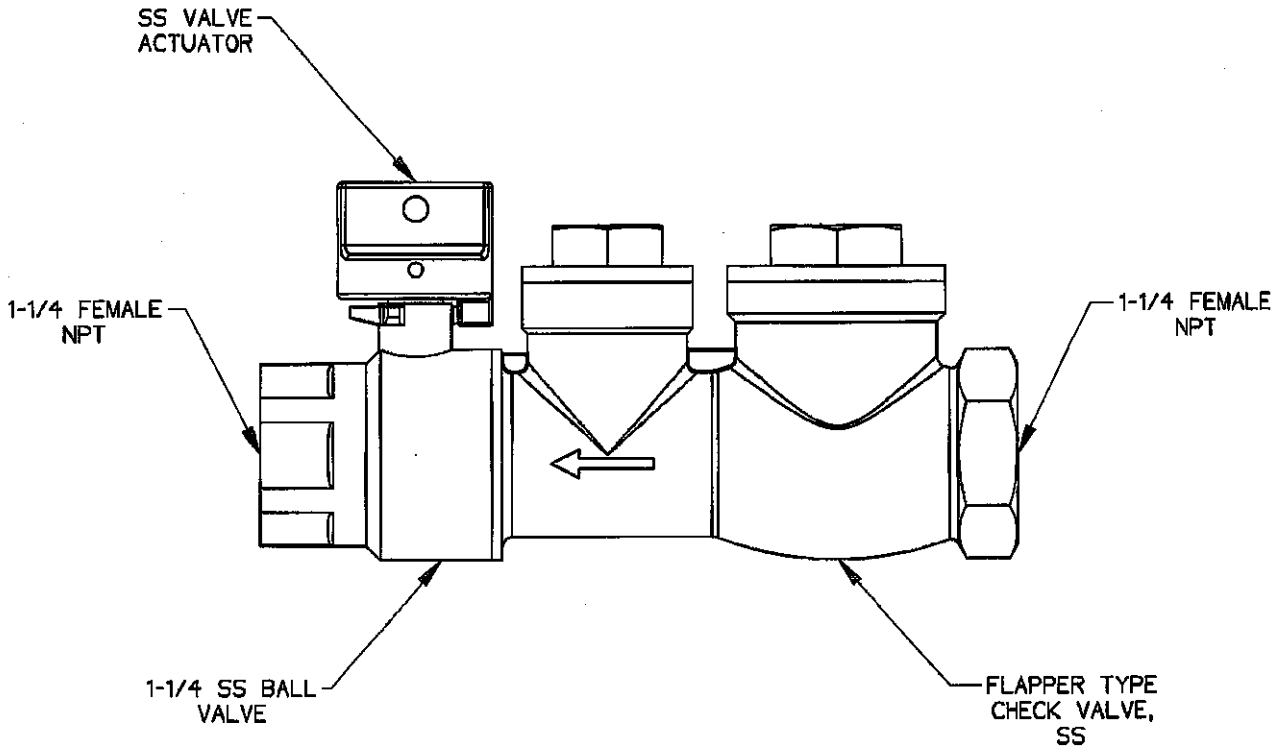
FMTREN.DWG

NOTES TO INSTALLER:
1. ALL WORK ASSOCIATED WITH 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 THE GRINDER PUMP MANUFACTURER'S DETAILS AND RECOMMENDATIONS.
2. SELECTION OF THE DISCHARGE PIPING SIZE AND MATERIAL TYPE SHALL BE BASED ON AN ENGINEERING ANALYSIS PERFORMED BY A 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 MANUFACTURER'S RECOMMENDATIONS AND STATE AND LOCAL CODE REQUIREMENTS.



TYPICAL GRINDER PUMP & LATERAL ASSEMBLY INSTALLATION DETAIL

STAINLESS STEEL LATERAL ASSEMBLY NO FITTINGS



PART IS A BALL VALVE CURB STOP WITH FEMALE PIPE THREADS, VALVE POSITION STOPS (OPEN/CLOSED), AND INTEGRAL CHECK VALVE
MATERIAL: STAINLESS STEEL

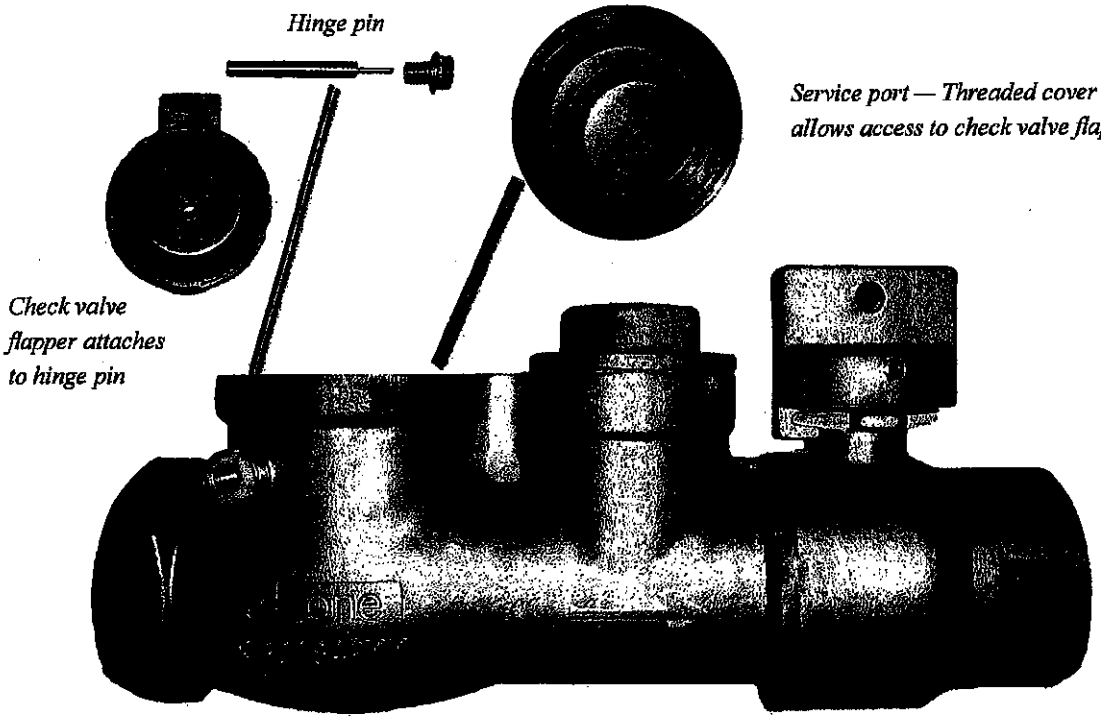
PRESSURE RATING: 235 PSI

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

Uni-Lateral — Stainless Steel Lateral



Approximate length: 8.6 inches
Approximate height (lowest point to highest point): 4 inches

DESCRIPTION
The new Uni-Lateral allows for cleanout and replacement of the check valve flapper.

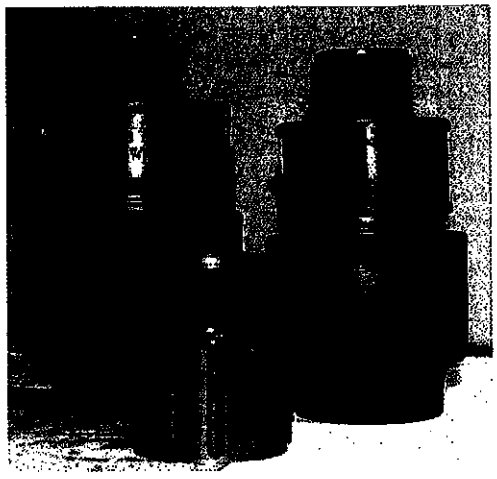
APPLICATION
Uni-Lateral can be installed between any residential grinder pump station and the street main.

AVAILABLE ADAPTER FITTINGS
Several types of fittings are available:

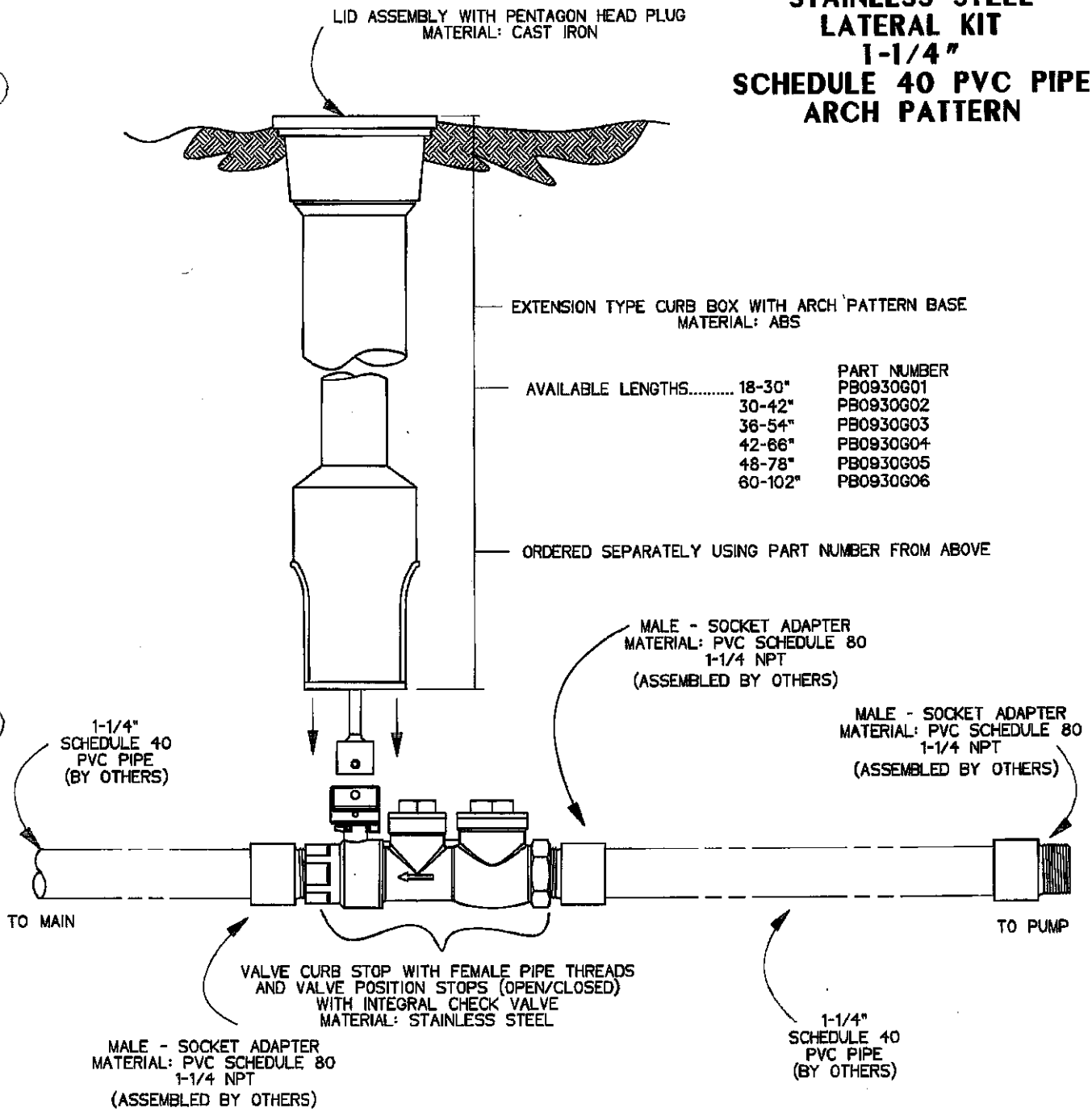
1-1/4" compression type fittings for HDPE, SDR PIPE PER ASTM 3035 (SDR11, SDR 9, SDR7)
PVC, SCHED 40, SDR21 & SDR26

1-1/2" compression type fittings for HDPE, SDR PIPE PER ASTM 3035 (SDR11, SDR 9, SDR7)
PVC, SCHED 40, SDR21 & SDR26

1-1/4" solvent weld (glue) type fittings for PVC, SCHED 40, SDR21 & SDR26



STAINLESS STEEL LATERAL KIT 1-1/4" SCHEDULE 40 PVC PIPE ARCH PATTERN

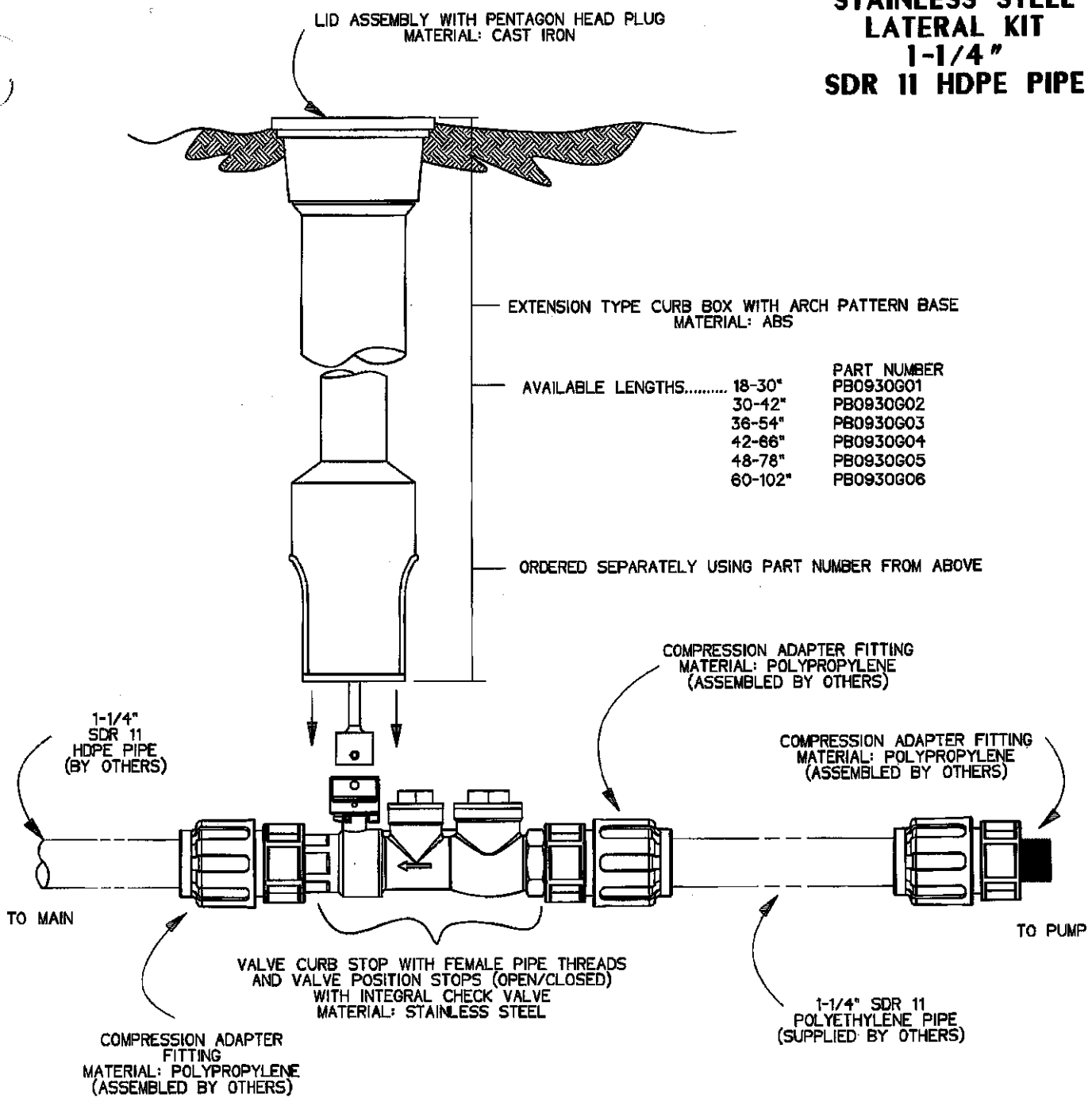


NOTES:

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

STAINLESS STEEL LATERAL KIT 1-1/4" SDR 11 HDPE PIPE

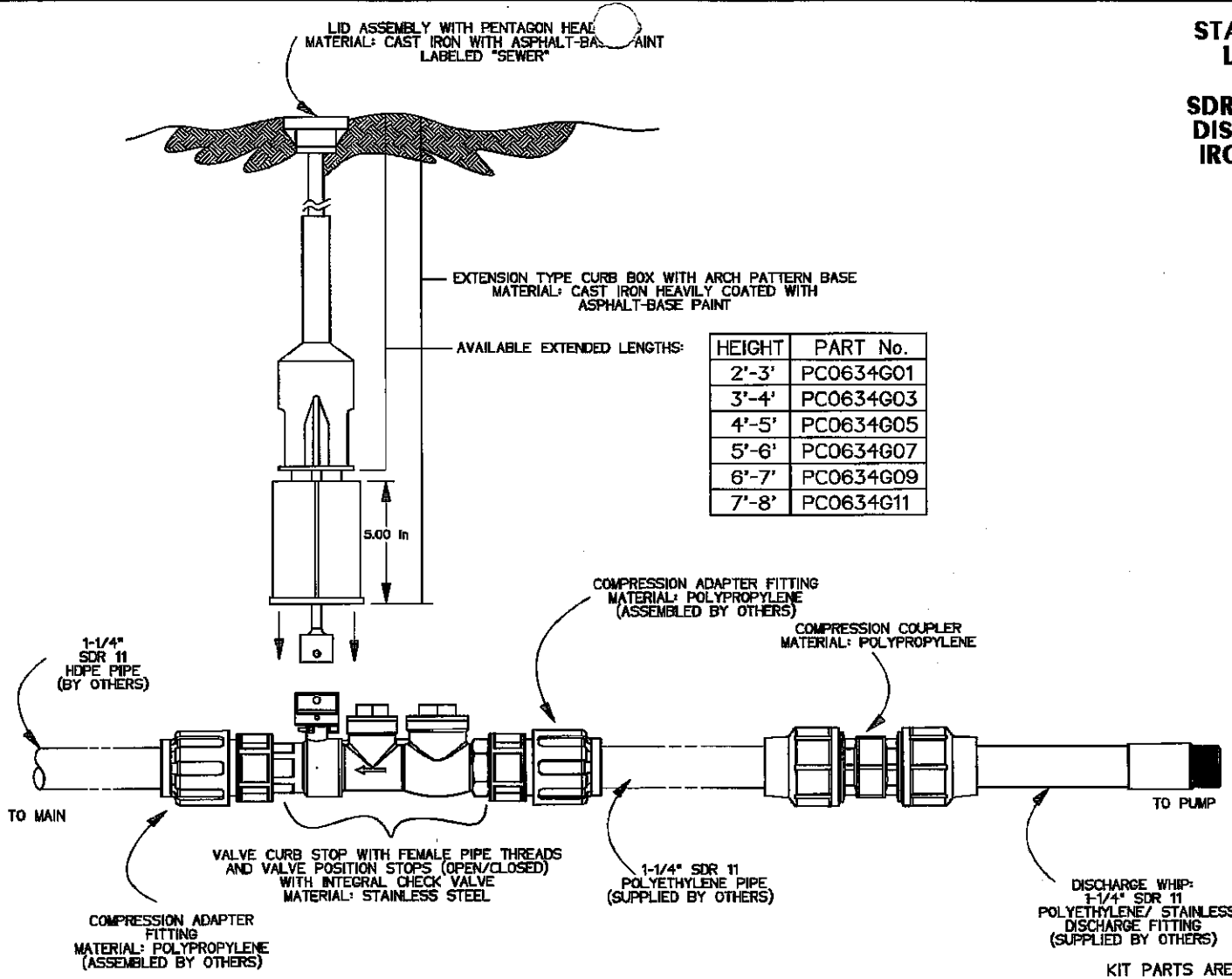


KIT PARTS ARE NOT ASSEMBLED

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

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

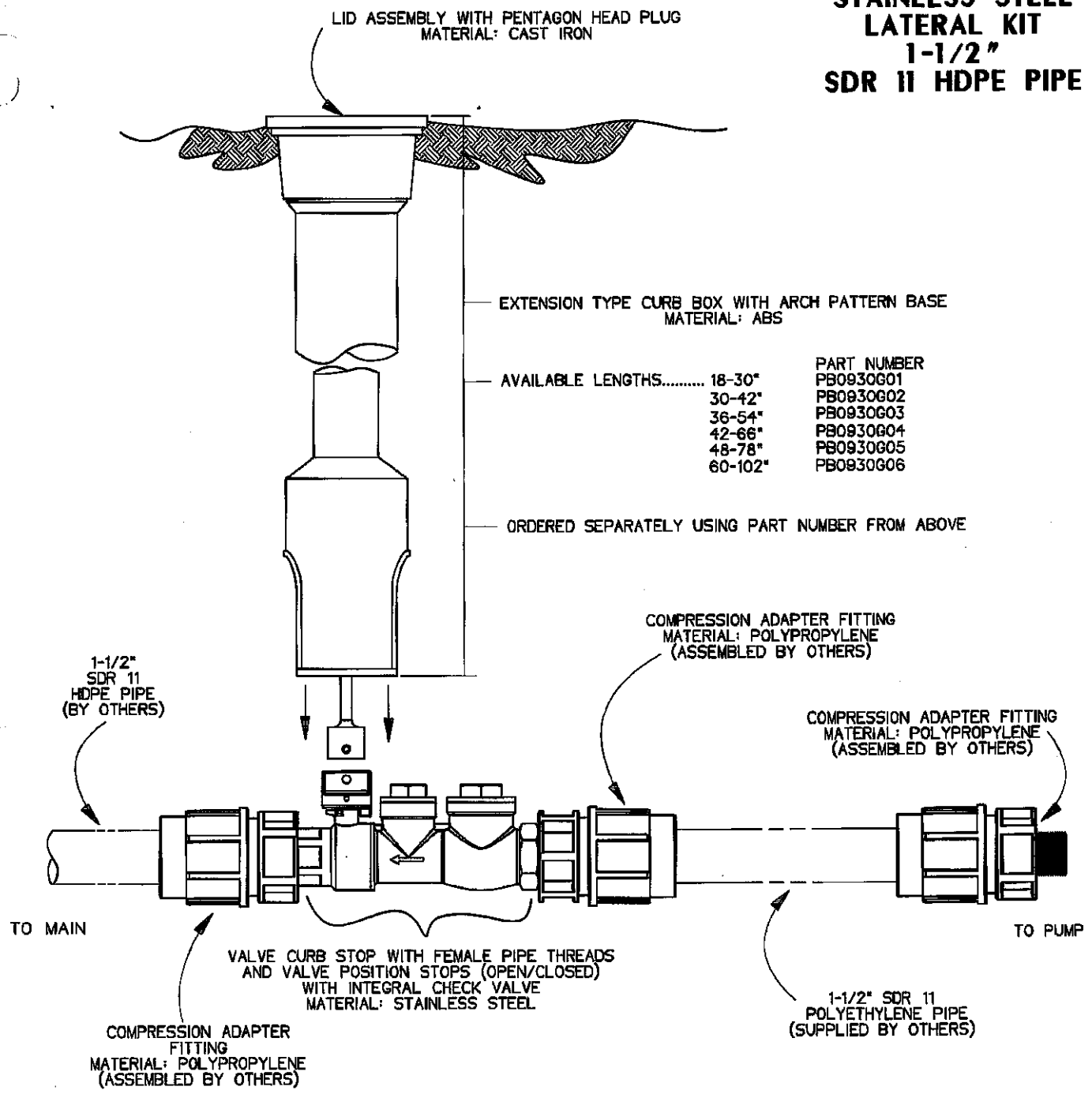
KIT PARTS ARE NOT ASSEMBLED

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"

STAINLESS STEEL LATERAL KIT 1-1/2" SDR 11 HDPE PIPE

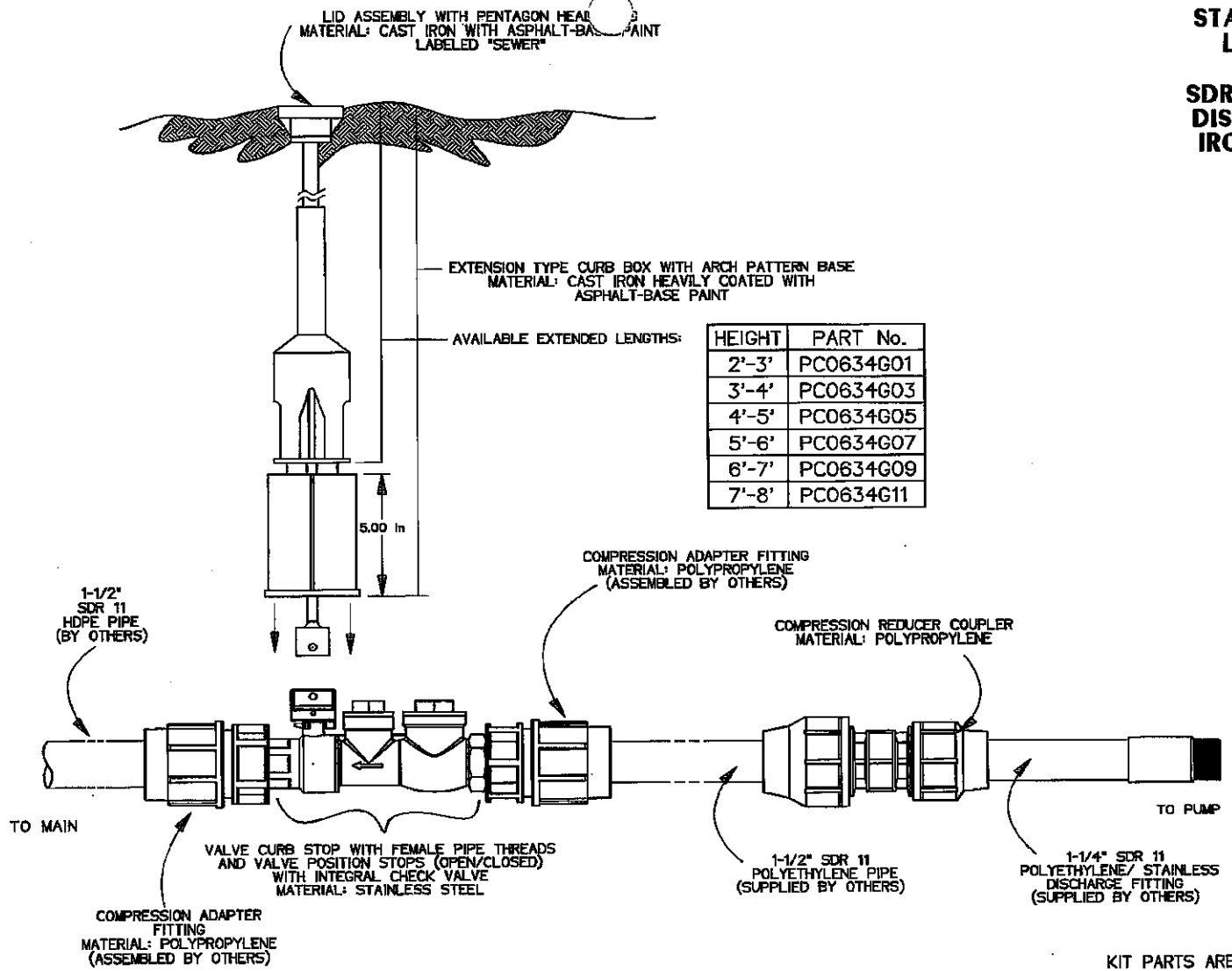


NOTES:

KIT PARTS ARE NOT ASSEMBLED

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

STAINLESS STEEL LATERAL KIT 1-1/2" SDR 11 HDPE PIPE DISCHARGE WHIP IRON CURB BOX



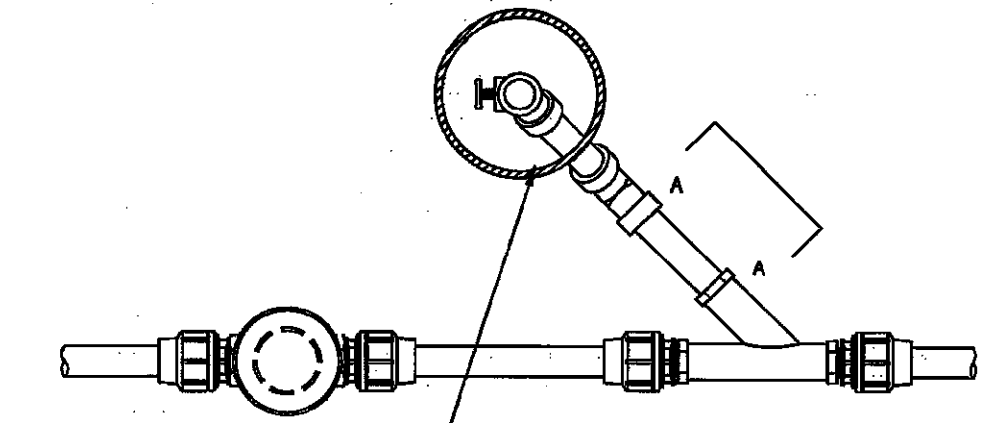
HEIGHT	PART No.
2'-3'	PC0634G01
3'-4'	PC0634G03
4'-5'	PC0634G05
5'-6'	PC0634G07
6'-7'	PC0634G09
7'-8'	PC0634G11

KIT PARTS ARE NOT ASSEMBLED

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"

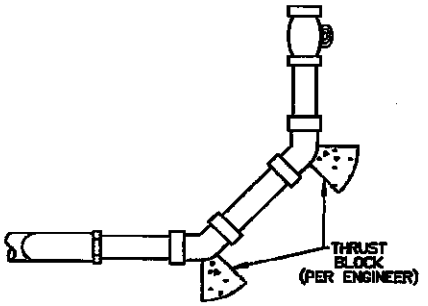
NOTES:

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

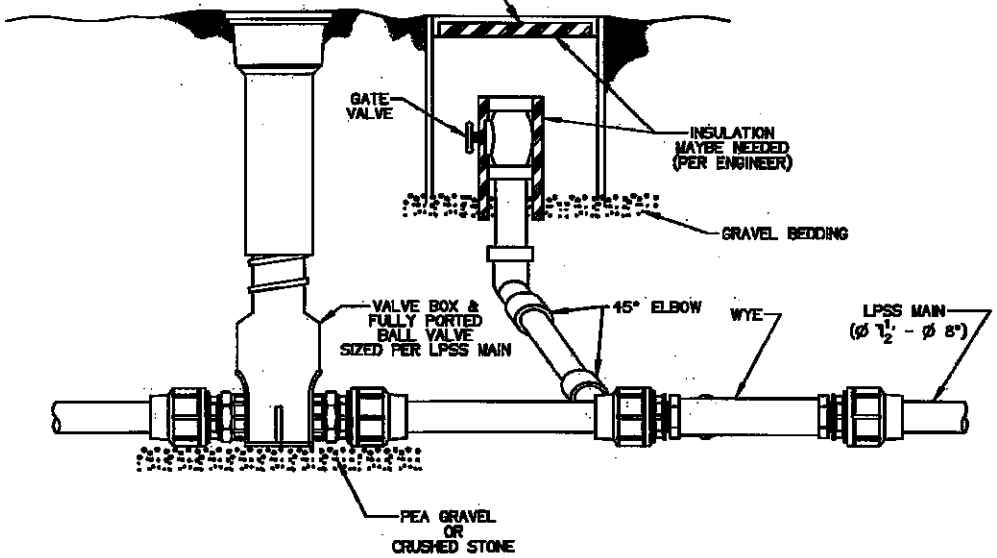


PLAN VIEW

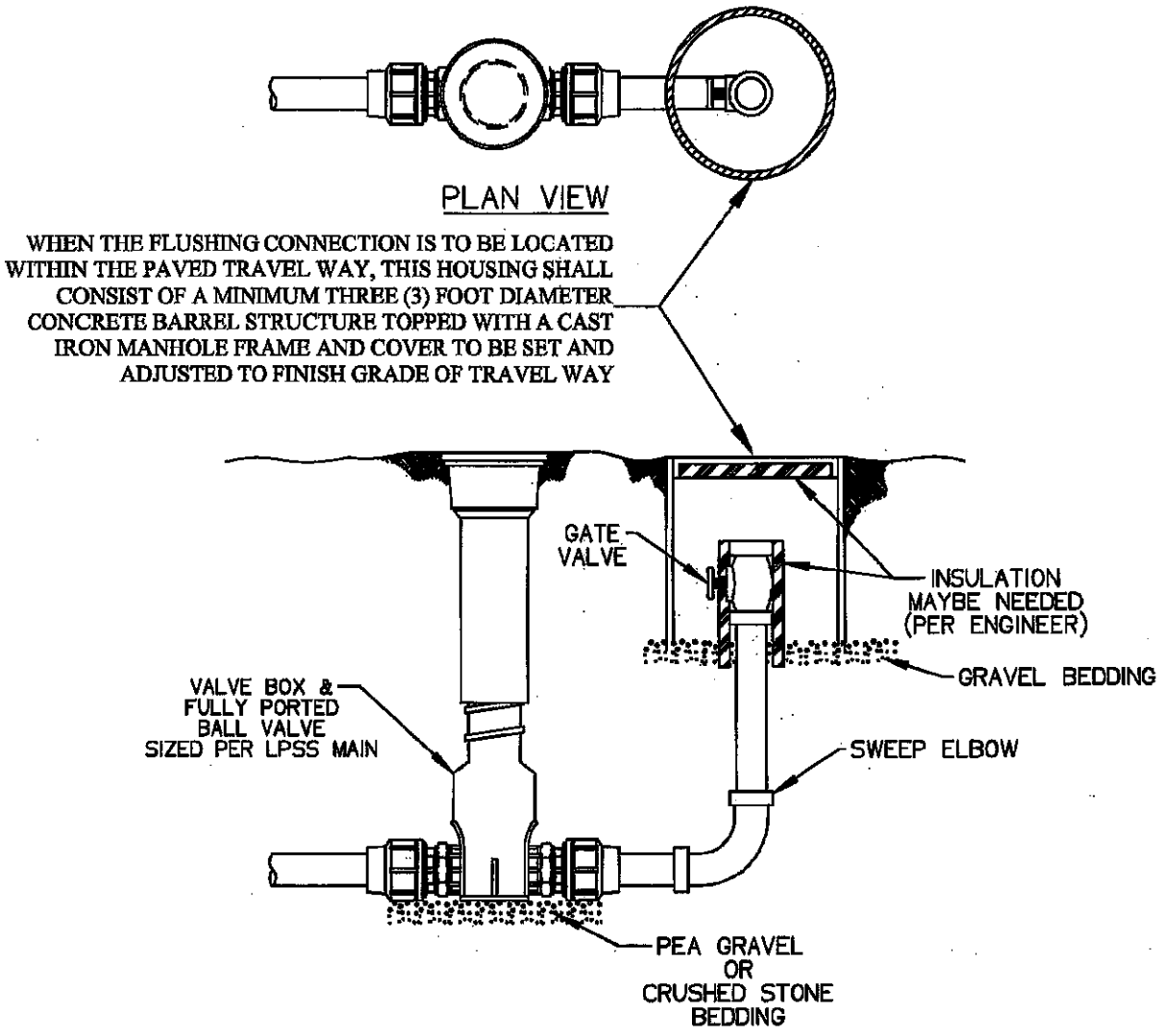
WHEN THE FLUSHING CONNECTION IS TO BE LOCATED WITHIN THE PAVED TRAVEL WAY, THIS HOUSING SHALL CONSIST OF A MINIMUM THREE (3) FOOT DIAMETER CONCRETE BARREL STRUCTURE TOPPED WITH A CAST IRON MANHOLE FRAME AND COVER TO BE SET AND ADJUSTED TO FINISH GRADE OF TRAVEL WAY



VIEW "A"
3/4 = 1



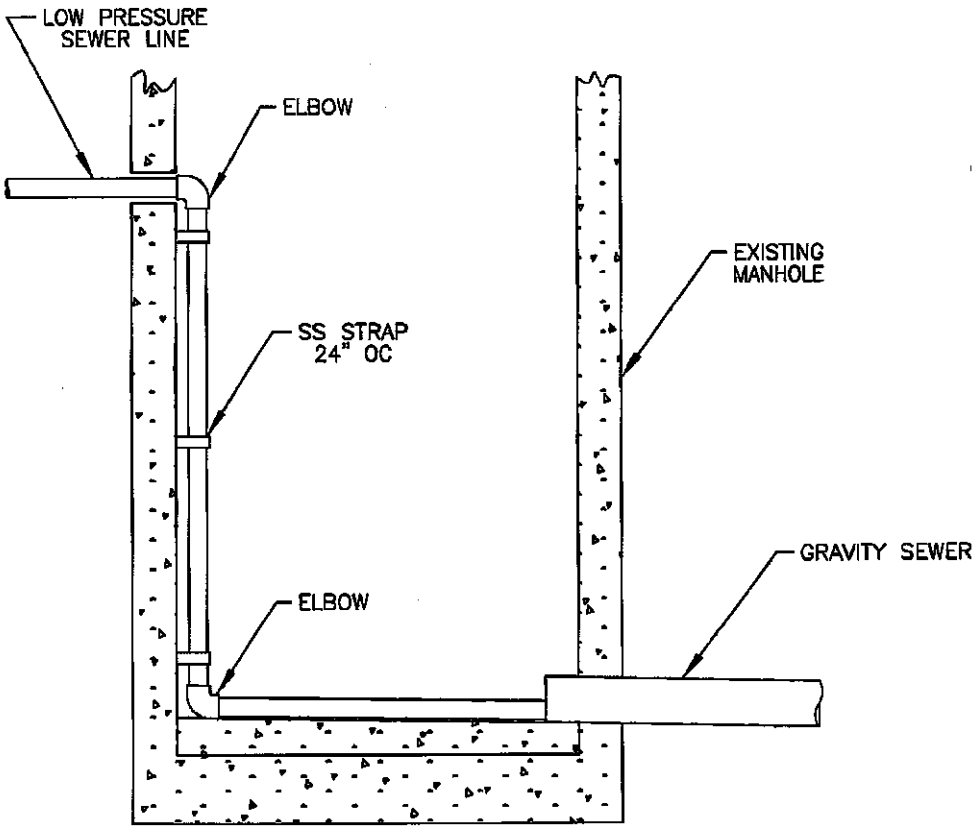
TYPICAL FLUSHING CONNECTION ON LPSS MAIN



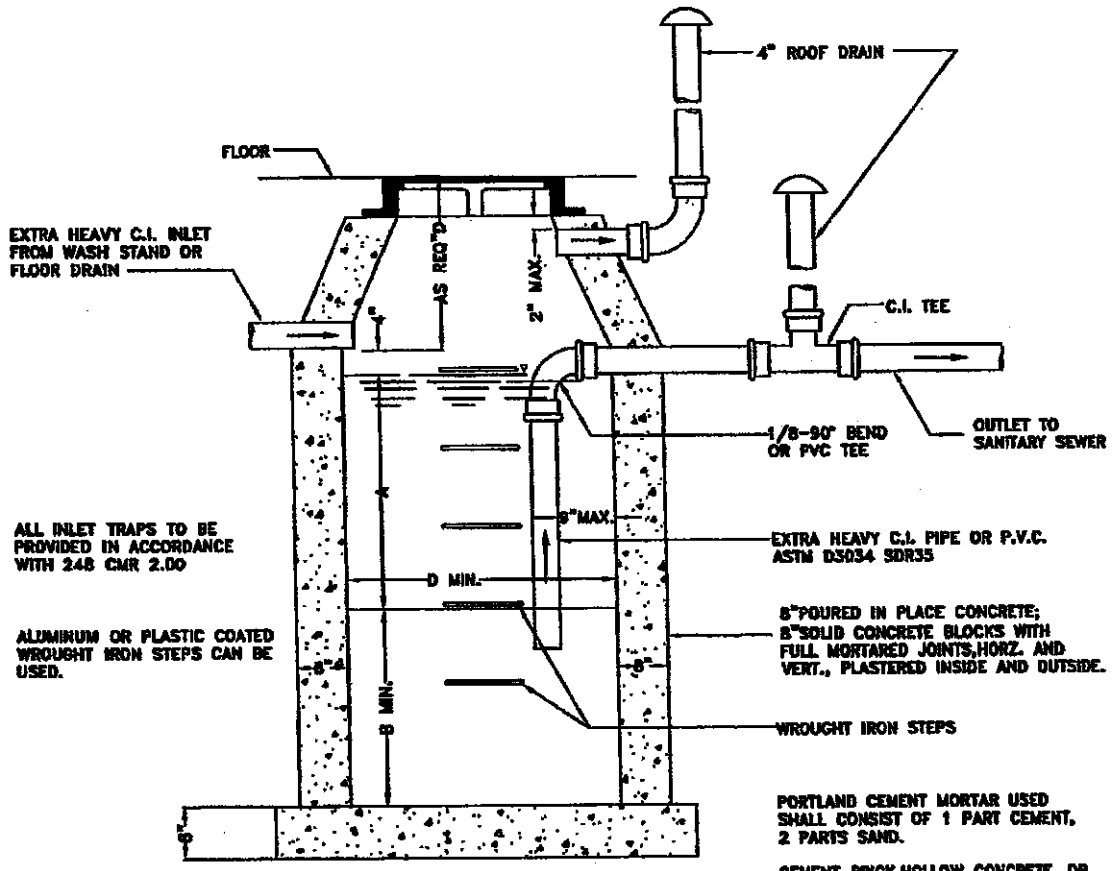
TYPICAL TERMINAL FLUSHING CONNECTION

TYPICAL TERMINAL FLUSHING CONNECTION

TYPICAL DROP CONNECTION
LPSS IN EXISTING MANHOLE



INLET	D	A	B	INLET	D	A	B
4"	3'-6"ø	3'-0"	2'-6"	8"	5'-0"ø	5'-0"	5'-0"
5"	3'-6"ø	5'-0"	4'-0"		5'-6"x 5'-6"	4'-6"	4'-0"
	3'-6"x 3'-6"	4'-0"	3'-0"		6'-0"ø	4'-0"	3'-6"
	3'-6"x 3'-6"	3'-6"	3'-0"		6'-0"x 6'-0"	3'-0"	2'-8"
	3'-6"x 3'-6"	3'-0"	2'-6"		6'-6"ø	3'-6"	3'-0"
	3'-6"x 3'-6"	3'-0"	2'-6"		6'-6"x 6'-6"	3'-0"	2'-8"
6"	4'-0"ø	5'-0"	4'-8"	10"	5'-6"ø	7'-6"	6'-6"
	4'-0"x 4'-0"	4'-0"	3'-6"		6'-0"x 6'-0"	5'-6"	4'-6"
	4'-6"ø	4'-0"	3'-6"		6'-0"ø	6'-6"	5'-6"
	4'-6"x 4'-6"	3'-6"	3'-0"		6'-6"x 6'-6"	5'-0"	4'-0"
	5'-0"ø	3'-6"	3'-0"				
	5'-0"x 5'-0"	3'-0"	2'-6"				



NOTES:

FOR INLETS LARGER THAN 10" THE DESIGN AND DIMENSIONS WILL BE DETERMINED FOR EACH PARTICULAR CASE

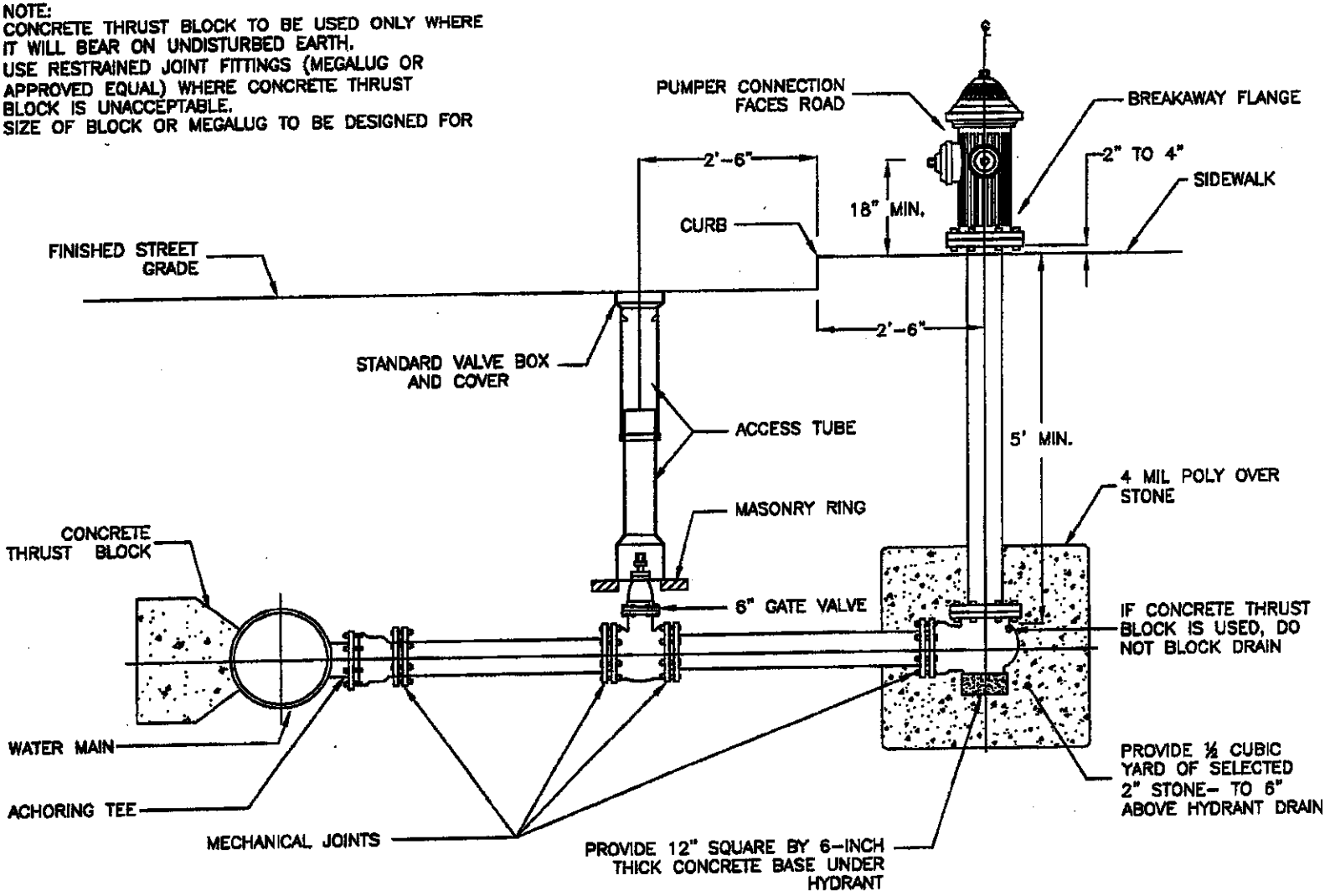
PRE-CAST SEPARATORS ARE TO HAVE ALL SPECIFIED HOLES EITHER CORE-BORED OR CAST IN PLACE.

OIL-GREASE SEPARATOR (MDC TRAP)

NOT TO SCALE

mdctrap.dwg

NOTE:
CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
USE RESTRAINED JOINT FITTINGS (MEGALUG OR APPROVED EQUAL) WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE.
SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR

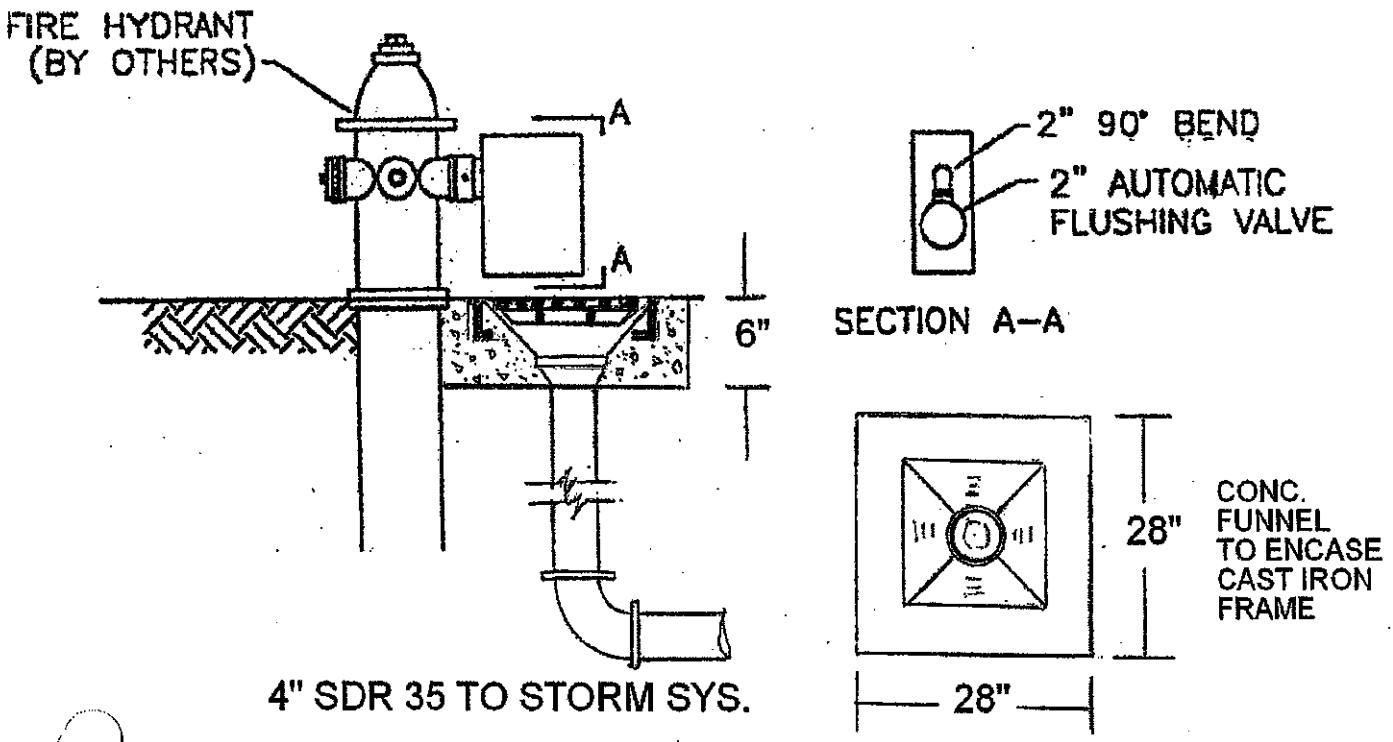


HYDRANT DETAIL

NOT TO SCALE

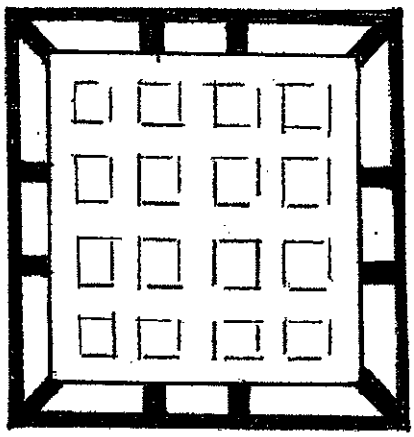
HYDRANT.dwg

HYDRANT WITH AUTO FLUSHER



TOP VIEW

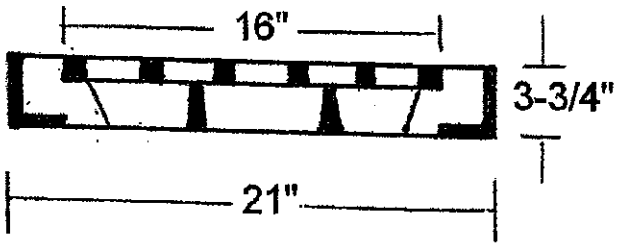
N.T.S.

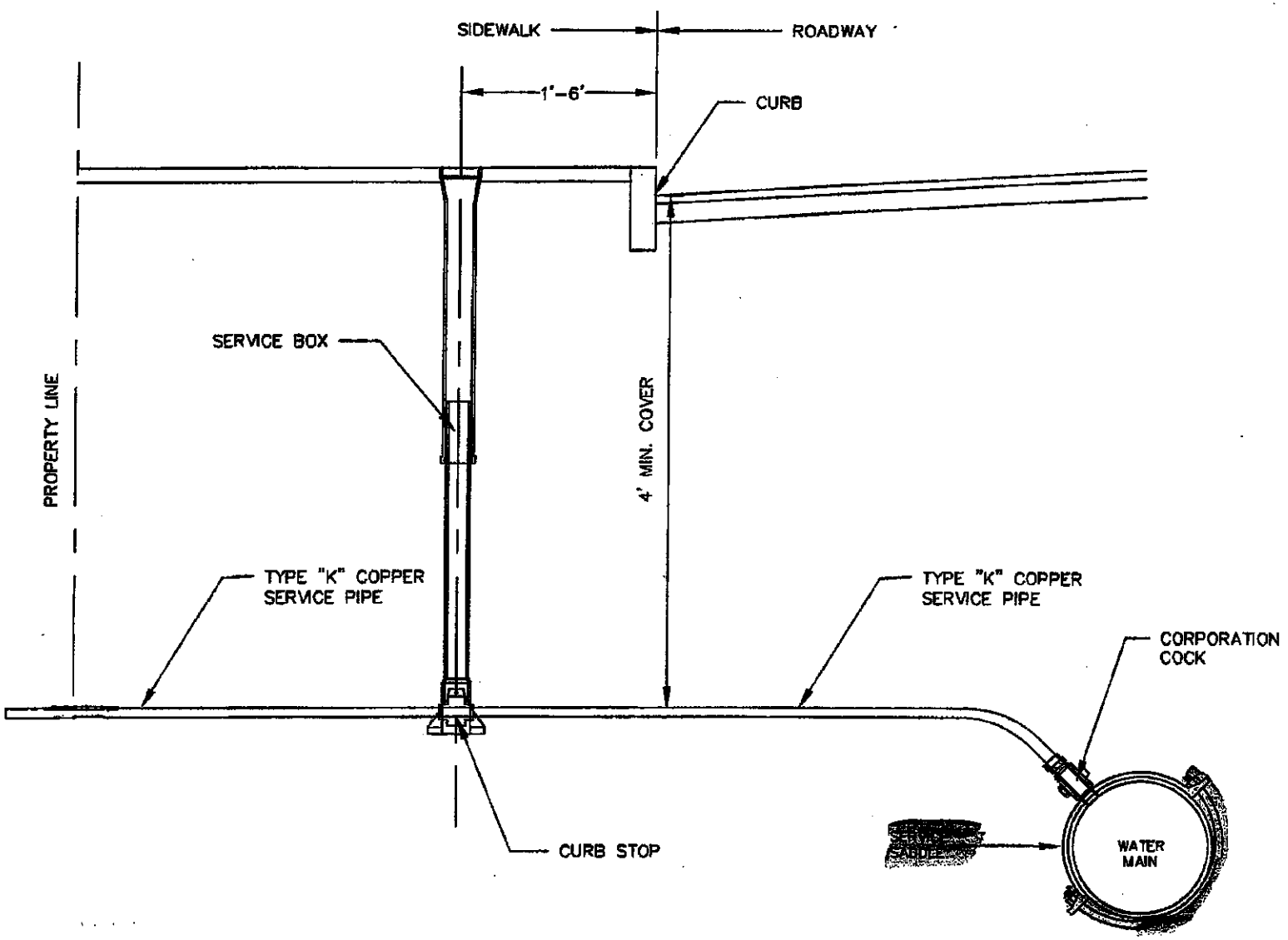


FRAME & GRATE
LEBARON FOUNDARY INC.
TYPE W-LW164, 53 lbs.
OR CITY ENGR.
APPR. EQUAL

SIDE VIEW

N.T.S.



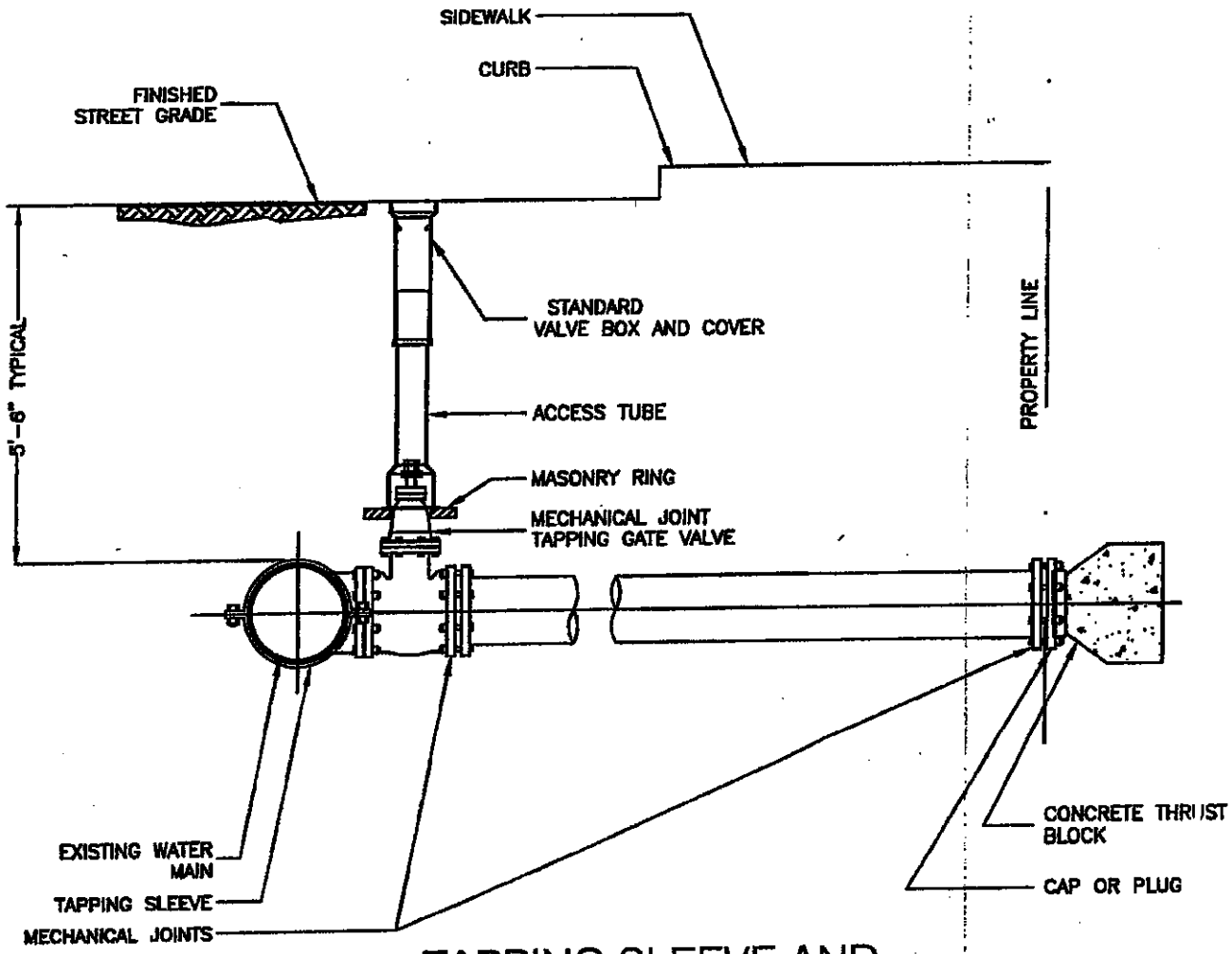


WATER SERVICE DETAIL

NOT TO SCALE

WATERSERV.dwg

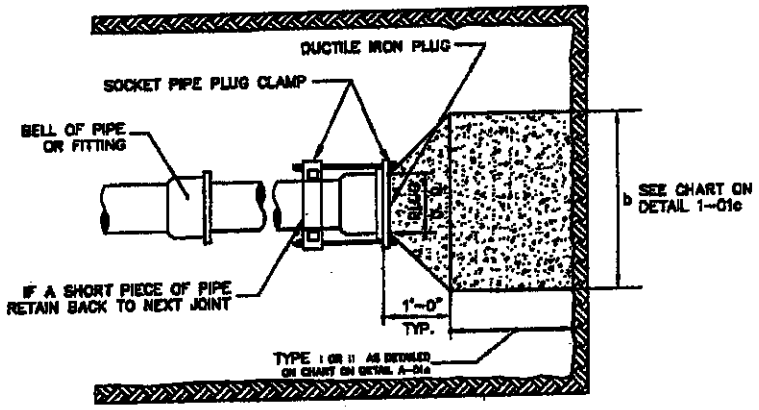
NOTES:
- CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
- USE RESTRAINED JOINT FITTINGS (MEGALUG OR APPROVED EQUAL) WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE.
- SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS.



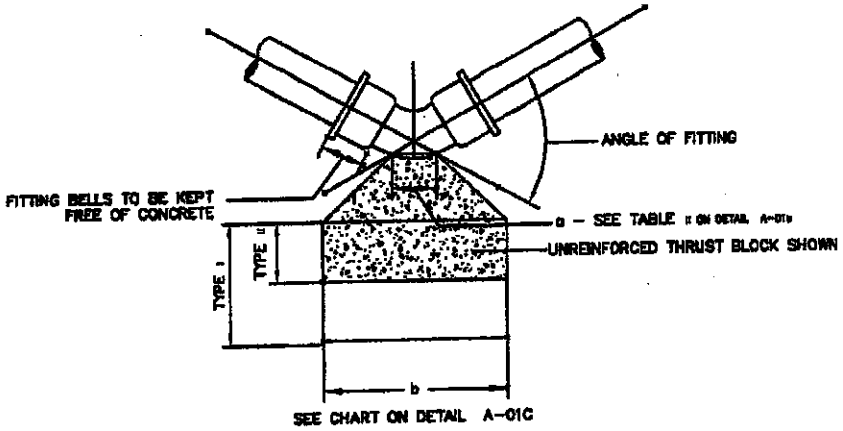
TAPPING SLEEVE AND GATE VALVE DETAIL

NOT TO SCALE

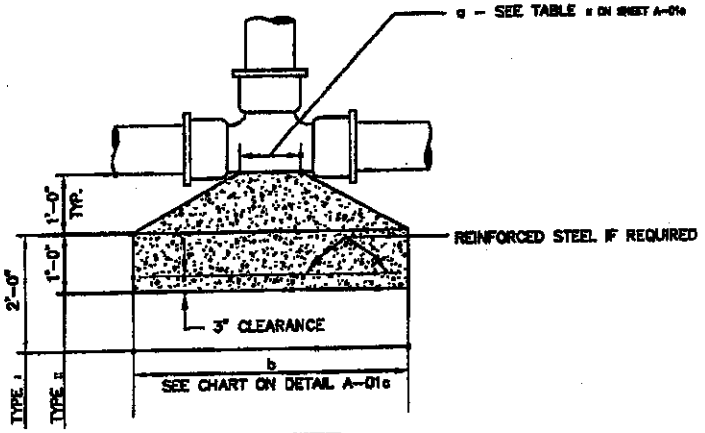
TAPSLV.DWG



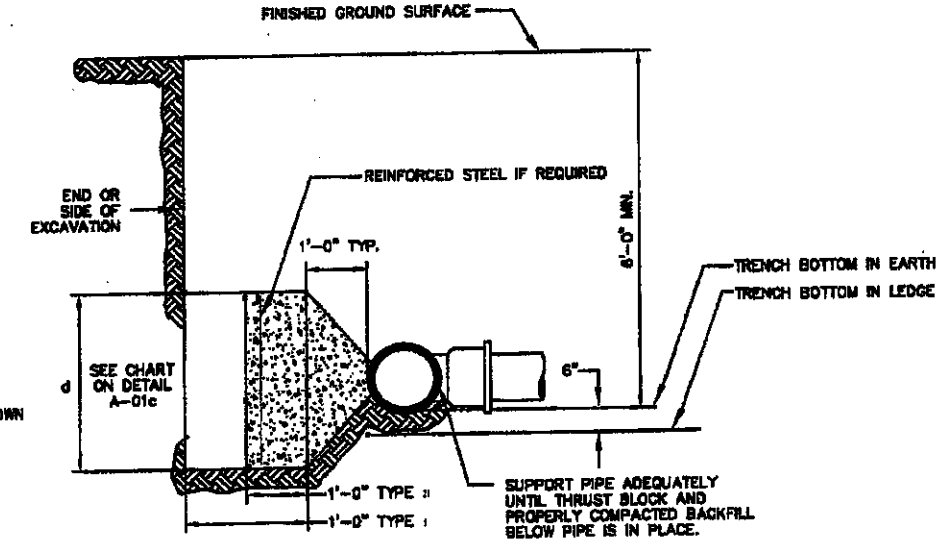
PLAN - DEAD END



PLAN - BEND



PLAN - TEE



TYPICAL SECTION
(FOR TEES, BENDS & DEAD ENDS)

A-01.DWG

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

TABLE II - "a" DIMENSION - FEET

PIPE DIAMETER - INCHES	90° FITTING	OTHERS
6, 8, 10 & 12	1 - 6	1 - 0
16 & 20	2 - 9	1 - 6
24" - 30"	3 - 0	2 - 0

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 "a" 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 DETAILS FOR TYPE I AND TYPE II REQUIREMENTS)

TWO SOLUTIONS TO ILLUSTRATIVE PROBLEM ARE ACCEPTABLE:

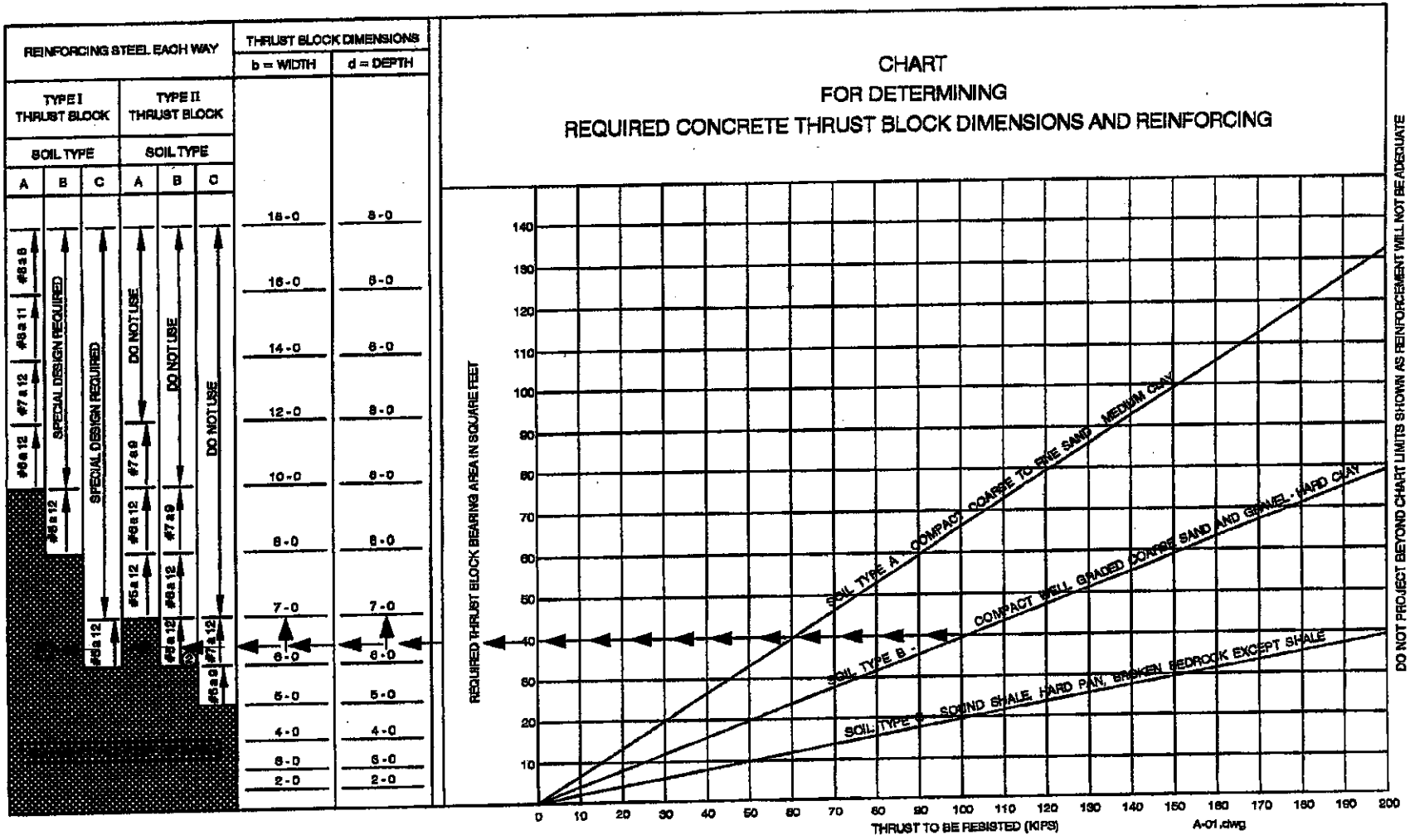
SOLUTION 1 - TYPE I THRUST BLOCK AND SOIL TYPE B INDICATE NO REINFORCEMENT REQUIRED.

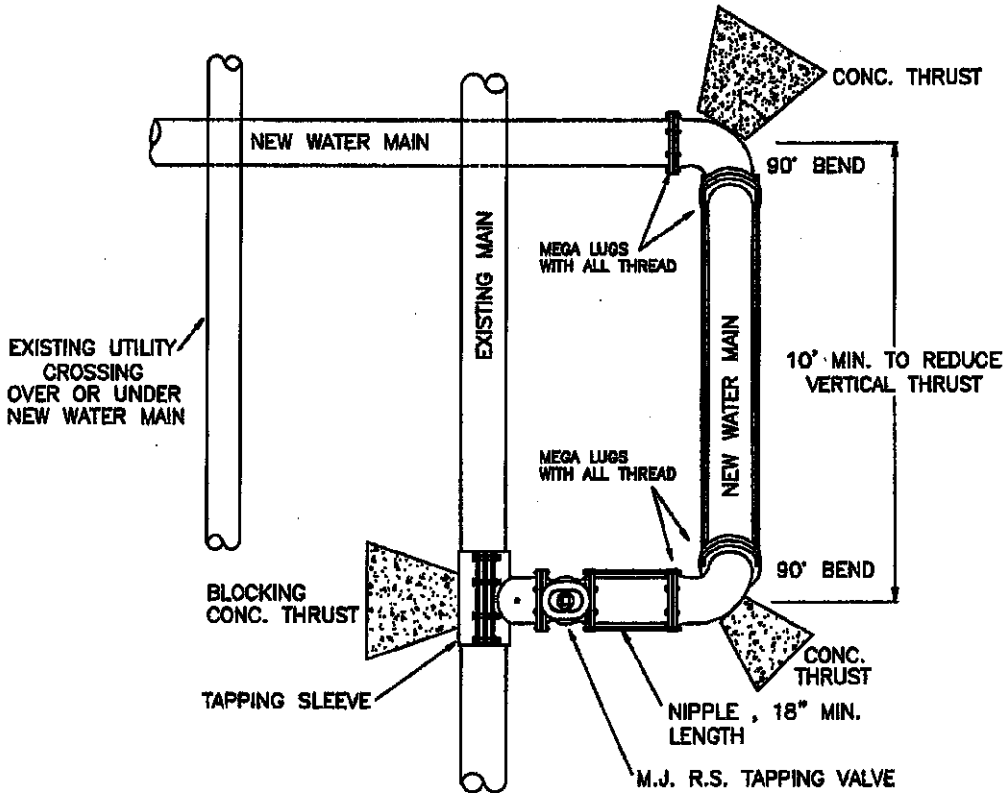
SOLUTION 2 - TYPE II THRUST BLOCK AND SOIL TYPE B INDICATES #5 @ 12 EACH WAY REQUIRED.

SCHEDULE OF TIE RODS

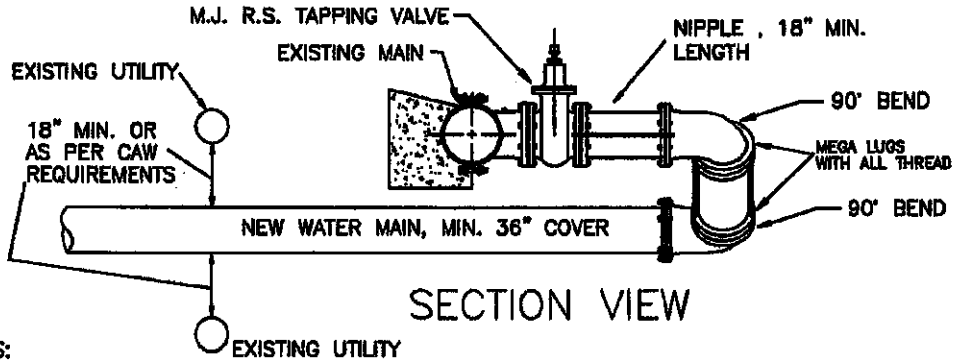
PIPE SIZE	NUMBER OF RODS PER FITTING	DIAMETER OF RODS
4" - 12"	2	3/4"
16"	4	3/4"
20" - 24"	4	1 1/2"
30"	6	1 1/2"

A-01.dwg


REINFORCING STEEL EACH WAY
TYPE I THRUST BLOCK
TYPE II THRUST BLOCK
SOIL TYPE
A
B
C
THRUST BLOCK DIMENSIONS
b = WIDTH
d = DEPTH
#8 a 8
#8 a 11
#7 a 12
#6 a 12
SPECIAL DESIGN REQUIRED
DO NOT USE
#7 a 9
#6 a 12
#5 a 12
18-0
16-0
14-0
12-0
10-0
8-0
7-0
6-0
5-0
4-0
3-0
2-0
CHART
FOR DETERMINING
REQUIRED CONCRETE THRUST BLOCK DIMENSIONS AND REINFORCING
REQUIRED THRUST BLOCK BEARING AREA IN SQUARE FEET
SOIL TYPE A - COMPACT COARSE TO FINE SAND, MEDIUM CLAY
SOIL TYPE B - COMPACT WELL GRADED COARSE SAND AND GRAVEL, HARD CLAY
SOIL TYPE C - SOUND SHALE, HARD PAN, BROKEN BEDROCK EXCEPT SHALE
THRUST TO BE RESISTED (KIPS)
DO NOT PROJECT BEYOND CHART LIMITS SHOWN AS REINFORCEMENT WILL NOT BE ADEQUATE
A-01.dwg



PLAN VIEW



SECTION VIEW

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 3/4" RODS FOR 6" THRU 24". USE 1" RODS FOR 30" THRU 36". USE 1 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

BACKSIDE TAP SWING CONNECTION

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 D.P.I. Engineering as outlined below.

Failure to meet said requirements in any way shall cause the drawing to be rejected and returned to the person submitting same.

1. Size
   Drawing shall be 24" x 36" overall, including 3/4" margin.
2. Medium
   Drawing shall be on Mylar drafting film, double matte finish, 3 mils min. thick resulting in a plan with long-term durability.
3. Format
   Drawing shall have a title block arranged thus:

   (STREET NAME) AS-BUILT SEWER (& SURFACE DRAIN)
   PLAN from (point of origin) to (point of termination)

   --SCALES --

   Horizontal: 1" = 40' Vertical: 1" = 4'
   Constructed By: (Name of developer)
   Construction Completed: (Date)

   _____
   DPI Commissioner

   Scales should be 1" = 40' Horizontal and 1" = 4' Vertical. Street name should be in letters 3/8" to 1/2" high, and title block should be in 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
   The drawing must contain the following information, in either black or colored ink as indicated below:

On Plan View:

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.
Plan view should show all pipe sizes, in appropriate color.

On Profile View:

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 black lines.
Profile should show pipe sizes, slopes, material type, manhole inverts in proper color.
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.
Water mains, valves, gas and electric lines, etc. are not part of a sewer record drawing, and should not be shown thereon.

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 should 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.

CONCRETE THRUST BLOCK REQUIREMENTS	
FITTING	**MINIMUM BEARING SURFACE AREA**
30" 1/8 BENDS	30 SQ. FT.
12" 1/8 BENDS	9 SQ. FT
16" 1/16 BENDS	8 SQ. FT
10" 1/8 BENDS	8 SQ. FT
8" 1/16" BENDS	4 SQ. FT
8" 1/8" BENDS	6 SQ. FT
8" ¼" BENDS	10 SQ. FT
6" 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 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 D.P.I. standards with respect to size, medium, format, content, and scope as outlined below.

Failure to meet said requirements in any way shall cause the drawing to be rejected and returned to the person submitting same.

1. Size
   Drawing shall be 24" x 36" overall, including ¾" margin.
2. Medium
   Drawing shall be on Mylar drafting film, double matte finish, 3 mils (min.) thick, using compatible inks that will not flake or chip, producing a permanent bond and resulting in a plan with long-term durability.
3. Format
   Drawing shall have a title block arranged thus:

   As-built water plan of
   (STREET NAME)
   From (point of origin) to (point of termination)

   SCALE
   Horizontal: 1" = 60'
   Constructed By: (Name of Developer)
   Construction Completed: (Date)

   _____
   DPI – Commissioner

   Scales should be 1" = 60' Horizontal. Street name should be in letters ¼" to ½" high, and title block should be in center of street. Other information, i.e., benchmark notation, appurtenance description, locus map, graphic scale etc., may be arranged as space permits.
4. Content
   The drawing must contain the following information, in black ink or colored ink as indicated below:

   ON PLAN VEW:

   a) Street line(s) and name(s) involved, Assessors' plot number, lot numbers, side lines, and frontage distance of abutting lots, north arrow. Black color.

b) Existing water with existing gate boxes and hydrants (indentified as "existing"). Show as dashed line. Gray color.
c) New water with mains, with gate boxes and hydrants (indentified as "new"). Show as solid lines. Black color.
d) Plan should show all pipe in appropriate colors.

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 should not be shown thereon.

5. Submit Mylar original along with CAD.DWG Data file.

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
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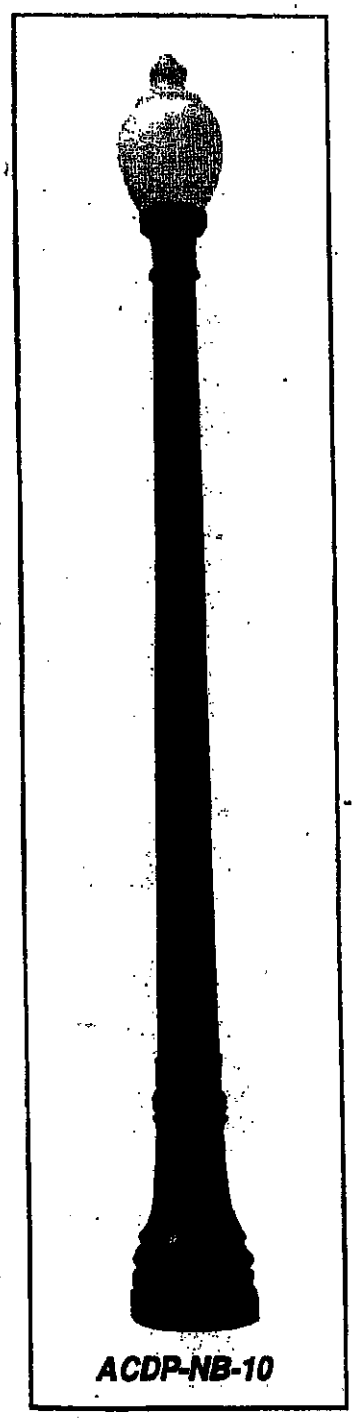
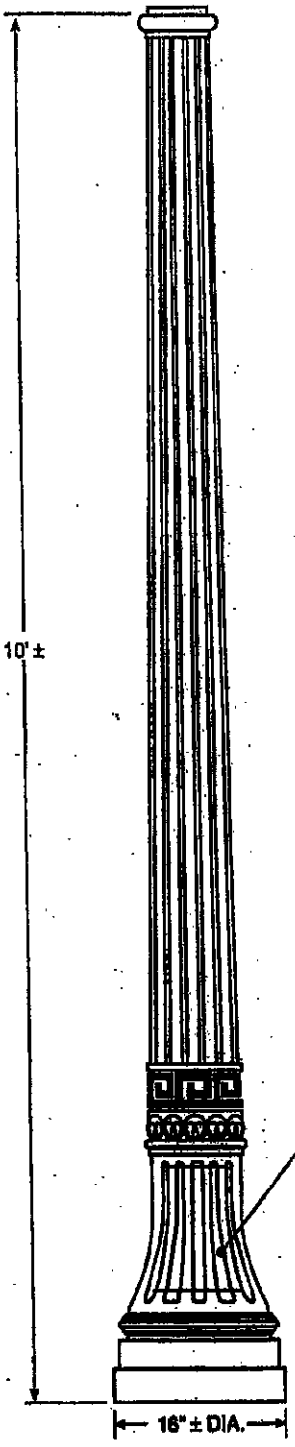
New Bedford Style Decorative Pole



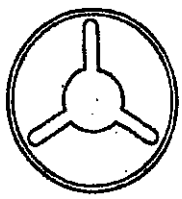
ACDP-NB-10



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 Alloy.
Finish:	Primed and finish painted to your specifications.
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:	see page 53

Finish Options: A wide variety of colors are available using the finest quality paints. Thermostat powder coating is available upon request.

ANCHOR BOLT DETAIL



(3) 3/4" ANCHOR BOLTS
ON 9 to 11"± BOLT CIRCLE

From: ALLOY CASTINGS CO., INC.
Quality Aluminum Castings Since 1948

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Telephone: (508) 378-2541 • FAX: (508) 378-1240
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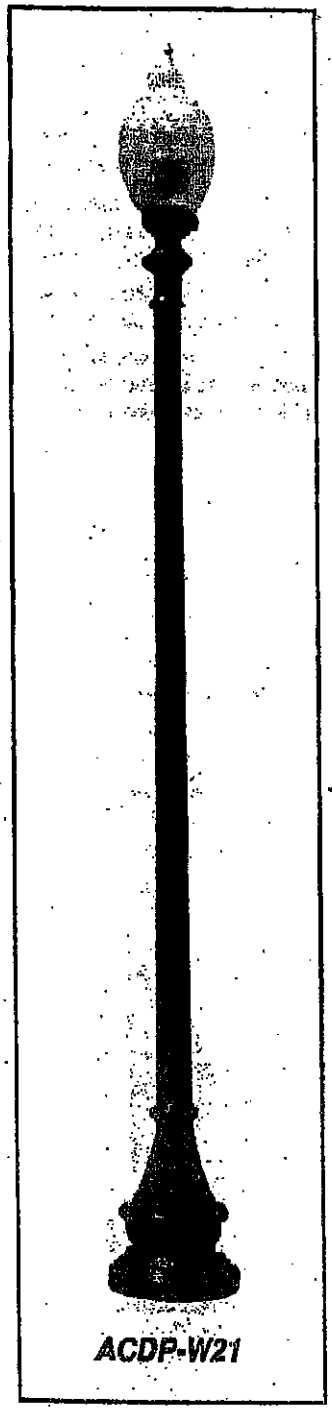
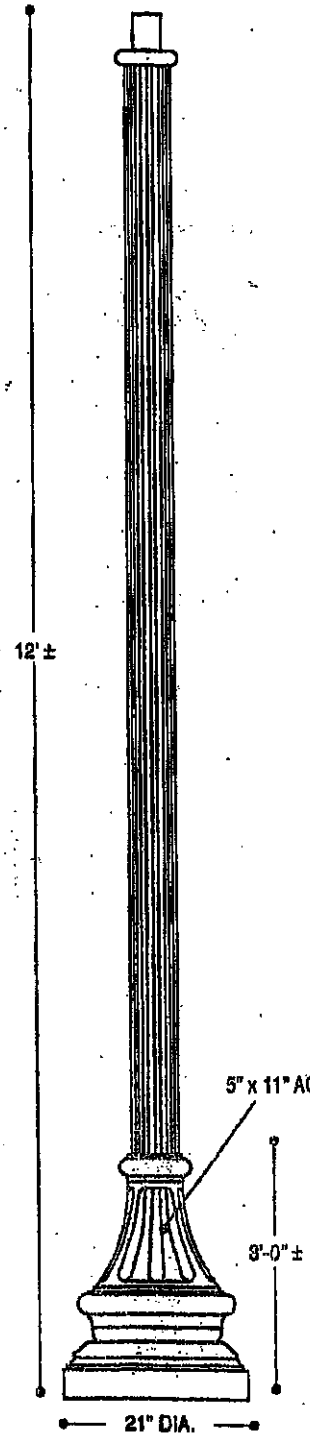
Washington 21 Style Decorative Pole

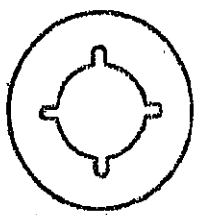


ACDP-W21

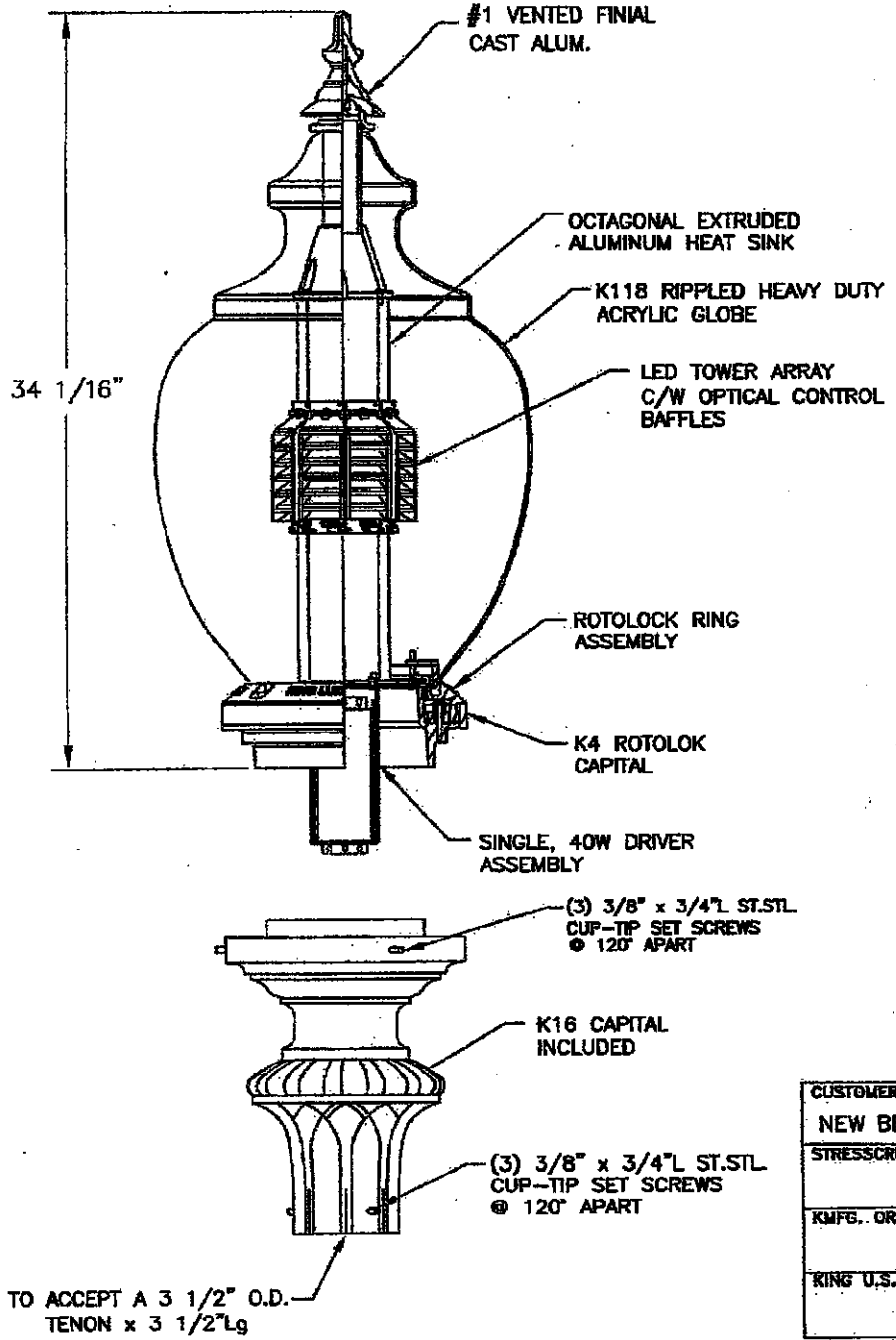


Style:	Washington 21
Height:	12' ±
Base:	21" ± diameter, round
Tennon:	3" x 2-7/8" diameter. Optional tenon heights and diameters available..
Material:	Heavy Wall Cast Aluminum 356 Alloy.
Finish:	Primed and finish painted to your specifications.
Access Door:	5" x 11", located in base.
Anchor Bolts:	(4) 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:	see page 53
Finish Options:	A wide variety of colors are available using the finest quality paints. Thermostat powder coating is available upon request.
Accessory Options:	Ladder rest and decorative brackets are available.

ANCHOR BOLT DETAIL



(4) 3/4" ANCHOR BOLTS ON 12"± BOLT CIRCLE



REV.	ALTERATION	DATE	BY

LUMINAIRE SPECIFICATIONS

CATALOGUE NO.:	KCK118R-B2AR-III-40(SSL) -1042-120-K4/K16-HE4
QUANTITY:	1
OPTICAL SYSTEM:	BAFFLED ARRAY ACRYLIC RIPPLED
IES CLASS.:	TYPE III
WATTAGE:	40W (1042 SERIES) SOLID STATE LIGHTING
LINE VOLTAGE:	120V
CCT:	4500K
POLE ADAPTOR:	K4/K16
PAINT:	TEXTURED BLACK
OPTIONS:	#1 VENTED FINIAL *** HEAVY DUTY GLOBE ***

OPTIONS

QUICK DISCONNCET ☒

CUSTOMER APPROVAL & DATE: _____

CUSTOMER ORDER No: NEW BEDFORD SAMPLE	PROJECT/CUSTOMER: NEW BEDFORD
STRESSCRETE ORDER No: —	DRAWN BY:
KMFG. ORDER No: —	
KING U.S. ORDER No: S01278	DRAWING TYPE:

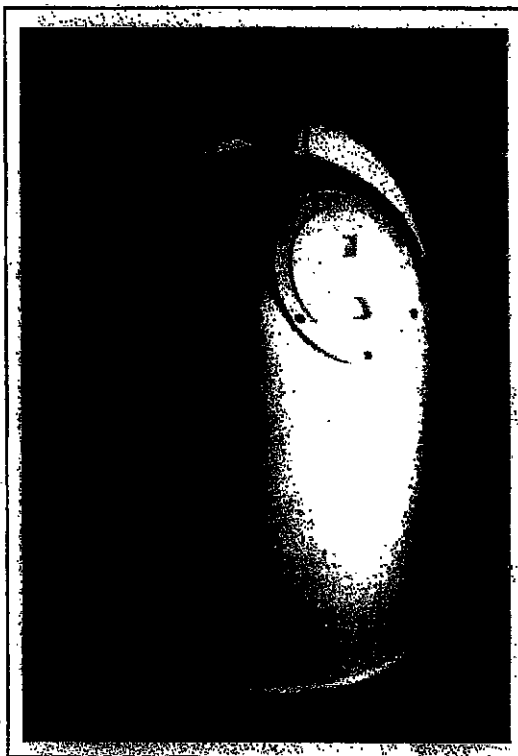
The "SNOUT"

by Best Management Products, Inc.

Oil-Debris Stop for Stormwater Catch Basins

Patent Pending

Clean up your rivers, streams and harbors



Anti-siphon device prevents contaminants from being drawn downstream

Attaches to catch basin wall over any type pipe

A marine-grade, gasketed, removable clean-out port is standard for easy access to pipe

Stainless hardware used throughout

Hooded outlet cover for sump style stormwater catch basin

Strong yet light-weight plastic composite construction

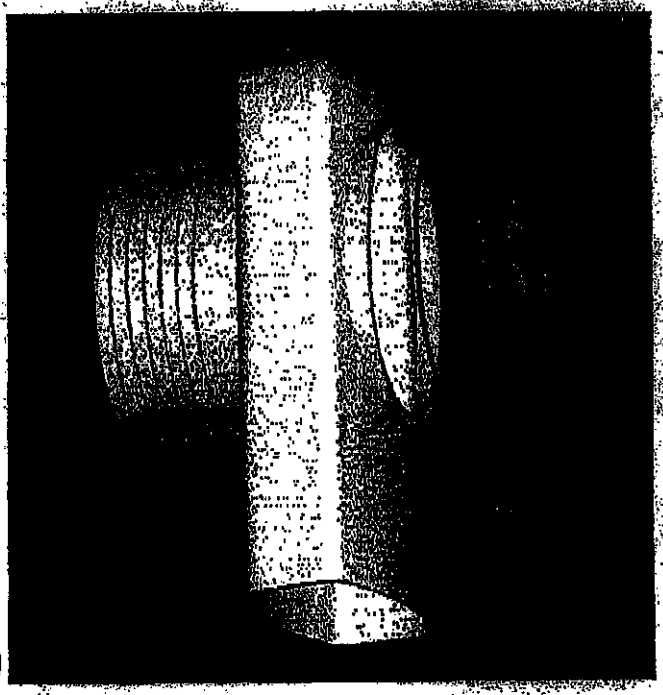
- **Converts any sumped catch basin into an oil / debris / water separator - - allowing for easy and inexpensive adoption of "Best Management Practices".**
- **Contains floatables and oil within the catch basin.**
- **Custom debris screens and installation kits available.**
- **Models for rectangular and round catch basins.**
- **Very easy to install. UNIT FOR UP TO 15" pipe size weighs only ten pounds.**
- **Unaffected by corrosive ice melting chemicals.**
- **Low head-loss design.**
- **80% separation of suspended oils. 100% reduction of floatables.**
- **Can be used in series to achieve greater degree of water quality improvement.**
- **Pipe cleaning maintenance substantially reduced.**

American Cast Metals Association
American Foundrymen's Society
Construction Industries of Massachusetts
Utility Contractor's Association

AMERICAN CAST METALS ASSOCIATION

The Eliminator

Oil & Floating Debris Trap For Catch Basins



THE ELIMINATOR

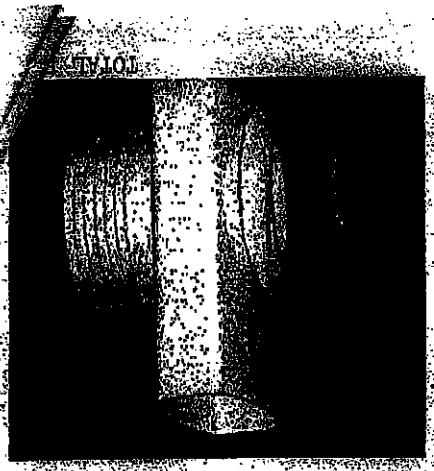
The ELIMINATOR Catch Basin Oil and Debris Trap is the most advanced trap of its kind on the market. Its clever design provides several unique features. Designed to follow the contours of round catch basins it offers the best clearance from the catch basin opening of any similar trap. Its unique neck design both seals and retains the trap in the outlet pipe. Manufactured from High Density Polyethylene it is lightweight, durable and resistant to the widest range of storm water contaminants. Its large inspection and maintenance port allows easy access to the outlet pipe with a quick quarter turn of the gasket sealed cover. Clearly the ELIMINATOR is the smart choice for your Catch Basins.

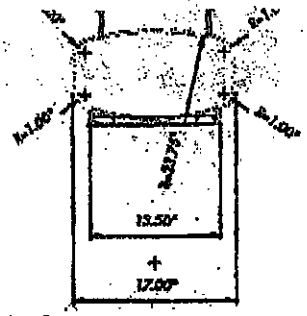
- Eliminates oil and floating debris from the storm water waste stream.
- Eliminates prolonged exposure of workers to confined spaces as it installs in minutes.
- Eliminates waste as it is partially manufactured from recycled materials.
- Eliminates labor costs as it installs in minutes without fasteners, or adhesives.
- Eliminates maintenance problems as its low and contoured profile prevents dislodgment during catch basin cleaning.
- Eliminates confusion, it's the catch basin trap you will always want to use.

MANUFACTURED BY GROUND WATER RESCUE, INC.

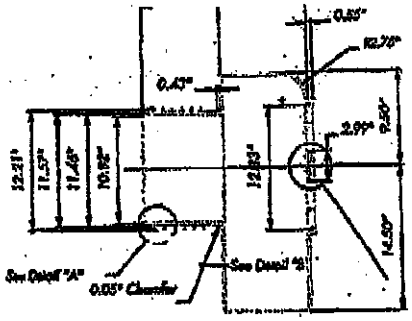
*24 Ryden Street, Quincy, MA 02169 * Tel: 617-773-1128 * Fax: 617-773-0510*

www.kleanstream.com

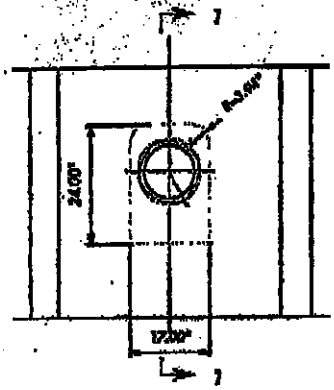




Enlarged Section 2-2

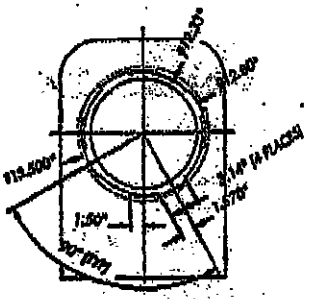


Enlarged Section 1-1



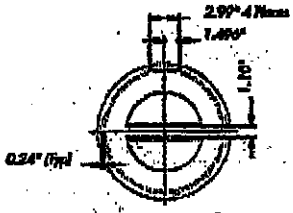
Front View

THE ELIMINATOR CATCH BASIN OIL & DEBRIS TRAP

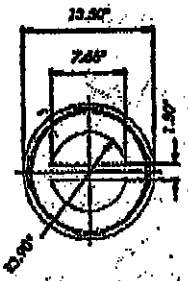


Enlarged Front View

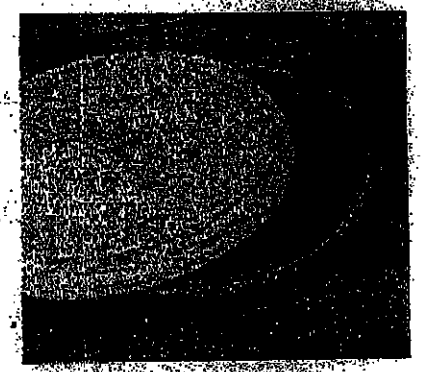
Side View of Cover

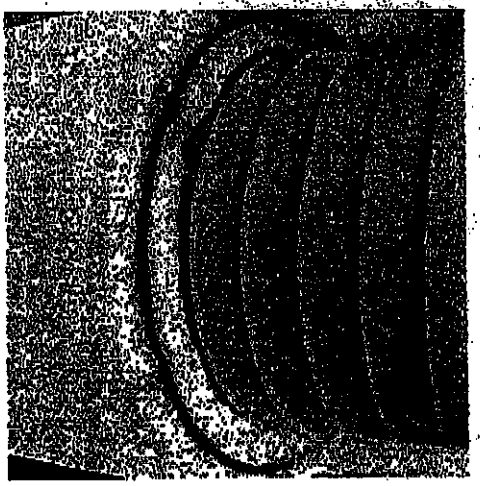


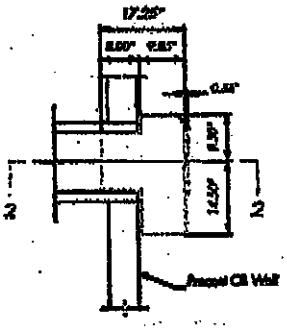
Rear View of Cover w/ Integral Handle



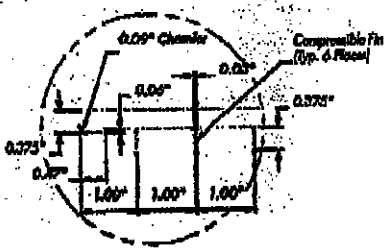
Front View of Cover w/ Integral Handle





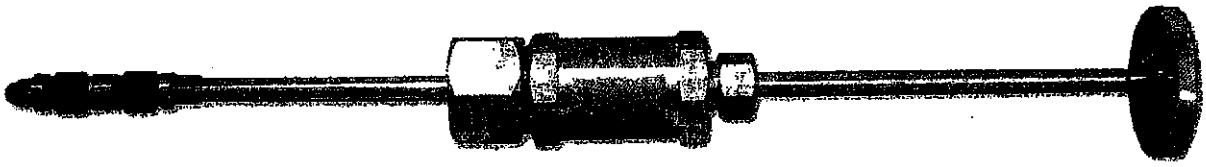


Section 1-1

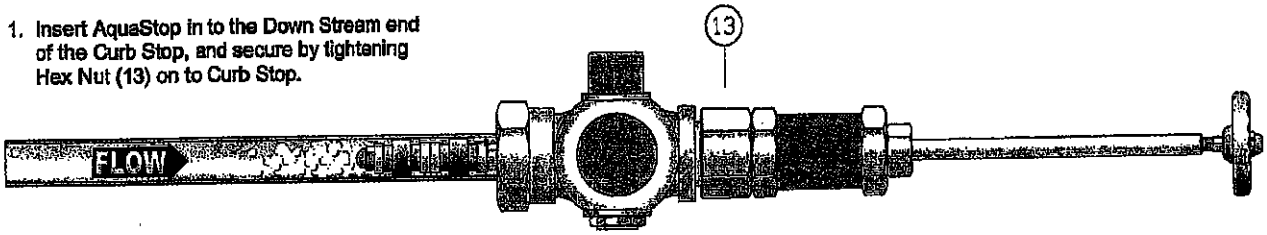


Detail "A"

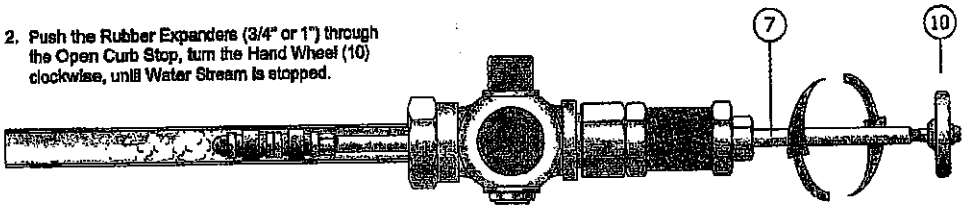
Aqua-Stop



1. Insert AquaStop in to the Down Stream end of the Curb Stop, and secure by tightening Hex Nut (13) on to Curb Stop.

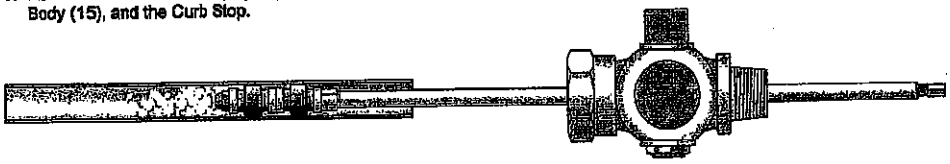


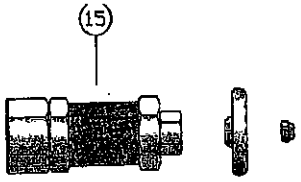
2. Push the Rubber Expanders (3/4" or 1") through the Open Curb Stop, turn the Hand Wheel (10) clockwise, until Water Stream is stopped.



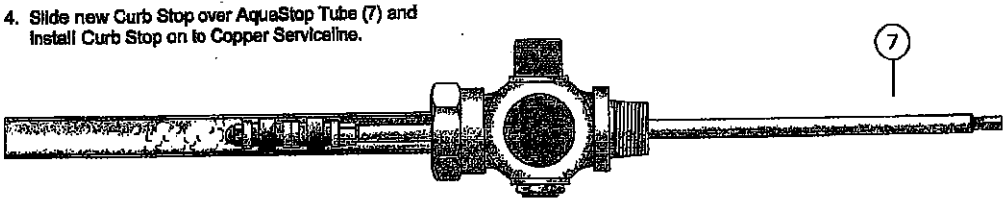
2a. While turning the Hand Wheel (10) clockwise, make certain that the AquaStop Tube (7) is secure and will not slide inside Copper Tubing.

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.

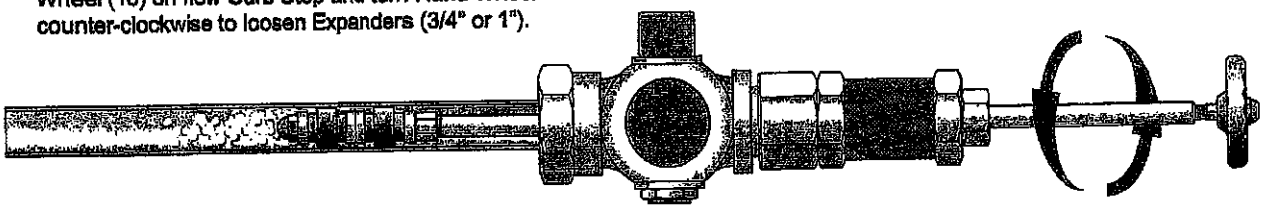


P64701 = 3/4" CTS
P64702 = 1" CTS

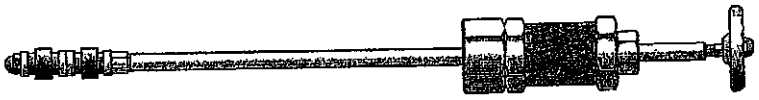
P648 Hollow Hammer

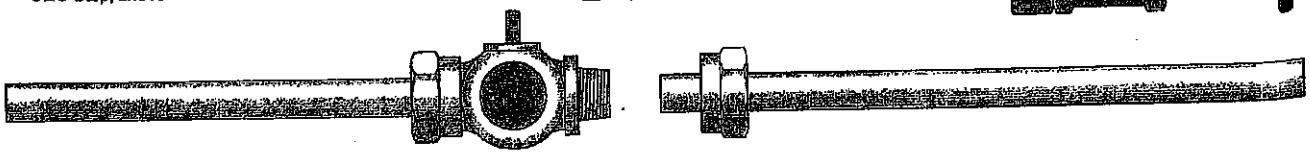
Use Pollard's Hollow Hammer and Hollow Flaring Tools for connecting Curb Stop with Flare Ends.

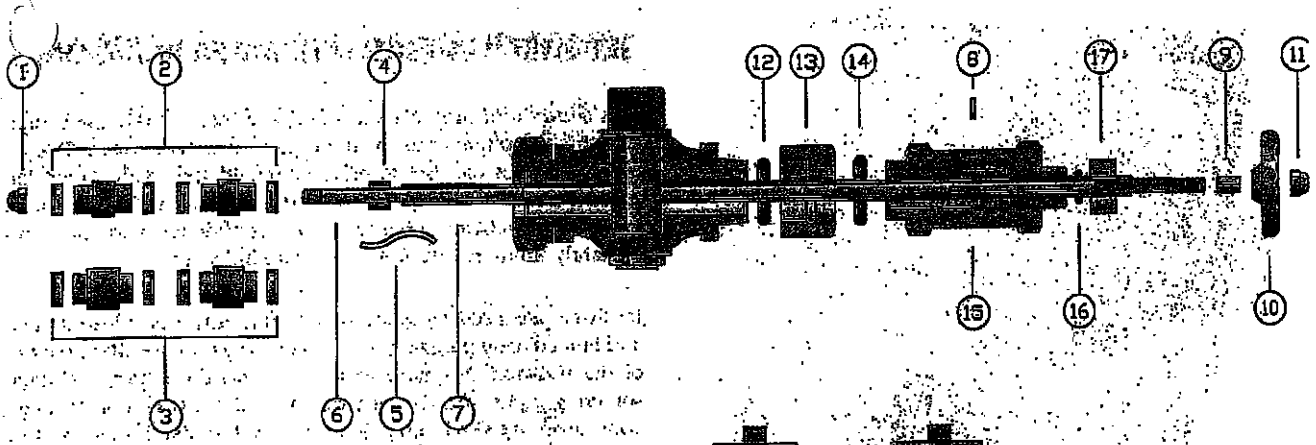
5. Re-assemble AquaStop Body (15) and Hand Wheel (10) on new Curb Stop and turn Hand Wheel counter-clockwise to loosen Expanders (3/4" or 1").



6. Once the AquaStop has been pulled out, close the Curb Stop, and re-assemble the Service Line.

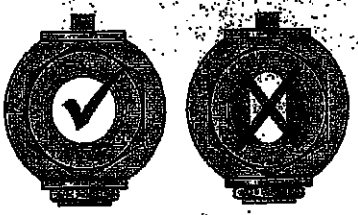






POLLARD WATER AQUA-STOP

- *Change "round port" curb stops under pressure*
- *The Aqua-Stop for 3/4" curb stops complete with iron pipe thread outlet and flare type copper tube outlet.*
- *Use the adapter kit for 1" full port oval curb valves.*
- *Flare under pressure with the Hollow Hammer Kit.*



AQUA STOP WORKS ONLY WITH FULL PORT ROUND OPENING CURB VALVES

P64602 ADAPTER KIT ALLOWS AQUA STOP TO WORK WITH ONE INCH ROUND PORT CURB VALVE

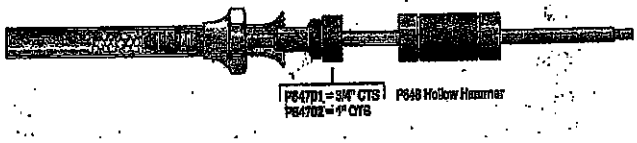
Item	Description	Each
P645	Aqua Stop for 3/4" curb stops.	127.00
P64602	Rubber and adapter kit for 1"	68.00

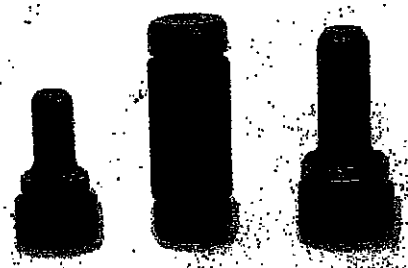
Replacement parts for the Aqua-Stop.

P64501	#1 Expander Nut	2.35
P64502	#2 Expander for 3/4 Inch (pair)	14.70
P64503	#3 Expander for 1 inch (pair)	16.45
P64504	#4 Tube Packing Nut	2.25
P64505	#5 Tube Packing	.50
P64506	#6 Operation Rod	16.00
P64507	#7 Tube	16.00
P64508	#8 Tube Pin	.80
P64509	#9 Operating Nut	4.55
P64510	#10 Handwheel	8.95
P64511	#11 Handwheel Nut	2.50
P64512	#12 Copper Adapter O-Ring, 3/4 Inch	.55
P64513	#13 Copper Adapter, 3/4 Inch	27.45
P64514	#14 Body O Ring, Large	.40
P64515	#15 Body	37.55
P64516	#16 Body O-Ring, Small	.40
P64517	#17 Body O-Ring Nut	3.30
[illegible]4603	#20 Copper Adapter, 1 inch	41.05
[illegible]04	#21 Iron Pipe Adapter, 1 inch	37.25
[illegible]05	#22 Adapter O-Ring, 1 inch	.30
P64606	Fiber Gasket for P64603	2.35

HOLLOW HAMMER FOR AQUA STOP

✓ *Flare under pressure using Aqua Stop*

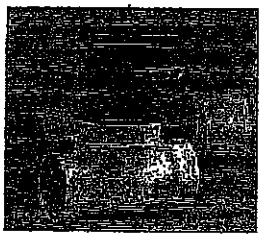




You can reflare under pressure with the Pollard Hollow Hammer and flaring tools. Simply install the aqua stop and slide the flaring tool over the shaft and use the hollow hammer to drive the flaring tool into the copper.

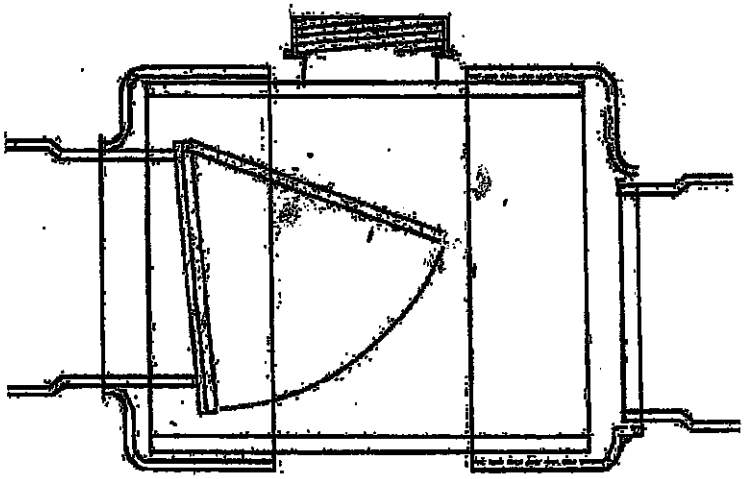
Item	Description	Each
P648	Hollow Hammer	60.00
P64701	Hollow Flaring Tool 3/4"	50.00
P64702	Hollow Flaring Tool 1"	52.00

Backwater Valves
& Terminal Backwater Valves



Also available in:
Sewer Gasket Bells
IPS Gasket Bells
IPS Solvent Weld Hubs
CIOD Gasket Bells

79ABWV04
79ABWV08
79ABWV12
79ABWV18
79ABWV24
79ABWV30



SDR35 PVC

Also available in:
Sewer Gasket Bells
IPS Gasket Bells
IPS Solvent Weld Hubs
CIOD Gasket Bells

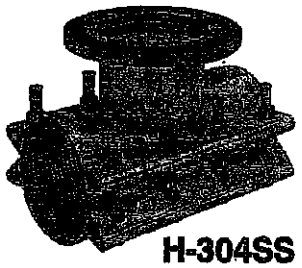
79ATBWV04G
79ATBWV06G
79ATBWV12G
79ATBWV18G
79ATBWV24G
79ATBWV30G

OR

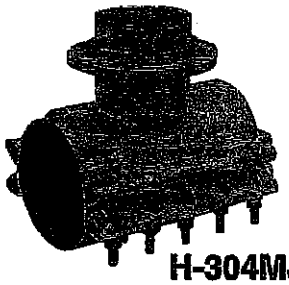
EQUAL

12.8 Mueller Co. STAINLESS STEEL TAPPING SLEEVE 4" - 24"

Rev. 5-08



H-304SS



H-304MJ

- ❑ Catalog number– **H-304** Stainless Steel Tapping Sleeve
- ❑ Sizes-3"*-24" main and outlet (see chart below for available size combinations).
- ❑ Outlet choices: flange or integral MJ outlet.
- ❑ Outlet flange material options: 304L Stainless steel, carbon steel, or ductile iron outlet flange which meets or exceeds all applicable requirements of ANSI B16.1, class 125 and in accordance with MSS-SP60.
- ❑ Integral MJ flange is 304L stainless steel.
- ❑ Certified to ANSI/NSF 61.
- ❑ 3/4" NPT brass test plug (Stainless Steel optional).
- ❑ 3"-12" sizes–250 psig (1723 kPa) maximum working pressure.
- ❑ 14"-24" sizes–200 psig (1379 kPa) maximum working pressure.

How to determine a Mueller Tapping Sleeve Part Number

Select the appropriate numbers from the pipe information chart that follows.

Example: For 6"x6" with 7.30-7.50 O.D. Range and stainless steel flange
Resulting Part No. **0606H304SS0750**

*3" outlet flange only available in stainless steel
** H-304 is constant for all Mueller Stainless Steel Tapping Sleeves listed here.
*** SS = stainless steel flange, CS = carbon steel flange, DI = ductile iron flange, MJ=integral mechanical joint outlet.*

Main Size	Outlet Size	Model No.	Outlet	Maximum O.D.
06	06	H-304**	SS***	0750

Tapping Sleeve pipe information

Size of main	Size of outlet flange	Available sleeve O.D. ranges		Class and type of pipe
		inch	mm	
4"	4"	4.50 - 4.90 4.80 - 5.00	114.30 - 124.46	Iron Pipe Size PVC; C900 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100
	4", 6"	6.59 - 6.99 6.89 - 7.30 7.10 - 7.50 7.40 - 7.80	167.39 - 177.55 175.00 - 185.42 180.34 - 190.50 187.96 - 198.12	Iron Pipe Size PVC; C900 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100, 150
8"	4", 6"	7.90 - 8.30	200.66 - 210.82	Iron Pipe Size PVC; C900 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100, 150, 200
	4", 6", 8"	8.62 - 9.06 9.04 - 9.45 9.20 - 9.60 9.60 - 10.00	218.95 - 230.12 229.62 - 240.03 233.68 - 243.84 243.84 - 254.00	
10"	4", 6", 8"	9.90 - 10.30	251.46 - 261.62	Iron Pipe Size PVC; C900 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100, 150, 200
	4", 6", 8", 10"	10.73 - 11.13 11.05 - 11.45 11.70 - 12.10 12.00 - 12.40	272.54 - 282.70 280.67 - 290.83 297.18 - 307.34 304.80 - 314.96	
12"	4", 6", 8", 10", 12	12.50 - 12.90 13.16 - 13.56 13.60 - 14.09 14.10 - 14.58	317.50 - 327.66 334.26 - 344.42 345.44 - 378.46 358.14 - 370.33	C900 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100, 150, 200; C905 IPS O.D. PVC (14")
14"	4", 6", 8", 10", 12	15.25 - 15.65 15.60 - 16.00 16.38 - 16.73 16.48 -16.88	387.35 - 397.51 396.24 - 406.40 416.05 - 424.94 418.59 - 428.75	C905 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100, 150, 200; C905 IPS O.D. PVC (16")
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	441.96 - 452.12 334.26 - 344.42 445.52 - 463.55 461.01 - 471.17 472.44 - 482.60	C905 Cast Iron OD PVC;Cast Iron 100-250, A, B, C, D; Ductile iron; AC 100, 150, 200; C905 IPS O.D. PVC (18")
18"	4", 6", 8", 10", 12	19.30 - 19.70 19.70 - 20.10	490.22 - 500.38 500.38 - 510.54	C905 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron; C905 IPS O.D. PVC (20")
20"	4", 6", 8", 10", 12	21.40 - 21.80 21.90 - 22.30 22.30 - 22.70	543.56 - 553.72 556.26 - 566.42 566.42 - 576.58	C905 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron
	4", 6", 8", 10", 12	23.30 - 23.70 23.80 - 24.10 25.60 - 26.00	591.82 - 601.98 604.52 - 612.14 650.24 - 660.40	C905 Cast Iron OD PVC; Cast Iron 100-250, A, B, C, D; Ductile iron

ROMAC INDUSTRIES, INC.
1-800-426-6341
www.romac.com

MADE IN U.S.A.

"SST III" Stainless Steel Tapping Sleeve

Material Specifications

Shell and Lugs: Stainless steel per ASTM A240, type 304 and type 304L.

Test Plug: ¾" NPT type 304 Stainless Steel. Plug threads coated to prevent galling.

Bolts: ⅝" 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 per ASTM A240, type 304 and plastic lubricating washer.

Gaskets: SBR per ASTM D 2000 MAA 610, compounded for water and sewer service. Other compounds available on request.

MJ Bolts & Nuts: ¾" 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 A 240, 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).

Meets requirements of MSS SP-124 and AWWA C223

SST III SLEEVES WITH MJ OUTLETS

MJ Gasket and HSLA T-bolts & Nuts are included with SST-MJ and SST-SS-MJ

NSF 61 certified upon request.

NOMINAL PIPE SIZE	SLEEVE O.D. RANGE (inches)	CATALOG NUMBER: SLEEVE NUMBER	BY	CATALOG NUMBER: BRANCH SIZE	LIST PRICE EACH: D.I. FLANGE	LIST PRICE EACH: 304 S.S. FLANGE	LIST PRICE EACH: D.I. MJ OUTLET	LIST PRICE EACH: 304 S.S. MJ OUTLET	APPROX. WEIGHT (lbs.)
4"	4.40 - 4.69 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- 5.80	X	6" 4"	NA $960.39	$1,194.74 1,194.74	NA $1,001.97	$1,236.92 1,236.92	37# 42#
6"	5.90 - 6.25 [1] 6.25 - 6.60 [1] 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	X	3" 4" 6"	NA 1,011.63 1,032.46	1,194.74 1,194.74 1,231.68	NA 1,053.41 1,079.61	1,236.92 1,236.92 1,276.83	50# 54# 59#
8"	7.90 - 8.30 [2] 8.30 - 8.69 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- 8.60 SSTIII- 8.69 SSTIII- 9.06 SSTIII- 9.37 SSTIII- 9.45 SSTIII- 9.60 SSTIII- 9.95 SSTIII-10.30	X	3" 4" 6" 8"	NA 1,051.42 1,144.17 1,476.75	1,224.66 1,224.66 1,324.96 1,620.56	NA 1,093.02 1,191.30 1,544.74	1,266.26 1,266.26 1,372.08 1,686.56	56# 60# 63# 83#
10"	10.33 - 10.73 [3] 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	X	3" 4" 6" 8" 10"	NA 1,176.00 1,205.14 1,486.97 2,094.79	1,411.15 1,411.15 1,423.49 1,656.89 2,792.60	NA 1,217.59 1,252.28 1,551.97 2,177.79	1,452.74 1,452.74 1,470.63 1,932.89 2,815.60	80# 84# 88# 99# 121#

[1] Not Available with 6" branch.
[2] Not Available with 8" branch.
[3] Not Available with 10" branch.

To Order: Specify Sleeve Number x Branch Size x Outlet Type.
Example: SSTIII - 6.45 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

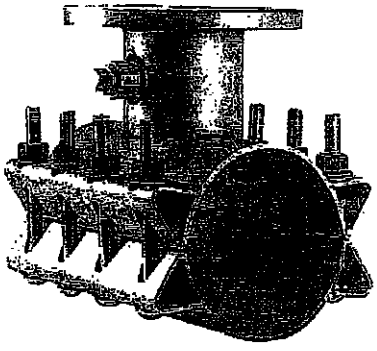
Tapping Sleeve shall be of the high strength type having a wide body, made of corrosion resistant, 304 stainless steel, which conforms to and reinforces the pipe. The sleeve shall have a wide gasket of Nitrile Butadiene Rubber (NBR, Buna-N) per ASTM D2000 with hydromechancial activated lip, captured in a recessed groove around the outlet; 18-8 Type 304 stainless steel hardware and nuts. Stainless steel tapping sleeve shall be furnished with a 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 stainless steel and 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). Outlets 2" – 12" rated for 175 PSI* maximum operating pressure.

For outlet sizes 14" and larger, the gasket groove must be consistently positioned about throat of tapping waterway. 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.

Nominal pipe sizes 36" and larger shall be of the heavy duty type.
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 & ANSI/NSF Standard 61 Annex G Certified.
JCM 400 Series Tapping Sleeves meet MSS-SP124 and ANSI/AWWA Standard C223 Fabricated Steel and Stainless Steel Tapping Sleeves 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.

NSF

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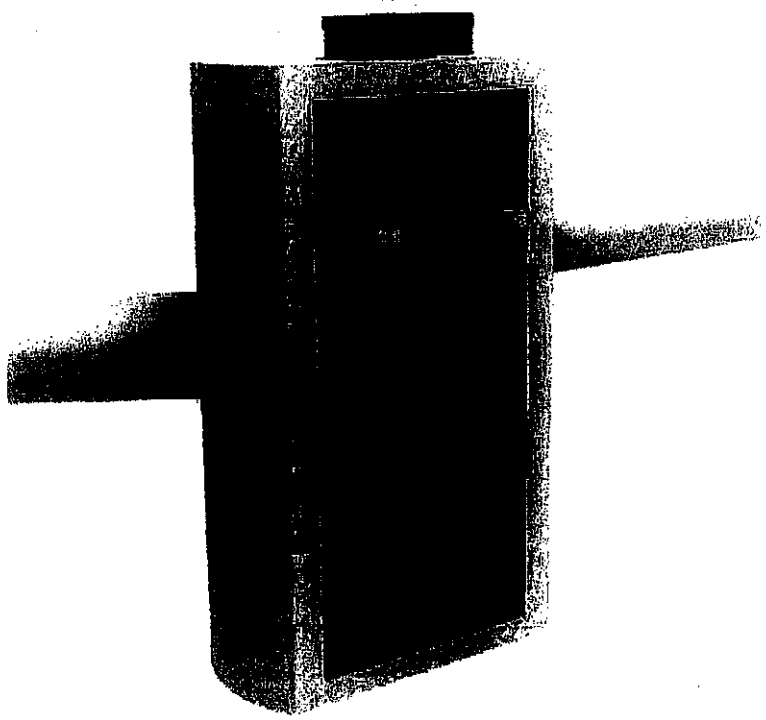
Hydro International



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