### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>I</th>
<th>DEFINITIONS</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECTION</td>
<td>II</td>
<td>GENERAL PROVISIONS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intent of the Specifications</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contractor's Legal Responsibility under State Laws</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Certificates of Compliance</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference to Specifications</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Layout of Work</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safety Precautions</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspection</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sampling and Testing</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flood Plain Zoning</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construction Dust Control</td>
<td>6</td>
</tr>
<tr>
<td>SECTION</td>
<td>III</td>
<td>ROAD CONSTRUCTION</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clearing and Grubbing</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excavation</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subgrade Preparation</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gravel Base Course</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface Course</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patching Trenches</td>
<td>13</td>
</tr>
<tr>
<td>SECTION</td>
<td>IV</td>
<td>DRAINAGE CONSTRUCTION</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scope of Work</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Materials</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excavation and Backfilling</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installation</td>
<td>19</td>
</tr>
<tr>
<td>SECTION</td>
<td>V</td>
<td>WATER MAIN CONSTRUCTION</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scope of Work</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Materials</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excavation and Backfilling</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installation</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Testing</td>
<td>34</td>
</tr>
</tbody>
</table>
### SECTION VI  SANITARY SEWER CONSTRUCTION

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of Work</td>
<td>43</td>
</tr>
<tr>
<td>Materials</td>
<td>44</td>
</tr>
<tr>
<td>Excavation and Backfilling</td>
<td>47</td>
</tr>
<tr>
<td>Installation</td>
<td>49</td>
</tr>
<tr>
<td>Testing</td>
<td>52</td>
</tr>
<tr>
<td>Construction of Force Mains</td>
<td>54</td>
</tr>
</tbody>
</table>

### APPENDIX:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary Sheet of Approved Materials</td>
<td>56</td>
</tr>
</tbody>
</table>

Typical Construction Detail Drawings:
TOWN OF DARTMOUTH
DEPARTMENT OF PUBLIC WORKS
CONSTRUCTION SPECIFICATIONS

SECTION I - DEFINITIONS

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

Sec. II. “Shall” and “Will” are mandatory. “May” and “Should” are permissive.

Sec. II. “Town Engineer” shall mean the Director of Public Works or his duly authorized
agents, representatives, or others having jurisdiction with regard to enforcement of the
Specifications or acting for the Town of Dartmouth, Massachusetts.

Sec. II. “Town” shall mean the duly appointed members of the Board of Public Works of the
Town of Dartmouth, Massachusetts, or its duly authorized deputies, agents,
representatives, or others having jurisdiction with regard to enforcement of these
Specifications or acting for the Town of Dartmouth, Massachusetts.

Sec. II. “Inspector” shall mean any person acting as a duly appointed agent of the Department
of Public Works to ensure compliance with all Specifications and Rules and
Regulations governing construction within the Town of Dartmouth, Massachusetts.

Sec. IV. “Storm Drainage System” shall mean a system of piping which carries storm and
surface waters and ground water drainage, but excludes sewage and industrial wastes.

Sec. IV. “Cellar Drains” shall mean the piping for collecting water, excluding sewage, which
connects the drain main directly to the inside of a building foundation.

Sec. IV. “Perimeter and Conductor Drains” shall mean the piping for collecting water from
around the outside of a foundation or from the downspouts of a building and
connecting directly to the drain main.

Sec. IV. “Director” shall mean the Director of Public Works of the Town of Dartmouth,
Massachusetts or his duly authorized assistant, agent or representative.

Sec. IV. “Drain Services” shall mean any piping for cellar drains, perimeter or conductor drains
connecting from the main to ten (10) feet from the foundation and which require a
connection permit.

Sec. V. “Water Distribution System” shall mean all piping and appurtenances for the purpose
of transporting water for public use or fire protection.
Sec. V. “Water Division” shall mean the Water and Sewer Division of the Department of Public Works of the Town of Dartmouth, Massachusetts.

Sec. V. “Domestic Services” shall mean the piping which connects the water main to one (1) foot inside the building foundation.

Sec. V. “Fire Services” shall mean the piping from the water main to the building foundation including all valves, fittings and hydrants used for the purpose of delivering water for fire protection.

Sec. VI. “Sanitary Sewer System” shall mean piping and appurtenances which carries sewage and to which storm, surface and groundwaters are not intentionally admitted.

Sec. VI. “Service Stub” shall mean the temporary terminus of the sewer service at the property line.

Sec. VI. “Service Connection” shall mean the pipe which extends from the sewer main to ten (10) feet from the building foundation.

Sec. VI. “Cap or Plug” shall mean the cap or plug sealing the open end of a sewer line and/or any clean-outs and/or water pipes.

Sec. VI. “Clean-out” shall mean a branched fitting inserted along the sewer service which will give access for purposes of cleaning or inspecting the inside of the service.
CONSTRUCTION SPECIFICATIONS

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 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 Town Engineer 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 Town of Dartmouth. 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. Plans reviewed by the DPW Engineering department shall expire 3 years after approval. After expiration, plans shall be re-submitted for review and approval and shall be in compliance with the latest edition of the Town of Dartmouth Construction Standards and Specifications.

CONTRACTOR'S LEGAL RESPONSIBILITY UNDER STATE LAWS:

Attention is hereby directed to the provisions of Section 40A, Chapter 82 of the General Laws requiring Contractors to notify public utility companies in writing at least 72 hours before excavating a public way to prevent accidental damage; and 520 CMR 14.00, 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 Town Engineer 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 Town Engineer. 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 Town.

Unless otherwise approved in writing by the Town Engineer, only new materials and equipment manufactured in the USA shall be incorporated in the work.
Construction Specifications
Section II – General Provisions

REFERENCE TO SPECIFICATIONS:

Where specifications of the American Association of State Highway & Transportation Officials (AASHTO), the American Society for Testing and Materials (ASTM), the American Standards Association (ASA), the American Water Works Association (AWWA), the Massachusetts Department of Transportation (MassDOT) Highway Division, or any other agency called for, the latest edition of those specifications shall be used, unless otherwise noted.

LAYOUT 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 Town Engineer. In no case shall construction be performed without plans that have been approved by the Town Engineer. 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 all stakes, monuments, bounds and other marks existing in the work area. Bounds for other marks which have to be destroyed during construction shall have adequate ties to facilitate replacement. Any marks which are damaged or destroyed by the Contractor shall be replaced by him to the satisfaction of the Town Engineer or other concerned parties.

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 Town and then perform his work in accordance with said permit. He shall be responsible for maintaining traffic control with police officers, flagman, 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 local controlling government agency, in accordance with the specifications herein or as detailed on the approved plan.

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 Town Engineer may require in order that the finished work may be completed as required by the drawings and specifications.
Construction Specifications
Section II – General Provisions

INSPECTION:
Prior to the start of any work a pre-construction meeting shall take place between the contractor, developer & the Town of Dartmouth DPW.

The Contractor shall notify the Department of Public Works at least twenty-four (24) hours prior to the construction of any public improvement so that the Town can have an Inspector present if the work requires inspection. In general, inspections will be required:

1. **For Road Construction:**
   a. When the subgrade 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, sewer main & sewer forcemain installations, final pressure test will be required by the Department of Public Works to assure pipe tightness.)

The developer shall be responsible for filing an "Application for Inspectional Services" with the Department of Public Works and pay the required fees to have an Inspector present during the construction of all work requiring inspections. The developer/contractor shall be responsible for requesting inspections, at the proper stages in the process of installation of improvements. Should an inspection not be performed because of failure of the developer/contractor to notify the DPW, the developer/contractor shall be required to uncover the improvements for inspection. No work will be accepted that has been covered before inspection. The Inspector will have the authority to reject any work or materials that do not constitute approval by the Town and shall not relieve the Contractor of any of his obligations to perform the work in accordance with the plans and specifications.

Trenches shall not be opened in traveled ways until all materials and equipment required for the work are at the site and available for immediate use. When work is not in progress trenches in areas subject to public travel shall be covered with steel plates capable of safely sustaining an HS20 Loading with 33% impact. The work at each trench shall be practically continuous, with the placing of conduit and piping, backfilling and patching of the surface closely following each preceding operation. At the end of each working day where trenches in areas of public travel are covered with steel plates, each edge of such plates shall either be beveled or protected by a ramp with a slope of 2-feet horizontally to 1-inch vertically. Temporary patching material for the ramps shall meet the requirements of Section 472 Hot Mix Asphalt for Miscellaneous Work.

Pending installation of castings, all structures in travel ways or deemed hazardous by the Engineer shall be protected with suitable covers (steel plates or equal) capable of safely sustaining an HS20 Loading with 33% impact.
Construction Specifications  
Section II – General Provisions  

**SAMPLING AND TESTING:**

All sampling and testing shall be done by a commercial testing laboratory approved by the Town Engineer at the Contractor’s expense. Sampling and materials for tests shall be taken by the testing laboratory, under the direction of the Town Engineer. All test results shall be reported to the Town Engineer in duplicate.

**FLOOD PLAIN ZONING:**

All public utilities such as sewer, gas, electrical and water systems within the FEMA designated flood zones as delineated on the latest FIRM Map must be located and constructed to minimize or eliminate flood damage. For location of flood plain zoning see map on file in the Planning Board Office.

**CONSTRUCTION DUST CONTROL:**

The Contractor shall comply with the provisions of the Massachusetts Department of Environmental Protection Code of Massachusetts Regulations (CMR) Regulations 310 CMR 7.09 “Dust, Odor, Construction and Demolition.”

The Contractor is responsible for control of dust at all times, 24 hours per day, 7 days per week. The Contractor shall treat soil at the site, haul roads, stockpiled materials and other areas disturbed by the operations with dust suppressors or other means to control dust. Dry power brooming will not be permitted. The Contractor shall use vacuuming, wet sweeping, regenerative air sweeping, or wet power broom sweeping. The use of sandblasting and compressed air will be permitted only with acceptable dust controls in place. Only wet cutting of concrete block, concrete and asphalt will be permitted.

Trucks and equipment leaving the site and entering public streets shall be cleaned of mud and dirt adhering to the vehicle body and wheels. Trucks and equipment arriving at and leaving the site with materials shall be loaded in a manner that will prevent the dropping of materials or debris on the streets. The contractor shall secure and cover transport equipment and loose materials to ensure that materials do not become airborne during transit. Material with high water content shall not be allowed to leak from truck cargo areas during transport over streets. Spills of materials in public areas shall be removed immediately without additional compensation.

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 Town Engineer. Calcium Chloride shall be commercial grade, furnished in 100 lb., 5-ply bags, stored under 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 Town Engineer.
CONSTRUCTION SPECIFICATIONS

SECTION III - ROAD CONSTRUCTION

CLEARING AND GRUBBING:

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 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.

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:

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 Town Engineer.
Excavation – continued.

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 local, state and federal 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. Filled areas shall be compacted to a minimum of 95% of maximum density as defined and measured in AASHTO test T-180 Method A and certified by a commercial testing laboratory when the subgrade level is reached.

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 sheeps-foot rollers, 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.
Construction Specifications
Section III - Road Construction

SUBGRADE PREPARATION:

The subgrade shall be prepared to the full width of the road right-of-way and any adjacent bank easements, in conformity with the lines, grades, slopes and cross-section of the approved plans. Grades under paved areas shall be held to a tolerance of plus or minus one-tenth of a foot (0.1’). 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 subgrade, 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 subgrade is properly shaped, it shall be thoroughly compacted with an approved roller weighing not less than 10 tons. Wetting or serating the subgrade by blading, required along with the rolling of the subgrade, shall be included to obtain proper compaction.

The top 6 inches of subgrade in paved areas shall be compacted to a minimum of 95% of maximum density as defined and measured in AASHTO test T-180 Method A.

The finished subgrade shall pitch from the centerline of road to the edge of pavement at a rate of two percent (2%) as shown on the typical road cross-section.

GRAVEL BASE COURSE:

General: The gravel base course shall consist of a twelve (12) inch total compacted thickness for roadway pavement and a eight (8) inch total compacted thickness for sidewalks. The gravel base course shall be placed only on a subgrade approved, in writing, by the Town 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 lanes parallel to the center line of the areas to be paved, and spaced 50 feet on center so that string lines may be stretched between the stakes.

All structures being installed within a new roadway construction shall be dropped and plated prior to gravel base course and prior to installation of HMA binder course. Steel plates shall be set watertight on the structure with butyl sealant.
Gravel Base Course – continued.

Material: Gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The material shall be stockpiled in such a manner to minimize segregation of particle sizes. The gradation shall meet MassDOT standard M1.03.1 & M2.01.7 with the following requirements:

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<td>¾ inch</td>
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<td>No. 4</td>
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<td>No. 50</td>
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<td>No. 200</td>
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Sieve Analysis: Prior to placement of aggregate material a sieve analysis from a Massachusetts certified testing laboratory, certifying the material meets the above gradation requirements, shall be submitted to the Town Engineer for review & approval at least seven days (7) prior to placement. Additional onsite sampling may be required at the discretion of the Town Engineer.

Placing and Mixing: Gravel base courses shall be placed and spread uniformly in layers not exceeding eight (8) 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 top four (4) inches of gravel base shall be constructed with MassDOT Dense Graded Crushed Stone M2.01.7. or equal and shall be spread in layers from self-spreading vehicles equipped with automatic grade controlled equipment, power graders or conventional self-spreading vehicles. 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 10 tons, and having a minimum weight of 300 pounds per inch width of rear wheel. Rolling shall progress gradually from the sides to the center, parallel with the center line 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 98% of maximum density for roadways and 95% of maximum density for sidewalks, as defined and measured in AASHTO test T-180 Method A.

A minimum of three (3) compaction tests will be required for roadway lengths under 500 feet, roadway lengths greater than 500 feet will require compaction tests every 300 feet. Additional test may be required as directed by the Town Engineer.

Compaction tests will be required for both the M1.03.1 & M2.01.7 material. The contractor shall obtain the services of an independent testing company to perform daily compaction tests on the material placed. The tests shall be performed for every layer of material placed. A copy of the compaction tests shall be furnished to the Town Engineer/Inspector on a daily basis.

Smoothness Test: The surface of the top layer of gravel base course shall show no deviations in excess of 3/8 inch when tested with a 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 Town Engineer. The surface of underlayers shall be finished to a reasonably even contour as approved by the Town Engineer. To accomplish a smooth and even surface, the top four (4) inches of gravel base shall be constructed with MassDOT Dense Graded Crushed Stone M2.01.7.
Construction Specifications
Section III - Road Construction

SURFACE COURSE:

General: Paving contractors must be pre-qualified in “Pavement Surfacing” and certified by the Massachusetts Department of Transportation – Highway Division (MassDOT – Highway) in accordance with the “Regulations Governing Classification and Rating of Bidders” for Highway Construction.

The surface course shall consist of Hot Mix Asphalt (HMA) for all roads in compliance with the latest edition of the Town of Dartmouth Planning Board's Rules and Regulations unless otherwise waived by the Planning Board and replaced by some other surface course of lasting strength. The Contractor shall provide a Quality Control Plan (QC Plan), adequate to ensure that all materials and workmanship meet the required quality levels for each specified Quality Characteristic. The Contractor shall provide qualified QC personnel and QC laboratory facilities and perform QC inspection, sampling, testing, data analysis, corrective action (when necessary), and documentation. The QC Plan should sufficiently document the QC processes of all Contractor parties (i.e. Prime Contractor, Subcontractors, Producers) performing work required under this specification.

Hot Mix Asphalt: The surface shall consist of two (2) HMA layers; the first a three (3) inch intermediate course (a.k.a. binder course), and the second a one and one-half (1½) inch surface course. The use of a maximum of 15% recycled asphalt pavement (RAP) will be allowed in the HMA surface course and a maximum of 20% recycled asphalt pavement (RAP) will be allowed in the HMA intermediate /binder course.

Where berms are called for, they shall be either a 6" x 8" bituminous concrete machine formed berm or a monolithic finish cape cod berm, one (1) foot wide x three and one-half (3½) inch high set on top of the binder course. The height of the berm shall be finish height after top course is installed.

All materials and workmanship shall conform to Subsection 460 and/or 470 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges. The Contractor shall submit a MassDOT approved Job Mix Formula to the Department of Public Works for review and approval at least seven days (7) prior to paving. A Quality Control Plan (QC Plan) & Quality System Manual (QSM) for Hot Mix Asphalt production and placement will be required for all projects and shall be submitted to the Town Engineer at least thirty (30) days prior to start of any related work. The QC Plan shall be done in accordance with the MassDOT Model QC & QSM Plan. The QC Plan is intended to be a project specific document.

Any reference, in that book to State officials or departments shall apply to the corresponding officials or departments of the Town of Dartmouth, Massachusetts or approved substitute.
Construction Specifications
Section III - Road Construction

PATCHING TRENCHES:

Trench Preparation: All material for backfilling the trench shall be suitable and free from organic substances, large stones, and frost. Twelve inches of processed gravel meeting the MassDOT standard M1.03.1 specifications shall be installed as a base course and compacted to a minimum of 98% of maximum density for roadway trenches and 95% of maximum density for sidewalk trenches, before the permanent patch is applied.

Controlled Density Fill: Cross trenches of existing Town roadways for service connections or main extensions shall require the installation of Controlled Density Fill (flowable fill) in place of backfilled material and gravel. Controlled Density Fill material is a flowable, self-consolidating, rigid setting, low density material that can substitute for compacted gravel for backfills, fills and structural fills. All materials shall meet MassDOT standard M4.08.0 Controlled Density Fill, Type 1E Very Flowable (Excavatable) or Type 2E Flowable (Excavatable).

Patching Material: A temporary pavement patch shall consist of two, (2) inch lifts of HMA binder course, resulting in a total thickness of four (4) inches. A permanent trench shall be installed equal to the existing pavement thickness, but not less than three (3) inches or greater than six (6) inches in two (2) inch lifts. Cold planing of cross trenches from curb line to curb line, one and one-half (1½) inches deep and two (2) feet wider on each side of the trench, shall be done before the permanent top course of bituminous concrete is installed. Utility extensions along existing Town roadways shall be overlaid from edge of pavement to edge of pavement with a one and one-half (1½) inch top course of bituminous concrete for the entire length after allowing for trench settlement over one (1) winter. In order to maintain existing curb reveal, the Town may require cold planing of the roadway before overlaying with pavement. The contractor shall be responsible for raising all structures to the proper grade and replacement of all disturbed traffic markings. The HMA for all roadway cuts shall be Superpave Intermediate Course 19.0 (SIC – 19.0) & Superpave Surface Course 9.5 (SSC – 9.5)
CONSTRUCTION SPECIFICATIONS

SECTION IV - DRAINAGE CONSTRUCTION

SCOPE OF WORK:

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

The Contractor shall perform his work in accordance with plans approved by the Planning Board, Conservation Commission or Department of Public Works.

MATERIALS:

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

1. Reinforced concrete pipe conforming to ASTM C-76, "Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe". The pipe shall be Class IV for diameters between 12 inches and 27 inches, Class III for diameters 30 inches and larger.

2. Corrugated metal pipe which shall be aluminum or be coated inside and outside with asphalt cement, and shall conform to the requirements of AASHTO M-36. Perforated pipe may be used on approval of the Director.

3. High-density polyethylene pipe (HDPE) conforming to ASTM D 3350, "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials" and AASHTO M-252 and AASHTO M-294. High-density polyethylene pipe shall not be allowed for flared ends or piping exiting manholes or catch basins to flared ends or outlets.
4. Polyvinyl Chloride Pipe (PVC) shall conform to ASTM Standard D1784 & D3034-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 D2444 and minimum pipe stiffness test at 5% deflection in accordance with ASTM D2412.
   d. The normal length of 12-inch size and smaller shall be 13 or 14 feet and 15-inch size shall be no longer than 20 feet.
   e. Pipe and fittings shall be manufactured in the United States of America. and shall be accompanied by the manufacturer's certificate of compliance, in addition to meeting the performance tests specified hereinafter.

The type of pipe allowable for cellar drains, conductor or perimeter drains shall be a minimum of 4 inches in diameter and limited to:
1. Polyvinyl Chloride Pipe conforming to ASTM Standard D1784 and D3034-SDR 35.
2. Cast Iron Pipe, not less than Class 24, conforming to ASA A21-8.
3. Ductile Iron Pipe, not less than Class 50.
Structures: Manholes and catch basins shall be precast concrete or concrete block conforming to standard dimensions shown on the typical detail. Precast cones and sections shall be constructed of reinforced concrete conforming to ASTM C-478 & AASHTO M199. Concrete shall be 4,000 psi minimum per ASTM C-478(6.1). Reinforcing steel shall conform to ASTM A-305 for bar reinforcement and ASTM A-185 for wire mesh and shall meet AASHTO H-20 loading. Manhole steps shall meet OSHA regulations 29 CFR1910.27, section 16 of ASTM C478 & section 10 ASTM C497. Butyl rubber joint sealant shall conform to ASTM C-900 & ASHTO M-198

Radial concrete blocks shall conform to ASTM C-139 and not be not less than 8 inches in length and of such shape that the joints can be effectively sealed and bonded with mortar.

Concrete for headwalls, footings and other structures shall have a minimum compressive strength of 4,000 psi at 28 days.

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.

Frames, covers, gratings and hoods: Shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes. All castings shall be true to pattern in form and dimensions, free from faults, sponginess, cracks, blowholes and other defects affecting their strength.

Outlet Control Structures: Shall be precast reinforced concrete conforming to standard dimensions of those shown on the typical detail. Concrete shall be 4,000 psi minimum per ASTM C-478(6.1). Reinforcing steel shall conform to ASTM A-305 for bar reinforcement and ASTM A-185 for wire mesh and shall meet AASHTO H-20 loading. Weir plates and trash baffles shall be ¼” thick stainless steel and shall be two separate pieces bolted to the outlet control structure with ¼” diameter stainless steel lag bolts and washers.
Construction Specifications  
Section IV - Drainage Construction

**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 1.5 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. Sheetin/shoring of trenches shall be the Contractor's responsibility 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 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 overdepth excavation below the footings of such structures shall be filled with concrete or as directed by the Town 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 Department of Public Works 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 (6) inches below grade and refilled to grade with suitable material as approved by the Town Engineer. 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 (6) inches when the pipe is laid in the trench with a normal alignment.

**Bedding:** 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. Bedding shall be comprised of a 6" layer of \( \frac{3}{4}'' \)- 1½” inch crushed stone for proper support and protection from settling.
Construction Specifications
Section IV - Drainage Construction

Excavation and Backfilling - continued.

Backfilling: The pipe shall be completely encased in an envelope of ¾” - 1½” inch crushed stone, approximately six (6) inches on each side and six (6) inches on the top & bottom. Stones larger than three (3) inches in diameter shall not be closer than twelve (12) inches to the pipe.

The trenches and other areas shall be backfilled with suitable excavated material to the extent available or with MassDOT M1.03.0 gravel borrow when excavated material is not available or suitable for backfill. All materials for backfilling shall be suitable and free from organic substances, large stones, roots, stumps and frost. No stones weighing over fifty (50) pounds shall be backfilled anywhere into the pipe trench.

Backfill for trenches, manholes & other structures shall be mechanically compacted to 95 percent of maximum dry densities of the same materials, as determined by AASHTO Standard Test T99, Method C, except that eighteen inches (18”) below finish grade of a roadway/common drive shall have 98 percent of maximum density. The contractor shall obtain the services of an independent testing company to perform daily compaction tests on the backfilled material. The tests shall be performed for every twelve inches (12”) of material backfilled. A copy of the compaction tests shall be furnished to the Town Engineer/Inspector on a daily basis.

If compaction by the puddling method is desired, the Contractor shall obtain permission from the Water Division who will install a hydrant meter. Charges for water so 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 Town. While puddling is underway and afterwards, until puddled areas have sufficiently hardened, the Contractor must protect the trench and the public with suitable barriers, lights, etc.
Construction Specifications  
Section IV - Drainage Construction

**INSTALLATION:**

**Pipe Laying:** All pipes, 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 pipe shall be laid to grades and alignment indicated on the approved plan by means of an interior pipe laser. Minimum allowable full flow pipe velocity of 3.0 feet per second shall be maintained by following the minimum slopes described below:

<table>
<thead>
<tr>
<th>Drain Pipe Design for Self-Cleansing Velocities</th>
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<tbody>
<tr>
<td>Drain Pipe Size</td>
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</tr>
<tr>
<td>12&quot;</td>
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<tr>
<td>15&quot;</td>
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<td>18&quot; to 21&quot;</td>
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<td>24&quot; to 30&quot;</td>
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<tr>
<td>36&quot; to 42&quot;</td>
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<td>48&quot;+</td>
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The maximum allowable full flow pipe velocity shall be **15 feet per second.**

**Joints:**

a. **Concrete Pipe (O-Ring Joint):** Reinforced concrete pipe (RCP) shall be joined using flexible watertight rubber gaskets conforming to ASTM C443 & C361.

b. **Corrugated Metal Pipe:** Joints shall be made by riveting or by means of connecting bands with bolted couplings in accordance with the recommendations of the pipe manufacturer. When the pipe laps at circumferential joints, the inner lap shall be on the downstream end of the culvert. Longitudinal laps shall be located at the horizontal axis.

c. **Ductile Iron Pipe:** Joints shall be made in accordance with the latest directions and specifications of the manufacturer.

d. **PVC 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 D3212.

e. **High-Density Polyethylene Pipe (HDPE):** Joints shall be bell and spigot meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be soil-tight and gaskets for diameters 12- through 60-inch, shall meet the requirements of ASTM F477. For diameters 4- through 10-inch, the joint shall be soil-tight using an engaging dimple connection. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.
Construction Specifications
Section IV – Drainage Construction

Installation – continued

Structures: All drainage structures shall be precast concrete conforming to the standard dimensions or those shown on the Town’s Standard details. All structures being installed within a new roadway construction shall be dropped and plated prior to gravel base course. Steel plates shall be set watertight on the structure with butyl sealant.

Catch basin frame & grates shall be set to binder grade prior to placement of HMA binder. Prior to any lot release recommendation to the planning board, the drainage system and its supporting BMP’s shall be installed and fully functional.

Block structures shall only be allowed for use with prior written approval from the DPW and shall conform to the dimensions shown on the typical details and 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 structures, and the inside, if required by the Town Engineer, shall be plastered and troweled smooth with 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 adjusted to finish grade using expanded polypropylene grade adjustment rings and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes. The frame casting shall be set true to line and final grade and sealed with a 4,000 psi concrete collar poured around the outside chimney from the concrete structure up to the bottom of the HMA binder course. The installation of the expanded polypropylene grade adjustment rings shall be done in the presence of a DPW Engineer.

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

Installation – continued.

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 50 pounds nor more than 125 pounds and at least 75% of the volume shall consist of stone weighing not less than 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 of its length or width.

Swales: Drainage swales shall have a bottom width at least equal to the diameter of the outfall pipe, with side slopes of 1 vertical to 2 horizontal. Soil from swales 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 swales.
CONSTRUCTION SPECIFICATIONS

SECTION V - 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, gate valves, fittings, hydrants, thrust blocks, etc. including all related work such as excavation, backfilling, compaction, testing and disinfecting. All work, filling, testing, and sampling must be done in the presence of the Town Inspector or Water Division personnel at all times. All apparatus and materials must meet the Inspector’s approval.

The Contractor shall perform his work in accordance with the plans, approved by the Planning Board and/or the approving authority in the Department of Public Works. Any proposed deviation to this rule shall be submitted as a special request, in writing, to the DPW for review and final approval.

Connection to Town’s System:

Water main connections to the Town’s distribution system will be inspected by the Engineering Division. The Contractor shall furnish all necessary materials and labor needed for such connection.

Whenever possible, water main connections shall be performed by professional installers equipped with a wet tapping machine that allows no interruption of service to existing water consumers.

No water supply will be shut off without giving a minimum of 24 hours’ notice to the consumers and stating the time when the supply will be turned off and turned back on. Permission to shut off water shall first be obtained from the Water Division who will shut the water off and turn it on again. Special care shall be taken so as not to damage consumers’ appurtenances; if such damages occur, the Contractor shall repair such damages at his own expense.

Water main extensions will be shut off from the Town’s distribution system at the connection gate valve until the water main is pressure tested for leakage, chlorinated, sampled and found to be bacteria free and until the first building is to be connected with a service and the meter set. Prior to the first building being connected and the water main reactivated, the water main shall be resampled. When long main extensions are installed, activation will be allowed only to service that portion which will be utilized by connections to existing buildings or buildings under construction. Arrangements may be made with the Water Division to temporarily activate the mains for testing or other purposes.
Construction Specifications
Section V - Water Main Construction

MATERIALS:

**Ductile Iron Pipe:** Water pipe shall be Class 52 double cement-lined ductile iron conforming in wall thickness to ANSI Spec. A21.51-1981, and AWWA C151, tar coated on the outside with push-on joints. Inside cement coating shall not be less than 1/8 inch and conform to ANSI Specs. A21.11-72 and A21.4-1980 and AWWA C-104. The pipe shall have normal laying lengths of at least 18 feet.

Jointing material shall be solid rubber rings with wedges and shipped separately from each length of pipe and shall conform to ANSI Spec. A21.11-1980 and AWWA C-111. The rubber rings shall be of solid cross-section. The full circumference of pipe joints shall be gaged with a feeler gage after assembly to verify proper seating of rubber rings.

Ductile Iron Pipe shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

**Water Main Fittings:** Fittings shall be either cast iron or ductile iron. Cast-iron fittings shall conform to the requirements of ANSI Spec. A21.10-1982 and AWWA C110. Fittings shall have a minimum working pressure of 150 p.s.i.

The fittings shall be cement-lined with a bituminous seal coat inside and outside in accordance with ANSI Spec. A21.11-1972 and A21.4-1980 and AWWA C104.

All fittings shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

**Tapping Sleeves:** Tapping sleeves shall be of split mechanical joint design, rating of 200 p.s.i., High Strength Cast Iron or Ductile Iron Bodies with a heavy coat of corrosion resistant coating and separate end and 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 pipe. Tapping sleeves shall conform to ANSI/AWWA standards.

Tapping sleeves shall have at least one testing port with plug and shall be pressure tested to 200 p.s.i. test pressure for five (5) minutes with no loss of pressure before the cutting of the pipe is started and must be approved by the Town’s representative.

Tapping sleeves shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.
Gate Valves: Gate valves for valves up to & including 12” shall be furnished in accordance with the requirements of the latest American Water Works Standard C509-87 for resilient seated gate valves and shall be in full compliance with the following supplementary requirements:

Valve body and bonnet shall be coated on all interior surfaces, in accordance with AWWA C550-90. Valve body exterior shall be coated with an appropriate coating of bonded epoxy or bitumastic to insure corrosion prevention.

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 iron.

The interior of the valve body shall be free of pocket or ledges where sediments 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 pressures.

Gate valves shall OPEN RIGHT with a square operating nut and the ends shall have mechanical joint fittings.

Resilient seated Tapping Valves shall be furnished with the tapping flange having a raised face or lip designed to engage the corresponding recess in the tapping sleeve flange in accordance with MSS 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 a misaligned shell cutter. The interior of the waterway in the body shall be full opening and capable of passing a full sized shell cutter.

Gate valves shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.
Construction Specifications  
Section V - Water Main Construction  

Materials - continued  

**Butterfly Valves (Rubber Seated):** Butterfly valves shall be utilized for valves larger than 12”. Butterfly valves shall be furnished in accordance with the requirements of the latest American Water Works Standard C504-Class 150-B and shall be in full compliance with the following supplementary requirements:

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

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 iron.

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 pressures.

Butterfly valves shall **OPEN RIGHT** with a 2” square operating nut and the ends shall have mechanical joint fittings (with joint accessories).

Butterfly valves shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

**Valve Boxes & Covers:** Valve boxes shall be cast iron, tar coated 5’-5½’ adjustable sliding type which include cast iron covers. Bell end of the lower sections shall in all cases be sufficiently large enough to fit over the stuffing boxes of the valves. The smallest inside dimension of the shaft shall not be less than 5¼ inches. Upper section shall have a flange sufficiently strong enough to furnish the bearing for that section so that all weight or jolting from street traffic or the like shall not be transmitted to the valve. Each valve box including cover shall weight at least 100 pounds. Valve box lid shall be drop type with “WATER” cast into lid.

Valve boxes & covers shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.
Construction Specifications
Section V - Water Main Construction

Materials – continued

**Hydrants:** Hydrants shall be furnished in accordance with the requirements of the latest American Water Works Standard (AWWA) C502 for Dry Barrel fire hydrants and shall be in full compliance with the following supplementary requirements:

The hydrants shall be of a dry top design with compression type main valve (opens against water pressure) and have a minimum of 5½” valve opening.

The operating threads shall be protected by a lubricant chamber that is sealed from the water-way by use of “O” rings. Dry top design is to include a factory lubricated operating mechanism which allows supplemental lubricant to be added in the field without removal of the top section. Standard lubricant where required shall be oil, which shall be suitable for human consumption and not pose a health threat if introduced into the Public Water Supply, and suitable for a temperature range of -60 to +150 degrees Fahrenheit.

The upper and lower sections of the hydrant shall be connected as such to prevent damage if struck by a vehicle (Traffic Hydrant). This design shall also permit the rotation of the hydrant to any position without excavation or disassembly of the operating components in the hydrant.

The main valve seat shall be bronze and threaded into a bronze bushing or sub-seat. The drain mechanism shall be integral with the valve assembly to provide flushing of the drain ports each time the hydrant is operated.

The hydrant inlet shall have a standard 6” mechanical joint connection complete with all accessories for connecting to Ductile Iron Pipe.

The internal parts of the hydrant shall be removable without excavating around the hydrant by use of manufacturers special hydrant tools.

Hydrant extension units shall be available in a minimum of 6” increments complete with rod extension couplings, flanges, gaskets, and hardware to facilitate raising of the hydrant where necessary.

The hydrant shall have (2) 2½” N.S.T., (National Standard Threads) hose nozzles with caps and (1) 4½"1 N.S.T. pumper nozzle with cap. Chains for retaining caps shall not be included. All cap threads shall have a thin even application of a high temperature anti-seize and lubricating compound such as Never-Seize, or equal.
Construction Specifications
Section V - Water Main Construction

Materials - 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, at least measure 1” (one inch) from point to flat at the base of the nut and the overall height of the nut shall be not less than 1”. Caps are to be provided with rubber gaskets.

The hydrant shall OPEN RIGHT. The operating direction of the hydrant valve must be clearly and permanently marked on the hydrant for quick reference by an operator. The hydrant exterior above ground level shall have received a coat of rust inhibitive primer and one coat of weather and chemical resistant, high gloss Red paint with exceptional color retention such as Pennsbury "Hydrant Hyde" or equal and the bonnet section shall receive a coat of durable red paint such as “Rust-Oleum” Acrylic Fire Hydrant Enamel or equal, over the primer.

Hydrants shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

Domestic Services: Piping for domestic services shall be limited to:

1. Copper tubing, shall be in accordance with and conforming to A.W.W.A. Specifications 7S-CR Type K or the latest edition of Federal Specs. W.W.T. Type K, as amended to 40 foot, 60 foot, or 100 foot coils, and 20 foot lengths. The size shall not be less than 1” for new construction and not less than ¾” for connection to existing services.
2. High Density Polyethylene copper tube size pipe #3408, SDR-9 rated for 200 psi used with compression fittings and meeting the requirements of ASTM D2737-81 (CTS).
Polyethylene pipe shall be manufactured in the USA with stainless steel connecting inserts and blue color coded. For connections to water mains up to and including 2” size services, the street side installation to the curb stop shall be Type K copper only.

Corporation stops: Shall be brass and in accordance with AWWA C800-55. Inlet CC thread and outlet copper compression and shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

Curb stops: Shall be brass and comply with all applicable parts of AWWA C800-55, inverted key, round way, combined cap and key with check, no drain, copper compression connections and shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

Curb boxes: Shall be arch pattern base 3½ x 4½ foot telescoping design with 30-inch stationary stainless steel rods. Covers shall have two holes for removal with spanner wrench or cone top covers with threaded brass pentagon plug for use in concrete or bituminous concrete.
Construction Specifications
Section V - Water Main Construction

EXCAVATION AND BACKFILLING:

The Contractor shall excavate all encountered materials to the depths shown on the drawings. Minimum pipe cover for all water pipe shall be five feet (5'-0''). Maximum pipe cover for all water pipe shall be six feet six inches (6'-6''). In no case shall the cover over the pipe exceed six feet six inches (6'-6'') without prior written approval from the Director. Urecon pre-insulated pipe or equal shall be used where five feet (5'-0'') of cover over water pipe cannot be achieved.

No tunneling shall be permitted in place of trench construction for the water mains, unless the road grade has been established in accordance with grade stakes previously set by a reputable engineer or surveyor at the expense of the Contractor.

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 1.5 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.

Care must be taken not to damage water pipes, drains, 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 Department of Public Works 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 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 fine material 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 (6) inches when the pipe is laid in the trench with a normal alignment.
Construction Specifications
Section V - Water Main Construction

Excavation and Backfilling - continued

Bedding of Water Mains: Six inch dirt mounds shall be used under the pipe. The clean earth with stones no larger than three (3) inches shall be hand shoveled and properly tamped beneath the pipe so that the pipe shall have a continuous and even bearing.

Bedding of Water Services: All water services shall be bedded in sand. Stone dust may be used with prior written approval by the Town Engineer.

The Contractor shall undercut unsuitable material and replace it with suitable material.

Backfilling: The trenches and other areas shall be backfilled with suitable excavated material to the extent available or with MassDOT M1.03.0 gravel borrow when excavated material is not available or suitable for backfill. All materials for backfilling shall be suitable and free from organic substances, large stones, roots, stumps and frost. No stones weighing over fifty (50) pounds shall be backfilled anywhere into the pipe trench. Stones larger than two (2) inches in diameter shall not be closer than twelve (12) inches to the pipe.

The backfill around the pipe shall be deposited by hand evenly on both sides to the centerline of the pipe and tamped with suitable tools, then filled in by hand for one (1) foot above the pipe before backfilling with a machine. The remaining backfill shall be compacted by machines, compactors or puddling, in which case a water charge will be made. While puddling is underway and afterwards, until the puddled areas have sufficiently hardened, the Contractor must protect the trench and the public by suitable barriers, lights, etc. 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.

Backfill for trenches & other structures shall be mechanically compacted to 95 percent of maximum dry densities of the same materials, as determined by AASHTO Standard Test T99, Method C, except that eighteen inches (18”) below finish grade of a roadway/common drive shall have 98 percent of maximum density. The contractor shall obtain the services of an independent testing company to perform daily compaction tests on the backfilled material. The tests shall be performed for every twelve inches (12”) of material backfilled. A copy of the compaction tests shall be furnished to the Town Engineer/Inspector on a daily basis.
Construction Specifications
Section V - Water Main Construction

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. Pipe shall be backfilled as necessary to prevent floating. Any pipe which has floated shall be removed from the trench and re-laid to the satisfaction of the Inspector. When pipe laying is not in progress, the open ends of all pipe lines shall be closed to keep out all foreign material and trench water.

Where water mains or water services have less than a ten (10) foot horizontal separation and are closer than eighteen (18) inch vertical separation to a sewer main or sewer service, the sewer pipe shall be sleeved with ductile iron pipe or SDR-35 PVC pipe of sufficient diameter for a distance of ten (10) feet away from the water main or water service and sealed at each end with rubber couplings and stainless steel bands or encasement of sewer pipe in concrete with a minimum thickness of six (6) inch in all directions around the outside of the pipe extending to a distance that will provide ten (10) feet horizontal or eighteen (18) inch vertical separation from the water main or water service.

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

Where water mains are within eighteen (18) inches of a drain line, the area surrounding all pipes shall be filled with 3/4 inch crushed stone from the bottom of the deepest newly excavated trench to one foot above the uppermost pipe.

Tapping Sleeves:

A. Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned, and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder at the rate of approximately 150 mg per square foot of surface area. Also see (Chlorination Procedures When Cutting Into Or Repairing Existing Mains).

B. Tapping sleeves shall be pressure tested to 200 p.s.i. test pressure for an estimated 5min with no loss of pressure before the cutting of the pipe is started and must be approved by the Town’s representative.
Construction Specifications  
Section V - Water Main Construction  

Installation - continued.  

Gate Valves and Hydrants:  All gate valves and hydrants shall be set plumb.  Valves, hydrants and all other fittings shall be connected with short lengths of pipe.  

Hydrants shall have the steamer nozzle facing the roadway.  Six (6) inch diameter ductile iron pipe shall be used for hydrant laterals.  Each hydrant must be valved on the lateral with a six (6) inch gate valve, box and cover.  Concrete thrust blocks shall be placed between the back of the hydrant and the undisturbed bank.  The concrete must not obstruct the hydrant drain.  

A pit at least twelve (12) inches in depth below the bottom of the hydrant and at least eighteen (18) inches in radius shall be dug at each hydrant.  This pit and space around the hydrant shall be re-filled to within two (2) feet of the ground surface with clean stone.  The backfilling around the hydrant shall be thoroughly tamped.  

After installation, hydrants shall be painted RED over the primer, with two coats of “Rust-Oleum” Acrylic Fire Hydrant Enamel or pre-approved equal.  The hydrant shall also be equipped with a red and white springless heavy duty 3/8” diameter by five (5’) foot fiberglass hydrant marker with a 2½” loop mount.  

Joints:  Joints in grooved rubber gasket and mechanical joint ductile iron pipe shall be made in accordance with the latest directions and specifications of the manufacturer.  

Concrete Backing:  The Contractor shall be responsible to supply and install concrete thrust blocks at all bends, tees, end caps and hydrants as shown on the Standard Detail.  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.  Solid concrete thrust/barrel blocks or other methods may be approved by the Town Engineer.  Stone shall not be allowed for use as thrust blocks.  

Dead End Mains:  All dead ends of mains without a terminal hydrant shall have a one (1) inch tap installed within two (2) feet of the end of the main with a copper flow for flushing purposes.  The flow shall consist of a one (1) inch corporation stop threaded into the main and attached to a one (1) inch curb stop with copper tubing; a length of copper tubing shall lead from the curb stop to the surface of the ground.  The curb stop shall turn left 1/4 turn to open and have an Erie type curb box with two (2) hole cover.  The line cap shall be held in place by a thrust block.  The flow curb box shall be in the shoulder of the roadway with the outlet directed toward the street surface.
Construction Specifications  
Section V - Water Main Construction

Installation - continued.

**Domestic Services:** Minimum size for a domestic service shall be one (1) inch. All services larger than one (1) inch shall be made with a ductile iron service saddle with double-stainless steel straps, tapped to the desired size with a corporation and a goose neck in the copper, close to the corporation stop for expansion. Wet taps shall be required on existing or newly installed water mains. The tap for a water service shall be performed in the presence of a DPW Engineer/Inspector. Taps shall be made to the upper quadrant of the pipe. Domestic services shall not be tapped off a dedicated fire service line. The Contractor shall furnish all necessary materials, equipment and labor needed for the installation.

From the main to the curb stop, all services shall be type “K” copper. High density polyethylene or copper may be used from the curb stop to the meter and shall be of one diameter. All services from the main to the foundation shall have a minimum cover of five (5) feet. Services shall enter the building at a 90 degree angle from the street directly into the front or either side.

Curb stops shall be placed two (2) feet from the property line on the town side. Services requiring tubing in lengths longer than is commonly commercially purchased shall be connected with compression-type, three part brass couplings.

Meter pits shall not be installed without prior written approval from the DPW or the Water Department Superintendent and shall be installed according to the latest "Meter Pit Detail".

Meter stops, meter connections and blanks will be furnished, but not installed, by the Water Division. Requests for meters to be set and water turned on shall be made, after the DPW Engineer/Inspector has determined that the service line has been installed properly and is leak free, to the Water Department at least 24 hours in advance.
Installation - continued.

Fire Services: The tap for a fire service shall be performed in the presence of a DPW Engineer or Water Division representative. Wet taps shall be required on existing water mains, whenever possible, with the installation of a tapping gate and sleeve. The Contractor shall furnish all necessary materials, equipment and labor needed for the installation.

Fire lines shall be considered extensions of the water main and require pressure testing and chlorination as described in these specifications. After pressure testing and chlorination, the line shall be flushed at 2.5 feet per second until the fire line is clear of chlorinated water. The Sprinkler Contractor will then be allowed to flush the fire line at the NFPA 13 flow rate of 10 feet per second, where system conditions allow. The Sprinkler Contractor shall monitor system pressure at the nearest hydrant off-site in order to maintain a minimum system pressure of 20 psi during flushing operations. In no case shall the Sprinkler Contractor allow system pressure to drop below the minimum requirement of 20 psi. The Sprinkler Contractor shall furnish all necessary materials, equipment and labor required to perform the flushing.

All testing shall be in the presence of a DPW Engineer or Water Division representative. All public water system valves shall be operated by a DPW Engineer or Water Division representative. After testing is completed by the Sprinkler Contractor, the line shall again be chlorinated as described in these specifications.
Construction Specifications
Section V - Water Main Construction

TESTING:

Hydrostatic Testing and Chlorination of Water Mains:

All water mains and apparatus shall be subject to hydrostatic pressure test for leakage and upon acceptance of such test, shall be properly disinfected for bacteriological purposes. All procedures shall comply with AWWA Standards #’s ANSI/AWWA C600-82 and AWWA C651-86. All work shall be performed by workmen who are experienced and well acquainted with pressure testing and disinfection procedures.

Fire lines shall be considered extensions of the water main and require pressure testing and chlorination as described in these specifications. After pressure testing and chlorination, the line shall be flushed at 2.5 feet per second until the fire line is clear of chlorinated water. The Sprinkler Contractor will then be allowed to flush the fire line at the NFPA 13 flow rate of 10 feet per second, where system conditions allow. The Sprinkler Contractor shall monitor system pressure at the nearest hydrant off-site in order to maintain a minimum system pressure of 20 psi during flushing operations. In no case shall the Sprinkler Contractor allow system pressure to drop below the minimum requirement of 20 psi. The Sprinkler Contractor shall furnish all necessary materials, equipment and labor required to perform the flushing.

All testing shall be in the presence of a DPW Engineer/Inspector or Water Division representative. All public water system valves shall be operated by a DPW Engineer/Inspector or Water Division representative. After testing is completed by the Sprinkler Contractor the line shall again be chlorinated as described in these specifications.
Construction Specifications
Section V - Water Main Construction

Filling: In order to perform the strength and leakage test, the main should be filled slowly (so as 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.

Flushing: All new water mains, and existing water mains that have been drained and cut-into for making connections, shall be thoroughly flushed prior to pressure or leakage testing or final chlorination. Flushing shall be accomplished by partially opening and closing valves, hydrants, and blowoffs, several times, under expected line pressure, with flow velocities of not less than 3.0 feet per second, in the main(s). The size and number of hydrant outlets or main taps to provide the required flow (at 40 psi residual pressure) is as follows:

1. **MINIMUM REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES**
   (40 psi Residual Pressure in Water Mains)

<table>
<thead>
<tr>
<th>Pipe Diameter (in.)</th>
<th>Flow Required to Produce 3.0 ft/sec Velocity in Main (gpm)</th>
<th>Size of Tap Used (in.)</th>
<th>Number of Taps Required on Pipe</th>
<th>Number of Hydrant Outlets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>1(^1/2)</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>120</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>260</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>470</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>730</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1,060</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>1,880</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With a 40-psi pressure in the main with the hydrant flowing to atmosphere, a 2\(^1/2\)-in. hydrant outlet will discharge approximately 1,000 gpm; and a 4\(^1/2\)-in hydrant outlet will discharge approximately 2,500 gpm.

2. If less than a 40 psi residual is available in the main, with the size tap shown above, then a larger or more tap(s) or hydrant outlets will be required, as directed by the Town Inspector or the Water Division Representative.

3. The length of time for flushing, at or above the minimum allowable velocity, shall be computed to allow a minimum of 3 times the total volume of water stored in the main(s) to be flushed to waste. Flushing shall be done in the presence of the Town Inspector or the Water Division Representative.
Construction Specifications
Section V - Water Main Construction

Pressure Testing:

A. All new water mains, or any valved sections thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure that will exist at the point of testing, or the rated pressure of the pipe, whichever is greater. Test pressures shall meet the following requirements:

1. Be of at least 2 hour duration.
2. Be not less than 1.25 times the expected system working pressure at the highest point along the test section or 150 psi, whichever is greater.
3. Not exceed pipe or thrust-restraint design pressures.
4. Not vary by more than ±5 psi for the duration of the test.
5. Not exceed 2 times the rated pressure of the valves or hydrants when the pressure boundary includes closed gate valves or hydrants. Valves shall not be operated in either direction at differential pressure greater than the rated pressure.
6. Not exceed 1 times the rated pressure of the valves when the pressure boundary of the test section includes closed butterfly valves or resilient seated gate valves.
7. Test shall be done with a liquid filled pressure gauge 0-200 psi range, with two pound increments. No test will be performed with gauges that exceed 200 psi.

B. Air Removal: Following flushing, and before applying the specified test pressure, air shall be completely expelled from the pipes, valves and hydrants. After all air has been expelled, the air blowoffs can be closed, and the test pressure applied.

C. Pressure Test: Each valved section of pipe shall be slowly raised to the specified test pressure for two separate periods. The first period shall be for 15 minutes, after which the pressure in the test section shall be allowed to drop slowly back to system pressure. The pressure shall then be slowly raised again to the specified test pressure and maintained for 2 hours. The test pressure shall be applied by means of a pump connected to the pipe, in a manner satisfactory to the Town Inspector or the Water Division Representative, and which will prevent backflow into the existing system. Valves shall not be operated in either the closing or opening direction, at differential pressure greater than the rated pressure.

D. Examination: Any exposed pipe, fittings, valves, hydrants and joints shall be carefully examined during the test. Any damaged or defective pipe, fittings, hydrants or valves discovered following, or as a result of the pressure test shall be repaired or replaced with sound material. If faulty materials are removed and replaced, the pressure testing procedure shall be repeated until satisfactory to the Town Inspector or the Water Division Representative.
Construction Specifications
Section V - Water Main Construction

Leakage Test:

A. Leakage testing shall be conducted concurrently with the pressure test.

B. Leakage Defined: Leakage shall be defined as the quantity of water that must be pumped into the new main, or any valved section thereof, to maintain pressure within ±5 psi of the specified test pressure, after the main(s) have been filled with water and all air has been expelled. Leakage shall be recorded to the nearest one-tenth of a gallon, by means of a calibrated test meter. If allowed by the Town Inspector or the Water Division Representative, drawdown may be measured in a calibrated barrel. All records and charts shall become the property of the Town. The Contractor shall employ qualified personnel throughout the testing. Leakage shall not be measured by a drop in pressure over a period of time.

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

\[
L = \frac{SD(\sqrt{P})}{148000}
\]

where
- \(L\) = allowable leakage gallons per hour
- \(S\) = the length of pipe tested, in feet
- \(D\) = the nominal pipe diameter in inches
- \(P\) = the average test pressure during the test, in psi

D. The leakage formula is based on the allowable leakage of 10.49 gallons per day, per mile of pipe, per inch (nominal) of pipe diameter, at a pressure of 150 psi. Allowable leakage at various pressures, for various pipe diameters are shown below.

1. ALLOWABLE LEAKAGE PER 1000 FEET OF PIPELINE (gph)

<table>
<thead>
<tr>
<th>Average Test Pressure (psi)</th>
<th>NOMINAL PIPE DIAMETER – (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td>250</td>
<td>0.64</td>
</tr>
<tr>
<td>225</td>
<td>0.61</td>
</tr>
<tr>
<td>200</td>
<td>0.57</td>
</tr>
<tr>
<td>175</td>
<td>0.54</td>
</tr>
<tr>
<td>150</td>
<td>0.50</td>
</tr>
<tr>
<td>125</td>
<td>0.45</td>
</tr>
<tr>
<td>100</td>
<td>0.41</td>
</tr>
</tbody>
</table>
2. If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

3. When testing against closed metal seated valves, an additional leakage shall be allowed per closed valve, of 0.0078 gallons per hour, per inch of nominal valve diameter.

4. When hydrants are in the test section, the test shall be made against the closed hydrant(s) and open gates.

5. Zero leakage will be allowed on the bridge crossings or jacking or borings.

E. Acceptance shall be determined on the basis of allowable leakage. If any test of pipe discloses leakage greater than that specified, the Contractor shall locate and make repairs as necessary until the leakage is within the specified allowance.

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

2. All water mains shall be pressure and leakage tested in the presence of the Town Inspector or the Water Division Representative, in order to qualify for acceptance.

Chlorination of Water Mains:

A. The method of chlorination shall be the Continuous Feed Method as described hereinafter, and as approved by the Owner and the Town Inspector or the Water Division Representative.

B. Continuous Feed Method of Chlorination. The continuous feed method consists of the following steps:

1. Upon completion of construction, fill mains with potable water and remove all air from high spots and/or pockets.

2. Flush the completed main(s) to remove particles. Following the filling and flushing of the main(s), and before chlorination, complete all hydrostatic testing to the satisfaction of the Town Inspector or the Water Division Representative.

3. Fill the main(s) with chlorinated potable water, having an initial concentration of 25 mg/l free chlorine residual in the main(s).

   A. Water from the existing distribution system or other approved source of supply shall be made to flow at a constant measured rate, into the new main(s). In the absence of a meter, the rate may be approximated by methods such as placing a pitot gauge in the discharge or measuring the time to fill a container of known volume.

4. At a point not more than 10 feet downstream from the beginning of the new main(s), water entering the new main shall receive a dose of hypochlorite solution fed at a constant rate such that the water in the main(s) will have not less than 25 mg/l free available chlorine. To assure that this concentration is achieved, the Contractor shall measure chlorine concentration at regular intervals along the main(s), using appropriate chlorine test kits, or as otherwise described in the current edition of A.W.W.A. M12 — Simplified Procedures for Water Examination.
Construction Specifications
Section V - Water Main Construction

C. The amount of chlorine required to obtain a concentration of 25 mg/l per 100 feet of various diameter pipes are as follows:

1. **CHLORINE REQUIRED TO OBTAIN A CONCENTRATION OF 25 MG/L PER 100 FEET OF PIPE.**

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.03</td>
<td>0.02</td>
<td>0.02</td>
<td>0.01</td>
<td>0.32 ounces</td>
</tr>
<tr>
<td>6</td>
<td>0.08</td>
<td>0.04</td>
<td>0.03</td>
<td>0.03</td>
<td>0.75 ounces</td>
</tr>
<tr>
<td>8</td>
<td>0.13</td>
<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
<td>1.30 ounces</td>
</tr>
<tr>
<td>10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.09</td>
<td>0.07</td>
<td>2.10 ounces</td>
</tr>
<tr>
<td>12</td>
<td>0.28</td>
<td>0.15</td>
<td>0.12</td>
<td>0.10</td>
<td>2.95 ounces</td>
</tr>
<tr>
<td>16</td>
<td>0.50</td>
<td>0.25</td>
<td>0.22</td>
<td>0.17</td>
<td>5.30 ounces</td>
</tr>
<tr>
<td>20</td>
<td>0.80</td>
<td>0.40</td>
<td>0.34</td>
<td>0.28</td>
<td>8.40 ounces</td>
</tr>
<tr>
<td>24</td>
<td>1.15</td>
<td>0.60</td>
<td>0.50</td>
<td>0.40</td>
<td>12.00 ounces</td>
</tr>
</tbody>
</table>

2. The above quantities are to be added to a sufficient quantity of water, dissolved, and mixed. The entire solution shall be injected into the main as specified.

3. The quantities shown are based on concentrations of available chlorine by volume. Extended or improper storage may have caused a loss of available chlorine.

4. For concentrations of 50 ppm, double the quantities listed.

D. During the application of chlorine, valves shall be closed to prevent strong chlorine solution in the new main(s) from flowing into the existing system. Chlorine application shall continue until the entire main(s) is filled with water having 25 mg/l of free available chlorine. The chlorinated water shall be retained in the main(s) for at least 24 hours, during which time all valves and hydrants in the section(s) being treated shall not be operated, in order to disinfect the appurtenances. At the end of this 24 hour period, all portions of the main(s) and appurtenances being tested shall have a free available chlorine residual of at least 10 mg/l. If less than 10 mg/l free chlorine residual is measured, the main(s) shall be flushed and the entire disinfection procedure repeated.

E. Hypochlorite solutions shall be applied to the water main(s) with a gasoline or electrically powered chemical feed pump designed for feeding chlorine solutions. Feed lines shall be of such material and strengths as to safely withstand corrosion caused by the concentrated chlorine solutions, and also the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the main.
Final Flushing:

A. After the specified retention period, the heavily chlorinated water shall be flushed from the main(s) until chlorine measurements show the concentration in the water leaving the main(s) is no higher than that generally prevailing in the system.

B. Arrangements shall be made with the Owner to flush the main(s) of chlorinated water. Great care shall be exercised in the selection of the rate of flow and the discharge points, in order to minimize complaints, and damage to public and private property.

C. The environment to which the chlorinated water is to be discharged shall be inspected. If it appears possible that the chlorinated discharge will cause damage to the environment, a reducing agent shall be applied to the water to thoroughly neutralize the chlorine residual remaining in the water. If necessary, state, federal, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

Bacteriological Tests:

A. Standard Conditions: After final flushing and before the water main(s) is placed in service, water samples shall be collected at each sampling point designated by the Town Inspector or the Water Division Representative and tested for bacteriological quality in accordance with Standard Methods. Water samples shall show the absence of coliform organisms and background bacteria. A standard plate count will be required by the Town Inspector or the Water Division Representative and must have at or below 50 ml before it can be accepted.

B. Special Conditions: If during construction, trench water has entered the main(s), or if in the opinion of the Inspector or the Water Division Representative excessive quantities of dirt or debris have entered the main(s), bacteriological samples shall be taken at intervals of approximately 200 feet and shall be identified as to location. Samples shall be taken of water that has stood in the main(s) for at least 24 hours after final flushing has been completed.

C. Sampling Procedure: Samples for bacteriological analysis shall be collected, by the Inspector, in sterile bottles treated with sodium thiosulfate. No hose or fire hydrant shall be used in the collection of samples. A corporation cock shall be installed in the main with a copper tube gooseneck assembly. After samples have been collected, the gooseneck assembly shall be removed and replaced with a brass plug.
Construction Specifications
Section V - Water Main Construction

Bacteriological Tests – continued.

D. The Inspector shall deliver samples to a State approved laboratory for bacterial analysis. Only after each consecutive sample is approved shall the main(s) be incorporated into the water system. In the event, that positive reports of contamination are received, the main(s) shall be flushed and chlorinated as many times as may be necessary to obtain approved (negative) results.

Re-Chlorination:

A. If the initial chlorination fails to produce satisfactory bacteriological samples, the main(s) shall be flushed and resampled. If check samples show the presence of coliform organisms, then the main(s) shall be rechlorinated by the continuous feed method of chlorination, until satisfactory results are obtained. High velocities in the existing system, resulting from flushing the new main(s), may disturb sediment that has accumulated in the existing mains. When check samples are taken, the Contractor shall sample water entering the new main(s).

B. A maximum of two (2) sampling rounds will be allowed. If the second round of sampling fails to produce satisfactory bacteriological samples, the Contractor shall re-apply for testing and inspection fees prior to any additional chlorination or testing.

Chlorination Procedures When Cutting Into or Repairing Existing Mains:

A. The following procedures apply when mains are wholly or partially dewatered. After the appropriate procedures have been completed, the main may be returned to service prior to completion of bacteriological testing, in order to minimize the time customers are out of water. Leaks or breaks that are repaired with clamping devices while the mains are full of water under pressure present little danger of contamination and require no disinfection.

1. Trench Treatment. When an old main is opened, either by accident or on purpose, the excavation will likely be wet and may be contaminated from nearby sources of sewage or other pollutions. Liberal quantities of hypochlorite tablets shall be applied to open trench areas to lessen the danger from pollution.

2. Swabbing with Hypochlorite Solution. The interior of all pipe and fittings used in making a repair (particularly couplings and sleeves) shall be swabbed or sprayed with a 1 percent hypochlorite solution before they are installed.

3. Flushing. If valve and hydrant locations permit thorough flushing toward the work location from both directions, it shall be done. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.
Chlorination Procedures When Cutting Into or Repairing Existing Mains – continued

4. Slug Chlorination. Where practical in addition to the procedures above, a section of main in which the break is located shall be isolated. All service connections shall be shut off, and the section flushed and chlorinated by the slug method and the dose may be increased to as much as 300 mg/l, and the contact time reduced to as little as 1-hour. After chlorination, flushing shall be resumed and continued until discolored water is eliminated and the water is free of noticeable chlorine odor.

5. Bacteriological samples shall be taken after repairs. If the direction of flow is unknown, samples shall be taken on each side of the main break. If positive samples are recorded, daily sampling shall be continued until two consecutive negative samples are recorded. Positive samples shall be evaluated by the Town Inspector or the Water Division Representative for corrective action.

ALL THE WATER USED FOR FILLING, TESTING, DISINFECTING AND FLUSHING WILL BE CHARGED TO THE CONTRACTOR. APPLICATIONS AND PAYMENT OF CURRENT SET FEES MUST BE MADE BEFORE TESTING TAKES PLACE.

A MAXIMUM OF TWO (2) SAMPLING ROUNDS WILL BE ALLOWED. IF THE SECOND ROUND OF SAMPLING FAILS TO PRODUCE SATISFACTORY BACTERIOLOGICAL SAMPLES, THE CONTRACTOR SHALL RE-APPLY FOR TESTING AND INSPECTION FEES PRIOR TO ANY ADDITIONAL CHLORINATION OR TESTING.
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, approved by the Planning Board, and/or the approving authority in the Department of Public Works.

The Contractor shall familiarize himself with and abide by all applicable sections of the latest edition of 310 CMR 15 State Environmental Code, Title 5 & MassDEP TR-16 Chapter IX.

Connection to Town’s System. Sanitary sewer main connections to the Town’s system shall be made either by the Town or by the Contractor at the discretion of the Director. The contractor shall furnish all necessary materials needed for such connections, including materials for construction of a required manhole.

“The requirements of this Section shall include all modifications to the existing sanitary sewer system including but not limited to the relocation of pipeline and structures, adjustment to manhole frames and covers, and all related appurtenant work.”
Construction Specifications
Section VI - Sanitary Sewer Construction

MATERIALS:

Pipe for Gravity Sewer: Pipe for sewer construction of gravity lines including services, service stubs up to the property line and couplings shall be limited to:

1. Polyvinyl Chloride Pipe (PVC). PVC sewer pipe for gravity sewers and service connections shall conform to ASTM Standard D1784 and D3034-SDR35, 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 D3212.
   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 D2444 and minimum pipe stiffness test at 5% deflection in accordance with ASTM D2412.
   e. The normal length of 12-inch size and smaller shall be 13 or 14 feet and 15-inch size shall be no longer than 20 feet.
   f. Pipe and fittings shall be manufactured in the United States of America and shall be accompanied by the manufacturer's certificate of compliance, in addition to meeting the performance tests specified hereinafter.

2. Ductile Iron Pipe. Piping for shallow installations, less than three (3) feet of depth, shall be ductile iron pipe. No installation shall have less than three (3) feet of cover.

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

All pipe services from the property line to ten (10) feet from the foundation wall shall be limited to:

1. Polyvinyl Chloride Pipe (PVC) sewer pipe conforming to ASTM D1784 and D3034-SDR 35

Fittings and special couplings for connecting different pipe sizes or materials shall be made according to pipe manufacturers’ recommendations.
Construction Specifications  
Section VI - Sanitary Sewer Construction  

Materials - continued.

**Manholes:** All manholes shall be precast concrete with extended base, conforming to standard dimensions or those shown on the typical detail. Precast manhole cones and sections shall be constructed of reinforced concrete sections, conforming to ASTM C-478. Concrete shall have a minimum compressive strength of 4,000 PSI at 28 days. The exterior surface of all sanitary sewer manholes shall be damp proofed with two (2) coats of a semi-mastic fibrated asphalt waterproof coating conforming to ASTM Standard D2383, Type I. Application rate shall not be less than one gallon per 50 square feet of surface area. Minimum thickness of 7 mils per coat and a total thickness of 14 mils; however, in no case shall the thickness per coat be less than that recommended by the manufacturer.

Brick for the construction of sewer inverts 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 I1. 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" and the YEAR of installation. Frames and covers shall be manufactured in the USA and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

Cross-country locking watertight frames shall be anchored to the precast concrete cone with four (4) (5/8”Ø x 5” min.) stainless steel threaded rods, 11 threads/inch, bolts & washers. 

Manholes shall also be sealed between the precast concrete cone section and the metal frame with an expanded polypropylene grade adjustment ring and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.
Construction Specifications
Section VI - Sanitary Sewer Construction

Materials - continued.

Pipe For Low Pressure Sewer Mains: Pipe for sewer main construction of low pressure sewer lines including service stubs up to the property line and couplings shall be limited to:

1. Polyvinylchloride (PVC) SDR21 force main pipe with push-on bell and spigot joint connections.

2. Brass pipe for cleanouts at main terminal ends. All piping shall have threaded connections to fittings which will also be brass.

Service connections shall consist of a wye and a one and one half (1½”) inch diameter pipe from the sewer force main to the property line and an E-ONE Stainless Steel Uni-Lateral Curb Stop/Check Valve Assembly with compression fittings.

Pipe for services from the property line to the grinder pump shall be limited to:
   1. High Density Polyethylene Pipe PE4710, green coded (1¼”) IPS SDR-11 rated for 200 psi.

Grinder Pumps: Grinder pumps shall be limited to the E-One Extreme Series DH071. Flood zone pumps shall be limited to E-One Extreme Series DH071-93. All pumps shall be installed per manufactures’ requirements and shall be purchased from the Town.
Construction Specifications  
Section VI - Sanitary Sewer Construction

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 1.5 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.

The Contractor shall undercut unsuitable material and replace it with selected material composed of screen gravel with stones not larger than 1½ inches.

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 Department of Public Works 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 (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 bedding shall be comprised of a six (6) inch layer of ¾” - 1 ½” 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.
Backfilling: The pipe shall be completely encased in an envelope of ¾”- 1 ½” inch crushed stone, approximately six (6) inches on each side and six (6) inches on the top & bottom. Stones larger than three (3) inches in diameter shall not be closer than twelve (12) inches to the pipe.

The trenches and other areas shall be backfilled with suitable excavated material to the extent available or with MassDOT M1.03.0 gravel borrow when excavated material is not available or suitable for backfill. All materials for backfilling shall be suitable and free from organic substances, large stones, roots, stumps and frost. No stones weighing over fifty (50) pounds shall be backfilled anywhere into the pipe trench.

Backfill for trenches, manholes & other structures shall be mechanically compacted to 95 percent of maximum dry densities of the same materials, as determined by AASHTO Standard Test T99, Method C, except that eighteen inches (18”) below finish grade of a roadway/common drive shall have 98 percent of maximum density. The contractor shall obtain the services of an independent testing company to perform daily compaction tests on the backfilled material. The tests shall be performed for every twelve inches (12”) of material backfilled. A copy of the compaction tests shall be furnished to the Town Engineer/Inspector on a daily basis.

If compaction by the puddling method is desired, the Contractor shall obtain permission from the Water Division who will install a hydrant meter. Charges for water so 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 Town. While puddling is underway and afterwards, until puddled areas have sufficiently hardened, the Contractor must protect the trench and the public with suitable barriers, lights, etc.

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

<table>
<thead>
<tr>
<th>Sieve (square openings)</th>
<th>Per Cent Passing (by weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1½ inch</td>
<td>100</td>
</tr>
<tr>
<td>1 inch</td>
<td>35-70</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>0-15</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-5</td>
</tr>
</tbody>
</table>

The use of selected material shall be as directed by the engineer.
Construction Specifications
Section VI – Sanitary Sewer Construction

INSTALLATION:

Pipe Laying: All pipes, 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 pipe shall be laid to grades and alignment indicated on the approved plan by means of an interior pipe laser. Self-cleansing velocities of two (2) feet per second shall be maintained by following the minimum slopes described below. Terminal sewers require greater minimum slopes because of the low flows and velocities at the head of a terminal line.

<table>
<thead>
<tr>
<th>Sewer Size</th>
<th>Minimum Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>8” (terminal sewers only)</td>
<td>0.008 ft/ft</td>
</tr>
<tr>
<td>8”</td>
<td>0.004 ft/ft</td>
</tr>
<tr>
<td>10”</td>
<td>0.0028 ft/ft</td>
</tr>
<tr>
<td>12”</td>
<td>0.0022 ft/ft</td>
</tr>
<tr>
<td>15”</td>
<td>0.0015 ft/ft</td>
</tr>
<tr>
<td>18”</td>
<td>0.0012 ft/ft</td>
</tr>
</tbody>
</table>

For service connections from the main to ten (10) linear feet of pipe from the foundation*, the minimum slope shall be two (2) percent. Final location of the stub at the property line shall be located on an "as built" plan giving the station at the wye, the length of the service from the main, the depth at the property line and at least two swing ties. Per 248 CMR 10.00: Uniform State Plumbing Code*

Where sewer mains or sewer services have less than a ten (10) foot horizontal separation and are closer than eighteen (18) inch vertical separation to a water main or water service, the sewer pipe shall be sleeved with ductile iron or SDR-35 PVC pipe of sufficient diameter for a distance of ten (10) feet away from the water main or water service and sealed at each end with rubber couplings and stainless steel bands, or encasement of sewer pipe in concrete with a minimum thickness of six (6) inch in all directions around the outside of the pipe extending to a distance that will provide ten (10) feet horizontal or eighteen (18) inch vertical separation from the water main or water service.

When the excavation for a sewer exposes other utilities, the area surrounding all pipes shall be filled with 3/4 inch crushed stone from the bottom of the deepest newly excavated trench to one (1) foot above the uppermost pipe.

The service connection ten (10) feet from the foundation to the main should not have an angular deviation of more than 180 degrees. All deflections, with the exception of pipe joints, shall be in the form of long sweeps and not short angular fittings.
Construction Specifications
Section VI - Sanitary Sewer Construction

Installation – continued:

Open ends of sewer pipe and cleanouts shall be sealed with caps or plugs as recommended and furnished by the manufacturer.

Repair couplings will not be allowed on new main installation within 1.5 pipe lengths from SMH. No more than two (2) repair couplings per manhole segment will be permitted.

Rubber Fernco’s will not be allowed on new main installation.

Clean-outs for each gravity sewer services shall be in the form of a tee-wye of six (6) inch diameter with a straight riser to the ground to afford a visual inspection of the service flow and shall be located within the Town right of way, as shown in the Town’s standard detail. The property line clean-out shall be installed with PVC SDR-35 pipe to within six (6) inches of the finish grade surface and provided with a threaded PVC male to female clean-out cover (plug). The threaded female fitting is to be glued to the PVC SDR-35 cleanout riser. A ten (10) inch cast iron clean-out cover marked "SEWER" is required over the riser and shall be purchased from the Town. The cover shall be set by the Contractor so as to be flush with the final grade level of the ground or asphalt. In addition, clean-outs shall be located on long services not more than 100 feet apart. When the distance between the building and the property line is more than 100 feet, a clean-out shall be located at one-half the distance, but not more than 100 feet apart. Clean-outs on long services within the property have to be brought to within six (6) inches of the finish grade surface and do not require a cast iron cover. See Town’s standard sewer cleanout detail.
Manholes: All manholes shall be precast concrete with an extended base as shown on the Town’s Standard Sewer Manhole Detail.

The exterior joints between sections shall be sealed with a minimum nine (9) inch wide external joint wrap and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

The interior joints between sections shall be sealed with an interior joint seal and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes.

Connections between the manhole and pipes shall be made with a synthetic flexible rubber boot and stainless steel strap for water tightness. Core drilling shall be required on any connection to existing manholes with a rubber boot inserted between the manhole and the pipe.

Lifting holes inside & outside shall be filled solid with hydraulic cement.

All structures being installed within a new roadway construction shall be dropped and plated prior to gravel base course and prior to installation of HMA binder course. Steel plates shall be set watertight on the structure with butyl sealant.

In no case shall utilities be connected to a dwelling or commercial building prior to the structures being raised at least to the HMA binder course.

The frame casting shall be adjusted to finish grade using expanded polypropylene grade adjustment rings and shall conform to the latest revision of the Town’s specifications for materials which are used for bidding purposes. The frame casting shall be set true to line and final grade and sealed with a 4,000 psi concrete collar around the outside chimney from the concrete structure up to the bottom of the HMA binder course. The installation of the expanded polypropylene grade adjustment rings shall be done in the presence of a DPW Engineer.
Construction Specifications
Section VI - Sanitary Sewer Construction

TESTING:

Gravity Mains:

The rate of infiltration into or leakage out of all sewers and appurtenant constructions shall be tested by the contractor and must be witnessed and approved by an authorized representative of the Town. Testing shall be performed as follows:

1. Low-pressure air tests in accordance with ASTM F1417 shall be used to test each section of the sewer line between manholes. Leakage shall be measured in terms of time for the pressure to drop from 3.5 lbs. per square inch gage to 3.25 lbs. per square inch gage. Testing time for different pipe sizes shall be as follows:

   6” and 8” sewer 4 minutes
   10” sewer 5 minutes
   12” sewer 6 minutes
   15” sewer 8 minutes
   18” sewer 9 minutes

   Test shall be done with a liquid filled pressure gauge 0-10 psi range, with 0.1’ pound increments. No test will be performed with gauges that exceed 10 psi.

2. Should any test on any section of the pipeline disclose a loss rate greater than 0.25 lbs. within the designated timeframe, the contractor shall, at his own expense, locate and repair the defective joints or pipe sections. After the repairs are completed, the line shall be retested until the air loss rate is within the specified allowance.

Gravity Mains Deflection Test:

1. Deflection shall be measured with a rigid mandrel “Go/No-Go” device cylindrical in shape. Pipe deflection shall be measured after the backfill has been completed and shall not exceed five (5) percent. The mandrel shall be hand pulled by the Contractor

2. Any section not passing the deflection test shall be uncovered and repaired.
Construction Specifications
Section VI - Sanitary Sewer Construction

Testing–continued.

Sewer Manholes: Vacuum Testing of Manholes shall be to the top of the concrete structure and shall be completed prior to paving. Vacuum Testing of Manholes shall be based on the following criteria:

A. 4’-0” or 5’-0” diameter manhole.
   1. Initial test pressure, 10 Hg (i.e., 20inch absolute)
   2. Test passing. A 1 inch Hg drop to 9 Hg in
      ➢ 2 minutes minimum allowable for 0-10 foot deep manholes;
      ➢ 2-1/2 minutes minimum allowable for 10-15 foot deep manholes;
      ➢ 3 minutes minimum allowable for 15-25 foot deep manholes.

B. If the pressure drop exceeds 1 inch Hg in the allowable time, the manhole shall be repaired and retested.

The Contractor shall make all necessary arrangements for testing purposes and shall stand the expense of these arrangements.

Cleaning Pipe Lines and Appurtenances: Upon completion of construction and testing all dirt, stones and other foreign material shall be removed from the pipe lines and their appurtenant constructions by flushing with water or other means. No materials shall be left in pipe lines to impede the normal flow through them. Debris cleaned from the lines shall be removed from the downgradient manhole.

PRIOR TO ACCEPTANCE OF ANY PORTION OF THE NEW ROADWAY OR FACILITIES, ALL PIPELINES AND MANHOLES MUST PASS THE LEAKAGE AND DEFLECTION TEST REQUIREMENTS.
CONSTRUCTION OF FORCE MAINS

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 6-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.

Bedding and backfill material shall be free of large stones or clods greater than 1½ inch in diameter or frozen earth. Backfill shall be hand placed and carefully compacted by hand tamping to fill all space around the pipe with particular attention to the haunches and sides of the pipe. Selected backfill material shall be placed to a minimum of 12 inches over the top of the pipe.

Details of gasket installation and joint assembly shall follow the directions of the pipe manufacturer, all subject to the approval of the Engineer. Each pipe unit shall be carefully pushed into place without damage to the pipe or gasket.

The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench.

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.

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.
Construction Specifications  
Section VI - Sanitary Sewer Construction  

Construction of Force Main Sewers – continued:

Testing: After the pipes of the force main sewers have been laid, secured in place and jointed as specified, the force main sewer shall be tested for strength and leakage. The tests shall be performed when approved by the Engineer and shall be performed as follows:

1. Hydrostatic pressure testing is required for force mains.
2. The contractor shall furnish all apparatus, material and labor and the necessary water for making the test.
3. Before testing pipe lines having flexible joints, the contractor must make certain that the pipe lines are securely held to prevent movement.
4. 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.
5. Strength shall be tested at a pressure of 100 psi. The pressure for strength test shall be maintained for at least ten minutes by pumping additional water into the pipe line.
6. After passing the strength test, leakage shall be tested at 50 psi. The test for leakage shall last for two hours. The additional water needed to maintain the required pressure shall be measured accurately in a manner approved by the Engineer.
7. Test shall be performed with a liquid filled pressure gauge 0-200 psi range, with no more than two pound increments. No test will be performed with gauges that exceed 200 psi.

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

\[ L = \frac{SD(\sqrt{P})}{148000} \]

where:
- \( L \) = allowable leakage, gallons per hour
- \( S \) = the length of pipe tested, in feet
- \( D \) = the nominal pipe diameter in inches
- \( P \) = the average test pressure during the test, in psi

B. The contractor shall replace failed sections when leaks are discovered.
# TOWN OF DARTMOUTH
## DEPARTMENT OF PUBLIC WORKS
### SUMMARY SHEET OF APPROVED MATERIALS

#### ROADWAYS
- **Gravel Base Course**: 8" meeting MassDOT standard M1.03.1
  - 4" meeting MassDOT standard M2.01.7 or M1.03.0 (Type d)
- **Hot Mix Asphalt**: MassDOT Hot Mix Asphalt Pavement for Local Streets
  - 3" Superpave Intermediate Course 19.0 (SIC - 19.0)
  - 1½" Superpave Surface Course 9.5 (SSC – 9.5)

#### SIDEWALKS
- **Gravel Base Course**: 8" meeting MassDOT standard M2.01.7 Dense Grade
- **Cement Concrete**
  - 4"(H) Air-Entrained 4,000 psi, ¼”, 610, per MassDOT 4.02.00
  - 6"(H) Air-Entrained 4,000 psi, ¼”, 610, per MassDOT 4.02.00 (Driveways)

#### CURBING
- **Bituminous Concrete Berm**: 6"(H) x 8"(W) Machine Formed Berm
- **Bituminous Concrete Berm**: 12"(W) x 3½"(H) Cape Cod Berm
- **Granite Curbing**: 5"(W) MassDOT M9.04.1 Type VB (15"-17" depth)
- **Granite Curb Inlets**: 6"(W) x 6'(L) MassDOT M9.04.5 (17"-19" depth)
- **Sloped Face Granite Curb**
  - 6"(W) x 18"(H) with 4"x4” or 5”x5” chamfer
  - *(a.k.a. Mountable Granite Curb)* Shall be used where sloped curbing is required including at cul-de-sac.
### DRAINAGE

**Pipe (Mains)**
- Reinforced Concrete Class IV (12”-27”)
- Reinforced Concrete Class III (30” and larger)
- Aluminum corrugated metal AASHTO M-36
- Corrugated Metal –asphalt coated inside and outside
- High Density Polyethylene (HDPE) ASTM D 3350
- Polyvinyl Chloride (PVC) SDR-35

**Pipe (Services)**
- Polyvinyl Chloride (PVC) SDR-35
- Ductile Iron, not less than Class 50
- High Density Polyethylene (HDPE) ASTM D 3350

**Catch Basins**
- Precast reinforced concrete ASTM C-478
- Concrete block ASTM C-139 w/ Precast concrete rings

**Manholes**
- Precast reinforced concrete ASTM C-478
- Concrete block ASTM C-139 w/ Precast concrete rings

**Inverts**
- Grey concrete brick or 4,000 psi concrete

**Manhole Frames & Covers**
- East Jordan Iron Works Cat. No. 0MA211000025

**Catch Basin Frames & Grates**
- East Jordan Iron Works Cat. No. 0MA552000022 (3FLG)
- East Jordan Iron Works Cat. No. 0MA552000023 (4FLG)

**Catch Basin Hoods**
- East Jordan Iron Works Cat. No. L 202
- Eliminator Oil & Floating Debris Trap manufactured by Ground water resources Inc.

**Cone to Frame Seals**
- PRO-RING by Cretex Specialty Products
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| SEWER Pipe (Gravity Mains)     | Polyvinyl Chloride (PVC) SDR-35  
Ductile Iron (DI), shallow depths only (2'-3')                                                                                      |
| SEWER Pipe (Low Pressure F.M.) | Polyvinyl Chloride (PVC) SDR-21  
Brass pipe for cleanouts at terminal ends                                                                                                |
| SEWER Pipe (Gravity Services)  | Polyvinyl Chloride (PVC) SDR-35                                                                                                               |
| SEWER Pipe (Low Pressure Services) | Polyvinyl Chloride (PVC) SDR-21 pressure pipe  
rated at 370 PSI, 1 1/4" diameter  
High Density Polyethylene SDR-11, 1 1/4" IPS, green-coded within property line                                                  |
| Curb Stops                     | E-ONE Stainless Steel Uni-Lateral Curb Stop/Check Valve Assembly  
(for Low pressure services)                                                                                                               |
| Manholes                       | Precast reinforced concrete ASTM C-478 w/rubber boots                                                                                       |
| Inverts                        | Sewer brick ASTM C-32, Grade SS                                                                                                               |
| Frame & Covers                 | East Jordan Iron Works Cat. No. 00104043L01 , ERGO Assembly  
with cover labeled “SEWER”                                                                                                               |
|                                | Watertight East Jordan Iron Works Cat. No. 41420026W01, CAMPRESSION Assembly with cover labeled “SEWER”                                      |
|                                | Cross country East Jordan Iron Works Cat. No. 41420026W01, CAMPRESSION Assembly with cover labeled “SEWER”                                      |
| Cone to Frame Seals            | PRO-RING by Cretex Specialty Products                                                                                                        |
| Manhole Sectional Joint Seals  | Cretex External Wrap by Cretex Specialty Products                                                                                           |
|                                | Cretex Internal Joint Seal by Cretex Specialty Products                                                                                     |
| Cleanout Covers                | East Jordan Iron Works Cat. No.00157322C01 cover labeled “SEWER”.                                                                            |
| Low Pressure Pumps             | E/One Extreme Series DH071 grinder pump (Outside Unit)  
E/One Extreme Series DH071F-93 grinder pump for Flood Zones  
E/One Extreme Series DH071-44 grinder pump (Inside Unit)                                                                         |
SUMMARY SHEET OF APPROVED MATERIALS (cont.)

**WATER**

Pipe (Mains)  
Cement Lined Ductile Iron (CLDI) Class 52

Pipe (Services)  
Copper tubing Type-K, not less than 1”
High Density Polyethylene SDR-9 copper tube size within the property, blue-coded

Hydrants (Open Right)  
U.S. Pipe Metropolitan M-94
Mueller “Super Centurion 250” / A-433
American Darling B-62-B-5

Gate Valves (Open Right)  
U.S. Pipe A-USPO-23
Mueller A2360-23 Resilient Seated
American Flow Control Series 2500

Butterfly Valves (Open Right)  
Muller Lineseal III or Pre approved equal by the Town

Tapping Sleeves  
Mueller H-615, Mueller H-616 or Mueller H-619
American-Darling 2800C or 2800A or
U.S. Pipe or Pre-Approved Equal by the Town

Corporation Stops  
Ford F-1000 or
Mueller 300 Ball Type or
A.Y. McDonald 74701BQ Ball Style

Curb Stops  
Ford B44-333 or Ford B44-444 or
Mueller 300 Ball Type
A.Y. McDonald 76100Q Ball Style

Compression Couplings  
Ford, Mueller or A.Y. McDonald

Curb Boxes  
Extension Type Cast Iron Arch Pattern Base w/ 2 hole flat cover or Cone Top w/ Brass Pentagon Plug & Stainless Steel Rods
## TOWN OF DARTMOUTH
CONSTRUCTION DETAILS DRAWING LIST

### MISCELLANOUS DETAILS & NOTES

<table>
<thead>
<tr>
<th>DRAWING No.</th>
<th>DESCRIPTION</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.10</td>
<td>MANHOLE / CATCH BASIN RISER DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>1.11</td>
<td>CONCRETE COLLAR DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>1.12</td>
<td>UTILITY TRENCH DETAIL</td>
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<tr>
<td>1.13</td>
<td>MULTIPLE UTILITY TRENCH DETAIL</td>
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### EROSION CONTROL DETAILS

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<th>DESCRIPTION</th>
<th>DATE</th>
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</thead>
<tbody>
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<td>2.01</td>
<td>CONSTRUCTION EXIT DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>2.02</td>
<td>CATCH BASIN SEDIMENT CONTROL WITH CURB FILTER</td>
<td>10/29/20</td>
</tr>
<tr>
<td>2.03</td>
<td>CATCH BASIN SEDIMENT CONTROL</td>
<td>10/29/20</td>
</tr>
</tbody>
</table>
# TOWN OF DARTMOUTH
CONSTRUCTION DETAILS DRAWING LIST

## ROAD CONSTRUCTION DETAILS

<table>
<thead>
<tr>
<th>DRAWING No.</th>
<th>DESCRIPTION</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.01</td>
<td>40’ R.O.W. SECTION (CCB) NO WALKWAYS</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.02</td>
<td>40’ R.O.W. SECTION (VGC) NO WALKWAYS</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.03</td>
<td>50’ R.O.W. SECTION (CCB) NO WALKWAYS</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.04</td>
<td>50’ R.O.W. SECTION (CCB) WALKWAY ONE SIDE</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.05</td>
<td>50’ R.O.W. SECTION (VGC) NO WALKWAYS</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.06</td>
<td>50’ R.O.W. SECTION (VGC) WALKWAY ONE SIDE</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.07</td>
<td>50’ R.O.W. SECTION (VGC) URBAN SETTING</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.10</td>
<td>MONOLITHIC CAPE COD BERM DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.11</td>
<td>MODIFIED CAPE COD BERM DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.12</td>
<td>HMA VERTICAL BERM DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.13</td>
<td>GRANITE CURB DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.14</td>
<td>SLOPED FACE GRANITE CURB DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.15</td>
<td>SLOPED FACE GRANITE TRANSITION CURB DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.16</td>
<td>GRANITE INLET STONE TO CAPE COD BERM GRANITE TRANSITION DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>3.20</td>
<td>CONCRETE WALKWAY DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.21</td>
<td>WALKWAY THROUGH CONCRETE DRIVEWAY DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.22</td>
<td>ACCESSIBLE CURB CUT DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>3.23</td>
<td>PARALLEL ACCESSIBLE CURB CUT DETAIL</td>
<td>10/29/20</td>
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<td>3.24</td>
<td>CEMENT CONCRETE DRIVEWAY APRON DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>3.25</td>
<td>HOT MIX ASPHALT (HMA) DRIVEWAY APRON DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>3.26</td>
<td>CUT &amp; MATCH DETAIL AT DRIVEWAYS</td>
<td>10/29/20</td>
</tr>
<tr>
<td>3.30</td>
<td>CONCRETE BOUND DETAIL</td>
<td>10/29/20</td>
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</table>
# TOWN OF DARTMOUTH
# CONSTRUCTION DETAILS DRAWING LIST

## DRAINAGE CONSTRUCTION DETAILS

<table>
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<tr>
<th>DRAWING No.</th>
<th>DESCRIPTION</th>
<th>DATE</th>
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<tbody>
<tr>
<td>4.01</td>
<td>DRAIN TRENCH SECTION</td>
<td>10/29/20</td>
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<tr>
<td>4.02</td>
<td>DRAIN MANHOLE DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>4.03</td>
<td>BLOCK DRAIN MANHOLE DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>4.04</td>
<td>CATCH BASIN DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>4.05</td>
<td>CATCH BASIN WITH CURB INLET STONE DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>4.06</td>
<td>BLOCK CATCH BASIN WITH CURB INLET STONE DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>4.07</td>
<td>CONCRETE AND MASONRY END WALL DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>4.08</td>
<td>MAXIMUM PIPE SIZE STANDARD AT ROUND MANHOLES</td>
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## WATER CONSTRUCTION DETAILS

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<tr>
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<tbody>
<tr>
<td>5.01</td>
<td>WATERMAIN TRENCH SECTION</td>
<td>10/29/20</td>
</tr>
<tr>
<td>5.02</td>
<td>HYDRANT DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.03</td>
<td>GATE VALVE DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.04</td>
<td>TAPPING SLEEVE AND GATE VALVE DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>5.05</td>
<td>WATER SERVICE DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.06</td>
<td>WATER SERVICE “CHANGE OVER” DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>5.07</td>
<td>WATER SERVICE “RE-CONNECTION” DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.08</td>
<td>WATER / SEWER CROSSING DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.09</td>
<td>AC WATERMAIN CROSSING DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.10</td>
<td>CONCRETE THRUST BLOCK DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>5.11</td>
<td>METER PIT DETAIL</td>
<td>10/29/20</td>
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## SANITARY SEWER CONSTRUCTION DETAILS

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<tr>
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<tr>
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<td>INTERIOR DROP SEWER MANHOLE DETAIL</td>
<td>10/29/20</td>
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<td>6.04</td>
<td>EXTERIOR DROP SEWER MANHOLE DETAIL</td>
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<td>SEWER MANHOLE INVERT DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>6.06</td>
<td>SEWER SERVICE CLEANOUT DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>6.07</td>
<td>PAVEMENT OR TRAVELED WAY SEWER SERVICE IN-LINE CLEANOUT DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>6.08</td>
<td>SEWER AT NORMAL DEPTH SERVICE CONNECTION DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>6.09</td>
<td>SEWER SERVICE CHIMNEY DETAIL</td>
<td>10/29/20</td>
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<tr>
<td>6.10</td>
<td>MANHOLE FRAME &amp; COVER REPLACEMENT / ADJUSTMENT DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>6.11</td>
<td>E-ONE STAINLESS STEEL LATERAL KIT ASSEMBLY</td>
<td>10/29/20</td>
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<tr>
<td>6.12</td>
<td>E-ONE PUMP CONNECTION TO E-ONE STAINLESS STEEL VALVE</td>
<td>10/29/20</td>
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<tr>
<td>6.13</td>
<td>E-ONE PUMP CONNECTION TO BALL VALVE CURB STOP</td>
<td>10/29/20</td>
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<tr>
<td>6.14</td>
<td>LOW PRESSURE FORCemain END LINE CLEANOUT DETAIL</td>
<td>10/29/20</td>
</tr>
<tr>
<td>6.15</td>
<td>GREASE TRAP DETAIL</td>
<td>10/29/20</td>
</tr>
</tbody>
</table>
NOTES:

1. INSTALLATION AND SURFACE PREPARATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER’S INSTRUCTIONS.


5. NO OTHER MATERIALS SHALL BE USED IN THE CONSTRUCTION OF THE GRADE ADJUSTMENT AREA BEYOND THOSE SPECIFIED ABOVE. PROHIBITED MATERIALS INCLUDE, BUT ARE NOT LIMITED TO WOOD OR WOOD SHIMS OF ANY KIND, CONCRETE, BRICK, BLOCK, STONES, ETC.

6. THE INSTALLATION OF THE EXPANDED POLYPROPYLENE GRADE ADJUSTMENT RINGS SHALL BE DONE IN THE PRESENCE OF A DPW ENGINEER.
NEW 1½" HMA SURFACE COURSE (9.5MM)
NEW HMA BINDER COURSE (19MM) MATCH EXISTING DEPTH

EXCAVATABLE FLOWABLE FILL MEETING MassDOT SPECS TYPE 1E & 2E OR M1.03.1 PROCESS GRAVEL AS DIRECTED

CAREFULLY COMPACTED SELECTED MATERIAL

ENVELOPE SEWER & DRAIN PIPES WITH 6"(MIN.) 3/4" CRUSHED STONE ON ALL SIDES TO PREVENT FLOATING. WATER MAINS SHALL BE BEDDED IN GRAVEL. WATER SERVICES SHALL BE ENVELOPED IN SAND.

TEMPORARY STEEL PLATES MUST BE LEFT IN PLACE FOR 24 HOURS (MIN.) AFTER POURING FLOWABLE FILL

SAW CUT EDGES (TYP.)

TACK COAT ALL JOINTS WITH A BRUSHED ON BITUMINOUS CONCRETE SEALANT (TYP.)

NEW UTILITY SERVICE PIPE

UTILITY MAIN

FLOWABLE FILL AREA

COLD PLANE 1½" OVER ENTIRE TRENCH A MINIMUM OF 12" OUTSIDE TRENCH AREA.

COLD PLANE 1½" OVER ENTIRE TRENCH A MINIMUM OF 12" OUTSIDE TRENCH AREA.

RAMP EDGES OF STEEL PLATES WITH TEMPORARY COLD MIX.
NEW 1½” HMA SURFACE COURSE (9.5MM)
NEW HMA BINDER COURSE (19MM)
MATCH EXISTING DEPTH

CUT EDGES TO OBTAIN CLEAN FULL THICK BUTT JOINT ON EXISTING BASE & REMOVE OLD PAVEMENT

EXCAVABLE FLOWABLE FILL MEETING MassDOT SPECS TYPE 1E & 2E OR M1.03.1 Process Gravel as Directed

UNDISTURBED FIRM MATERIAL

NEW UTILITY SERVICE PIPE
UTILITY MAIN

ENVELOPE SEWER & DRAIN PIPES WITH 6"(MIN.) 3/4" CRUSHED STONE ON ALL SIDES TO PREVENT FLOATING. WATER MAINS SHALL BE BEDDED IN GRAVEL. WATER SERVICES SHALL BE ENVELOPED IN SAND.

*TEMPORARY STEEL PLATES MUST BE LEFT IN PLACE FOR 24 HOURS (MIN.) AFTER POURING FLOWABLE FILL

SECTION

TACK COAT ALL JOINTS WITH A BRUSHED ON BITUMINOUS CONCRETE SEALANT (TYP.)

FLOWABLE FILL AREA

COLD PLANE 1½” OVER ENTIRE TRENCH A MINIMUM OF 12” OUTSIDE TRENCH AREA.

RAMP EDGES OF STEEL PLATES WITH TEMPORARY COLD MIX.

REPLACE BERM OR CURB AS REQUIRED

CAREFULLY COMPACTED SELECTED MATERIAL

FLOWABLE FILL AREA

CAREFULLY COMPACTED SELECTED MATERIAL

12” MIN.

12” MIN.

MULTIPLE UTILITY TRENCH DETAIL

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DATE OF ISSUE
OCTOBER 29, 2020

DRAWING NUMBER
DDPW 1.13

MULTIPLE UTILITY TRENCH DETAIL

N.T.S.
NOTES:
1. THE MINIMUM LENGTH SHALL BE 75 FEET, EXCEPT THAT THE MINIMUM LENGTH CAN BE REDUCED TO 50' IF A 3-INCH TO 6-INCH HIGH BERM IS INSTALLED AT THE ENTRANCE OF THE PROJECT SITE.
2. THE PAD SHALL EXTEND THE FULL WIDTH OF THE CONSTRUCTION ACCESS OR 24 FEET, WHICHERSOEVER IS GREATER.
3. THE PAD SHALL SLOPE AWAY FROM THE EXISTING ROADWAY.
4. THE PAD SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT OF WAY, THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANING OUT THE PAD.
5. ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE.
6. ALL SEDIMENT SPILLED, DROPPED WASHED OR TRACKED ONTO THE PUBLIC RIGHT OF WAY/PAVED ROADWAY MUST BE REMOVED IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.
CATCH BASIN SEDIMENT CONTROL
WITH CURB FILTER

NOTES:
1. AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS., A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS.
2. INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT.
3. FILTER BAGS SHALL BEemptied AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE CATCH BASIN/INLET.
4. DAMAGED OR CLOGGED FILTER BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF FILTER BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE LOCAL, STATE & FEDERAL GUIDELINES AND STANDARDS.
NOTES:
1. AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS., A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS.
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4. DAMAGED OR CLOGGED FILTER BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF FILTER BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE LOCAL, STATE & FEDERAL GUIDELINES AND STANDARDS.
CAP COD BERM INSTALLED
WITH BINDER & SURFACE COURSE

1½" HOT MIX ASPHALT (HMA)
(9.5mm) SURFACE COURSE

3" HOT MIX ASPHALT (HMA)
(19mm) BINDER COURSE

EMULSION TACK COAT

CAP COD BERM INSTALLED
WITH SURFACE COURSE

1½" HOT MIX ASPHALT (HMA)
(9.5mm) SURFACE COURSE

3" HOT MIX ASPHALT (HMA)
(19mm) BINDER COURSE

EMULSION TACK COAT
NOTES:
1. A JOB MIX FORMULA (JMF) FOR THE HOT MIX ASPHALT (HMA) THAT WILL BE USED TO CONSTRUCT THE MODIFIED CAPE COD BERM SHALL BE SUBMITTED TO THE DPW ENGINEERING DEPARTMENT FOR REVIEW AND APPROVAL AT LEAST THIRTY (30) DAYS PRIOR TO START OF WORK.

2. ROADWAY CENTERLINE NAILS SHALL BE SET AT A MINIMUM OF 50 FT INTERVALS AND AT ALL RADIUS POINTS OF CURVATURE AND POINTS OF TANGENTS.

3. LAYOUT OF ROADWAY CENTERLINE NAILS FOR BERM INSTALLATION SHALL BE DONE BY A MASSACHUSETTS REGISTERED LAND SURVEYOR.
1½" HOT MIX ASPHALT (HMA) (9.5mm) SURFACE COURSE

3" HOT MIX ASPHALT (HMA) (19mm) BINDER COURSE

2" RAD.

EMULSION TACK COAT

3"

7½"
GRANITE CURB DETAIL

SEE DETAIL OF WALKWAY

15" - 17"

6" CONCRETE ON BACK SIDE

6" COMPACTED GRAVEL

6" MAX

12"

6"

5"

5"

5"

5"

HMA SURFACE COURSE

SEE DWGS FOR HEIGHT

SAWCUT EXISTING PAVEMENT

HMA SURFACE COURSE

HMA BINDER COURSE

6" CONCRETE ON STREET SIDE TO EX. HMA BINDER GRADE

GRANITE CURB

MASS DOT M9.04.1 TYPE VB

DATE OF ISSUE

OCTOBER 29, 2020
DRAWING NUMBER

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DATE OF ISSUE
OCTOBER 29, 2020

SLOPED FACE
GRANITE CURB DETAIL

LOAM & SEED

HMA SURFACE COURSE
SEE DWGS FOR HEIGHT

SAWCUT EXISTING PAVEMENT

HMA BINDER COURSE

CONCRETE ON STREET SIDE
TO EX. HMA BINDER GRADE

6"(H) CONCRETE
ON BACK SIDE

6" COMPACTED GRAVEL

MAX

(MOUNTABLE GRANITE CURB)
SLOPED FACE GRANITE TRANSITION CURB DETAIL

CONCRETE ON STREET SIDE TO EX. HMA BINDER GRADE

6" COMPACTED GRAVEL

6" MAX

CONCRETE ON BACK SIDE

LOAM & SEED

6" ±

6"

5"

HMA SURFACE COURSE
SEE DWGS FOR HEIGHT

SAWCUT EXISTING PAVEMENT

HMA SURFACE COURSE
HMA BINDER COURSE

(CHAMFER TO FLUSH TRANSITION)
CONCRETE WALKWAY DETAIL

NOTES:
1. ALL WALKWAYS MUST BE IN FULL COMPLIANCE WITH 521 CMR MASSACHUSETTS AAB & ADA.
2. WHENEVER WORK IS BEING PERFORMED IN AN AREA THAT HAS AN IMPACT ON THE WALKWAYS, A TEMPORARY ACCESSIBLE ROUTE MUST BE PROVIDED AROUND THE CONSTRUCTION SITE BY THE CONTRACTOR.
3. USE OF RECYCLED PROCESS GRAVEL NOT PERMITTED.
4. INSPECTIONS BY THE DPW ENGINEERING DEPARTMENT WILL BE REQUIRED FOR SUBGRADE, GRAVEL, CONCRETE FORMS & POURING OF CONCRETE.

CEMENT CONCRETE
(4,000 PSI, 3/4", 610)
PER MASSDOT M4.02.00

M2.01.7 DENSE GRADE COMPACTED TO 95% MAX. DENSITY

COMPACTED SUBGRADE
VERTICAL GRANITE CURB MASSDOT TYPE VB

TOOLED EDGE C.J.

1.5% MAX*

4.5% SLOPE MAX

½" PREFORMED EXPANSION JOINT FILLER, FULL DEPTH INSTALLED AT 30'-0" O.C.

½" to ½" x ½" (DEEP) TOOLED (C.J.) LOCATED AT 5'-0" O.C. AND RUN PERPENDICULAR TO PEDESTRIAN TRAFFIC FLOW

CEMENT CONCRETE WALKWAY

GRASS/EARTH

Curb/Berm

PROVIDE BROOM FINISH PERPENDICULAR TO PEDESTRIAN TRAFFIC FLOW

PLAN VIEW

SECTION

* = TOLERANCE FOR CONSTRUCTION ±0.5%
ACCESSIBLE CURB CUT DETAIL

LEGEND

- HSL = HIGH SIDE TRANSITION LENGTH
- W = SIDEWALK WIDTH
- Wc = CURB WIDTH
- Wf1 = PERPENDICULAR RAMP LENGTH

USABLE SIDEWALK WIDTH PER AAB = W - Wc

RAMP LENGTH, Wf1 = W - 4' MIN.

* = TOLERANCE FOR CONSTRUCTION ±0.5%

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DATE OF ISSUE
OCTOBER 29, 2020

DDPW
3.22
NOTES:

1. IN AREAS WHERE WALKWAYS EXIST OR ARE TO BE PROVIDED, ALL WALKWAYS MUST BE IN FULL COMPLIANCE WITH 521 CMR 20.00 & 22.00 (MASSACHUSETTS AAB) & ADA.

2. WHenever work is being performed in an area that has an impact on the walkways, a temporary accessible route must be provided around the construction site by the contractor.

3. USE OF RECYCLED PROCESS GRAVEL NOT PERMITTED.

4. CONTROL JOINTS SHALL BE TOOLLED AT ½" to ⅜" x ½" (DEEP) AND LOCATED AT 5'-0" O.C. AND RUN PERPENDICULAR TO PEDESTRIAN TRAFFIC FLOW.

5. INSPECTIONS BY THE DPW ENGINEERING DEPARTMENT WILL BE REQUIRED FOR SUBGRADE, GRAVEL, CONCRETE FORMS & PLACEMENT OF CONCRETE.
NOTES:

1. IN AREAS WHERE WALKWAYS EXIST OR ARE TO BE PROVIDED, ALL WALKWAYS MUST BE IN FULL COMPLIANCE WITH 521 CMR 20.00 & 22.00 (MASSACHUSETTS AAB) & ADA.

2. WHENEVER WORK IS BEING PERFORMED IN AN AREA THAT HAS AN IMPACT ON THE WALKWAYS, A TEMPORARY ACCESSIBLE ROUTE MUST BE PROVIDED AROUND THE CONSTRUCTION SITE BY THE CONTRACTOR.

3. USE OF RECYCLED PROCESS GRAVEL NOT PERMITTED.

4. INSPECTIONS BY THE DPW ENGINEERING DEPARTMENT WILL BE REQUIRED FOR SUBGRADE, GRAVEL, HMA BINDER COURSE & HMA SURFACE COURSE.
NOTES:

1. ALL THICKNESS SHOWN ARE COMPACTED DIMENSIONS.

2. REFER TO DPW SPECIFICATIONS FOR ADDITIONAL INFORMATION.
NOTES:

1. SEE UTILITY TRENCH DETAIL FOR BACKFILLING OVER NEWLY INSTALLED MAINS OR SERVICES WITHIN EXISTING ROADWAYS.

2. METALLIC 3" WIDE DETECTABLE IDENTIFICATION TAPE SHALL BE INSTALLED OVER DRAIN LINES 12" BELOW FINISH GRADE.
DRAIN MANHOLE DETAIL

NOTES:
1. CONCRETE SHALL BE 4,000 PSI MINIMUM AFTER 28 DAYS.
2. PLUG ALL LIFTING HOLES IN & OUT WITH HYDRAULIC CEMENT.
3. WHERE STUBS ARE REQUIRED, THE LOCATION AND SIZE SHALL BE SHOWN ON THE PLANS AND INVERT ELEV. ON PROFILE.

4,000 PSI CEMENT CONCRETE COLLAR

ADJUST TO GRADE WITH CRETIX PRO-RING MIN 8" ADJUSTMENT & MAX 12" ADJUSTMENT

REINFORCED STEEL CONFORMS TO ASTM A185 SPEC. 0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.

PRECAST REINFORCED CONCRETE ECCENTRIC CONE SECTION PER ASTM C478

POLYPROPYLENE STEPS PER ASTM C478

BUTYL JOINT GASKET PER ASTM C990 (TYP. ALL JOINTS)

PRECAST REINFORCED CONCRETE RISER SECTION PER ASTM C478

SHELF TO SPRINGLINE 4,000 PSI CONCRETE SLOPE SHELF @ 1%

PRECAST MONOLITHIC REINFORCED CONCRETE EXTENDED BASE SECTION PER ASTM C478

SET ON MIN. 6" OF ¾"-1½" CRUSHED STONE

INVERT ARCH TO BE 4,000 PSI SOLID CONCRETE NO CRUSHED STONE.

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DATE OF ISSUE
OCTOBER 29, 2020

DRAWING NUMBER

DRAIN MANHOLE DETAIL N.T.S.
MORTAR BETWEEN HORIZONTAL JOINTS

KEY WAYS TO BE FILLED W/ MORTAR

DRAIN MANHOLE FRAME & COVER
PER TOWN OF DARTMOUTH STANDARDS.
REFER TO THE LATEST EDITION OF THE
TOWN OF DARTMOUTH DPW CONSTRUCTION
SPECIFICATIONS FOR MANUFACTURER & MODEL NO.

ADJUST TO GRADE WITH CRETEX PRO-RING
MIN 8" ADJUSTMENT &
MAX 12" ADJUSTMENT

PIPE FLUSH OR NOT TO PROJECT MORE THAN 4" BEYOND FACE OF WALL

6" BLOCK TO A MAX. DEPTH OF 9'
8" BLOCK AT DEPTHS BELOW 9'

FLOW

18" - 24" TAPER

4'-0"Ø

2'-0"Ø

30"Ø MAX.

INVERT ARCH TO BE 4,000 PSI SOLID CONCRETE
NO CRUSHED STONE.

4"(H) CONCRETE BASE
OR PRECAST CONCRETE
SECTIONS (SEE ABOVE)

BLOCKS TO BE SET IN FULL BED OF MORTAR

VARIABLE DEPTH

6" OR 8"

2" MIN.
4 FLG. CATCH BASIN FRAME & GRATE PER TOWN OF DARTMOUTH STANDARDS. REFER TO THE LATEST EDITION OF THE TOWN OF DARTMOUTH DPW CONSTRUCTION SPECIFICATIONS FOR MANUFACTURER & MODEL NO.

FINISH GRADE

4,000 PSI CEMENT CONCRETE COLLAR

ADJUST TO GRADE WITH CRETEX PRO-RING MIN 8" ADJUSTMENT & MAX 12" ADJUSTMENT

2'-0" SQUARE

REINFORCED STEEL CONFORMS TO ASTM A185 SPEC.
0.12 SQ. IN./LINEAL FT. AND 0.12 SQ. IN. (BOTH WAYS) BASE BOTTOM.

5"  4'-0" Ø

PRECAST REINFORCED CONCRETE RISER SECTION PER ASTM C478

OUTLET

HYDRAULIC CEMENT PIPE PENETRATIONS

PRECAST MONOLITHIC REINFORCED CONCRETE EXTENDED BASE SECTION PER ASTM C478

4'-0" SUMP

OIL/WATER SEPARATOR REFER TO THE LATEST EDITION OF THE TOWN OF DARTMOUTH DPW CONSTRUCTION SPECIFICATIONS FOR MANUFACTURER & MODEL NO.

SET ON MIN. 6" OF 3/4"-1 1/2" CRUSHED STONE

NOTES:
1. CONCRETE SHALL BE 4,000 PSI MINIMUM AFTER 28 DAYS.
2. PLUG ALL LIFTING HOLES IN & OUT WITH HYDRAULIC CEMENT.
3. DOUBLE GRATE CATCH BASIN SHALL BE MIN. 5'-0" I.D., WITH 2'x4' OPENING IN TOP SLAB.
NOTES:
1. CONCRETE SHALL BE 4,000 PSI MINIMUM AFTER 28 DAYS.
2. PLUG ALL LIFTING HOLES IN & OUT WITH HYDRAULIC CEMENT.
3. DOUBLE GRATE CATCH BASIN SHALL BE MIN. 5'-0" I.D., WITH 2'x4' OPENING IN TOP SLAB.
3 FLG. CATCH BASIN FRAME & GRATE PER TOWN OF DARTMOUTH STANDARDS. REFER TO THE LATEST EDITION OF THE TOWN OF DARTMOUTH DPW CONSTRUCTION SPECIFICATIONS FOR MANUFACTURER & MODEL NO.

6'(L)x17"(H) VGC INLET STONE (M9.04.5)

FINISH GRADE

3"

FINISH GRADE

4,000 PSI CEMENT CONCRETE COLLAR

ADJUST TO GRADE WITH CRETEX PRO-RING MIN 8" ADJUSTMENT & MAX 12" ADJUSTMENT

HYDRAULIC CEMENT PIPE PENETRATIONS

OUTLET

OIL/WATER SEPARATOR REFERENCE THE LATEST EDITION OF THE TOWN OF DARTMOUTH DPW CONSTRUCTION SPECIFICATIONS FOR MANUFACTURER & MODEL NO.

BASE PIES

SHOWN WITH CURB INLET
**NOTE(S):**
1. THE MINIMUM DISTANCE BETWEEN PIPES ENTERING MANHOLES SHALL BE 1'-6".

**CROSS SECTION OF MANHOLE**

<table>
<thead>
<tr>
<th></th>
<th>4 FT. DIAMETER MANHOLE</th>
<th>5 FT. DIAMETER MANHOLE</th>
<th>6 FT. DIAMETER MANHOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX. PIPE O.D.</td>
<td>33 ½&quot; O.D.</td>
<td>44&quot; O.D.</td>
<td>51&quot; O.D.</td>
</tr>
<tr>
<td>STRAIGHT THRU TO 45°</td>
<td>27&quot; R.C.P.</td>
<td>36&quot; R.C.P.</td>
<td>42&quot; R.C.P.</td>
</tr>
<tr>
<td>DEFLECTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAX. PIPE O.D.</td>
<td>23&quot; O.D.</td>
<td>33 ½&quot; O.D.</td>
<td>37&quot; O.D.</td>
</tr>
<tr>
<td>90° DEFLECTION</td>
<td>18&quot; R.C.P.</td>
<td>27&quot; R.C.P.</td>
<td>30&quot; R.C.P.</td>
</tr>
</tbody>
</table>
NOTES:

1. SEE UTILITY TRENCH DETAIL FOR BACKFILLING OVER NEWLY INSTALLED MAINS OR SERVICES WITHIN EXISTING ROADWAYS.

2. METALLIC 3" WIDE DETECTABLE IDENTIFICATION TAPE SHALL BE INSTALLED OVER WATER LINES 12" BELOW FINISH GRADE.

3. MINIMUM PIPE COVER FOR ALL WATER PIPE SHALL BE FIVE FEET (5'-0''), MAXIMUM PIPE COVER FOR ALL WATER PIPE SHALL BE SIX FEET SIX INCHES (6'-6''). IN NO CASE SHALL THE COVER OVER THE PIPE EXCEED SIX FEET SIX INCHES (6'-6'') WITHOUT PRIOR WRITTEN APPROVAL FROM THE DIRECTOR. URECON PRE-INSULATED PIPE OR EQUAL SHALL BE USED WHERE FIVE FEET (5'-0'') OF COVER OVER WATER PIPE CANNOT BE ACHIEVED.
1. HYDRANT MUST BE BURIED TO PROPER DEPTH (BURY LINE) TO ALLOW SUFFICIENT CLEARANCE TO BOLT/UNBOLT THE UPPER BARREL AND SAFETY FLANGES, IF NEEDED, INSTALL EXTENSION.

2. USE BOTH MEGA–LUG RESTRAINT GLANDS AND THRUST BLOCKS. THRUST BLOCKING SHALL HAVE A MINIMUM OF 3 SQUARE FEET AGAINST UNDISTURBED EARTH.
C.I. GATE VALVE COVER EMBOSSED WITH WORD "WATER" (TYP ALL VALVES)

WATER

VALVE BOX COVER

TELESCOPING VALVE BOX, CAST IRON, 5¼” BARREL

FINISH GRADE

GATE VALVE (OPEN RIGHT) PER TOWN OF DARTMOUTH STD’S

WATER MAIN

"MEGALUG" MECHANICAL JOINT RESTRAINT SYSTEM (TYP)

LEVELING BLOCK

SEE PLANS
PLAN VIEW

NEW WATER LINE
SEE DWG'S FOR
SIZE & TYPE

"MEG-A-LUG"
MECHANICAL JOINT
RESTRAINT SYSTEM
OR EQUAL

GATE VALVE (OPEN RIGHT)
PER TOWN OF DARTMOUTH
STANDARDS

FLANGE JOINT

MECHANICAL
D.I. TAPPING SLEEVE
PER TOWN OF DARTMOUTH
STANDARDS

TEST PORT

EXISTING WATER MAIN
SEE DWG'S FOR
SIZE & TYPE

EXISTING WATER MAIN
SEE DWG'S FOR
SIZE & TYPE

CONCRETE
THRUST BLOCK

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

TAPPING SLEEVE AND
GATE VALVE DETAIL

DATE OF ISSUE
OCTOBER 29, 2020
DRAWING NUMBER
5.04

N.T.S.
NOTES:

1. TAPS INTO EXISTING AC OR CAST IRON PIPES SHALL BE MADE WITH A DUCTILE IRON SERVICE SADDLE WITH DOUBLE-STAINLESS STEEL STRAPS.

2. SERVICES GREATER THAN 1" SHALL BE MADE WITH A DUCTILE IRON SERVICE SADDLE WITH DOUBLE-STAINLESS STEEL STRAPS.

3. ALL SERVICES TO BE BEDDED IN SAND, 6" MIN. ALL AROUND SERVICE PIPE.

4. METALLIC 3" WIDE DETECTABLE IDENTIFICATION TAPE SHALL BE INSTALLED OVER WATER LINES 12" BELOW FINISH GRADE.
NOTES:

1. TAPS INTO EXISTING AC OR CAST IRON PIPES SHALL BE MADE WITH A DUCTILE IRON SERVICE SADDLE WITH DOUBLE-STAINLESS STEEL STRAPS.

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1. TAPS INTO EXISTING AC OR CAST IRON PIPES SHALL BE MADE WITH A DUCTILE IRON SERVICE SADDLE WITH DOUBLE-STAINLESS STEEL STRAPS.

2. SERVICES GREATER THAN 1" SHALL BE MADE WITH A DUCTILE IRON SERVICE SADDLE WITH DOUBLE-STAINLESS STEEL STRAPS.

3. ALL SERVICES TO BE BEDDED IN SAND, 6" MIN. ALL AROUND SERVICE PIPE.

4. METALLIC 3" WIDE DETECTABLE IDENTIFICATION TAPE SHALL BE INSTALLED OVER WATER LINES 12" BELOW FINISH GRADE.
SLEEVE SEWER PIPE WITH DI CLASS 52 OR SDR35 PVC. SLEEVE SHALL BE 2xDIA. OF PIPE TO BE SLEEVED.

WATER MAIN

CASCAD MFG. STAINLESS STEEL CASING SPACERS OR PRE-APPROVED EQUAL.

TYP. RUBBER FERNCO OR EQUAL AT ENDS.

IF EXISTING CONDITIONS REQUIRE PIPES TO BE CLOSER THAN 18", SLEEVE THE SEWER PIPE IN D.I. CLASS 52 OR SDR35 PVC.

CONCRETE 6" MIN. ALL AROUND SEWER PIPE

SANITARY SEWER PIPE

IF EXISTING CONDITIONS REQUIRE PIPES TO BE CLOSER THAN 18", ENCASE THE SEWER PIPE IN CONCRETE 10' EACH SIDE OF CROSSING OR USE D.I. FOR SEWER.

CONCRETE 6" MIN. ALL AROUND WATER & SEWER PIPE

SEWER MAIN

WATER PIPE

10' Min. 10' Min.

IF EXISTING CONDITIONS REQUIRE THAT WATER CROSS UNDER SEWER, REGARDLESS OF DEPTH, WATER PIPE SHALL BE A FULL LENGTH OF DUCTILE IRON, CLASS 52 WITH THE JOINTS EQUALLY SPACED FROM THE POINT OF PIPE CROSSING.

IF CROSSING IS WITHIN 18" MINIMUM, BOTH MAINS MUST BE ENCASED IN CONCRETE.
NEW 1 1/2" HMA
SURFACE COURSE (9.5MM)

NEW HMA BINDER
COURSE (19MM)
MATCH EXISTING DEPTH

12"
MIN.

12"
MIN.

SAW CUT EDGES TO
OBTAIN CLEAN FULL
THICK BUTT JOINT
ON EXISTING BASE &
REMOVE OLD PAVEMENT

UNDISTURBED
FIRM MATERIAL

EXCAVATABLE FLOWABLE FILL
MEETING MassDOT SPECS
TYPE 1E & 2E

COMPRESSION
COUPLING (TYP.)

AC PIPE

DI PIPE

AC PIPE

UNDISTURBED
FIRM MATERIAL

CONCRETE
BLOCK (TYP.)

3/4"-1 1/2"
CRUSHED STONE

12"

SECTION

NOTES:

1. TRENCH TO BE STEEL PLATED FOR A MINIMUM OF 24HRS.

2. SEE UTILITY TRENCH DETAIL FOR BACKFILLING OVER NEWLY
INSTALLED MAINS OR SERVICES WITHIN EXISTING ROADWAYS.
**CONCRETE THRUST BLOCK DETAIL**

**DRAWING NUMBER**

**DATE OF ISSUE**
OCTOBER 29, 2020

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**ENGINEERING DIVISION**

**TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS**

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### Line Pressure = 150 PSI
**Pipe Size (A)**

- **12"**
  - 0'-10" 1'-10" 1'-6" ± CF
- **8"**
  - 0'-10" 2'-7" 2'-7" 1'-6" ± CF
- **6"**
  - 0'-10" 2'-7" 1'-11" 1'-6" ± CF
- **4"**
  - 0'-10" 1'-0" 1'-0" 1'-0" ± CF

### Soil Pressure = 2000 PSF
**Pipe Size (B)**

- **12"**
  - 0'-10" 1'-0" 1'-0" ± CF
- **8"**
  - 0'-10" 2'-2" 2'-2" 1'-3" 84 CF
- **6"**
  - 0'-10" 2'-2" 1'-3" 1'-3" ± CF
- **4"**
  - 0'-10" 1'-3" 1'-3" ± CF

### NOTES:

1. Blocking shall be 3000 PSI concrete.
2. Soil felt paper to be placed between concrete and all pipe surfaces.
3. The water line must be lowered in order to have 4'-6" of cover at the bend, tee, reducer, or plug at all locations where these fittings are utilized.
METER NOT INCLUDED

PLAN VIEW

FRAME & COVER WITH ELECTRONIC READ LOCKING LID SUPPLIED BY TOWN OF DARTMOUTH WATER DEPARTMENT

18"Øx60"(H) PLASTIC COIL METER PIT SUPPLIED BY TOWN OF DARTMOUTH WATER DEPARTMENT

PLASTIC PLATFORM

COILS

1" MP INLET & OUTLET CONNECTIONS

SET ON MIN. 6" OF ¾"-1½" CRUSHED STONE

SECTION

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

METER PIT DETAIL

DATE OF ISSUE
OCTOBER 29, 2020

DRAWING NUMBER
DDPW
5.11

N.T.S.
NOTES:

1. SEE UTILITY TRENCH DETAIL FOR BACKFILLING OVER NEWLY INSTALLED MAINS OR SERVICES WITHIN EXISTING ROADWAYS.

2. DUCTILE IRON PIPE SHALL BE USED FOR SHALLOW INSTALLATIONS, (LESS THAN 3’). NO SEWER MAIN OR SEWER SERVICE SHALL BE INSTALLED WITH LESS THAN THREE (3) FEET OF COVER, UNLESS GRANTED WRITTEN APPROVAL BY THE DIRECTOR OR HIS DESIGNEE.

3. METALLIC 3” WIDE DETECTABLE IDENTIFICATION TAPE SHALL BE INSTALLED OVER SEWER LINES 12” BELOW FINISH GRADE.
NOTES:
1. CONCRETE SHALL BE 4,000 PSI MINIMUM AFTER 28 DAYS.
2. PLUG ALL LIFTING HOLES IN & OUT WITH HYDRAULIC CEMENT.
3. WHERE STUBS ARE REQUIRED, THE LOCATION AND SIZE SHALL BE SHOWN ON THE PLANS AND INVERT ELEV. ON PROFILE.
NOTES:
1. All new pipe penetrations into existing manhole shall be machine core drilled & rubber boot ed.
2. When the new pipe diameter is smaller than the existing pipe diameter the crown of the new pipe shall match the crown of the existing pipe.
3. A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert.
EXTERIOR DROP
SEWER MANHOLE DETAIL

NOTES:
1. ALL NEW PIPE PENETRATIONS INTO EXISTING MANHOLE SHALL BE MACHINE CORE DRILLED & RUBBER BOOTED.
2. WHEN THE NEW PIPE DIAMETER IS SMALLER THAN THE EXISTING PIPE DIAMETER THE CROWN OF THE NEW PIPE SHALL MATCH THE CROWN OF THE EXISTING PIPE.
3. A DROP PIPE SHALL BE PROVIDED FOR A SEWER ENTERING A MANHOLE AT AN ELEVATION OF 24 INCHES OR MORE ABOVE THE MANHOLE INVERT.
DRAWING NUMBER

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DATE OF ISSUE
OCTOBER 29, 2020

DRAWING NUMBER

SEWER MANHOLE INVERT DETAIL

TOP VIEW

CROSS SECTION

N.T.S.
TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
SEWER SERVICE
CLEANOUT DETAIL
N.T.S.

DATE OF ISSUE
OCTOBER 29, 2020
DRAWING NUMBER
DDPW 6.06

ROW/PROPERTY LINE

2'-0" TOWN SIDE

SEWER

METAL CLEANOUT FRAME & COVER INSTALLED FLUSH WITH GROUND

MALE THREADED PVC CLEANOUT COVER

FEMALE THREADED x GLUE ON CLEANOUT COVER ADAPTER GLUED TO STACK

6" SDR35 PVC

METAL CLEANOUT COVER
GRAY IRON ASTM A48 CL35B

8 7/8" 3/4"

2"

9"

8"

10"

13 3/4"

METAL CLEANOUT FRAME
GRAY IRON ASTM A48 CL35B

6" CRUSHED STONE ALL AROUND SERVICE

6"x6" SANITARY TEE (T-Y) PVC SDR35 GASKETED SEWER
SEWER SERVICE IN-LINE CLEANOUT DETAIL

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DATE OF ISSUE
OCTOBER 29, 2020

DRAWING NUMBER
DDPW 6.07

PAVEMENT OR TRAVELED WAY

SEWER SERVICE IN-LINE CLEANOUT DETAIL

N.T.S.
EXISTING GRAVEL ROAD OR LAWN AREA

FASTEN FRAME TO CONE SECTION WITH 4%" Ø THREADED RODS, 16 THREADS/INCH, ST/ST BOLTS & WASHERS 5" MIN. EMBEDMENT INTO MANHOLE CORE

NEW FRAME AND COVER (PROVIDED BY TOWN)

12"
2"

CAPSULE ANCHOR

PROPOSED CONCRETE COLLAR

FRAME FASTENED TO CONCRETE, TYP.

REMOVE EXISTING MASONRY AS REQUIRED AND ADJUST TO GRADE WITH CRETEX PRO RINGS (PROVIDED BY TOWN)

EXISTING GRAVEL ROAD OR LAWN AREA

NEW FRAME AND COVER (PROVIDED BY TOWN)

12"
2"

PRO-RING DEPTH (VARIIES)

CAPSULE ANCHOR

PROPOSED CONCRETE COLLAR

FRAME FASTENED TO CONCRETE, TYP.

REMOVE EXISTING MASONRY AS REQUIRED AND ADJUST TO GRADE WITH CRETEX PRO RINGS (PROVIDED BY TOWN)

EXISTING PRECAST CONCRETE STRUCTURE

EXISTING PAVEMENT OR LAWN

RESTORE existing SURFACES AS REQUIRED

3"

BRUSH/ CROSS COUNTRY AREA

FASTEN FRAME TO CONE SECTION WITH 4%" Ø THREADED RODS, 16 THREADS/INCH, ST/ST BOLTS & WASHERS 5" MIN. EMBEDMENT INTO MANHOLE CORE

NEW FRAME AND COVER (PROVIDED BY TOWN)

12"
2"

CAPSULE ANCHOR

PROPOSED CONCRETE COLLAR

FRAME FASTENED TO CONCRETE, TYP.

REMOVE EXISTING MASONRY AS REQUIRED AND ADJUST TO GRADE WITH CRETEX PRO RINGS (PROVIDED BY TOWN)

EXISTING PRECAST CONCRETE STRUCTURE

EXISTING PAVEMENT OR LAWN

RESTORE existing SURFACES AS REQUIRED

3"
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 TEFLOM TAPE, A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURES INSTRUCTIONS. * FOR SS FITTING INTO SS THREADED, USE PIPE DOPE OR TEFLOM 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.
7. ALL SERVICES TO BE BEDDED IN SAND, MIN 6" ALL AROUND PIPE.

E-ONE STAINLESS STEEL LATERAL KIT ASSEMBLY

TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DATE OF ISSUE
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DRAWING NUMBER
DDPW 6.11
4" SCH40 μ = 2% MIN. GRAVITY SEWER FROM HOUSE INSERT INTO PIPE CHAMBER RUBBER SEAL, TO A DEPTH OF 3 1/2" MAX.

LIFTING EYES (PRECAST ONLY)

SET ON MIN. 6" OF 1/2" CRUSHED STONE

SLOPE FINISH GRADE AWAY FROM UNIT TO WITHIN 1" BELOW GRADE LINE ON UNIT TO ALLOW FOR VENTILATION

6"x6"x6" 4,000 PSI CONC. PAD

CAP MARKED "SEWER"

4' (1 1/4") SDR11 HDPE WITH FEMALE THREADED GALVANIZED END SUPPLIED WITH E-ONE PUMP

POLY COMPRESSION COUPLING SUPPLIED WITH E-ONE PUMP

1 1/4" SDR11 BEDDED IN SAND

POLY COMPRESSION COUPLING WITH 1 1/4" MALE THREADED FITTING

CONC. BLOCK

POURED CONCRETE ANCHOR (SEE E-1 SPEC FOR BALLAST CALCULATION) FILL UNIT WITH WATER TO BOTTOM OF INLET PRIOR TO POURING. CONCRETE MAY BE PRECAST—INSTALLED WITH STEEL LIFTING EYES.

CAST IRON TELESCOPING CURB BOX WITH ARCH PATTERN BASE & SS ROAD & PIN.

1/2" E-1 SS VALVE ASSEMBLY OR PRE-APPROVED EQUAL

1/2" POLY COMPRESSION COUPLING WITH 1/2" MALE THREADED FITTING

PVC PIPE

NOTES:
1. DO NOT DROP, ROLL, OR LAY UNIT ON IT'S SIDE.
2. ALL PRESSURE PIPE AND FITTINGS TO HAVE MINIMUM 4' COVER AND ARE TO BE BEDDED IN SAND A MINIMUM OF 6" ALL AROUND.
TOWN OF DARTMOUTH DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

E-ONE PUMP CONNECTION TO BALL VALVE CURB STOP
N.T.S.

NOTES:
1. DO NOT DROP, ROLL, OR LAY UNIT ON ITS SIDE.
2. ALL PRESSURE PIPE AND FITTINGS TO HAVE MINIMUM 4" COVER AND ARE TO BE BEDDED IN SAND A MINIMUM OF 6" ALL AROUND.
3. ALL PVC SCH40 PIPE AND FITTINGS MUST HAVE A MINIMUM PRESSURE RATING OF 370 PSI WITH A CELL CLASS OF 12454–B.
PAVED AREAS

CONCRETE PAD DETAIL

SEWER CLEAN OUT BOX W/ COVER

CONCRETE PAD SEE DETAIL BELOW

CAST IRON TELESCOPING CURB BOX WITH ARCH PATTERN BASE & SS ROD

4' MIN

45° BEND (BRASS/THREADED)

1½" BRASS PIPE (THREADENDED)

TYP. CONCRETE THRUST BLOCK AT ALL BENDS.

1½" PVC UNION (THREAD/GUDED)

SEWER

SEWER CLEAN OUT BOX W/ COVER

CONCRETE PAD SEE DETAIL BELOW

CAST IRON TELESCOPING CURB BOX WITH ARCH PATTERN BASE & SS ROD

4' MIN

45° BEND (BRASS/THREADED)

1½" BRASS PIPE (THREADENDED)

TYP. CONCRETE THRUST BLOCK AT ALL BENDS.

1½" PVC UNION (THREAD/GUDED)

PAVED AREAS

NOTES:
1. ALL PRESSURE PIPE AND FITTINGS TO HAVE MINIMUM 4' COVER & ARE TO BE BEDDED IN SAND A MINIMUM OF 6" ALL AROUND.
NOTES:

1. GREASE TRAP SHALL BE SIZED IN ACCORDANCE WITH 310 CMR 15.00 TITLE 5.

2. MINIMUM TANK SIZE SHALL BE 1500 GALLON

3. GREASE TRAP SHALL BE INSPECTED MONTHLY BY THE OWNER/OPERATOR AND SHALL BE CLEANED BY A LICENSED SEPTAGE HAULER WHETHER THE LEVEL OF GREASE IS 25% OF THE EFFECTIVE DEPTH OF THE TRAP, OR AT LEAST EVERY THREE MONTHS, WHICHER IS SOONER. THE OWNER/OPERATOR SHALL KEEP ALL INSPECTION AND PUMPING RECORDS ON FILE AND MADE AVAILABLE TO THE TOWN OF DARTMOUTH UPON REQUEST.

4. NO WASTEWATER, OTHER THAN FROM KITCHEN FIXTURES OR FOOD PROCESSING EQUIPMENT, SHALL DISCHARGE INTO THE GREASE REMOVAL SYSTEM. WASTEWATER FROM SANITARY SOURCES SUCH AS TOILETS AND BATHROOM SINKS ARE PROHIBITED FROM BEING DISCHARGED INTO THE GREASE TRAP.

5. ALL WASTEWATER FROM FOOD PREPARATION OPERATIONS AND/OR WASHING AND CLEAN-UP OPERATIONS, INCLUDING BUT NOT LIMITED TO POT SINKS, PRE-RINSE STATIONS, WOK STATIONS, SOUP KETTLES, BRASSING PANS, MOP SINKS AND WASTEWATER GENERATED FROM EXHAUST FAN HOD CLEANING OPERATIONS MUST DISCHARGE TO THE GREASE REMOVAL DEVICE.

6. TANK MUST BE CERTIFIED WATERTIGHT BY THE MANUFACTURER. TESTING FOR TANK LEAKAGE SHALL BE CONDUCTED FOR ALL TANKS AT THE SITE. TANK SHALL BE TESTED BY WATER AS FOLLOWS:
   A. FILL TANK WITH WATER TO TOP OF ACCESS COVERS.
   B. LET WATER SOAK TANK FOR 24 HOURS.
   C. REFILL THE TANK.
   D. TEST TANK FOR ONE (1) HOUR.
   E. WASTE LEVEL SHALL HOLD FOR ONE HOUR WITH ZERO DROP IN ELEVATION.

7. THE TOWN OF DARTMOUTH DPW ENGINEERING DEPARTMENT SHALL BE NOTIFIED TWENTY FOUR (24) HOURS PRIOR TO INSTALLATION OF THE GREASE TRAP IN ORDER TO INSPECT AND OVERSEE THE INSTALLATION.