SECTION 02315

EXCAVATION, BACKFILL, COMPACTION AND DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Excavation, backfill and compaction for subsurface utilities

2. Earth retention systems

3. Test pits

4. Temporary dewatering systems

B. Related Sections

1. Section 01570 – Temporary Erosion Controls

2. Section 02320 - Borrow Materials

3. Section 02740 – Bituminous Concrete and Gravel Road Repair

1.2 REFERENCES

A. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 [600 kN-m/m3]), Annual Book of ASTM Standards - Volume 04.08. - Soil and Rock

B. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method. Annual Book of ASTM Standards - Volume 04.08 - Soil and Rock

C. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System). Annual Book of ASTM Standards - Volume 04.08 - Soil and Rock

D. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), Annual Book of ASTM Standards - Volume 04.08. - Soil and Rock

E. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth), Annual Book of ASTM Standards - Volume 04.08. - Soil and Rock

F. 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.560 through 1926.562 including Appendices A through F

1.3 DEFINITIONS

A. Benching - A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

B. Earth Retention Systems - Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.

C. Excavation - Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

D. Protective System - A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

E. Registered Professional Engineer - A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

F. Shield System - A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

G. Sloping - A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

H. Temporary Dewatering System – A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.

I. Trench - A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m).

1.4 SUBMITTALS

A. Drawings and calculations for each Earth Retention System required in the Work. The submittal shall be in sufficient detail to disclose the method of operation for each of the various stages of construction required for the completion of the Earth Retention Systems.

1. Submit calculations and drawings for Earth Retention Systems prepared, signed and stamped by a Professional Engineer registered in the state where the work is performed.

2. All Excavation, Trenching, and related Earth Retention Systems shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

B. Performance data for the compaction equipment to be utilized

C. Construction methods that will be utilized for the removal of rock

1.5 PROJECT CONDITIONS

A. Notify Dig Safe and obtain Dig Safe identification numbers.

B. Notify utility owners in reasonable advance of the work and request the utility owner to stake out on the ground surface the underground facilities and structures. Notify the Engineer in writing of any refusal or failure to stake out such underground utilities after reasonable notice.

C. Make explorations and Excavations to determine the location of existing underground structures, pipes, house connection services, and other underground facilities in accordance with Paragraph 3.2.D of this Section.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Fill material is subject to the approval of the Engineer and may be either material removed from excavations or borrow from off site. Fill material, whether from the excavations or from borrow, shall be of such nature that after it has been placed and properly compacted, it will make a dense, stable fill.

B. Satisfactory fill materials shall include materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, SW, and SP.

C. Satisfactory fill materials shall not contain trash, refuse, vegetation, masses of roots, individual roots more than 18 inches long or more than 1/2 inch in diameter, or stones over 6 inches in diameter. Organic matter shall not exceed minor quantities and shall be well distributed.

D. Satisfactory fill materials shall not contain frozen materials nor shall backfill be placed on frozen material.

E. Excavated surface and/or pavement materials such as gravel or trap rock that are salvaged may be used as a sub-grade material. In no case shall salvaged materials be substituted for the required gravel base.

2.2 DEWATERING MATERIALS

A. Provide haybales and silt fence in accordance with Section 01570.

B. Provide silt filter bags (Dandy Dewatering Bag, Dirtbag, JMP Environ-Protection Filter Bag, or equal) of adequate size to match flow rate.

PART 3 EXECUTION

3.1 PREPARATION

A. Public Safety and Convenience

1. Take precautions for preventing injuries to persons or damage to property in or about the Work.

2. Provide safe access for the Owner's representatives at site during construction.

3. Do not obstruct site drainage, natural watercourses or other provisions made for drainage.

3.2 CONSTRUCTION

A. Earth Retention Systems

1. Provide Earth Retention Systems necessary for safety of personnel and protection of the Work, adjacent work, utilities and structures.

2. Maintain Earth Retention Systems for the duration of the Work.

3. Systems shall be constructed using interlocking corner pieces at the four corners. Running sheet piles by at the corners, in lieu of fabricated corner pieces, will not be allowed.

4. Drive sheeting ahead of and below the advancing trench excavation to avoid loss of materials from below and from in front of the sheeting.

5. Sheeting is to be driven to at least the depth specified by the designer of the earth retention system, but no less than 2 feet below the bottom of the Excavation.

6. Remove sheeting, unless designated to be left in place, in a manner that will not endanger the construction or other structures. Backfill and properly compact all voids left or caused by the withdrawal of sheeting.

7. Remove earth retention systems, which have been designated by the Engineer to be left in place, to a depth of 3 feet below the established grade.

B. Excavation

1. Perform excavation to the lines and grades indicated on the Drawings. Backfill unauthorized over-excavation in accordance with the provisions of this Section, at no additional cost to the Owner.

2. Excavate with equipment selected to minimize damage to existing utilities or other facilities. Hand excavate as necessary to locate utilities or avoid damage.

3. Sawcut the existing pavement in the vicinity of the excavation prior to the start of excavation in paved areas, so as to prevent damage to the paving outside the requirements of construction.

4. During excavation, material satisfactory for backfill shall be stockpiled in an orderly manner at a distance from the sides of the excavation equal to at least one half the depth of the excavation, but in no case closer than 2 feet.

   a. Excavated material not required or not suitable for backfill shall be removed from the site.

   b. Perform grading to prevent surface water from flowing into the excavation.

   c. Pile excavated material in a manner that will endanger neither the safety of personnel in the trench nor the Work itself. Avoid obstructing sidewalks and driveways.

d. Hydrants under pressure, valve pit covers, valve boxes, manholes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the Work is completed.

5. Make pipe trenches as narrow as practicable and keep the sides of the trenches undisturbed until backfilling has been completed. Provide a clear distance of 12 inches on each side of the pipe.

6. The final 6 inches of excavation and grading of the trench bottom shall be performed by hand so as not to disturb the material below the grade required for setting the pipe or appurtenances.

   a. Where suitable bedding materials will be placed and compacted throughout the length of the trench, hand excavation of the final 6 inches will not be required.

   b. Grade the trench bottom to provide uniform bearing and support for the bottom quadrant of each section of pipe.

   c. Excavate bell holes at each joint to eliminate point bearing.

   d. Remove stones greater than 6 inches in any dimension from the bottom of the trench to avoid point bearing.

7. If satisfactory materials are not encountered at the design subgrade level, excavate unsatisfactory materials to the depth directed by the Engineer and properly dispose of the material. Backfill the resulting extra depth of excavation with satisfactory fill materials and compact in accordance with the provisions of this Section.

C. Backfill and Compaction

1. Unless otherwise specified or indicated on the Drawings, use satisfactory material removed during excavation for backfilling trenches. The Engineer may require stockpiling, drying, blending and reuse of materials from sources on the Project.

2. Spread and compact the material promptly after it has been deposited. When, in the Engineer's judgment, equipment is inadequate to spread and compact the material properly, reduce the rate of placing of the fill or employ additional equipment.

3. When excavated material is specified for backfill and there is an insufficient amount of this material at a particular location on the Project due to rejection of a portion thereof, consideration will be given to the use of excess material from one portion of the Project to make up the deficiency existing on other portions of the Project. Moving this excess material from one portion of the Project and placing it in another portion of the Project will be at no additional cost to the Owner.

   a. Use borrow material if there is no excess of excavated material available at other portions of the Project.

4. Backfilling and compaction methods shall attain 95% of maximum dry density at optimum moisture content as determined in accordance with ASTM D698, Method C.

5. Do not place stone or rock fragment larger than six inches in greatest dimension in the backfill.

6. Maximum loose lift height for backfilling existing or borrow material shall be 8 inches, unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing. In no case shall loose lift height for backfilling exceed 12 inches.

7. Do not drop large masses of backfill material into the trench endangering the pipe or adjacent utilities.

8. Install pipe in rock excavated trenches on a dense graded stone bedding with a minimum depth of 6 inches. Shape the stone bedding at the pipe bells to provide uniform support. Encase the pipe in the dense graded crushed stone bedding to a grade 6 inches over the top of the pipe and 12 inches on each side of the pipe.

9. Backfill from the bottom of the trench to the centerline of the pipe with the specified material. This initial backfill is to be placed in lifts of no more than 6 inches and thoroughly tamped under and around the pipe. This initial backfilling shall be deposited in the trench for its full width on both sides of the pipe, fittings and appurtenances simultaneously.

10. Electrical conduit not encased in concrete, shall be backfilled with sand borrow conforming to the requirements of Section 02320. The backfill shall be placed in the trench for its full width and shall extend to 12 inches over the pipe.

11. Where excavation is made through permanent pavements, curbs, paved driveways or paved sidewalks, or where such structures are undercut by the excavation, place the entire backfill to sub-grade with granular materials and compact in 6 inch lifts. Use approved mechanical tampers for the full depth of the trench. If required, sprinkle the backfill material with water before tamping so as to improve compaction.

12. Place and compact backfill around manholes, vaults, pumping stations, gate boxes or other structures in six inch layers, from a point 1 foot over the pipe. Exercise care to protect and prevent damage to the structures.

13. Install impervious trench dams where stone borrow is used for pipe bedding to prevent groundwater from following along the stone bedding. Install dams every 100 feet.

D. Test Pit Excavation

1. Excavate test pits at locations as are indicated on the Drawings, as necessary, or as required by the Engineer. Test pits are required to locate underground facilities whose location, depth or size are not precisely known and are critical to the Work. Brace, sheet, and pump test pit excavations for safe excavation and examination of the structure or utility to be exposed.

2. Determine the material and construction characteristics of the existing pipeline exposed during the test pit excavation.

3. Measure the depth to the top of each pipe and utility, from the ground surface, at each test pit location.

4. Clear the site, excavate and backfill all test pits. Cut and remove roadway surfaces; remove cement, concrete and bituminous concrete sidewalks; remove, handle, rehandle, backfill and dispose of materials encountered within the limits of the Work.

5. Conduct all subsurface investigations in accordance 29 CFR Part 1926 Subpart P – OSHA Excavation Regulations 1926.560 through 1926.562 including Appendices A through F.

6. Upon completion of the examination by the Engineer backfill and compact the test pits in accordance with this Section.

7. Repair paved surfaces in accordance with Section 02740.

E. Dewatering

1. Provide, operate and maintain adequate pumping, diversion and drainage facilities to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. Locate dewatering system components so that they do not interfere with construction under this or other contracts.

2. Take actions necessary to ensure that dewatering discharges comply with permits applicable to the Project. Dispose of water from the trenches and excavations in such a manner as to avoid public nuisance, injury to public health or the environment, damage or public or private property, or damage to public or private property, or damage to the work completed or in progress.

3. Repair any damage resulting from the failure of the dewatering operations and any damage resulting from the failure to maintain all the areas of work in a suitable dry condition, at no additional cost to the Owner.

4. Exercise care to ensure that water does not collect in the bell or collar holes to sufficient depth to wet the bell or collar of pipes waiting to be jointed.

5. Take precautions to protect new work from flooding during storms or from other causes. Control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, provide temporary ditches for drainage. Upon completion of the work, all areas shall be restored to original condition.

6. Brace or otherwise protect pipelines and structures not stable against uplift during construction.

7. Do not excavate until the dewatering system is operational and the excavation may proceed without disturbance to the final subgrade.

8. Unless otherwise specified, continue dewatering uninterrupted until the structures, pipes, and appurtenances to be installed have been completed such that they will not float or be otherwise damaged by an increase in groundwater elevation.

9. If open pumping from sumps and ditches results in "boils", loss of fines, or softening of the ground, submit a dewatering plan to the Engineer within 48 hours. Implement the approved modified plan and repair any damage incurred at no additional cost to the Owner.

10. Where subgrade materials are unable to meet the subgrade density requirements due to improper dewatering techniques, remove and replace the materials in accordance with Section 02320 at no additional cost to the Owner.

11. Notify the Engineer immediately if any settlement or movement is detected of survey points adjacent to excavations being dewatered. If settlement is deemed by the Engineer to be related to the dewatering, submit a modified dewatering plan to the Engineer within 24 hours. Implement the approved modified plan and repair any damage incurred to the adjacent structure at no additional cost to the Owner.

12. Dewatering discharge:

    a. Install sand and gravel filters in conjunction with well points and deep wells to prevent the migration of fines from the existing soil during the dewatering operation.

    b. Do not discharge water into any sanitary sewer system.

    c. Provide separately controllable pumping lines.

    d. The Engineer reserves the right to sample discharge water at any time.

13. Removal

    a. Do not remove dewatering system without written approval from the Engineer.

    b. Backfill and compact sumps or ditches with screened gravel or crushed rock in accordance with Section 02320.

    c. Remove well points and deep wells. Backfill abandoned well holes with cement grout having a water cement ratio of 1 to 1 by volume.

END OF SECTION

SECTION 02320

BORROW MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Gravel Borrow

2. Processed Gravel Borrow for Pavement Sub-base

3. Stone Borrow

4. Ordinary Borrow

1.2 REFERENCES

A. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

B. ASTM C117 - Standard Test Method for Materials Finer than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing

C. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort (12,400 ft-lbf/ft^3)

D. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

E. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb./ft^3)

F. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head)

G. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

H. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

I. ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

J. AASHTO – Standard Specification for Transportation Materials and Methods of Sampling and Testing, 1986 Edition as amended

K. Commonwealth of Massachusetts Department of Public Works “Standard Specification for Highways and Bridges”, 1988 Edition as amended

1.3 SUBMITTALS

A. Representative Samples of borrow materials taken from the source. Tag, label, and package the Samples as requested by Engineer. Provide access to the borrow site for field evaluation and inspection.

B. Provide sieve analysis (ASTM C136) and permeability analysis (ASTM D2434) from certified soils testing laboratory for all borrow materials. Take and test a sample, at no additional cost to the Owner for each 1,500 cubic yards of borrow material placed.

C. Provide standard proctor analysis (ASTM D698) from certified soils testing laboratory for all borrow materials.

1.4 QUALITY ASSURANCE

A. No borrow shall be placed prior to the approval of samples by the Engineer.

1.5 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. Comply with any environmental requirements and restrictions.

2. Keep all public and private roadway surfaces clean during hauling operations and promptly and thoroughly remove any borrow or other debris that may be brought upon the surface before it becomes compacted by traffic. Frequently clean and keep clean the wheels of all vehicles used for hauling to avoid bringing any dirt upon the paved surfaces.

PART 2 PRODUCTS

2.1 ORDINARY BORROW

A. Ordinary Gravel borrow shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings, and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50. The intent of this project is to reuse as much existing material on site as possible.

Ordinary Borrow shall comply with Section M1.01.0 of the MASSDOT Standard Specifications for Highways and Bridges.

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2.2 GRAVEL BORROW

A. The compacted gravel borrow to be used for pavement subbase shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50. Gravel Borrow shall also conform to Section M1.03.0 of the MASSDOT Standard Specifications for Highways and Bridges.

PART 3 EXECUTION

3.1 INSTALLATION

A. Prior to the placement of borrow material, site preparation shall be completed as required by the Contract Documents, and approved by the Engineer.

B. Ensure that all materials are properly stockpiled on site to prevent contamination by other materials.

C. Place borrow material over the entire area in uniform lifts and compact to 95% of maximum dry density.

D. Utilize stockpiled borrow prior to using off-site borrow.

E. Utilize gravel borrow in all locations where a surface treatment has not been specified but requires a firm finish surface.

F. Processed gravel for pavement subbase is intended to provide a stable foundation for driveways, sidewalk and roadway repair where a gravel base has been specified.

G. Borrow shall be used as a replacement for unsuitable materials where poor soil conditions below the invert or subbase depth of the trench are encountered during the progress of the work. Extra excavation and the type of borrow, as determined by Engineer, shall be used only in those locations where its use is ordered by Engineer. The intent of the borrow is to provide a stable foundation for the pipe as a replacement of unsatisfactory material, not as an aid to dewatering trenches. Its use shall be limited to those areas in which Engineer orders its use in writing.

H. Shape borrow used for pipe foundation material so that it supports the pipe properly and will not damage the pipe, bells, collars, or the pipe fittings.

I. Place all borrow to keep it free of other materials and to prevent segregation.

END OF SECTION

SECTION 02530

MANHOLES AND CATCHBASINS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Precast concrete manholes

2. Cast iron manhole frames and covers

B. Related Sections

1. Section 02503 – Testing of Storm Drainage Systems.

1.2 REFERENCES

A. ASTM C32 - Standard Specification for Sewer and Manhole Brick (made from clay or shale).

B. ASTM A48 – Standard Specification for Gray Iron Castings.

C. ASTM C150 – Standard Specification for Portland Cement.

D. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes.

E. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections.

F. ASTM C443 – Standard Specification for Joints for Circular Concrete Sewer and Culvert Piping Using Rubber Gaskets.

G. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

H. ASTM C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.3 SUBMITTALS

A. Submit shop drawings, showing details of construction, reinforcing, joints, pipe connections to structures, manhole rungs, manhole frames and covers, and manhole chimneys.

B. Submit weights of manhole frames and covers.

1.4 QUALITY ASSURANCE

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or on the work after delivery, or at both places, and the materials shall be subject to rejection at any time on account of failure to meet any of the Specification requirements; even though samples may have been accepted as satisfactory at the place of manufacture. Material rejected after delivery to the job shall be marked for identification and shall be

removed from the job at once. Materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced.

B. At the time of inspection, the materials will be carefully examined for compliance with the latest ASTM designation specified and these Specifications, and with the approved manufacturer's drawings. Manhole sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

C. Imperfections in manhole sections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at 7 days and 5,000 psi at 28 days, when tested in 3″ by 6″ cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

D. Personnel shall have confined space entry training as appropriate for the work to be performed.

PART 2 PRODUCTS

2.1 PRECAST CONCRETE MANHOLE SECTIONS

A. Precast concrete barrel sections and transition top sections, shall conform to Specifications for Precast Reinforced Concrete Manhole Sections, ASTM C478 and meet the following requirements:

1. The wall thickness shall not be less than 5 inches for 48-inch diameter reinforced barrel sections, 6 inches for 60 inch diameter reinforced barrel sections and 7 inches for 72 inch diameter reinforced barrel sections.

2. Top sections shall be eccentric except that flat top sections shall be used where shallow cover requires a top section less than 4 feet as shown on the Drawings.

3. Barrel sections shall have tongue and groove joints.

4. All sections shall be cured by an approved method and shall not be shipped nor subjected to loading until the concrete compressive strength has attained 3,000 psi and not before 5 days after fabrication and/or repair, whichever is longer.

5. Precast concrete barrel sections with precast top slabs and precast concrete transition sections shall be designed for a minimum of H-20 loading plus the weight of the soil above at 120 pcf.

6. The date of manufacture and the name and trademark of the manufacturer shall be clearly marked on each precast section.

7. Precast concrete bases shall be monolithically constructed. The thickness of the bottom slab of the precast bases shall not be less than the barrel sections or top slab whichever is greater. Precast concrete bases shall be constructed with a 6-inch extended base.

8. Knock out panels for piping shall be provided in precast sections at the locations shown on the Drawings. They shall be integrally cast with the section, 2½ inches

thick and shall be sized as shown on the Drawings. There shall be no steel reinforcing in knock out panels.

9. The side wall height of the base section shall be a minimum of 12 inches above the top of the pipe coming into the manholes.

2.2 BRICK MASONRY

A. Bricks shall be good, sound, hard and uniformly burned, regular and uniform in shape and size, of compact texture. Underburned or salmon brick will not be acceptable and only whole brick shall be used unless otherwise permitted. In case bricks are rejected by the Engineer, they shall be immediately removed from the site of the work and satisfactory bricks substituted therefor.

1. Bricks for the channels and shelves shall comply with the latest specifications of ASTM C32 for Sewer Brick, Grade SM.

2. Bricks for building up and leveling manhole frames shall conform to ASTM C32 Grade MS.

3. Poured concrete inverts will not be allowed.

B. Mortar used in the brickwork shall be composed of one-part Type II Portland cement conforming to ASTM C150 to two parts sand to which a small amount of hydrated lime not to exceed 10 lbs. to each bag of cement shall be added.

C. Sand used shall be washed, cleaned, screened, sharp and well graded as to different sizes and with no grain larger than will pass a No. 4 sieve. It shall be free from vegetable matter, loam, organic or other materials of such nature or of such quantity as to render it unsatisfactory.

D. Hydrated lime shall conform to ASTM C207.

2.3 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30B.

B. Manhole covers shall have a diamond pattern, pickholes and the word "SEWER" cast in 3 inch letters. Manhole frame and covers shall be Manufactured by LeBaron Foundry; Mechanics Iron Foundry; Neenah Foundry or approved equal.

C. Manhole frames and covers shall comply with the detail shown on the Drawings.

2.4 JOINTING PRECAST MANHOLE SECTIONS

A. Tongue and groove joints of precast manhole sections shall be sealed with a preformed flexible joint sealant. The preformed flexible joint sealant shall conform to ASTM C990.

2.5 MANHOLE RUNGS

A. Manhole rungs shall be either of cast aluminum alloy 6061-T6, drop front design, 14 inches wide with an abrasive step surface, or of steel reinforced, copolymer, polypropylene, plastic. Manhole rungs shall conform to OSHA requirements.

2.6 PIPE CONNECTIONS

A. Pipe connections shall be accomplished in the following ways:

1. For all pipe types except PVC, fill tapered hole around pipe with non-shrink waterproof grout, such as Hallemite; Waterplug; Embeco; or equal, after the pipe has been set into the structure.

2. For PVC pipe connections, a flexible pipe-to-structure connector shall be used.

a. The flexible connectors shall be designed to provide a positive seal between the connector and the structure wall and between the connector and the pipe.

b. The flexible boot shall be manufactured of EPDM synthetic rubber in accordance with ASTM C443 and C923 and shall be 3/8 inch thick or greater.

c. The external bands shall be made entirely of 304 series non-magnetic stainless steel.

d. The flexible connectors shall be provided with a wedge-type or toggle-type expander to secure the pipe in the structure opening.

e. The flexible connectors shall meet the following criteria, in accordance with ASTM C923:

1) Shall not leak when subjected to a head pressure of 10 psi for 10 minutes.

2) Shall have the ability to deflect 7 degrees in any direction without leakage under the head pressure conditions described above.

3) Shall not leak when subject to a load of 150 lbs./in. pipe diameter and the head pressure conditions described above.

2.7 DAMPPROOFING

A. Dampproofing coating shall be an asphalt compound specially made to adhere to below grade concrete structures.

B. The dampproofing shall be Hydrocide 648 by Sonneborn Building Products; Dehydratine 4 by Tamms Industries; RIW Marine Liquid by Toch Brothers, or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation

1. Manholes shall be constructed to the dimensions shown on the Drawings and as specified in these Specifications. All work shall be protected against flooding and flotation.

2. Precast concrete barrel sections shall be set so as to be vertical and with sections in true alignment with a ¼ inch maximum tolerance to be allowed. The joints of precast concrete barrel sections shall be sealed with the preformed flexible joint sealant used in sufficient quantity to fill 75% of the joint cavity. The outside and inside joint shall be filled with non-shrink mortar and finished flush with the adjoining surfaces. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The precast sections shall be installed in a manner that will result in a watertight joint.

3. Holes in the concrete barrel sections required for handling or other purposes shall be plugged with a non-shrink grout or non-shrink grout in combination with concrete or rubber plugs, and finished flush on the inside.

B. Pipe Connections

1. General

a. Pipe stubs for future extensions shall be connected to the structures as shown on the drawings and the stub end closed by a suitable watertight plug.

2. Flexible Pipe-to-Structure Connectors

a. The flexible pipe-to-structure connectors shall be used for PVC pipe.

b. The flexible connectors shall be installed in accordance with the manufacturer's recommendations.

3. Grouting

a. All pipe types except PVC shall be grouted into place in the existing structure using non-shrink, water-proof grout.

b. After the new pipe has been set in place, completely fill the hole around the new pipe with non-shrink, water-proof grout.

c. In addition, place a 6 inch thick concrete encasement a total of 12 inches in length around the pipe stub adjacent to the wall of the structure. Concrete shall have a 28 day compressive strength of 3,000 psi.

C. Manhole Rung Installation

1. Aluminum manhole rungs shall be cast into precast sections, on 12-inch centers, by the manufacturer that casts the precast sections. Those parts of the rungs which are embedded shall receive a heavy coating of zinc chromate or other approved paint.

2. Steel reinforced copolymer polypropylene plastic steps shall be press fitted by hand driven hammer into preformed holes in cured precast sections, on 12 inch centers, by the manufacturer that casts the precast sections.

D. Brickwork

1. Mortar shall be mixed only in such quantity as may be required for immediate use and shall be used before the initial set has taken place. Mortar shall not be retained for more than one and one-half hours and shall be constantly worked over with a hoe or shovel until used. Anti-freeze mixtures will not be allowed

in the mortar. No masonry shall be laid when the outside temperature is below 40°F unless provisions are made to protect the mortar, bricks, and finished work from frost by heating and enclosing the work with tarpaulins or other suitable material. The Engineer's decision as to the adequacy of protection against freezing shall be final.

2. Channels and shelves shall be constructed of brick as shown on the Drawings. The brick channels shall correspond in shape with the lower half of the pipe. The top of the shelf shall be set at the elevation of the crown of the highest pipe and shall be sloped 1 inch per foot to drain toward the flow through channel. Brick surfaces exposed to sewage flow shall be constructed with the nominal 2″ x 8″ face exposed (i.e., bricks on edge).

3. Manhole covers and frames shall be set in a full mortar bed and bricks, a maximum of 12 inches thick for conical tops and 6 inches thick for flat top sections, and shall be utilized to assure frame and cover are set to the existing grade. The manhole frames and covers shall be reset to final grade prior to placement of final paving.

E. Dampproofing

1. Outer surfaces of precast manholes shall be given two coats of bituminous dampproofing at the rate of 30-60 sq. ft. per gallon in accordance with manufacturer's instructions.

3.2 LEAKAGE TEST

A. Sewer Manholes shall be leak tested in conjunction with the pipeline in accordance with Section 02503

3.3 CLEANING

A. New manholes shall be thoroughly cleaned of silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 02740

BITUMINOUS CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Bituminous concrete paving.

B. Related Sections

1. Section 02315 - Excavation, Backfilling, Compaction and Dewatering

2. Section 02320 – Borrow material

1.2 REFERENCES

A. Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 Edition as amended.

B. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 1990 Edition, as amended.

1.3 SUBMITTALS

A. Product information and mix design for each mix specified under this Section.

B. Product data sheets for all additives proposed in the mix design.

C. Certificate indicating the mixes specified meet or exceed the requirements specified herein.

D. Certificate indicating the mix plant conforms to TAI Manual MS-3, Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with TAI Manual MS-8., Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

B. Mixing Plant: Conform to TAI Manual MS-3, Commonwealth of Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges".

C. Obtain materials from same source throughout.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. Bituminous materials shall conform to the requirements of these Specifications.

2. Bitumen delivered to a project or to a mix plant must be accompanied by a proper certificate signed by the producer’s authorized representative.

Shipments of material not accompanied by a certificate will not be accepted for use in the work.

B. Bituminous Concrete Paving shall be Class I, Type I-1, as specified in Sections 460 and M3.11.0 of the above referenced Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended.

C. Cutback Asphalts: Materials shall be blends of asphalts cements and suitable solvents. They shall be homogeneous, free from water, and conform to the requirements of AASHTO M 81 for the rapid curing type and AASHTO M 82 for the medium curing type.

D. Asphalt Primer: Material shall be suitable for priming concrete and masonry surfaces prior to the application of waterproofing asphalt. It shall conform to the requirements of AASHTO M 116.

E. Asphalt Emulsions: Materials shall be homogeneous and shall show no separation after mixing within thirty days after delivery. They shall conform to the requirements of AASHTO M 140 with the following exception: Viscosity determination will not be required for material sampled at the point of delivery.

F. Cationic Emulsified Asphalt: Material shall be a homogeneous for a minimum of 3 months. The material shall conform to the requirements of AASHTO M 208.

G. Protective Seal Coat Emulsion: Material shall be a homogeneous emulsion consisting of coal tar pitch dispersed in water by means of a mineral colloid. Any separation or coagulation of its components shall be capable of being overcome by moderate stirring. The material shall contain no asphaltic materials or chemical emulsifiers. When tested according to prescribed methods it shall meet the following requirements:

	Minimum	**Maximum**
Percent Water (AASHTO T 55)		50
Percent Non-Volatile Matter (ASTM D 2939, Sec. 7)	48	
Percent Ash in Non-Volatile Matter (ASTM D 2939, Sec.9)	20	45
Percent Solubility of Non-Volatile Matter in CS_2 (AASHTO T 44)	40	
Resistance to Water (ASTM D 446)	No blistering, loss of adhesion or re-emulsification	
Resistance to Petroleum Solvents (ASTM D 446 – with Solvents substituted for water)	No penetration and no loss of adhesion	

H. Hot Poured Joint Sealer: Sealer shall be composed of a mixture of materials which will form a resilient and adhesive compound capable of effectively sealing joints in concrete and shall conform to the requirements of AASHTO M 173.

I. Joint and Crack Sealer, Asphaltic-Fiber: Material shall consist of a blend of asphalt cement (AC-20) and polyester fibers. The asphalt-fiber blend shall consist of 6% fiber mass to mass of asphalt.

J. Calcium chloride shall meet requirements of AASHTO M-144 and shall be spread wherever directed to control dust conditions. The Engineer may direct the Contractor to employ sprinkling of water in lieu of calcium chloride for dust control.

K. Tack coat shall consist of either emulsified asphalt, Grade MS-1 conforming to Section M3.03.0, or cutback asphalt, Grade MC-70 or MC-250 conforming to Section M3.02.0 of the above-referenced Specifications.

PART 3 EXECUTION

3.1 PAVING – GENERAL

A. Install bituminous concrete pavement in accordance with Section 460 of the Massachusetts Department of Public Works "Standard Specifications for Highways and Bridges", 1988 edition, as amended.

B. Place binder course as soon as possible after the gravel base has been prepared, shaped and compacted for Town streets and driveway/sidewalk repair.

C. Place and compact binder course by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete.

D. Maintain pavement under this Contract during the guarantee period of one year and promptly (within 3 days of notice given by the Engineer) refill and repave areas which have settled or are otherwise unsatisfactory for traffic.

E. All pavement thicknesses referred to herein are compacted thicknesses. Place sufficient mix to ensure that the specified thickness of pavement occurs wherever called for.

F. In no case will pavement be placed until the gravel base is dry and compacted to at least 95% maximum density at optimum moisture content.

G. No mix shall be placed on wet or damp surfaces.

H. Regardless of any temperature requirements, no mix conforming to the requirements of these specifications shall be placed after October 31 or before May 1 of any year.

I. All manhole frames, catch basin frames and utility boxes are to be set to the grade of the binder course until such time as the top course is placed. Then reset the frames to the grade of the top course. Frames and utility boxes shall not be allowed to protrude above the surface of the binder course. All excavated materials removed for raising of the frames and utility boxes are to be replaced with concrete. This ring of concrete shall be filled flush with the surrounding binder course.

J. Furnish and spread calcium chloride on disturbed surfaces to control dust conditions.

K. The contact surfaces of curbings, castings, and other structures shall be painted with a tack coat prior to placement of paving.

L. Along curbs, structures and all other places not accessible with a roller, the paving mixture shall be thoroughly compacted with tampers. Such tampers shall not weigh less than 25 pounds and shall have a tamping face no more than 50 square inches in size. The surface of the mixture after compaction shall be smooth and true to the established line and grade.

M. When the air temperature falls below 50ºF, extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials and placing and compacting the mixtures.

N. No mixtures shall be placed when the air temperature is below 40ºF, or when the material on which the mixtures are to be placed contains frost or has a surface temperature ENGINEER considers too low.

O. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

P. Existing drainage patterns shall not be altered by the new pavement construction unless otherwise shown on the Drawings.

Q. Maintain binder course in a condition suitable for traffic throughout the construction period. Defects shall be repaired within 3 days of notification.

R. Prepare the binder course for placement of the top course. The binder course shall be regraded, placing additional bituminous concrete where settling has occurred, repairing the existing surface and replacing broken or damaged sections at no additional cost to the Owner. The binder course surface shall be in all respects acceptable to the Engineer before the final pavement is placed. The surface shall then be broom cleaned.

S. Following preparation of the binder course, apply the tack coat at 0.10 gallons per square yard and place the top course.

T. Apply joint adhesive to all longitudinal joints for proper adhesion of the new bituminous concrete pavement to the existing.

U. Pavement markings damaged during the course of the work shall be repaired in accordance with Section 02760.

V. Following all paving, the area along the edge of all pavements, sidewalks, berms, waterways, etc. shall be backed up with gravel, or loam and seed as required, so that it is flush with the adjacent paving. Whenever possible the final surface of the backup material shall slope away from the surface edge to allow proper sheeting of runoff.`

3.2 BITUMINOUS CONCRETE BERM

A. Install 6” thick compacted gravel base below the area to be repaired.

B. The berm shall match the existing berm as closely as possible and be either Type 1, 2, or 3 as detailed in the Mass. Department of Public Works Construction Standards 1977.

C. Closure between berms installed hereunder and existing berm shall be the same shape and texture as the machine installed bituminous concrete berm.

D. The ends of the existing berm shall be cut with a saw prior to construction of bituminous concrete curb repairs.

E. Construction methods and procedures for bituminous concrete curb shall be in accordance with Section 500 of the Massachusetts Department of Public Works Standard Specifications for Highways and Bridges", 1988 edition, as amended.

END OF SECTION

SECTION 02920

LAWNS AND GRASSES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Restoration of all vegetated areas disturbed during construction including:

a. Lawn areas

b. Grass surfaces

c. Tree belts

2. Products specified herein include loam, starter fertilizer, lime, and lawn seed.

B. Related Sections

1. Section 01570 – Temporary Erosion Controls

2. Section 02315 – Excavation, Backfill, Compaction and Dewatering

3. Section 02740 – Bituminous Concrete

1.2 REFERENCES

A. ASTM D5539 – Standard Specification for Seed Starter Mix

1.3 QUALITY ASSURANCE

A. Seed shall be placed only between the periods from April 15th to June 1st, and from August 15th to October 1st, unless otherwise approved by the Engineer.

1.4 SUBMITTALS

A. Submit the following for approval:

1. Lawn seed mixture including percent by weight of each seed type, and manufacturer/supplier name.

2. Suitable laboratory analysis of the soil to determine the quantity of fertilizer and lime to be applied.

3. Lime and starter fertilizer application rates based on laboratory soil tests.

PART 2 PRODUCTS

2.1 MATERIALS

A. Loam

1. Loam shall consist of fertile, friable, natural topsoil typical of the locality without admixture of subsoil, refuse or other foreign materials and shall be obtained from a well-drained arable site. It shall not be a swampy mulch nor shall it contain excessive quantities of sand or clay. It shall be free of stumps,

roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.

2. The loam shall have an acidity range, such that its pH ranges from 5.5 to 7.6.

B. Starter Fertilizer

1. Starter fertilizer shall bear the manufacturer's name and guaranteed statement of analysis, and shall be applied in accordance with the manufacturer's directions.

2. Shall be Scott's Starter Fertilizer, or equal, with timed nitrogen release to prevent burning.

C. Lime

1. Lime shall be pelletized type for prolonged time release to soil.

D. Lawn Seed

1. Lawn seed shall be a fresh, clean, new crop seed. The weed seed content shall be less than 0.5% by weight. The seed shall contain a high percentage of perennial grasses.

2. Seed shall be Scotts Play Area Mixture, Scotts Pure Premium Sun and Shade Brand (North) Grass Seed Mixture, or equal.

PART 3 EXECUTION

3.1 PREPARATION

A. The Contractor shall salvage all existing loam, which shall be stockpiled at an acceptable on-site location. Under no circumstances shall existing topsoil be removed from the project site for another use by the Contractor.

B. The ground surface shall be fine graded and raked so as to prepare the surface of the loam for lime, fertilizer and seed.

C. The Contractor shall perform a laboratory soil test on the proposed loam before placing any lime, fertilizer, or seed. This work shall be in accordance with ASTM D5539 (Standard Specification for Seed Starter Mix).

3.2 APPLICATION

A. Fertilizer and lime shall be applied to the surface of the ground in accordance with the manufacturer's instructions, and based on the results of the certified soils test.

B. The seed shall then be placed using a drop or rotary spreader at the rate recommended by the seed manufacturer for the intended use of the lawn or grass area being restored.

C. After spreading of the seed, lightly rake the surface to work the seed in. The surface shall then be rolled.

3.3 MAINTENANCE

A. Maintain loamed and seeded areas by mulching, covering, netting, watering, fencing, etc., until an acceptable stand of vegetation is approved by the Engineer.

B. Suitable signs and barricades should be placed to protect the seeded areas. After the grass has started, all areas and parts of areas that fail to show a uniform stand of grass for any reason whatsoever, shall be reseeded until all areas are covered with a satisfactory growth of grass.

3.4 SPECIAL CONSIDERATIONS

A. Following the final top course of paving all pavement edges, waterways, sidewalks, berms, etc. shall be brought to grade with loam, fine graded, raked, seeded, and rolled to the satisfaction of the Engineer. Whenever possible the final surface of the loam backup shall slope away from the surface edge to allow proper sheeting of runoff. The Contractor shall be solely responsible for protecting, maintaining, and repairing this work until a satisfactory start of healthy grass is established.

B. Upon removal of the haybales and siltation fence, the Contractor shall loam and seed all disturbed areas.

C. In locations where the project area passes through existing grass, weed brush or tree-surfaced areas that are not covered by a specific lawn repair item, surface restoration shall be as follows:

1. After completion of backfilling, the existing loam and surface materials, which were salvaged during excavation, shall be returned to the top of the trench.

2. After natural settlement and compaction has taken place, the trench surface shall be harrowed, dragged and raked as necessary to produce a smooth and level surface.

3. The area is then to be sowed with “orchard grass” or “rye grass” or other such materials to hold the soil and produce a growth similar to that existing prior to construction.

4. The cost of repairing the trench surface in this manner shall be included in the Item ‘Loam & Seed’.

END OF SECTION

SECTION 02953

CURED-IN-PLACE PIPE LINING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Work required to install a cured-in-place pipe (CIPP) liner into the designated section of storm drain pipe.

2. The following tasks:

a. Hydraulically clean sections of the storm drain piping to be rehabilitated.

b. Perform a television inspection of the cleaned storm drain pipes to be rehabilitated before and after the rehabilitation process.

c. Cut protruding lateral pipes before lining.

d. Provide bypass pumping as required.

e. Provide structural rehabilitation liners in all storm drain pipes to be rehabilitated.

f. Core holes in main line pipe liner for lateral pipes.

g. Chemical grout pipe laterals and install top-hat liners.

h. Perform all other miscellaneous work required to rehabilitate the storm drain as specified and/or directed by the Owner.

B. Related Sections

1. Section 01310 – Coordination

2. Section 02955 – Cleaning of Pipes and Structures

3. Section 02958 – Television Inspection of Pipelines

1.2 REFERENCES

A. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.

B. ASTM D790 – Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

C. ASTM D2122 – Standard Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

D. ASTM D2152 – Standard Test Method for Degree of Fusion of Extruded Poly (Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion.

E. ASTM D2444 – Standard Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight). F.

ASTM D4276 – Standard Practice for Confined Area Entry.

G. ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube. H.

29 CFR 1910.146 – Permit Required Confined Spaces

1.3 SUBMITTALS

A. Submit material specifications and shop drawings for all materials and equipment furnished under this Section.

B. Submit a detailed description of the installation procedures that will be used. Verify that these procedures are recommended by the manufacturer.

C. Submit a report on the findings, conclusions and recommendations from the smoke testing.

D. Submit calculations for the liner thickness determination stamped by a Professional Engineer.

E. Submit typed pre-construction and post-construction television logs, two copies of the pre-construction CD or DVD and two copies of the post- construction CD or DVD.

F. Submit references upon request.

G. Submit results of liner testing.

1.4 QUALITY ASSURANCE

A. The manufacturer shall have at least 10 years of experience in the manufacture of the lining system being provided for this project. Similarly, the installer shall have at least 10 years of experience installing the lining system being provided for this project. Pipe lining system includes both mainline pipe and service lateral connections.

B. The manufacturer shall have supplied and provided the installation for at least 10 lining projects of similar size and project conditions. The job location and contact person for references shall be provided upon request by the Owner.

C. The liner installer's personnel shall have confined space entry and other training as appropriate for the product to be installed (CIPP installers shall have 40-hour HAZWOPER training). The confined space entry shall be in accordance with the requirements and protocol as specified in 29 CFR 1910.146, Permit Required Confined Spaces, and ASTM D 4276-84.

1.5 PROJECT CONDITIONS

A. Existing Conditions

1. The sections of storm drain to be lined as part of this project are shown on plans sheet 3 & 4.

1.6 WARRANTY

A. Make all necessary repairs and replacements to remedy defects, breaks, or failures of the Work occurring with one year following the date of acceptance of the Work due to faulty or inadequate materials or workmanship so long as the pipe service remains within initial project design parameters.

PART 2 PRODUCTS

2.1 MATERIALS

A. Mainline Pipe Liner

1. Liner material shall be compatible with municipal stormwater. The liner shall be fabricated to a size that, when installed, will neatly fit the internal circumference of the existing (host) pipeline. Allowance for circumference stretching during installation shall be made. The minimum length shall be that necessary to effectively span the distance, as shown on the Drawings. The installer shall verify the pipe lengths and diameters in the field before installation.

2. Liner material shall be fabricated from a polyester or vinylester felt tube impregnated with a polyester or vinylester resin and catalyst (CIPP) liner.

3. The liner shall be constructed of material which, when installed, shall provide a structurally sound lining able to withstand all imposed static, dynamic and hydrostatic loads, independent of the load-bearing capacity of the host pipe.

4. Determine the liner thickness for the existing site conditions and base the determination on providing a 50-year design life. Calculations for the determination of liner thickness shall be stamped and signed by a licensed professional engineer. The finished cured initial physical characteristics of the liner shall meet or exceed those specified below (assume long-term CIPP physical properties will be reduced by a minimum of 50% from the initial values.

Minimum Initial Structural Properties		
Property	**Standard**	**Liner**
		CIPP
Tensile Strength	ASTM D-638	3,000 psi
Tensile Modulus	ASTM D-638	300,000 psi
Flexural Strength	ASTM D-790	4,500 psi
Flexural Modulus	ASTM D-790	250,000 psi
Impact Resistance	ASTM D-2444	--
Chemical Resistance	* ASTM F-1216	-- Pass

California “Green Book” Standard Specifications for Public Works Construction

5. Use the available information described below to design the storm drain pipe liner and be responsible for collecting any additional information needed to complete the liner design:

   a. Pipe depths see Plan Sheet 3 & 4

6. The flow capacity of the lined storm drain pipe shall have a final capacity equal to or greater than the original storm drain pipe (host pipe).

7. Curing equipment shall be capable of monitoring and controlling

adequate flow, pressure, and temperature to properly cure the liner according to the manufacturer's recommended curing procedures.

8. If so directed, the installer shall furnish, prior to use of the materials, satisfactory written certification of his compliance with the manufacturer's standard for all materials and conformance with the methods of the manufacturer's process.

9. CIPP liners shall comply with ASTM F1216.

10. Liner wall thickness design shall be based on a factor of safety of 2. Assume H-20 superimposed loads. B.

Lateral Connection Lining

1. Chemical Grout Sealant

   a. Chemical sealant solution shall contain a principal chemical sealant constituent, initiator and catalyst specifically recommended for the purpose of sealing leaks in pipelines and manholes. Chemical sealant constituent, initiator and catalyst shall be compatible when mixed. Solution shall have ability to tolerate dilution and react in moving water. After final reaction, it shall be a stiff, impermeable, yet flexible gel. The grout proportions shall be such that dilute aqueous solutions, when properly catalyzed, will form stiff gels. Grout shall make true solution at concentrations as high as three pounds per gallon of water. Solutions shall have ability to accept dilution by groundwater of at least 50% by volume, without significantly changing sealing ability of the gel when at rest or in motion. Solutions shall gel when exposed to normal groundwater pH ranges, and be capable of formula adjustments to compensate for changing conditions. Final reaction shall produce a continuous, irreversible, impermeable stiff gel at chemical concentrations as low as 0.4 lbs per gallon of water. Gel shall not be rigid or brittle. Gel shall have negligible corrosion rate on mild steel plates.

2. Top Hat (SLC) Liner

   a. Material Requirements

      1) The finished SLC product shall be an ECR (E-glass corrosion resistant) fiberglass laminate impregnated with an UV-light reactive Polyester resin which when cured is chemically resistant to domestic sewage over the expected life time of the rehabilitated pipe.

      2) The SLC product shall be compatible with the lining system utilized for the main and/or lateral sewer lines.

      3) This specification references the American Society for Testing and Materials (ASTM) standards that are made part hereof by reference and shall be the latest edition and revision.

      4) D543 Testing Method of Plastics to Chemical Reagents D578 Standard Specifications for Glass Fiber Strands D1600 Abbreviations of Terms Relating to Plastics

      5) Reference is further made to NASSCO Standard: Recommended Specification for Sewer Collection Systems Rehabilitation.

   b. SLC Product

1) The flexible fiberglass top hat tube insert shall be fabricated to a size that when installed will key into the internal surface irregularities of the lateral joint and neatly fit tight to the internal circumference of the lateral. The top hat tube shall be a laminate made of non-woven fiberglass materials that allow for circumferential stretching and angular alignment with the lateral pipe connection geometry during insertion.

2) The insert laminate shall seal to the inside wall of the sewer main 3 inches around the lateral opening and to the lateral wall 6 inches up into the lateral pipe from the main.

3) Unless otherwise specified, the installer shall furnish a specially formulated polyester resin and catalyst system compatible with the SLC process that provides cured physical strength at least to the same level as required for the lateral liner if specified.

4) A secondary epoxy-sealing component shall be used to form a sealing bond between the SLC product and the host lateral and main pipe walls.

c. Physical Properties

1) The cured SLC shall conform to the minimum Flexural Modulus ASTM 0790 800,000 psi minimum Of Elasticity

PART 3 EXECUTION

3.1 CLEANING AND PRE-CONSTRUCTION TELEVISION INSPECTION

A. Cleaning of the existing storm drain pipe shall, at a minimum, restore 95% of the sewer's original carrying capacity.

B. Cleaning and debris collection and disposal shall in no way alter or fill any areas of Town-owned or residential properties. Care shall be exercised portions of the project within 200 feet of the stream for compliance with MGL c. 131 §40, Negative Determination

B. Clean pipe sections using a hydraulically propelled, high-velocity jet, or mechanically powered equipment where root intrusion and/or lateral pipe intrusions are to be removed. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all lines. The equipment shall carry its own water tank, auxiliary engines, pumps and hydraulically driven hose reel.

C. Isolate the pipe section to be cleaned at the upstream manhole by using a pipe plug. Take special precautions so as to prevent flooding of the upstream manholes and prevent damage to public or private property.

D. No material is permitted to be disposed of, or stored, on the site and shall be disposed of offsite at a receiving facility acceptable to the Owner.

E. After cleaning, the drain pipe is to be television inspected per Section 02958 - Television Inspection of Pipelines. The Owner and the liner installer shall mutually determine whether further cleaning is required. During inspection, lateral pipe connection locations shall be carefully noted and logged as well as conditions that may prevent the proper installation of the liner.

3.2 MAINLINE PIPE LINING

A. Provide a notice to each house/building owner and tenant along the route of the

pipe to be lined at least one week in advance of the lining work. The notice shall indicate if a disruption in drain service is anticipated and will describe the lining process. The notice shall also indicate odors traveling through the storm drain pipe and into homes/buildings may be generated during the lining work. Contractor shall prevent any escape of vapors to exceed regulatory or guidance concentrations for contaminants within an occupied building or structure.

B. Perform the rehabilitation of the storm drain pipe without the need for excavation or demolition of existing structures. Excavation for point repairs or emergencies shall be permitted, but only as required and approved by Owner.

C. During the lining procedure, isolate the pipe section at the upstream manhole by using a pipe plug. Take special precautions so as to prevent flooding of the upstream sewer system and damage to public or private property. If bypass pumping is required, supply the pumps, conduits, and other equipment necessary to divert the entire flow.

D. The liner insertion shall be done according to the manufacturer's recommended installation procedures. Make field measurements as needed to ensure correct fit of liner.

E. After liner insertion is completed, cure the liner according to the manufacturer's recommended curing procedures using heat and pressure. The liner shall be expanded until pressed tightly against the existing (host) pipe wall with a concave dimple appearing at each lateral pipe connection. Curing pressures shall not exceed 15 psi.

F. The lining shall have the ability to expand at least 2 inches larger than the host pipe diameter without splitting or rupturing.

G. CIPP liner installation shall comply with ASTM F1216. Installation, reformation and processing shall cause no degradation of the liner physical properties.

H. The finished pipe shall be continuous (jointless) over the entire length of a lining run and be as free as commercially practicable from visual defects such as foreign inclusion, dry spots, pinholes and delamination.

I. If the liner fails to form, remove the failed liner and replace it with a new liner. J.

After the liner has formed, the ends of the liner shall be cut away neatly at both manholes. Provide a smooth transition between liner and existing manhole invert.

K. If, due to broken or misaligned pipe at the manhole wall, the new pipe fails to make a tight seal, apply a seal at the joint. The seal shall be of a resin mixture compatible with the pipe and shall be as recommended by the manufacturer. Seal shall be approved by Owner prior to installation.

L. Reconnect the existing lateral pipe connections only after the manufacturer's minimum recommended curing time has elapsed. This shall be done without excavation, and by means of a television camera and cutting device that reestablishes the service to at least 90% of the previous capacity. Provide at least a one-week written notice to each property owner whose service will be suspended, during the lining process, explaining the lining process and the anticipated duration of service suspension. Brush the finished lateral cut to a smooth finish, free from any burrs.

3.3 LATERAL PIPE REHABILITATION

A. Chemical Grout Sealant

1. Chemical grout sealant shall extend 18-inches to 24-inches into the service lateral or to the first bend. Seal the exterior of the connection with chemical grout sealant as follows:

a. Test each service lateral by isolating the lateral with a lateral sealing packer. Position the lateral sealing packer straddling the lateral and inflate the packer ends to isolate the lateral and insert an inflatable inversion tube. Once the designated pressure in the isolated void is displayed on the meter of the control panel, stop the application of air pressure and wait twenty seconds. If the void pressure drop during this period is greater than that allowed in the Air Test Table, the lateral shall be grouted.

Initial Void Pressure (psi)	Void Pressure After 20 Seconds (psi)
11 - 12	4.4 - 4.8
10 - 11	4.0 - 4.4
9 - 10	3.6 - 4.0
8 - 9	3.2 - 3.6
7 - 8	2.8 - 3.2
6 - 7	2.4 - 2.8
5 - 6	2.0 - 2.4

b. To grout the lateral, leave the lateral packer in position, and inject chemical grout sealant through the lateral packer into the annular space between the inversion tube and the lateral pipe. This forces the grout material into the soil through leaking joints and pipe defects.

c. After the lateral has been grouted, a second air test shall be performed to verify the sealing of the connection. If the air test fails again, the grouting procedure shall be repeated. The sequence of air testing and grouting shall be repeated until the air

test passes or it is determined that the amount of grout injected is too high and may result in lateral pipe blockage. Determination to stop subsequent attempts to seal a lateral shall be made jointly by the Owner and the Contractor.

d. Upon completion of sealing procedure, flow through the service connection shall be verified. With the lateral packer in position, retract the inversion tube and inject air pressure into the lateral. If the pressure reading in the lateral builds and does not quickly drop to zero, the lateral shall be TV inspected. Flush water through the lateral from the upstream (home/business) side to determine if the lateral is blocked with grout. If the lateral is blocked, remove the obstruction and perform additional water flushing to verify flow through the lateral has been restored.

B. Top Hat (SLC)

1. Line Preparation

a. Prior to installing the SLC product the area around the lateral sealing surface in both the main and lateral shall be inspected. Waste product build-up, hard scale, roots, lateral cutting debris or resin slugs must be removed using high pressure water jetting or in-line cutters.

b. Break-in connection and /or lateral pipe protruding into the mains shall be ground back to no more than a 1/8-inch protrusion into the mainline.

c. Built-up deposits on the main and lateral pipe walls shall be removed. The removal shall reach at least one foot beyond the SLC product to allow the bladder to inflate tightly against the pipe walls ensuring a smooth transition from SLC product to the existing pipe wall.

d. In relined pipes the lateral must be opened 95 percent or more and edges finished without "teeth". Over-cuts shall not exceed one inch beyond the internal diameter of the lateral.

e. The contractor shall be responsible, if needed, for bypassing of sewage during the installation of the SLC product. In cases where the temporary backup of sewage is accepted as a replacement for bypassing, the contractor is responsible for all damage caused by the backup.

f. The lateral seal installation contractor is not responsible for the overall cleaning of the main or lateral lines prior to seal installation unless specified in the contract.

2. Installation

a. The resin impregnated SLC product shall be loaded on the applicator apparatus, attached to a robotic manipulator devise and positioned in the mainline pipe at the service connection that is to be rehabilitated.

b. The robotic devise together with a television camera will be used to align the SLC repair product with the service connection opening.

c. Air pressure, supplied to the applicator through an air hose, shall be used to insert the resin impregnated connection repair product into the lateral pipe.

d. The inserted product will then be inspected using a TV camera to confirm the SLC product is correctly positioned and/or centered in the lateral opening prior to curing (this TV inspection step is necessary to minimize the reworking or dig-up of incorrectly deployed SLC product).

e. The insertion pressure will be adjusted to fully deploy the SLC product into the lateral connection and hold the SLC product tight to the main and lateral pipe walls.

f. The pressure apparatus shall include a bladder of sufficient length in both the main and lateral lines such that the inflated bladder extends beyond the ends of both the lateral tube and main line brim segments of the SLC product pressing the end edges flat against the internal pipe wall thus forming a smooth transition from SLC product to pipe diameters without a step, ridge or gap between the SLC product and the inner diameters of the lateral and mainline pipes.

g. After insertion is completed, recommended pressure must be maintained on the impregnated SLC product for the duration of the UV light curing process.

h. The packer is then deflated, removed from connection and returned to the manhole to repeat the cycle. The finished SLC product shall be free of dry spots, lifts and delamination.

i. The installed SLC product should not inhibit the post installation video inspection, using a closed circuit television camera, of the mainline and service lateral pipes or future pipe cleaning operations.

j. After the work is completed the contractor will provide the customer with an electronic picture and recorded data identifying the location and showing the completed work and restored condition of all the rehabilitated SLCs.

k. During the warranty period any defects with the SLC that affect the performance or cleaning of the lateral connection shall be repaired at the contractor's expense in a manner acceptable to the customer.

3.4 BYPASS OF FLOW

A. Provide pumping equipment to bypass the flow around sections of storm drain to be lined. The pump and bypass lines shall be of adequate capacity and size to handle the flow.

B. Perform investigative work at each pipe segment requiring bypass pumping to determine the most appropriate setup of the bypass pumping system.

C. Provide protection of the bypass pump discharge pipe and allow continuous access to businesses and homes through the use of devices such as pipe ramps.

3.5 INSPECTION/TESTING

A. General

1. Test CIPP liner samples in accordance with ASTM F1216.

B. CIPP Liner

1. Collect, prepare and test liner samples for flexural properties in accordance with ASTM F1216, Section 8.1.

2. Perform gravity pipe leakage testing prior to reestablishing service laterals, in accordance with ASTM F1216, Section 8.2.

3. Measure wall thickness of liner samples.

4. Provide information on chemical resistance of liner per ASTM F1216.

3.6 CLEAN-UP

A. Upon acceptance of the installation work and testing, restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

3.7 POST-CONSTRUCTION TELEVISION INSPECTION

A. Perform post-construction television inspection, with inspection report and USB Flash Drives, on the completed pipe segment, per Section 02958 - Television Inspection of Pipelines.

B. Verify that the services have been reestablished to at least 90% of their pre- construction capacity.

END OF SECTION

SECTION 02955

CLEANING OF PIPES AND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Removal of dirt, rocks, sand and other material within underground piping

2. Removal of dirt, rocks, sand and other material within underground structures

3. Root removal within underground piping and structures

1.2 SUBMITTALS

A. Proposed cleaning procedures

B. Proposed cleaning equipment

1.3 QUALITY ASSURANCE

A. Contractor shall have at least 5 years experience cleaning underground piping and structures.

B. Contractor shall have successfully completed a minimum of 10 projects where piping and structures of similar size and condition to those on this project were cleaned.

C. Contractor shall have Confined Space Entry training.

PART 2 PRODUCTS

2.1 CLEANING EQUIPMENT

A. High-Velocity Jet (Hydrocleaning) Equipment

1. All high-velocity pipe cleaning equipment shall be constructed for ease and safety of operation.

2. The equipment shall have a selection of two or more high-velocity nozzles.

3. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.

4. Equipment shall also include a high-velocity gun for washing and scouring structure walls and floors. The gun shall be capable of producing flows from a fine spray to a solid stream.

5. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

B. Mechanically Powered Equipment

1. Mechanically powered equipment includes power rodding machines, bucket machines and winches using root cutters and porcupines.

2. Machines shall be belt-operated or shall have an overload device.

3. Machines with direct drive that could cause damage to the pipe are not allowed.

4. A power rodding machine shall be either a sectional or continuous rod type capable of holding a minimum of 750 feet of rod. The rod shall be made of heat-treated steel. The machine shall be fully enclosed and have an automatic safety clutch or relief valve.

C. Vacuum-Operated Equipment

D. Other cleaning equipment approved by the Engineer

PART 3 EXECUTION

3.1 CLEANING OF PIPES AND STRUCTURES

A. Clean the piping to be lined by hand; by using hydraulically propelled, high- velocity jet; vacuum-operated equipment; mechanically powered equipment; or other methods/equipment approved by the Engineer. The methods used shall be capable of removing dirt, rocks, sand, roots, and other materials and obstructions from the piping and structures.

B. If cleaning of an entire pipe length can not be completed from one end, set up the equipment at the other end of the pipe and the again attempt to clean the pipe section.

C. Restore pipes to a minimum of 95% of their original hydraulic capacity.

D. Remove all dirt, rocks, sand, roots, and other materials within the structures to be cleaned.

E. During pipe cleaning operations, take precautions in the use of equipment to prevent damage to public and private property.

F. When hydraulically propelled cleaning tools or flows which retard the flow in the pipe are used, take precautions to insure that the water pressure created does not cause damage or flooding of public or private property. When possible, use the flow in the pipe to provide the necessary pressure for hydraulic cleaning devices. When additional water from hydrants is necessary, conserve water and do not use unnecessarily.

END OF
SECTION

SECTION 02958

TELEVISION INSPECTION OF PIPELINES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Television Inspection of pipelines

B. Related Sections

1. Section 02953 – Cured-In-Place Pipe Lining

1.2 SUBMITTALS

A. Manufacturer's product data for the television inspection equipment, including camera, television monitor, carriage, recording device, signal conductor cable, etc.

B. Information on database/software that will be used to store and review inspection data.

C. Sample of television inspection log that will be used. Provide a legend for all abbreviations, symbols, codes, etc. used on the logs.

D. Documentation submittals

1. Two printed copies of the television inspection reports.

2. Two copies of the television inspection video and voice audio recordings saved onto USB Flash media.

1.3 QUALITY ASSURANCE

A. Personnel shall have confined space entry and other training as appropriate for the work to be performed.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Provide all equipment necessary to complete the video inspections with voice audio recordings, including, but not limited to, inspection studio, television camera, and video capture equipment.

B. The inspection equipment shall be capable of inspecting a minimum of 2,000 feet of pipe where entry into the pipe can be made from both ends. Where entry can only be made from one end, the equipment shall be capable of inspecting a minimum of 700 feet. The equipment shall be capable of providing a picture of acceptable quality at these maximum lengths, regardless of the vibration caused by normal movement of the camera and the length of the signal conductor cable between the camera and the recording device.

C. The inspection equipment shall be capable of clearly televising the interior of a six inch diameter pipe and all larger sizes.

D. The television camera used for the inspection shall be one specifically designed and constructed for such inspection.

E. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe.

F. The camera shall be waterproof and operative in 100% humidity conditions.

G. The camera, television monitor, and other components of the video system shall be capable of producing a high quality color image with clear definition of pipe internal features.

H. A pan and tilt camera shall be used for the television inspection to provide the ability to view into the laterals to determine the accessibility of the lateral by the lateral inspection system (LIS) camera.

I. The pan and tilt camera shall be capable of 360 degree rotational scan. The tilt arc shall not be less than 225 degrees and the viewing angle shall be a minimum of 300 degrees. The lens position shall be operated remotely. Cameras incorporating mirrors for viewing sides or cameras using exposed rotating heads are not acceptable.

J. The camera shall be an auto-iris type with remote controlled manual override. The adjustment of focus and iris shall provide a minimum focal range of from 6 inches in front of the camera lens to infinity.

K. The distance along the pipe in focus from the initial point of observation shall be a minimum of twice the vertical height of the pipe.

L. The illumination must be such as to allow an even distribution of light, which will produce a clear picture around the pipe perimeter, regardless of diameter and without the loss of contrast, flare out of picture, or shadowing. The lighting system shall also minimize reflective glare and the intensity shall be fully adjustable. The camera lighthead shall include a high-intensity side viewing lighting system to allow illumination of internal sections of lateral pipe connections.

M. The television studio shall be insulated against noise and extremes in temperature and shall be large enough for two people for the purpose of viewing the television monitor while the inspection is in progress. The television studio shall be mounted on a mobile vehicle which allows safe and orderly movement of the inspection equipment.

N. The television monitor screen shall be not less than 17 inches, measured on the diagonal.

O. The television camera, monitor, and other components of the video system shall be capable of receiving and transmitting a picture having not less than 500 lines of resolution.

P. The camera shall be mounted on a skid assembly that is able to ride over obstructions and cushion the camera against shock. The skid shall also have guards to keep the camera in line in the event of a turnover due to an obstruction.

Q. The television inspection equipment shall meet the following criteria:

1. Color: The following colors shall be clearly differentiated: white, yellow, cyan, green, red, blue, and black.

2. Linearity: The background grid shall show squares of equal size, without convergence or divergence over the whole picture. The center circle shall appear round and have the correct height and width relationship.

3. Resolution: The live picture shall be displayed on a monitor capable of providing a clear, stable image free of electrical interference with a minimum horizontal resolution not less than 500 lines.

4. Color Consistency: To ensure that the camera shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure color consistency, generally no variation in illumination shall take place during the survey.

R. The monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the distance along the pipe from the cable calibration point to the center point of the camera. Use a suitable metering device which enables the length of the pipe being inspected to be accurately measured to within ±0.2 feet.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean sewers to be video-inspected, where necessary to allow for inspection of the sewer, using hydraulically propelled, high-velocity jet or mechanically powered equipment.

B. Reduce flow level in pipe being inspected by bypass pumping or by jetting to meet the requirements described below, unless otherwise agreed to:

Maximum Depth of Flow for Television Inspection	
6 inch to 10 inch pipe	20% of pipe diameter
12 inch to 24 inch pipe	25% of pipe diameter
Greater than 24 inch pipe	30% of pipe diameter

C. Alternatively, perform television inspection during off-peak hours when flow depths are lower.

3.2 INSPECTION

A. Television inspect pipes to be lined, as shown on the Contract Drawings.

B. Move the camera through the pipe at a moderate rate, stopping where necessary to permit proper documentation of all pertinent features/defects. In no case will the television camera be pulled at a speed greater than 30 feet per minute.

C. Use manual winches, power winches, TV cable, powered rewinds or other devices to move the camera through the pipe that do not obstruct the camera view or interfere with proper documentation of the pipe conditions. All winches shall be stable with either locking or ratcheting drums.

D. If, during the inspection operation, the television camera will not pass through the entire pipe section from one direction, set up equipment so that the inspection can be performed from the opposite direction, if possible.

E. When manually operated winches are used to pull the television camera through the pipe, use portable radios, telephones or other suitable means of communication between members of the crew located at each end of the pipe section being inspected to insure good communications.

F. The importance of accurate distance measurements is emphasized. Measurement for location of pipe features/defects shall be by means of a meter device. Marking on the cable or a similar method will not be allowed. Accuracy of the distance meter shall be checked by use of a measuring wheel, tape, or other suitable distance measuring device.

G. Record the following pipe features/defects, at a minimum, and report them on the inspection logs:

1. Pipe diameter and material of construction.

2. Joint spacing and the location of joints which appear to be damaged, incorrectly installed, shifted, open, or in any way deficient.

3. Location, size and orientation (clock position) of connecting pipes (such as building services in a sewer).

4. Description and location of pipe structural deficiencies such as cracks, breaks, collapses, corrosion/erosion, etc.

5. Description and location of pipe obstructions (such as sediment, roots or grease).

6. Description and location of grade concerns, such as pipe sags, especially in gravity pipes.

7. The locations where infiltration is entering the pipe and an estimated infiltration rate at each location.

H. Indicate direction of survey and distance to each feature/defect from the beginning of the inspection.

I. Provide an audio description of each feature/defect observed.

J. Report on the logs weather conditions, ground conditions, and surface cover. K.

Repair pipe damaged as a result of the inspections at no cost to the Owner.

L. Position camera head to reduce risk of picture distortion and along the longitudinal axis of the pipe. In circular pipes, position camera lens centrally, ±10% of the vertical sewer dimension. In non-circular pipes, position camera lens at mid-height and centered horizontally.

3.3 DOCUMENTATION

A. Television Inspection Logs

1. Prepare television inspection logs describing features/defects identified and their locations.

B. Video Recordings

1. Provide continuous video tape recordings of the inspection view as it appears on the television monitor. The image recorded shall be equal to or better than the quality of the original picture on the television monitor.

2. Provide a visual and voice audio description record of the pipe features/defects observed recorded simultaneously as original live recordings.

3. The audio portion of the recording shall be sufficiently free of electrical interference and background noise to produce an oral report that is clear, complete, and easily discernable. The audio portion of the tape report shall include the location and identification of the pipe section inspected, the direction of travel, a description of the features/defects encountered, and the distance traveled.

4. Provide television inspection video/audio recordings saved onto USB Flash media. USB Flash Drives shall be properly identified by video number, location, and project name.

5. Video recordings shall, by electronic means, display continuously and simultaneously generated transparent digital information as described below:

a. At the start of each pipe section inspected:

1) Size and length of pipe and pipe material

2) Pipe section reference number

3) Date of inspection

4) Road name/location (city/town)

5) Direction of inspection (upstream or downstream)

6) Starting time of inspection

b. Continuously during the inspection:

1) Automatic update of the camera's position, in feet and tenths of feet from the beginning of the pipe section

2) Upstream and downstream locations (manholes reference numbers for sewers and drains).

END OF SECTION

Willow Brook Rd
2020

town of

LONGMEADOW, MASSACHUSETTS

incorporated 1783 *01106*

CONSERVATION COMMISSION

June 18th, 2020

Mr. Timothy Keane, P.E.
Longmeadow Department of Public Works
31 Pondside Rd.
Longmeadow, MA 01106

Dear Mr. Keane:

Please find enclosed the original WPA Form 2 – Determination of Applicability, issued for the RDA submitted in regards to DPW's Storm drain rehabilitation project on Willow Brook Rd., in Longmeadow, MA. Duplicate copies have been sent electronically to:

a) MassDEP in Springfield, MA.

Please keep this document for your records.

Respectfully submitted,

Bianca Damiano
Administrative Assistant
Longmeadow Conservation Commission
T 413.565.4100, ext. 1323
e-mail: concom@longmeadow.org

Enc.: (1) WPA Form 2, signed and dated.

Willow Brook Rd. 4
2020

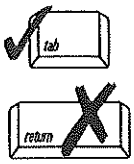
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 2 – Determination of Applicability

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

A. General Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



From:

Longmeadow
Conservation Commission

To: Applicant

Longmeadow Dept. of Public Works
(Town Engineer Tim Keane, PE)
31 Pondside Rd
Mailing Address
Longmeadow | MA | 01106
City/Town | State | Zip Code

Property Owner (if different from applicant):

Name
Mailing Address
City/Town | State | Zip Code

1. Title and Date (or Revised Date if applicable) of Final Plans and Other Documents:

Title	Date
Complete RDA Application with plans Sheet 3-4 and 4-4	September 2016

2. Date Request Filed:

May 20, 2020

B. Determination

Pursuant to the authority of M.G.L. c. 131, § 40, the Conservation Commission considered your Request for Determination of Applicability, with its supporting documentation, and made the following Determination.

Project Description (if applicable):

The storm drain system on Willow Brook Rd, which consists of a series of catch basins and buried drain lines under road pavement that discharge into Longmeadow Brook will be improved by replacing existing catch basins and manholes as well as rehabilitating drain pipes using cured-in-place pipe technology.

Project Location:

Willow Brook Road
Street Address

Longmeadow
City/Town

786
Assessors Map/Plat Number

39/55
Parcel/Lot Number

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 2 – Determination of Applicability
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Determination (cont.)

☐ 6. The following area and/or work, if any, is subject to a municipal ordinance or bylaw but not subject to the Massachusetts Wetlands Protection Act:

☐ 7. If a Notice of Intent is filed for the work in the Riverfront Area described on referenced plan(s) and document(s), which includes all or part of the work described in the Request, the applicant must consider the following alternatives. (Refer to the wetland regulations at 10.58(4)c. for more information about the scope of alternatives requirements):

- ☐ Alternatives limited to the lot on which the project is located.
- ☐ Alternatives limited to the lot on which the project is located, the subdivided lots, and any adjacent lots formerly or presently owned by the same owner.
- ☐ Alternatives limited to the original parcel on which the project is located, the subdivided parcels, any adjacent parcels, and any other land which can reasonably be obtained within the municipality.
- ☐ Alternatives extend to any sites which can reasonably be obtained within the appropriate region of the state.

Negative Determination

Note: No further action under the Wetlands Protection Act is required by the applicant. However, if the Department is requested to issue a Superseding Determination of Applicability, work may not proceed on this project unless the Department fails to act on such request within 35 days of the date the request is post-marked for certified mail or hand delivered to the Department. Work may then proceed at the owner's risk only upon notice to the Department and to the Conservation Commission. Requirements for requests for Superseding Determinations are listed at the end of this document.

☐ 1. The area described in the Request is not an area subject to protection under the Act or the Buffer Zone.

☒ 2. The work described in the Request is within an area subject to protection under the Act, but will not remove, fill, dredge, or alter that area. Therefore, said work does not require the filing of a Notice of Intent.

☐ 3. The work described in the Request is within the Buffer Zone, as defined in the regulations, but will not alter an Area subject to protection under the Act. Therefore, said work does not require the filing of a Notice of Intent, subject to the following conditions (if any).

☐ 4. The work described in the Request is not within an Area subject to protection under the Act (including the Buffer Zone). Therefore, said work does not require the filing of a Notice of Intent, unless and until said work alters an Area subject to protection under the Act.

D. Appeals

The applicant, owner, any person aggrieved by this Determination, any owner of land abutting the land upon which the proposed work is to be done, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate Department of Environmental Protection Regional Office (see http://www.mass.gov/eea/agencies/massdep/about/contacts/) to issue a Superseding Determination of Applicability. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and Fee Transmittal Form (see Request for Departmental Action Fee Transmittal Form) as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Determination. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant if he/she is not the appellant. The request shall state clearly and concisely the objections to the Determination which is being appealed. To the extent that the Determination is based on a municipal ordinance or bylaw and not on the Massachusetts Wetlands Protection Act or regulations, the Department of Environmental Protection has no appellate jurisdiction.

B. Instructions (cont.)

2. On a separate sheet attached to this form, state clearly and concisely the objections to the Determination or Order which is being appealed. To the extent that the Determination or Order is based on a municipal bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

3. Send a **copy** of this form and a **copy** of the check or money order with the Request for a Superseding Determination or Order by certified mail or hand delivery to the appropriate DEP Regional Office (see http://www.mass.gov/eea/agencies/massdep/about/contacts/).

4. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.