The City of Waltham
Engineering Department

REQUEST FOR BIDS
FOR
SUMP PUMP DISCHARGE REDIRECTION

DECEMBER 2017

The City of Waltham requests your pricing for the sump pump discharge redirection at a private residence located at 598 Lexington Street, Waltham MA.

PROJECT LOCATION:
Project location is at 598 Lexington Street; see accompanying plan.

SCOPE OF WORK:
See attached bid information including design drawings and specifications.

TIME CONSTRAINTS:
The work shall be completed within fourteen days of notification to proceed, weather permitting.

SUBMISSION OF BID:
The bid shall be submitted as a lump sum cost on the attached form. Prevailing wage rates apply and are attached.

The bid shall be submitted in writing in a sealed envelope marked "**598 Lexington Street Sump Pump Discharge Redirection**" to:

City of Waltham
Water Sewer Department
163-169 Lexington Street
Waltham Ma 02452
Attn: Julie Martinos, Business Manager

No later than 3:00 p.m. on Friday, December 22, 2017.

Firms planning to submit a quote are encouraged to ask for clarification on any aspect of this request so that the submitted quote fulfills the requirements of the Engineer/Water-Sewer Department. Such information shall be shared with interested parties of record.

Clarification on any aspect may be obtained from Julie Martinos, Business Manager, Engineering Department, c/o Water-Sewer Division, 163-169 Lexington Street, 02452.
Phone Number 781 314 3839
Fax number 781 314-3535
email: jmartinos@city.waltham.ma.us

DESIGN DRAWINGS AND SPECIFICATIONS

FOR

SUMP PUMP AMNESTY PROGRAM

CITY OF WALTHAM

#598 LEXINGTON STREET

Sump Pump Discharge Redirection

NOVEMBER 2017

Prepared by:

SSV ENGINEERING INC.
609 Winter Street
Framingham. MA 01702

Scope of Work
Sump Pump Amnesty Program
City of Waltham

Sump Pump Discharge Reconnection - #598 Lexington Street

The work called for includes the following:

The work of this Contract is located on and/or adjacent to private property of residences at a location in Waltham - #598 Lexington Street, as shown on the Drawing included in this Contract.

The Work under this Contract includes private inflow removal at one (1) property.

#598 Lexington Street The work includes, but is not necessarily limited to installing pipe and fittings from existing drywell leaching basin and connecting to the existing storm drain system. Coordination with the City of Waltham to establish appointments to execute the work at the residence and for inspection of completed work; obtaining required permits, ordering police details and all appurtenances and incidental work necessary to complete this Contract in its entirety as shown on the Drawings and as specified herein.

The Contractor will be responsible for coordinating and ordering the required Police Details; however, he/she will not be responsible for the cost.

Contractor shall limit the use of the premises for his/her work to minimize disruption to homeowner. The Contractor shall not use sites for storage of equipment or material.

A general description of the work to be performed under this contract shall include, but will not be limited to, the following construction operations:

1. Coordination of all construction activities with the appropriate local and State authorities and utilities.

2. Attending the pre-construction conference and required job progress meetings.

3. Mobilization to the site.

4. Protection of existing structures and installation of environmental control measures (erosion and sedimentation control measures).

The utilities shown on the plans have been located primarily from information furnished by others and are considered approximate both as to size and location. It shall be the Contractor's responsibility to locate all existing utilities and to protect same from damage or harm. All utilities interfered with or damaged shall be properly restored, at the expense of the Contractor, to the satisfaction of its Owner.

The following is a partial list of Owners of Utilities:

Water, Storm Drain and Sewer:
Waltham Consolidated Public Works Department
163 Lexington Street
Waltham, MA 02452
Telephone: (781) 314-3832

Electric:
NStar Electric
Telephone: (800) 592-2000

Gas:
National Grid
Telephone: (800) 233-5325

DIGSAFE: (800) 344-7233

Bid Items:

Item No.	Item Description Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
Private Inflow Removal and Sump Pump Discharge Redirection and Connection to the Existing Drainage System					
1	598 Lexington Street _____ Dollars and Cents	LS	1		
2	Police Detail - Allowance Two Thousand Five Hundred Dollars and no Cents _____ Dollars and Cents	LS	1	$2,500.00	$2,500.00

TOTAL BID PRICE

$_____
(Amount in figures)

_____
(Amount in words)

BID ITEM DESCRIPTIONS

1. Under the price specified to be paid for each item, the Contractor shall furnish all materials and equipment, furnish all labor and plant and perform all operations to complete all work as indicated and specified. Provide all supervision, overhead items, insurance, bond and permit costs, protection and precautions and all other costs, incidental to the construction work, complete, and as specified, are also included.
2. Each unit or lump sum price stated in the Bid shall constitute full compensation as herein specified for each item of work completed in accordance with the Drawings and Specifications.
3. The prices shall include compensation for disposal of surplus excavated material, dewatering, earth support, and handling and disposal of water.
4. The prices for all pipe items shall constitute full compensation for furnishing, laying, jointing, and testing of pipe; excavation and backfill; and clean up.
5. Contractor shall install tracer wire on top of the pipe in the trench prior to backfill.

Item 1

1. Under the lump sum bid price for each Item, the Contractor shall provide all necessary materials equipment and labor to execute the work as specified and as shown on the drawings.

2. Payment under each lump sum Item shall be made based on the percentage of work completed, as determined by the Engineer.

   Under the lump sum bid price for each Item, the Contractor shall provide all necessary materials, equipment and labor to connect sump pumps to the existing storm drain system, including site restoration. The price shall include mobilization and demobilization, connecting a new discharge pipe from existing concrete drywell and connection to the existing storm drain pipe or structure in the street. Work shall include scheduling and coordinating with property owners, verification of existing pipe sizes, coring, cutting and patching in walls and foundations, grouting of openings and corings, protection of private property and utilities, excavation, dewatering, backfill and compaction, restoration, sedimentation and erosion control measures installation and maintenance, disposal of any water; and maintenance of flow during construction. Work shall include but not limited to resetting any disturbed curbs, walkways, driveways, retaining walls, landscaping or any other site features disturbed during construction. Pavement shall include temporary trench pavement and permanent pavement.

3. Full payment shall not be made until the piping is tested to the satisfaction of the Engineer and the property is restored to its pre-construction condition or better.

4. Payment shall be per unit as listed on the Bid Form.

Design Drawing/Sketch

598 LEXINGTON STREET SUMP PUMP AMNESTY PROGRAM DESIGN CITY OFWALTHAM MASSACHUSETTS

DISCLAIMER:

This map is for reference and planning purposes only. It is prepared for the inventory of real property within the City of Waltham and is compiled from tax maps, recorded deeds and plats. Users of this tax map are hereby notified that the aforementioned public primary information sources should be consulted for the verification of the information contained on this map. The City of Waltham and its mapping contractors assume no legal responsibility for the information contained herein.

DATA SOURCE:

The digital planimetric base map data was developed by Chas H Sells, Inc. and is based on spring 2015 1"= 40' scale color orthophotographs. Map prepared by Eric Rizzo.

Existing concrete leaching basin

1. Install new 6-inch PVC from existing concrete leaching basin.
2. Restore garden bed, landscape edging, shrubs/plantings and asphalt driveway paving.
3. Remove and reset existing stone retaining wall.

1. Replace existing 2-inch PVC with 4-inch PVC within the same trench across exiting paved driveway.
2. Install permanent asphalt trench patch.
3. Reconnect existing 1 1/2" PVC discharges from the two (2) sump pumps outside of the building to the new 4-inch PVC

1. Install new 6-inch PVC between granite curb and asphalt sidewalk.
2. Restore asphalt driveways.
3. Loam and seed unpaved areas

Connect new 6-inch PVC to existing catch basin.

#606 #605 #598 #599 #586 #590 #595 #587 #583 #578 #579 #574 #575

LEXINGTON STREET

20' WIDE DRAINAGE EAS

R033 002 0018 640

R033 003 001A 655 R

R033 002 0024 R033 586 0024 576

R033 002 0023 590 R033 590 0023 590

R033 003 0004 595 R033 595 0004 595

R033 002 025A 578 R R033 002 025A 578 R

R033 002 0025 578 R033 578 0025 578

R033 003 0019 554 R033 003 0019 554

R033 003 0018 54 R033 003 0018 54

R033 003 0005 587 R033 587 0005 587

R033 003 0006 583

R033 003 0007 579 R033 579 0007 579

R033 002 0026 574 R033 574 0026A 574

R033 002 0027 564-1 R033 564-1 0027 564-1

R033 003 0008 575 R033 575 0008 575

R033 003 0009 569 R033 569 0009 569

R033 003 0016 36 R033 036 0016 36

R033 003 0017 40 R033 040 0017 40

R033 003 0001 22

Legend

- Drain Manhole
- Catch Basin
- Sewer Manhole
- Gate Valve - Hydrant
- Hydrant
- Tee
- Catch Basin Lateral
- Drain Line
- Sewer Main
- Hydrant Lateral
- Water Main
- Contour (1ft)
- Index Contour (1ft)
- Stream
- Easement Lines
- Swimming Pools
- Building Footprints
- Deck
- Private Walkway
- Water Bodies
- Athletic Field
- Vegetated Area

Parcel ID

Address

N

0 10 20 40 Feet

Date: 10/31/2017

Document Path: G:\Maps\598 Lexington Street - Sump Design 20 Scale 24 x 36.mxd

Technical Specifications

SECTION 02515

CONCRETE SIDEWALKS, WALKWAYS AND DRIVEWAY APRONS

PART 1-GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required and install concrete sidewalks, walkways and sidewalk aprons as specified herein.

B. Damaged concrete sidewalks, walkways and driveway aprons as a result of construction shall be replaced to the nearest existing undisturbed concrete panel on all sides of construction disturbance.

1.2 RELATEDWORK

A. Earthwork is included in Section 02200.

B. Loaming and hydroseeding is included in Section 02920. Cast-in-Place Concrete is included in Section 03300.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein, the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, MassHighway (SSHB) shall apply to materials and workmanship required for the work of this Section.

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 -PRODUCTS

2.1 MATERIALS

A. Concrete shall be as specified in Section 03300, but in no case less than 3,500 psi at 28 days.

B. Expansion joint shall be bituminous type, ½-in thick meeting AASHTO Spec. M-213-65.

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C. Materials for gravel base course shall be as specified in Section 02200.

PART 3-EXECUTION

3.1 SIDEWALK, WALKWAY AND DRIVEWAY APRON INSTALLATION

A. The full sidewalk, walkway or driveway apron panel(s) disturbed during construction shall be replaced. The Contractor shall saw cut the edges of the existing concrete at the edge of the existing undisturbed panels. The existing panels shall be saw cut at an existing tooled joint or removed to an existing expansion joint.

B. The subgrade for sidewalks, driveways and driveway aprons shall be shaped parallel to the proposed surface of the sidewalks, walkways and driveway aprons and thoroughly compacted. All depressions occurring shall be filled and again compacted until the surface is smooth and hard.

C. After the subgrade has been prepared, a gravel base course shall be placed. After being thoroughly compacted, the base course shall be at least 4-in in thickness and parallel to the proposed surface of the sidewalk, walkway or driveway apron. Reuse existing gravel base in areas not disturbed for trenching and provide new gravel base in areas disturbed for trenching.

D. Forms:

1. Side and transverse forms shall be smooth, free from wrap, of sufficient strength to resist springing out of shape, of a depth to conform to the thickness of the sidewalk, walkway or driveway apron.

2. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked and thoroughly braced and set to the established lines with their upper edge conforming to the grade of the finished sidewalk, walkway or driveway apron. Walkways shall have sufficient pitch to provide for surface drainage, but not to exceed ¼-in per foot. Driveway aprons shall have sufficient pitch to provide for surface drainage and shall be finished to meet existing grades of the driveway and street.

E. Placing and Finishing Concrete:

1. Concrete sidewalks, walkways and driveway aprons shall be placed in slabs to dimensions to meet existing walkways and driveway aprons, except as otherwise ordered. The joints between new and existing concrete shall be separated by transverse, preformed expansion joint filler.

2. Preformed expansion joint filler shall be placed adjacent to structures.

3. Concrete shall be placed in such quantity that,. after being thoroughly consolidated in place, it shall be 4-in in depth for sidewalks and walkways and 6-in in depth for driveway aprons. Finishing operations shall be delayed until all bled water and water sheen has left the surface and concrete has started to stiffen. After water sheen has disappeared, edging operations shall be completed. After edging and jointing operations, the surface shall be

floated with an aluminum or magnesium float. Immediately following floating, the surface shall be steel troweled. If necessary, tooled joints and edges shall be rerun before and after troweling to maintain uniformity. Finish with broom at right angles to alignment of walk, then round all edges with ¼-in radius after brooming.

4. When completed, the sidewalks, walkways and driveway aprons shall be kept moist and protected from traffic and weather for at least 3 days.

END OF SECTION 02515

SECTION 02576

PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals removed or disturbed by the Contractor's operations and as specified and required for this project.

B. New pavement shall consist of initial temporary layer required to remain for a specified settlement time followed by the installation of final pavement layer.

C. Streets, driveways, parking areas or sidewalk pavements damaged or disturbed by the Contractor's operations shall be repaired, replaced or restored in accordance with the requirements specified herein and as directed for the respective type of pavement replacement and in a manner satisfactory to the Owner.

1.2 RELATED WORK

A. Trimming edges of existing pavement for the purpose of excavating trenches shall be by either saw or wheel cutters.

B. Roadway line painting shall be restored to n1atch the conditions prior to construction.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein; the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, Department of Public Works, shall apply to 1naterials and workmanship required for the work of this Section.

B. American Association of State Highways and Transportation Officials (AASHTO) AASHTO M144 - Standard Specification for Calcium Chloride.

C. Where reference is made to one of the above standards, the revision in effect at the tune of bid opening shall apply.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES.

1. Product Data: Submit complete data on materials to be used in construction, Including gradation tests for granular base.

2. Design Data: Submit design mix for bituminous base, binder and top course.

3. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Laboratory Testing Required:

l. The bituminous mixture shall be compacted to at least 95% of the density achieved on the laboratory testing of the design mix for the project. The density of the Bituminous Concrete Pavement will be determined by using either the following tests; Nuclear Density Gauge Method ASTM D2950 or the Bulk Specific Gravity Method AASHTO-T166.

C. Thickness: Test in-place asphalt concrete courses for compliance with requirements for thickness. Repair or remove and replace unacceptable paving as directed by Engineer. In-place compacted thickness will not be accepted if exceeding the following allowable variation from required thickness:

1. Binder Course 1-inch, plus no minus

2. Top (Wearing) Course: 1/2-inch, plus no minus

1.6 PROJECT SITE CONDITIONS

A. Environmental Requirements:

1. Do not place materials when underlying surface is muddy, frozen, or has frost, snow, or water thereon.

2. Do not place concrete when air temperature at time of placement, or anticipated temperature for following 24 hours, is lower than 40°F or higher than 90°F.

3. Apply prime and tack coats when ambient temperature is above 50°F and when temperature has not been below for 12 hours immediately prior to application.

4. Binder Course may be placed when air temperature is above 30°F and rising.

5. Grade Control: Establish and maintain required lines and elevations.

B. Existing Conditions:

1. Drawings show approximate locations of paving areas.

2. Drawings show approximate location of existing structures along pipeline route.

3. Location of subsurface borings and the logs are indicated on drawings.

1.7 GUARANTEE

A. All final pavement placed in City streets shall be warranted by the Contractor for a period of one year. During this period all areas which have settled or are unsatisfactory for traffic shall be removed and replaced at no cost to the City, including the cost of Traffic Police.

PART 2 PRODUCTS

2.1 MATERIALS

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

B. Initial pavement (temporary paving) shall be Binder Course, conforming to the referenced specification, Section M3.11, Class I, Type I-1 bituminous concrete.

C. For locations not receiving a full width overlay, final trench pavement shall consist of Binder Course and Top Course, conforming to the referenced specification, Section M3.11, Class I, bituminous concrete.

PART 3 -EXECUTION

3.1 GENERAL

A. Paving shall consist of an initial layer of temporary paving followed by a second layer of permanent paving.

B. Within 4 days of backfilling in areas to be paved, the Contractor shall commence temporary paving, unless directed otherwise in writing by the Engineer. The Contractor shall not leave excavated areas over weekends unless through written approval of the Engineer.

After completion of the backfilling, final pavement shall not be placed over trenches until the temporary paving has been in place for at least 90 days, or a winter settlement period, unless otherwise directed in writing by the Engineer. Where it is used as backfill, final pavement may be installed once the CDF has cured.

D. Materials for pavement shall be mixed, delivered, placed and compacted in accordance with the referenced specification, Sections M3.11 and 460 and as specified herein.

E. Whenever the subbase becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

F. 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.

G. Pavement Construction Period. No pavement shall be constructed during the period from December 20 to March 15, without approval in writing from the engineer.

3.2 PREPARATION

A. Protection of existing Roadways:

1. Saw cut existing pavement to required width and depth to avoid damage to adjacent pavement, curbs, gutters, or other structures and as indicated on the drawings.

B. Sub-Surface Preparation:

1. Pavement Subbase:

a. The subbase to be placed under pavement shall be a minimum of 12-inches thick after compaction. Subbase shall be evenly spread and thoroughly compacted in accordance with the Contract Documents.

b. The subbase shall be spread in layers not more than 8 - inches thick except the last layer of gravel shall be 4-inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

c. Complete subbase preparation, including dynamic compaction, for full width before placing surfacing materials.

2. Subgrade:

a. Prepare subgrade in accordance with Section 0221.

b. Complete subgrade preparation, including dynamic compaction, for full width before placing surface materials. .

c. Stabilize subgrades in accordance with Section 02221 so that loaded construction vehicles do not cause rutting or displacement when depositing materials.

3.3 DESCRIPTION

A. In general, the following pavement repairs shall be made:

1. Wherever existing paved areas are disturbed a 2-inch temporary pavement layer is to be placed. When, and if, this material is disturbed during additional excavation work required for utility installation it shall be replaced. After a 90-day minimum period, or a winter settlement period, a permanent pavement wearing course shall be installed.

2. In roads and streets that are not scheduled to have full width overlay placed, following a 90-day minimum period, or a winter settlement period, the temporary layer shall be removed, the pavement edges cutback 12-inches from existing, and a permanent pavement wearing course installed.

3. In roads and streets that are to receive a full width overlay, following a 90-day minimum period, or a winter settlement period, the full width 1-1/2 inch overlay of permanent pavement wearing course shall be placed over the existing pavement and the 2-inch temporary pavement layer.

4. Driveways shall be paved as described in 3.3A2, above.

5. Driveway aprons and waterways shall be paved as part of the work

6. Asphalt berms shall be replaced as part of the work.

7. The paving thicknesses specified above may be increased based on permit or field requirements. Payment for additional thickness shall be made at the unit price bid in the proposal

3.4 INSTALLATION

A. Initial pavement:

1. An initial layer of temporary pavement shall be placed wherever existing pavement has been removed or disturbed as soon as practical after backfilling is completed.

2. The pavement subbase shall be excavated, graded, and compacted to a depth of 2-inches below the existing pavement.

3. Hose clean with water all road surfaces adjacent to the area to be paved. No paving is to be placed until subsurface is dry.

4. The initial pavement layer shall be a hot mixed binder course placed and compacted to a thickness of 2-inches by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. The new pavement shall be rolled smooth and even with the existing pavement.

5. Initial pavement shall be maintained in a condition suitable for traffic until replaced or overlaid by final pavement. Defects shall be repaired within 24 hours of notification of such defects.

B. Final pavement: areas not receiving full width overlay

1. Remove initial pavement and subbase to 3-1/2-in. below existing pavement. Saw cut all edges back 12-inches from edge of original trench, keeping the final

pavement edge neat and straight. Shape and compact subbase to 95 percent of maximum dry density as determined by ASTM 01557, Method C.

2. Trim loose edges of existing pavement. Broom and tack coat all edges with emulsified or cutback asphalt.

3. Place Binder Course and compact to 2-in. thickness by steel-wheeled roller.

4. Place Top Course and compact to 1-1/2-in. thickness, finish smooth, dense and flush with surface of existing pavement.

5. Match roadway edges to and existing driveways or berms as required.

C. Final pavement: areas receiving full width overlay

1. The permanent pavement wearing course shall be a hot mixed top course and placed to a compacted thickness of 1-1/4 inches: Leveling course material shall be placed in vertical depression in the existing pavement which are greater than 0.5 inches from the surrounding existing pavement level.

2. Prior to the application of the overlay course, the entire surface shall be cleared of dirt and debris using power sweepers, and then tack coated with cut-back asphalt emulsion.

3. All thicknesses are measured after rolling. The permanent surface course shall be evenly spread and rolled with a power roller having a minimum weight of 5-tons.

4. The overlay course shall be keyed to the existing pavement at ends of pavement repair sections, including driveways. Keys shall be cut to full pavement depth and be at minimum width of 8-inches.

D. Pavement Markings:

1. The Contractor shall replace all reflectorized pavement markings removed or covered-over in carrying out the work, and as directed by the Engineer, no sooner than 48 hours after completion of overlay pavement. Markings shall conform to the latest standards of the municipality or agency having jurisdiction over the roadway. The markings shall be thermoplastic markings, 4-inches wide, white or yellow, single or double lines as required for road markings, and 12-inches wide, white for crosswalk markings.

2. Markings shall conform to MHD: M7.01.03 - White Thermoplastic Reflectorized Pavement Markings and M7.01.04 - Yellow Thermoplastic Reflectorized Pavement Markings.

3. The Contractor shall provide temporary markings on the temporary pavements where existing markings are removed at no additional cost to the Owner.

E. Curb and Gutter Replacement:

1. Replace curb and gutter with same material to pre-construction lines and curb sections. Reset granite curb to pre-construction line and grade.

2. Removal and replacement of curbing shall be done in accordance with Sections 501 and 580, as applicable of the MHD Specifications for Highways and Bridges.

3. Provide expansion joints at each intersection with existing curb sections.

4. Use expansion joints one inch wide. Fill with expansion joint material and cut to shape of curb section.

F. Sidewalk, Driveway, and Parking Area Replacement:

1. Gravel sidewalks:

a. Gravel sidewalks shall be restored to a condition at least equal to that existing immediately before the work was started.

2. Bituminous concrete sidewalks, driveways, and parking areas:

a. Construct in accordance with MHD Section 701, sidewalks, Wheelchair Ramps and Driveways.

b. The subgrade shall be shaped parallel to the proposed surface of the sidewalk or driveway and shall be thoroughly rolled and tamped. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard in order for a gravel foundation to be placed upon it.

c. The sidewalk, driveway, or parking area shall be a minimum of 2-1/2 compacted inches thick, laid in two equal courses.

d. Sidewalk cross slopes cannot exceed 2 percent as required by the Americans with Disabilities Act (ADA). The Contractor shall merge new sidewalk slopes into existing sidewalk slopes as required by ADA.

3. Cement concrete sidewalks, and driveways

a. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

b. Use 6x6, W10xW10 welded wire reinforcement.

c. Concrete sidewalks shall be 4-inches thick and concrete driveways shall be 6-inches thick.

d. The subgrade for the walk or driveway shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content, and tamped with a power roller weighing not less than one ton and not more than 5 tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

e. After the subgrade has been prepared, a subbase of gravel at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel shall be a minimum of 8 inches in thickness.

f. The forms shall be smooth, free from warp, strong enough to resist springing out of shape, and deep enough to conform to the thickness of the proposed walk or driveway. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked thoroughly braced, and set to the established lines with their upper edge conforming to the grade of the finished walk or driveway.

g. The finished surface shall have sufficient pitch from the outside edge to provide for surface drainage. This pitch shall be ¼ of an inch per foot unless otherwise directed by the Engineer. Before the concrete is placed, he subbase for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.

4. Handicap ramps:

a. Handicap ramps will be installed where indicated on the drawings, in accordance with these contract documents.

b. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

c. The Contractor shall install curb cuts and accessible walkways in accordance with the requirements of the Americans with Disabilities Act and as required in 521 CMR (2/23/96 edition) Sections 21 and 22.

d. Handicap ramps are to be constructed of cen1ent concrete unless otherwise approved by the Engineer.

e. Existing granite curbing shall be removed, cut if required and reset to allow for the ramp construction. New curbing shall be installed to replace granite curbing damaged by the Contractor.

5. General:

a. Valve boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grades.

G. Berms and Waterways

1. Bituminous curbing shall be replaced as required. Curbing shall be machine laid and conform to grade of roadway and adjacent curb areas.

2. Bituminous berms shall be replaced as required. Berms shall be machine laid and conform to the grade of the roadways. Berms shall be placed in accordance with MHD Specification 470.20.

3. Bituminous waterways which have been disturbed by construction operations shall be repaired or replaced. The waterways shall be repaired and constructed in accordance with the applicable requirements of Section 280 of the MHD Specifications. Waterways shall be placed in two 1-1/2-inch thick courses on a prepared gravel base. Material shall be compacted by tamping or rolling.

3.5 RAISING BOXES AND CASTINGS

A. Prior to placing permanent pavement, the Contractor shall raise all boxes, utility castings, as required, to proper grade.

B. Contractor shall coordinate with all utility companies to obtain their requirements on Castings.

C. Castings which need to be raised or adjusted to complete final top course full-width paving shall be done immediately prior to paving.

END OF SECTION 02576

SECTION 02622

POLYVINYL CHLORIDE GRAVITY PIPE

PART 1 -GENERAL

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Providing and testing of pipe, pipe fittings and specials, jointing materials, and accessories, of various sizes, classes, joints and types, and appurtenant work, at the locations and to the lines and grades as indicated and/or as directed, complete in place, in accordance with the drawings and specifications.

2. The pipe specified under this section shall include all gravity flow sanitary sewers.

B. Related sections include the following:

1. Section 02210 - Earth Excavation, Backfill, Fill and Grading

2. Section 02601- Manholes

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300- SUBMITTAL PROCEDURES:

1. Submit shop drawings or descriptive literature, or both showing pipe dimensions, joints, joint gaskets, and other details for each size of pipe to be furnished for the project. All pipe furnished shall be manufactured only in accordance with the specifications and the drawings.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610. PART 2 - PRODUCTS

2.1 PIPE FITTINGS AND SPECIALS

A. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM Standard Specifications for Type PSM PVC Sewer Pipe and Fittings, Designation ASTM D3034, latest revision, for sizes 4"-15" and ASTM F679, latest revision, for sizes 18"-27" The pipe shall have a maximum pipe diameter to wall thickness ratio (SDR) of 35. The pipe shall be tested by the flat plate deflection method at a minimum of 45 psi at 5 percent deflection in accordance with ASTM D 2412. Standard laying lengths shall be either 13 feet or 20 feet.

B. Specials, if required, shall conform to the Specifications for straight pipe insofar as applicable and to the details indicated on the Drawings or bound into the back of the Specifications.

C. Insulation shall be manufactured by Thermal Pipe Systems, Braintree, Massachusetts, Atlas Insulation, Ayer, Massachusetts or Insulated Piping Systems Inc., Canton, Massachusetts, or equal Insulation shall be factory formed-in-place polyurethane foam insulation having nominal thickness of 3", with an in-place density of 2.5 pcf, and a "K" factor of 0.14 BTU/in./hr/deg./F/sq.ft. Straight joints between insulated pipe lengths, and the end section of non-insulated pipe shall be 20-guage corrugated aluminum performed to be fastened with stainless steel screws and bands. Jackets shall have expansion joints at 25-foot intervals. Sections of jacket shall have 2-inch minimum at all seams.

2.2 JOINTS

A. Joints for the polyvinyl chloride pipe shall be push-on bell and spigot joints using elastomeric ring gaskets. The gaskets shall be securely fixed into place in the bells so that they cannot be dislodged during joint assembly. The gaskets shall be of a composition and texture which is resistant to con1mon ingredients of sewage and industrial wastes, as well as petroleum products (oil, gasoline, etc.) and groundwater, and which will endure permanently under the conditions of the proposed use. The joints shall conform to ASTM Standard Specifications for Joints for Drain and Sewer Plastic pipes using Flexible Elastomeric Seals, Designation D3212.

2.3 INSPECTION, TESTS AND ACCEPTANCE

A. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to the above-mentioned ASTM Specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such tests as he deems necessary.

B. All tests shall be made in accordance with the methods prescribed by the above mentioned ASTM Specifications, and the acceptance or rejection shall be based on the test results.

C. The Contractor shall furnish all labor to assist the Engineer in inspecting the pipe. Pipe will be inspected upon delivery, and such as does not conform to the requirements of this

contract shall be rejected and shall immediately be removed from the project site by the Contractor.

PART 3-EXECUTION

3.1 HANDLING PIPE

A. All pipe shall be stored at the site until installation in a manner which will keep the pipe at ambient outdoor temperatures. Temporary shading shall be provided as required to meet this requirement. Simply covering the pipe which allows temperature build-up when exposed to direct sunlight will not be permitted.

B. Care shall be taken to avoid damaging the pipe and fittings.

3.2 INSTALLATION

A; Each pipe unit shall be inspected before being installed. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-inch per foot of length. If a piece of pipe fails to meet this requirement for straightness, it shall be rejected and removed from the site. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Crushed stone shall be as specified in Section 02435.

C. Suitable bell holes shall be provided, so that after placement, only the barrel of the pipe receives bearing pressure from the supporting material. Special care shall be taken to hold the trench width at the crown of the pipe to the maximum indicated on the Trench Detail included in the Details section of these specifications.

D. All pipe fittings shall be cleared of all debris, dirt, etc., before being Installed and shall be kept clean until accepted in the completed work.

E. Pipe and fittings shall be installed to the lines and grades indicated on the Drawings. Care shall be taken to ensure true alignments and gradients.

F. Before any joint is made, the previously installed unit shall be checked to assure that a close joint with the adjoining unit has been maintained that the inverts are matched and conform to the required grade. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber or other unyielding object.

G. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer 's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe units together so that they will fit with minimum open recess inside and outside and have tightly sealed joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.

H. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.

I. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units and new gaskets.

J. Details of gasket installation and joint assembly shall follow the directions of the manufacturers of the joint materials and of the pipe, all subject to review by the Engineer. The resulting joints shall be watertight and flexible.

K. All premolded gasket joint polyvinyl chloride pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM Specifications as hereinbefore specified. If the pipe is unsatisfactory, as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

L. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.

M. After each pipe has been properly bedded, enough crushed stone shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment. Bell holes, provided for jointing, shall be filled with crushed stone and compacted, and then crushed stone shall be placed compacted to complete the pipe bedding.

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

O. At all times pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs, or by other acceptable means.

P. If water is in the trench when work is to be resumed, the plug shall not be removed until suitable provisions have been made to prevent water, earth, or other substances from entering the pipe.

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

3.3 ALLOWABLE PIPE DEFLECTION

A. Pipe provided under this Specification shall be so installed as to not exceed a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

B. Upon completion of a section of pipe, including placement and compaction of backfill, the Contractor shall measure the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance

with the recommendations of the pipe manufacturer, and be reviewed by the Engineer. The section of pipe must be placed and backfilled for a minimum of 90 days before the deflection can be measured.

C. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem without additional compensation.

3.4 CLEANING

A. Care shall be taken to prevent earth, water and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, the Contractor shall clean out the pipeline and manholes being careful to prevent soil, water and debris from entering any existing pipe.

3.5 TESTING OF PIPE

A. If the visual inspection of the completed pipe or any part thereof shows any pipe, manhole or joint which allows infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired as directed.

B. After completing installation and backfill of pipe, the Contractor shall, at his expense, conduct a line acceptance test using low pressure air.

C. Equipment used shall meet the following minimum requirements.

D. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

E. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

F. All air used shall pass through a single control panel.

G. Three individual hoses shall be used for the following connections.

1. From control panel to pneumatic plugs for inflation.

2. From control panel to sealed line for introducing the low pressure air.

3. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

H. All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

I. After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

J. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be te1med "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any groundwater that may be over the pipe) is not less than the time shown for the given diameter in the following table.

Pipe Diameter	Specification Time for Length Shown (min:sec)			
Inches	100ft.	200ft.	300ft.	400ft.
6	5:40	5:40	5:40	5:42
8	7:34	7:34	7:36	10:08
10	9:26	9:26	11:52	15:49
12	11:20	11:24	17:05	22:47
15	14:10	17:48	26:42	35:36
18	17:00	25:38	38:27	51:16
21	19:50	34:54	52:21	69:48
24	22:47	45:34	68:22	91:10

K. In areas where groundwater is known to exist, the Contractor shall install a 1/2-inch diameter capped pipe nipple, approximately 10-inches long, through the manhole wall adjacent to one of the sewer lines entering the manhole. This shall be done at the time the line is installed. immediately prior to the performance of the Line Acceptance Test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is ll-112 feet, then the added pressure will be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same). In no case shall the starting pressure exceed 9.0 psig.

3.6 TEST FAILURE

A. If the section of pipe fails to pass the leakage and pressure test, or if there is any visible leakage, the Contractor shall locate, uncover and repair or replace the defective pipe fitting or joint and retest all at his own expense. Pipe will be considered passing only when the leakage does not exceed the above standard. Passing the test does not absolve the Contractor from his responsibility if leaks develop later within the period of warranty.

3.7 CONTRACT CLOSEOUT

Provide in accordance with Section 01700.

END OF SECTION 02622

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1-GENERAL

1.1 SUMMARY

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the specifications and in accordance with good construction practice. Refer to the Contract Drawings for locations of work included in the contract.

A. Work Included - The work under this section generally includes the following:

1. Concrete building foundations
2. Concrete slabs
3. Exterior concrete stairs
4. Concrete retaining walls

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section, and:

1. Section 02200 Earthwork

1.3 SUBMITTALS

A. In addition to Product Data, submit design mixes for each concrete mix.

1.4 QUALITY ASSURANCE

A. Quality Assurance: Comply with ACI 301, "Specification for Structural Concrete," and ACI117, "Specifications for Tolerances for Concrete Construction and Materials."

1. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in- service performance.

2. Manufacturer Qualifications: A firm experienced in manufacturing ready-Mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

PART 2-PRODUCTS

2.1 MATERIALS

A. Steel Reinforcement: As follows:

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
2. Plain-Steel Wire: ASTM A 82, as drawn.
3. Deformed-Steel Wire: ASTM A 496.
4. Plain-Steel Welded Wire Fabric: ASTM A 185, flat sheets.

B. Concrete Materials: As follows:

1. Portland Cement: ASTM C 150, Type I or II.
2. Aggregate: ASTM C 33, uniformly graded, from a single source.
3. Water: ASTM C 94.
4. Air-Entraining Admixture: ASTM C 260.
5. Water-Reducing Admixture: ASTM C 494, Type A.
6. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
7. Water-Reducing and Accelerating Admixture: ASTM C 494, Type
8. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

B. Related Materials: As follows:

1. Vapor Retarder: ASTM E 1745, Class C, not less than 7.8 mils polyethylene sheet.
2. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
3. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
4. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, of class and grade to suit requirements.

D. Curing Materials: As follows:

1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
   a. 2 coats Sonneborn "Kure-N-Seal" or equal.

2.2 CONCRETE MIXES

A. Concrete Mixes, General; - Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, with the following properties:

B. Footings, Foundations, Retaining Walls

1. Con1pressive Strength (28 Days): 3000 psi.
2. Slump: 4 inches.
3. Air Content: 4.5 to 7.0 percent.

C. Slabs

1. Compressive Strength (28 Days): 4000 psi.
2. Slump: 3 inches.
3. Air Content: 4.5 to 7.0 percent

D. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

PART 3 EXECUTION

3.1 FORMWORK

A. Design, construct, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

C. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved 28-day design compressive strength.

D. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.

E. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTME 1643.

3.2 PLACING REINFORCEMENT

A. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 JOINTS

A. Locate and install construction, isolation, and contraction joints as indicated.

3.4 CONCRETE PLACEMENT

A. Deposit concrete continuously and avoid segregation. Deposit concrete in forms in horizontal layers no deeper than 24 inches, avoiding cold joints.

1. Consolidate concrete with mechanical vibrating equipment.
2. Screed and initial-float concrete floors and slabs using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
3. Comply with ACI 306.1 for cold-weather concrete placement.
4. Place concrete according to recommendations in ACI 305R when hot-weather conditions exist.

3.5 FINISHING

A. Finish formed surfaces as follows:

1. Apply rough-formed finish, defined in ACI 301, to concrete surfaces indicated or not exposed to public view.

B. Finishing Floors and Slabs: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces.

1. Float Finish: Apply float finish, defined in ACI 301, to surfaces indicated, to surfaces to receive trowel finish,

2. Trowel Finish: Apply a trowel finish to surfaces indicated and to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

   a. After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

   b. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following: 1/8 inch.

3. Trowel and Fine-Broon1 Finish: Apply a partial trowel finish, stopping second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

4. Broom Finish: Apply a broom finish to exterior concrete, bro01ning with fiber-bristle broom perpendicular to main traffic route, to platforms, steps, and ramps, and elsewhere as indicated.

3.6 CONCRETE PROTECTION AND CURING

A. Concrete Protection and Curing: Protect concrete from excessive cold or hot temperatures. Con1ply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

1. Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause excessive moisture loss.
2. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
3. Cure formed and unformed concrete for at least seven days by moisture curing, moisture-retaining-cover curing, or curing compound.
4. Cure and seal floors and slabs with a curing and sealing compound according to manufacturer's written instructions.

3.7 QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified independent testing and inspecting agency subject to Owner approval to sample materials, perform tests, and submit test reports during concrete placement. Tests shall be performed according to ACI 301.

B. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

END OF SECTION 03300

SECTION 03600

GROUT

PART 1-GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required to install grout for modifications to existing foundations, walls and manholes as shown on the Drawings and as specified herein.

1.2 RELATEDWORK

A. Cast-in-Place Concrete is included in Section 03300.

1.3 SUBMITTALS

A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installer for:

1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

B. Submit to Engineer, in accordance with Section 01300, proposed method of repairing penetrations of existing foundations (all types), including formwork arrangement and grout installation.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes.

2. ASTM C579- Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes.

3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens for Cementitious Mixtures.

4. ASTM C1107- Standard Specification for Packaged D1y, Hydraulic-Cement Grout

B. U.S. Army Corps of Engineers (CRD)

1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout.

C. Where reference is made to one of the above standards, the revision in effect at the time of the bid opening shall apply.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.

PART 2- PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

B. Like materials shall be the product of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Nonshrink Cementitious Grout:

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be Portland cement based, contain a pre-proportioned blend of select aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by The Euclid Chemical Co. NBEC Grout by U.S. Grout Corp. or equal.

b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Cotp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U.S. Grout Corp. or equal.

B. Water:

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.

PART 3 EXECUTION

3.1 PREPARATION

A. Surfaces to receive grout shall be clean and sound; free of ice, frost ice, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.

B. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of lattice and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with the grout shall be the oilless type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.

C. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.

3.2 INSTALLATION- GENERAL

A. Mix, apply and cure products In strict compliance with the manufacturer's recommendations and this section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the grout between 60 and 90 degrees F during grouting and until the grout compressive strength reaches 1000 psi or as recon1mended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of existing surfaces and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

3.3 INSTALLATION- NONSHRINK CEMENTITIOUS GROUT

A. Mix in accordance with the manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures.

B. When mixing, add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain the workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3-inches in depth shall include the addition of clean, washed pea-gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated• areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement shall proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to mix (retemper) after initial stiffening.

F. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

END OF SECTION 03600

SECTION 15400

PLUMBING- GENERAL PROVISIONS

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, services and incidentals required and install and test new plumbing systems for redirecting private inflow sources from existing sump pumps as specified in the following:

1. 15405 - Demolition (Interior Plumbing Systems)

2. 15410 - Plumbing-Piping Systems

B. More specifically the work shall include, but shall not be limited to the following:

1. Installation of all plumbing piping and appurtenances to redirect sump pumps from the sanitary sewer system to either the storm drain system or a leaching basin.

2. Disconnecting existing sump pump connections to the sanitary system.

3. Cutting, coring and rough patching for penetrations through existing foundations and walls in accordance with Section 01045.

4. Removal of existing piping in existing buildings.Refer to Section 15405 Demolition.

5. The absence of all pipe supports and details on the Drawings shall not relieve the Contractor of the responsibility for providing them.

1.2 RELATED WORK

A. The following work related to, but not covered under the plumbing work will be done under other related Sections.

1. Excavating and backfilling is included under Division 2.

2. Concrete and grout is included under Division 3.

1.3 SUBMITTALS

A. Inspection by the Engineer of failure to inspect shall not relieve the Contractor of responsibility to provide materials and perform the work in accordance with the documents.

B. Submit in accordance with Section 01300, shop drawings and product data to establish compliance with this Section. Submittals shall include the following:

1. Shop drawings and technical literature covering details of piping and accessories being furnished under this section prior to fabrication, assembly or shipment.

2. All submittals shall contain a statement that Section 15400 and all other referenced Sections have been read and complied with The certification statement shall be made by all of the following that are applicable; the Contractor, sub-contractor and the vendor The statement shall be an individual statement for each party involved, and shall be included with every submittal and resubmittal.

A. Following completion of construction and acceptance, Contractor shall submit Detailed layout drawings of completed piping to Owner. Drawing shall show he locations of piping appurtenances and specialties.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

B. American National Standards Institute (ANSI)

C. American Water Works Association (AWWA)

D. National Fire Protection Association (NFPA)

E. National Electrical Manufacturers Association (NEMA)

F. Plumbing and Drainage Institute (PDI)

G. Cast Iron Soil Pipe Institute (CISP)

H. Underwriters Laboratories (UL)

I. Factory Mutual (FM)

J. American Society of Plumbing Engineers Date Book (May be used as a design guide)

K. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in- service performance.

2. Manufacturer Qualifications: A firm experienced in manufacturing ready- mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1.5 QUALITY ASSURANCE

A. The Contractor shall be fully responsible for the proper execution and performance of the work described herein. It shall be their responsibility to inspect all installation conditions and bring to the attention of the Owner any conditions which may affect their work adversely. They shall report to the Owner, prior to commencing and portion of this work, any conditions unsuitable for the installation of their portion of the work.

B. Mention herein or indication on the Drawings of equipment, materials, operation or methods shall require that each item mentioned or indicated be provided to make a complete system of plumbing ready for continuous operation.

C. The location of all fixtures and piping shall be considered as approximate only. Before the work is installed, the position of such equipment and piping to meet structural conditions and to provide proper headroom clearance or for other suffi- cient causes and such changes shall be made without additional expense to the Owner.

D. Comply with all the laws, ordinances, codes, rules and regulations of the State, local or other authorities having jurisdiction over any of the work specified herein including the Commonwealth of Massachusetts Fuel, Gas, and Pluming Code.

E. Obtain all required permits and pay all legal fees for the same and in general take complete charge and responsibility for all legal requirements pertaining to this Section of work. .

F. Requirements set forth in this Section and indicated on the Drawings shall be fol- lowed when in excess of the required or minimum regulations.

G. If any work is performed and subsequent changes are necessary to conform to the regulations, such change shall be made as part of this work at no additional cost to the Owner.

H. All work shown on the Drawings is intended to be approximately correct to scale and to layout. The Drawings shall be taken in a sense as diagrammatic. Size of pipes and general method of running them are shown, but it is not intended to show every offset and fitting nor every structural difficulty that may be encountered. To carry out the true intent and purpose of the Drawings all necessary parts to make complete working systems ready for use shall be furnished without extra charge.

I. Locations shown on the Drawings shall be checked and all measurements must be taken at the building.

1.6 SERVICE AND UTILITY CONNECTIONS

A. The storm drainage systems for sump pumps shall terminate at the connection to the existing drain service outside the building. The existing drain service is generally located at the property line or the back of the existing sidewalk.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to requirements of Section 01601.

B. All materials shall be inspected for size, quality and quantity against approved ship drawings upon delivery.

1.8 COORDINATION

A. The Contractor shall assume full responsibility for coordination of the Plumbing systems, including; scheduling, and verification that all structures and piping are compatible.

B. The Contractor shall start up each system and shall make all adjustments so that the system is placed in proper operating condition.

1.9 SUPPORTS

A. All components shall be provided with lugs, brackets or field supplied devices to allow the components to be firmly attached to the structure. The lugs, brackets or field supplied devices shall be sized to withstand the seismic loads for the area and type of application.

1.10 SEISMIC RESTRAINTS

A. Seismic restraints shall be provided for all plumbing systems including but not limited to all piping installed under Division 15.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 INSTALLATION

A. All the items specified in Section 15410 shall be installed according to the applicable manufacturer’s recommendations, the details shown on the Drawings and as specified herein and in other related Sections.

B. The Contractor shall not install materials until the Owner and Engineer have approved all submittals. If any materials are installed prior to approval of the submittals, it shall be at the Contractor's risk.

C. All work shall be installed in accordance with the manufacturer's printed instructions and shall be rigid, plumb and true to line, with all parts in perfect working order. Maintain protective covers on all units until final cleanup time and at that time re- move covers and clean and polish all surfaces.

3.2 PROTECTION

A. Materials shall be properly protected at all times and all pipe openings shall be temporarily closed so as to prevent obstruction and damage.

END OF SECTION 15400

SECTION 15405

PLUMBING - DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment and incidentals required and remove and dispose of interior plumbing piping for private inflow source removal work in the existing buildings as indicated on the Drawings and as specified herein.

B. Provide all plumbing demolition work associated with the removal of plumbing piping from the existing facilities, including disconnecting and removing all piping to the existing sanitary plumbing system and to sump pumps.

C. Maintain storm water and groundwater flow in existing sump pump systems.

D. Contractor shall adequately brace piping to remain prior to cutting existing piping and demolition of piping.

E. Test sump pump for operation prior to demolition of existing sump pump piping.

1.2 RELATED WORK

A. Cutting, coring and patching is included in Section.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. In general, the work includes removal and disposal of plumbing piping including their hangers and supports. Existing sump pump connections to the sanitary system to be abandoned shall be capped or plugged at the existing sanitary service indicated to remain as shown on the Drawings. Sump pump piping to be re- directed to the storm drain system or leaching basin shall be prepared for connection of new piping. All piping that is to be abandoned shall be removed.

DEMOLITION AND REMOVAL

A. Remove piping to be limits shown on the Drawings. In general pipes indicated to be removed shall be removed back to the source or nearest point of usage.

B. Remove all brackets, stems, hangers, and other accessories for the pipes being removed.

C. Test sump pumps to determine if sump pumps are operational prior to demolition of existing sump pump piping.

3.3 DISPOSITION OF MATERIALS AND EQUIPMENT

A. All material removed under this Section shall become the property of the Contractor and shall be removed from the site and disposed of by the Contractor.

END OF SECTION 15405

SECTION 15410

PLUMBING - SUMP PUMP PIPING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section specifies the basic Plumbing Systems of Piping and the materials of each system, including valves and appurtenances.

B. Furnish all labor, materials, equipment, services and incidentals required and install complete interior Plumbing Piping systems as shown on the Drawings and as specified herein for private inflow removal work including new piping and valves for existing sump pumps.

C. Furnishing and installing all pipe, fittings, valves, plugs, cleanouts, and hangers in conjunction with the sump pump work. Reuse existing sump pumps. Redirect the discharge from the sanitary sewer to an onsite infiltration basin or to a storm drain as shown on the Drawings.

D. All piping shown on the Drawings is intended to be approximately correct to scale and layout. The Drawings shall be taken in a sense as diagrammatic. Size of piping is shown, but it is not the intent to show every offset or fitting, nor every hanger or support, or structural difficulty that may be encountered. To carry out the intent and purpose of the Drawings all necessary parts to make a complete working system ready for use shall be furnished without extra charge. All work shall be. in compliance with State and local plumbing codes including the Commonwealth of Massachusetts Fuel, Gas, and Plun1bing Code.

1.2 RELATED WORK

Refer to Section 15400.

1.3 SUBMITTALS

A. Submit in accordance with sections 15400 and 01300, shop drawings and technical literature covering details of all plumbing piping systems being furnished under this Section prior to fabrication, assembly or shipment.

B. All submittals shall contain a statement that Sections 15400 and 15410 and all other referenced Sections have been read and complied with. The certification statement shall be made by all of the following that are applicable; the Contractor, sub- contractor and the vendor. The statement shall be an individual statement for each party involved, and shall be included with every submittal and resubmittal.

C. Layout drawings of the completed piping shall be provided to the Owner. Drawings shall show detailed locations of piping appurtenances, specialties, and all valves.

D. Provide manufacturers catalogs, literature, and engineering data on all hangers and supports. Load ratings, materials, and installation shall be in accordance with the recommendations of MSS SP-58 and MSS SP-69.

1.4 REFERENCE STANDARDS

A. Refer to Section 15400.

1.5 SERVICE AND UTILITY CONNECTIONS

A. Refer to Section 15400.

1.6 QUALITY ASSURANCE

A. Inspection by the Engineer of failure to inspect shall not relieve the Contractor of responsibility to provide materials and perform the work in accordance with the documents.

1.7 DELIVERY, STORAGE AND HANDLING

A. All materials shall be inspected for size, quality and quantity against approved ship drawings upon delivery.

1.8 COORDINATION

A. The Drawings indicate the extent and general arrangement of the systems. If any departures from the drawings or specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practical for review to Owner.

B. The Contractor shall assume full responsibility for coordination of the Plumbing systems, including; scheduling, and verification that all structures and piping are compatible.

C. The Contractor shall make every effort to coordinate the location of new piping for the work of this Contract with the property owner. The completed layout shall not interfere with property owner's future use needs of the basement as much as possible. Any disagreement between property owner and Contractor shall be decided by the Owner.

1.9 SEISMIC RESTRAINTS

A. Refer to Section 15400.

PART 2 PRODUCTS (NOT USED)

2.1 SUMP PUMP PIPING SYSTEM

A. Pipe for sump pump discharges shall be manufactured from PVC compounds meeting ASTM D1784, Class 12454-B in accordance with ASTM D1785, PVC

1120. The pipe shall be suitable for field cutting and solvent welding. Pipe shall be of the sizes as shown on the Drawings and shall be Schedule 40 unless otherwise shown.

B. Fittings shall be the socket type for solvent welded joints conforming to ASTM D2467 or ASTM D2466 where Schedule 40 pipe is shown on the Drawings. Fittings shall be manufactured from PVC compound meeting ASTM D1784, Class 12454-B. Solvent cement shall be as specified in ASTM D2564.

2.2 BALL CHECK VALVES

A. It is the intention of the Drawings and this Section to install a check valve at the bottom of all sump pump service risers and as shown on the Drawings. If design does not include connection directly at sump pump and new PVC piping from the sump pump to the ceiling, the Contractor shall install a new check valve and union, as detailed in the existing riser piping and provide all couplings and adapters required to connect to existing piping.

B. All valves shall be certified as completely compatible for use with groundwater or storm water; compatibility shall apply to the material of the valve and internal components, including all seals, gaskets, 0-rings and washers; solvents and primers used in valve joint make-up shall be specifically in conformance with the written instructions of the valve supplier.

C. Valve ends shall be socket-type designed for solvent welding. The valve manufacturer shall provide specific recommendations for solvent and primer.

D. Valve material shall be PVC, Type 1, Grade 1, per ASTM D1784 classification, made from unplasticized polymer, and generally suitable for service to 120 degrees F.

E. O-rings, valve seats and stem seals shall be Teflon, or Teflon encapsulated elastomer. Alternative materials may not be substituted without complete documentation provided to the Engineer of service suitability.

F. Gaskets shall be made from PTFE-bonded sheet material, GORE-TEX manufactured by W.L. Gore & Associates; AV Low-Torque gaskets by Asahi/America or equal.

G. No factory or field coatings shall be applied to the valves.

H. All valves shall have a non-shock service pressure rating of not less than 120 psig at 70 degrees F. All valves shall be given hydrostatic and pressure and leakage tests at the factory.

I. Ball check valves shall be double-union style with socket ends, solid and completely spherical ball and capable of either horizontal or vertical mounting. Valves shall be the standard, catalogued products of Chemtrol, Asahi/America, Plast-0-Matic, Hayward, or equal.

2.3 CLEANOUTS

A. Cleanouts shall consist of solvent weld PVC Schedule 40 tee or wye fitting with PVC screw cleanout plug with square or hexagonal nuts. Cleanout adapter with plug may be used as approved by the Engineer. All cleanouts shall be of size shown on the Drawings.

2.4 HANGERS, SUPPORTS AND ANCHORS

A. Piping support systems shall include restraints as required by the applicable building codes to withstand seismic loading.

B. The absence of pipe supports and details on the drawings shall not relieve the contractor of the responsibility for providing them.

C. The Contractor shall be responsible to provide a complete system of supports, expansion joints, and anchors.

D. All hangers shall be of a type to permit vertical adjustment after installation.

2.5 PLUGS

A. Plugs for connections between the drain lines to be redirected to the storm water system and the existing sanitary system shall be a permanent plug fully enclosing or capping the existing connection to the sanitary system manufactured specifically for the type of pipe being plugged. All plugs and work shall be in accordance with local and state codes and regulations.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install all piping, valves, hangers and appurtenances as specified herein and in the referenced Sections above.

B. The Contractor shall not install any materials until the Owner and Engineer have approved all submittals. If any materials are installed prior to approval of the submittals, it shall be at the Contractor's risk.

C. The Contractor is responsible for the final design conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, and performing the work in a safe and satisfactory manner.

D. Valves
   1. Install valves in locations to be easily operated.

E. PVC Solvent Weld Piping and Valves

1. The installation of plastic pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions. Pipe slopes shall be in accordance with local and State plumbing codes.

2. Joints for PVC pipe shall be solvent cemented. In making solvent cemented connections, clean dirt and moisture from pipe and fittings, bevel pipe ends slightly with emery cloth to remove any shoulder or burrs created by cutting of the pipe. Solvent cement joints shall be made in accordance with ASTM D2855. Primer shall be used whenever recommended by the pipe, fitting, or cement manufacturer and in all cases for joints on pipe systems 4-in in diameter or larger. Making solvent cement joints shall not be performed and the work shall stop when the temperature, measured in the shade, is 40 degrees F and falling.

3. Joints between PVC pipe and cast-iron soil pipe shall be made with approved mechanical compression joints designed for such use.

4. Installation of valves and fittings shall be in accordance with manufacturer's instructions. In making solvent cement connections, the solvent cement or primer shall not be spilled on valves. Any cement allowed to run from joints shall be cleaned from the pipe and fittings immediately.

F. Cleanouts

1. Install cleanouts as shown and in accordance with applicable code, at end of each branch drain and pressure sun1p pump discharge line where rainwater lines change direction, and at the bottom of every drop as a cleanout tee above floor.

G. Plugs

1. Permanently plug connections between the existing drain lines and the sanitary system to be redirected to the storm drain system. Plugs shall be installed per the 1nanufacturer's instructions and shall be fully air and water tight.

3.2 FIELD TESTING

A. Provide all connections for testing sump pumps and roof drain systems under this Section. Remove all debris resulting from testing. Use the water in an efficient and economical manner.

B. Provide all apparatus and all other supplies or materials which may be necessary for testing the roof drain and sump pump systems and operating the apparatus during the period while tests of any kind are being made, or for carrying out the work of the Contract.

C. All additional tests, methods or materials that may be required by the local ordinances and not specifically specified herein, shall be made as directed by the local inspection authority.

D. Provide for all repeated tests as necessary to make systems tight as required. E. Test sump pump piping as follows:

1. Test sump pump for operation prior to demolishing existing sump pump piping. If sump pump does not operate, provide alternate means for completing sump pump discharge piping test for completed work.

2. Test for leakage of sump pump piping by continually pumping water through completed piping system via existing sump pump for a minimum of 15 minutes. Make visual inspection of interior and exterior piping for leakage. Immediately repair any leaking or damaged piping and retest.

3.3 CLEANING

A. At the completion of the work, clean all piping included in this Section. Return property and site to pre-construction conditions.

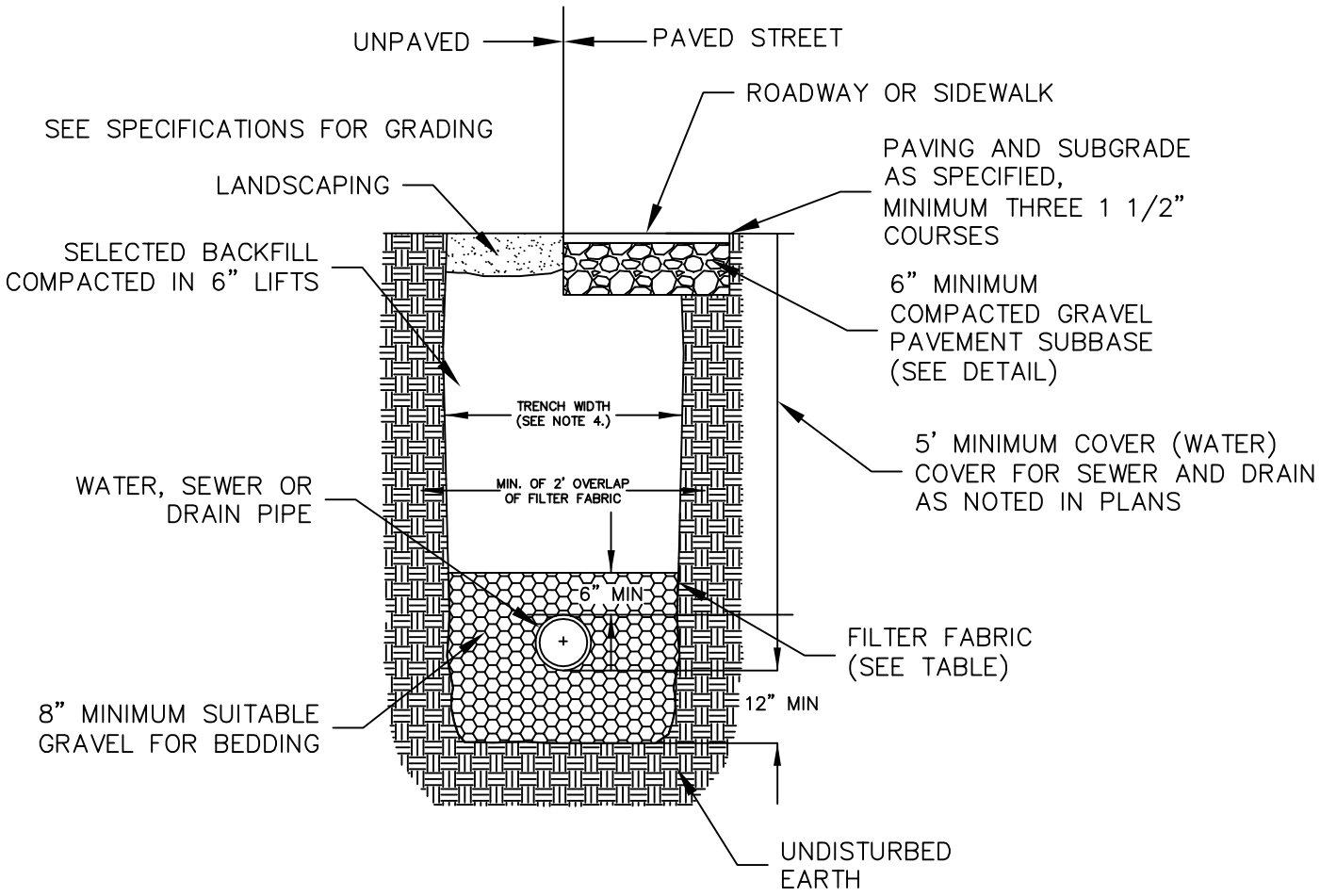
3.4 ACCEPTANCE INSPECTION

A. Schedule appointment with plumbing inspector for inspection and acceptance of completed plumbing system for sump pump piping.

B. Schedule appointment as close to completion of work as possible.

END OF SECTION 15410

Construction Design Details



NOTES:
1. ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
2. PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
3. NO LEDGE TO BE WITHIN 6" OF PIPE.
4. TRENCH WIDTH:

   LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET

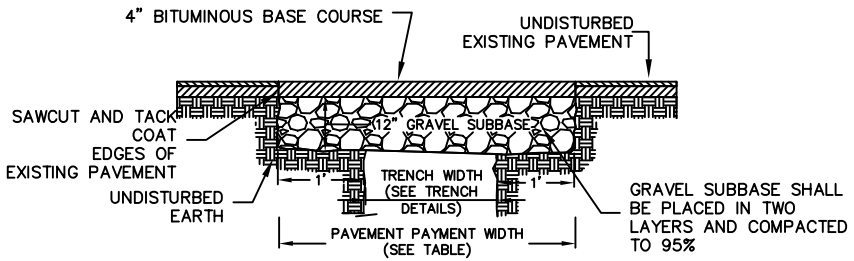
   EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)

FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

WATER, SEWER, AND DRAIN TRENCH DETAIL

	FIGURE NAME: 141.000.A – TRENCH DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



TRENCH PAY LIMIT TABLE FOR TEMPORARY PAVEMENT

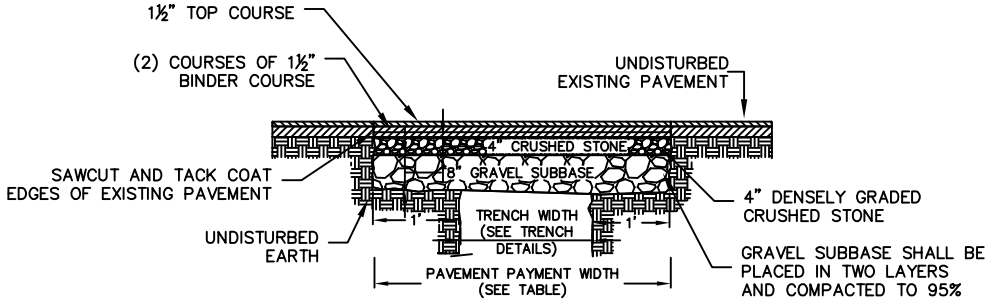
	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	6'–6"	9'–6"	12'–6"	15'–6"	PAY WIDTH
OVER 24"	O.D. + 4'–0"	O.D. + 7'–0"	O.D. + 10'–0"	O.D. + 13'–0"	

I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

TEMPORARY PAVEMENT DEPTH SHALL BE 3–IN.

TEMPORARY TRENCH PAVEMENT DETAIL



TRENCH PAY LIMIT TABLE FOR PERMANENT PAVEMENT

	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	8'–6"	11'–6"	14'–6"	17'–6"	PAY WIDTH
OVER 24"	O.D. + 6'–0"	O.D. + 9'–0"	O.D. + 12'–0"	O.D. + 15'–0"	

I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

PERMANENT TRENCH PAVEMENT DETAIL

TEMPORARY AND PERMANENT TRENCH PAVEMENT NOTES:
1. PERMANENT TRENCH PAVEMENT PAYMENT WIDTH SHALL BE THE TRENCH PAY LIMIT PLUS 2 FEET
2. TEMPORARY TRENCH PAVEMENT PAYMENT WIDTH SHALL BE EQUAL TO THE TRENCH PAYMENT LIMIT
3. REMOVE AND DISPOSE ALL TEMPORARY PAVEMENT AS REQUIRED. RESTORE AND COMPACT SUBBASE AS REQUIRED PRIOR TO PERMANENT TRENCH PAVEMENT.
4. DEPTH OF PERMANENT TRENCH PAVEMENT SHALL BE THE SAME THICKNESS AS THE EXISTING PAVEMENT.

	FIGURE NAME: 141.000.B – TRENCH PAVEMENT DETAILS	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011